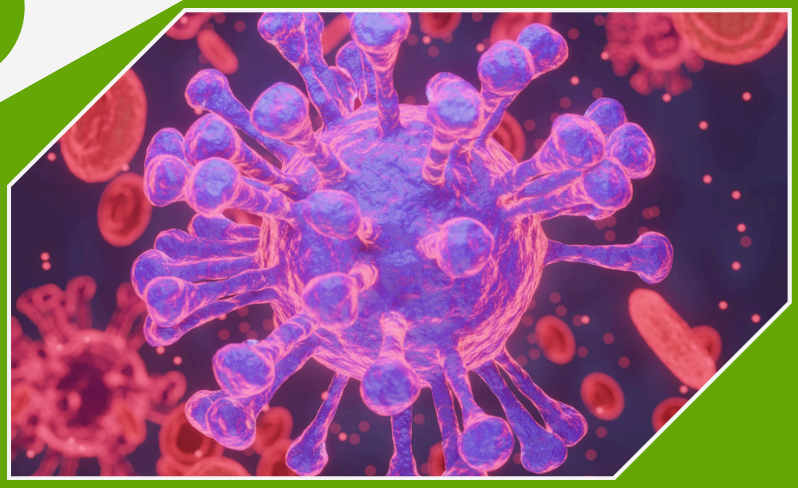
ASSOCIATION of FISH & WILDLIFE AGENCIES



NATIONAL FISH AND WILDLIFE HEALTH INITIATIVE

TOOLKIT

2024

ABOUT THIS TOOLKIT

AFWA FISH AND WILDLIFE HEALTH PROGRAM TOOLKIT

Thriving fish and wildlife populations are important to all. State, Territorial, Provincial, and Tribal natural resource management agencies are entrusted with the responsibility to prioritize fish and wildlife health in their mission delivery and, as such, must maintain agency capacity to do so. This document is a resource for agency leadership and decision-makers to support the creation, maintenance, and improvement of fish and wildlife health programs. Meeting agency fish and wildlife health goals often requires partnerships. Within the fish and wildlife health arena, such partnerships exist and can be leveraged with other State, Territorial, Provincial, and Federal agencies, Tribal agencies academic institutions; regional laboratories and programs; organizations; and individual subject matter experts. One Health is the recognition of the interconnection of wild, captive, and domestic animal health; human health; and ecosystem health. Partnership is the core value of One Health implementation. Because One Health relies on a transdisciplinary, collaborative approach working at local, regional, national, and global scales, connections among natural resource management agencies, public health, and agricultural agencies are essential for fish and wildlife health. Building a fish and wildlife health program takes time and resources and evolves as constantly changing conditions warrant. The content of this document provides a menu of tools to consider for an effective fish and wildlife health program. Throughout the document, “fish and wildlife management agencies” will be used to represent the relevant State, Territorial, Provincial, Federal, and Tribal natural resource management agencies responsible for healthy fish and wildlife populations.

CONTENTS:

A. ABOUT THE NATIONAL FISH AND WILDLIFE HEALTH INITIATIVE

Our Vision: Healthy fish and wildlife populations in the United States that are managed by effective, well-funded resource agencies supported by informed and involved citizens.

In working towards this Vision, the National Fish and Wildlife Health Initiative (NFWHI) will lead and collaborate to:

- Recognize that free ranging fish and wildlife are publicly managed resources and acknowledge that public trust, compliance, and participation are essential to maintain healthy fish and wildlife populations.
- Recognize that natural resources have fundamental ecological, cultural, aesthetic, human health, and economic values that contribute significantly to the quality of life at local, state, tribal, territorial, and national scales.
- Protect and support local, state, tribal, territorial, and national authorities for the conservation of fish and wildlife.
- Recognize that local, state, tribal, territorial, and national fish and wildlife agencies are responsible for making risk-based decisions affecting free ranging fish and wildlife.
- Provide useful and sound information for agency development, management, and enhancement of fish and wildlife health programs.
- Facilitate information sharing, coordination, collaboration, and priority setting for individual and collective member agency action in support of fish and wildlife health.
- Promote a One Health philosophy and enhance coalition building to foster collaboration, coordination, and communication among jurisdictions engaged in fish and wildlife health, domestic animal health, human health, and environmental health at local, state, tribal, territorial, and national levels.
- Build upon existing fish and wildlife health expertise and infrastructure within local, state, tribal, territorial, federal, and academic institutions to establish, support, and optimize processes to improve fish and wildlife heath capabilities at these levels.
- Provide guidelines to foster the development and maintenance of competencies, management tools, and training in fish and wildlife health management within local, state, tribal, territorial, and national fish and wildlife agencies.
- Support fish and wildlife health-related research and promote science-based prevention, surveillance, monitoring, and management strategies designed to effectively address fish and wildlife health issues.
- Develop and implement strategies designed to increase funding and support for fish and wildlife health initiatives throughout the United States. Seek to increase funding and supporting resources for fish and wildlife health initiatives and, to the degree practical, coordinate the ensuing business model among partners that are associated with such funding.

EXECUTIVE SUMMARY

Human activities, such as ecosystems alterations and the movement of pathogens, hosts or vectors, often enhance the emergence and resurgence of diseases at the interface of wild, captive, and domestic animals and humans. These diseases can significantly affect fish; wild, captive, and/or domestic animal; and/or human health and necessitate a coordinated, multi-agency response.

The Mission: is to conserve and enhance healthy fish and wildlife resources of the United States while recognizing and respecting the missions, jurisdictions, and abilities of individual fish and wildlife management agencies.

This mission will be achieved by six principal strategies:

1. Identify, respect, and integrate the authorities and capabilities of cooperating partners in a complementary fashion.
2. Identify, secure, and facilitate optimal use of fiscal and human resources needed for the development of fish and wildlife management agencies health programs.
3. Through these programs, conduct proactive, coordinated, and sustained surveillance of fish and wildlife populations to detect and monitor disease threats.
4. Support research to enable the development of integrated disease prevention and management strategies.
5. Establish and maintain an effective communication plan and develop networks to inform policymakers and citizens about fish and wildlife health.
6. Maintain a NFWHI Steering Committee to facilitate, oversee, and coordinate effective implementation of the Initiative.

The Goal: is to build fish and wildlife management agency capability to effectively address health issues involving free-ranging fish and wildlife.

The following objectives provide a solid course to facilitate actions needed to achieve the goals of the NFWHI:

1. Establish or augment fish and wildlife management agency capacities to adequately address fish and wildlife health issues.
2. Train fish and wildlife biologists and veterinarians to provide needed wildlife disease management expertise.
3. Create communication strategies to inform and engage other agency personnel, policymakers, stakeholders and the public about fish and wildlife health issues.
4. Build a national and interactive network of fish and wildlife management agencies to detect, prevent, research, and effectively manage wildlife disease and health problems.
5. Prevent introduction, establishment, and spread of pathogens in fish and wildlife populations through policy, early detection, and rapid response appropriate to risks.
6. Protect fish and wildlife population health through habitat conservation, risk analysis and adaptive management.

B. MEETING THE CHALLENGE

NOTE TO DIRECTORS: Meeting the challenge of maintaining healthy free-ranging fish and wildlife populations requires visionary leadership and mission-focused action related to agency staffing, funding, training, research, and connectedness to other agencies and entities. Dedicated in-house staff provide a solid foundation for fish and wildlife health programs; wildlife disease biologists/ecologists, wildlife veterinarians, terrestrial and aquatic specialists, and others (e.g., wildlife toxicologists, geneticists, microbiologists) are subject matter experts who advance fish and wildlife health program goals. In addition to subject experts, the most successful programs will have communications, marketing, and support staff. Ideally, the program has the full support of a dedicated budget. Access to grants and leveraging external relationships may augment budgets that are inadequate to completely sustain the program. Program staff and goals will benefit from leadership support for training, professional connectedness via collaborations, alignment of research with management needs, and timely and robust communication. The AFWA Fish and Wildlife Health Initiative identifies elements for States, Territories, Provinces, and Tribes to consider in creating and maintaining fish and wildlife health programs that address health issues in free-ranging fish and wildlife populations.

Elements to consider in the development of a fish and wildlife health program by fish and wildlife management agencies:

- **Administration and Management**
  - Coordination and communication. There are several options for administration and management of fish and wildlife health programs, including stand-alone programs and programs integrated into other bureaus and/or divisions. The most important consideration is the need to allow free-flowing coordination and communication between the program and the rest of the agency with clearly defined priorities and a chain of command.

- **Fish and Wildlife Health Program Capacity**
  - Program dedicated Fish and Wildlife Health staff. This could include wildlife veterinarian(s), wildlife disease biologist/ecologist(s), wildlife and aquatic health specialists, fish disease biologist/ecologist(s), and other technical and support staff. Recognizing that this is a staffing commitment that some agencies have achieved, and others may aspire to, it needs to be understood that the needs associated with fish and wildlife health are highly specialized, requiring trained professionals. Thus, it will be appropriate to hire wildlife disease biologists/ ecologists, or veterinarians with existing experience and training in wildlife population health.

- Dedicated budget for Fish and Wildlife Health to meet basic needs associated with health-related management and surveillance, monitoring, and outbreak investigations, as well as sufficient funding to support appropriate staff, leadership, administration, and research.
- Optimize access to grants. Coordinate with U.S. Fish and Wildlife Service's Wildlife and Sport Fish Restoration personnel on developing templates for federal grants via Pittman-Robertson and Dingell-Johnson, as well as with State or Federal Wildlife Grants and disease-specific grants or cooperative agreements (e.g., CWD management and SARS-CoV-2 surveillance) to better assist agencies with limited grant capacity. Agencies would ideally be prepared for evolving funding opportunities such as Recovering America's Wildlife Act (RAWA) by developing the capacity for rapid grant submission and approval.
- Access to necropsy, sample collection, or diagnostic laboratories. Dedicated physical infrastructure for collecting and processing wildlife or fish samples, preparing specimens for submission to diagnostic laboratories, and access to diagnostic testing. This space needs to be a dedicated space that provides basic biosecurity to protect personnel from exposure to potential pathogens and toxins.
- Training to Maintain Proficiency in Technical aspects. Have training in place for biologists and technicians related to fish and wildlife health. When feasible, collaborate with other agencies to coordinate training events and standardization of procedures. A standard component of training may include exercises to simulate responses to an emerging fish or wildlife disease or other health threat. This capacity should be considered for inclusion in the curriculum at the National Conservation Training Center (see repository for link). This is also a key need that should be coordinated by the National Fish and Wildlife Health Initiative (NFWHI).
- Development of management plans. Disease and health management plans should be co-developed by the agencies to prevent and mitigate the impact of diseases and toxins on free-ranging fish and wildlife populations.
- Internal Capacity for IT. Develop in-house capabilities for needs such as data management and sharing, statistical support, outreach/public relations, and policy. In the case of managing data, agencies should coordinate regionally and nationally to ensure comparability of analysis as appropriate and/or feasible.

- **Policy**
  - Internal policies that facilitate compliance with state and federal regulations. Federal and state rules govern the practice of veterinary medicine, use of prescription and controlled drugs, care and treatment of animals, interstate movement of animals and exhibition of animals. Agency policy, rules, and statutes should align with existing regulatory authorities.

- **Research Collaboration**
  - Collaborate in national and regional surveillance and research efforts. Disease transmission pathways do not recognize jurisdictional boundaries. For this reason, it is important to support regional or national monitoring work. Similarly, to optimize the distribution of research funds, agencies should coordinate research priorities and ensure rapid and widespread distribution of findings.
  - Align research priorities with management needs and establish partnerships. Contribute to tribal, state, regional, territorial, and national research initiatives related to fish and wildlife health. If involved, be an owner or full partner in such research.

- **Communication**
  - Communication within agencies and to stakeholders. Communication about diseases and health threats to wildlife populations, people and captive and domestic animals, ecosystem impacts or threats, and implementation and effectiveness of management actions is challenging. Access to and support from conservation social scientists and communication professionals is necessary to effectively support fish and wildlife agency objectives.

- **Partnerships**
  - In some cases, such as for the southeastern states, a collaborative approach is used to meet individual state and regional wildlife health needs (Southeastern Cooperative Wildlife Disease Study, see repository for website).
  - Leverage Partners' Capacities and Resources. Leverage existing expertise and seek available support from tribal, state and regional, federal, and university labs. Develop formal partnership agreements with collaborators to increase the efficiency of meeting the needs of fish and wildlife management agencies.
  - Maintain agency relationships with tribal governments; USDA Animal Plant Health Inspection Service (APHIS), Agricultural Research Service, and Forest Service; DOI FWS and USGS; and others to ensure connections to federal One Health and fish and wildlife health actions and priorities. This is especially important as One Health becomes the predominant narrative, it is vital for the Association of Fish and Wildlife Agencies and the regional associations to maintain an effective "seat at the table" when high-level interagency planning and decision-making is being considered in the One Health context.

C. ADMINISTRATION & MANAGEMENT

NOTE TO DIRECTORS: There are several options for administration and management of fish and wildlife health programs. Many agencies have recognized that once established, fish and wildlife health programs are able to provide support at many levels within the agency such as fish and wildlife management, population health assessments, disease surveillance and response, policy development, training support, law enforcement support, forensic investigations, and more. There are many options for integrating a fish and wildlife health program into a fish and wildlife agency. In some instances, fish and wildlife health is a stand-alone program, in others it is within the wildlife management and/or fisheries management bureau or division. The most important consideration is the need to allow free flowing coordination and communication between the program and the rest of the agency with clearly defined priorities and a chain of command within the agency for the fish and wildlife health program.

Examples of organizational charts for state fish and wildlife agencies available in the Toolkit Online Repository:

- Alaska Department of Fish and Game agency structure
- Texas Parks and Wildlife:
- Florida Fish and Wildlife Conservation Commission- Fish and Wildlife Research Institute:
- Oregon Fish and Wildlife Commission:

Organizational and leadership training and development assistance is available to state agencies through the **AFWA Management Assistance Team**.

Regional Associations' Fish and Wildlife Health Committees consist of fish and wildlife health experts from member state and provincial agencies and encourage regional coordination on fish and wildlife health matters:

- SEAFWA Wildlife Health Technical Committee
  - Point of contact: Ellen Haynes, SEAFWA Regional Wildlife Health Coordinator, ellen.haynes@uga.edu
- MAFWA Fish and Wildlife Health Committee
  - Committee Chair: Lindsey Long, Lindsey.Long@wisconsin.gov
  - Tricia Fry, MAFWA Regional Wildlife Health Coordinator, tfry.mafwa@gmail.com
- WAFWA Wildlife Health Committee
  - Chair: Anne Justice-Allen, Arizona Game and Fish Department: ajusticeallen@azgfd.gov.
  - Assistant Wildlife Health Coordinator: Noelle Thompson: noelle.thompson@wafwa.org
- NEAFWA Fish and Wildlife Health Committee
  - Point of contact: Melanie Kunkel, NEAFWA Regional Fish and Wildlife Health Coordinator, mrk266@cornell.edu

Native American Fish and Wildlife Society (NAFWS) Fish and Wildlife Health efforts consist of diverse expertise and similarly include a point of contact for wildlife health for coordination among participating tribal nations:

- Point of contact Dr. Tolani Francisco, tolanifrancisco65@gmail.com

The Toolkit Online Repository includes links to known Fish and Wildlife Health laboratory management and personnel. These examples can be used as a starting point for laboratory management and personnel needs. This list represents a small sample of available examples:

- State of California
- Wildlife Health Laboratory at Cornell University
- Florida Aquatic Health Lab
- Colorado
- Oregon
- USDA APHIS WS Wildlife Disease Diagnostic Laboratory

Suggested protocols and policies for a wildlife health program:

- Biosecurity expertise/Infection control considerations for field staff or in a laboratory setting
  - Field practices – Personal Protective Equipment, research, disease investigations and surveillance, carcass disposal
  - Training manual on wildlife disease outbreak investigations-OIE Example (see repository)
  - Laboratory – safety protocols, operations manuals, OSHA standards, biologic waste disposal SOPs
- Identifying agricultural/public health contacts and liaisons so there are professional relationships and understanding related to pathogen concerns at the domestic animal-wildlife interface and human-wildlife interface
  - CDC Public Health Directory (see repository)
  - State Animal Health Officials (see repository)
- Development, implementation, and coordination of disease management plans (e.g., CWD, rabies) and operations handbooks (e.g., controlled substance, capture and handling, humane killing and euthanasia)
  - Chronic Wasting Disease and Cervid Regulations by state (see repository)
  - Standard operating procedures (SOP) should be created for necropsy investigations and sample collection. SOPs should be created using guidance related to federal and international shipping regulations for field staff to follow.
  - Training and supervision of fish and wildlife health personnel (e.g., veterinarian, laboratory manager, disease specialists)
- Draft regulations related to captive wildlife management (e.g., wildlife rehabilitation, exhibits)
  - Link to example in repository - Wisconsin's- captive wildlife regulations and licenses
  - Development of captive wildlife (e.g., cervid) escape policies

D. FISH AND WILDLIFE HEALTH PROGRAM CAPACITY

NOTE TO DIRECTORS: Fish and wildlife health programs should have the capacity to respond to and identify the cause of fish and wildlife disease events that can impact fish and wildlife population, ecosystem, human, captive or domestic animal health. In some cases, the fish and wildlife health program will need to coordinate with other programs in the agency and with outside agencies (e.g. state health and agricultural departments, federal agencies). Occasionally, a response will require establishment of an Incident Command Structure. Response to significant events may require sample collection in the field from live and deceased animals, wildlife capture, submission of samples to one or more diagnostic labs, analysis of results, consideration of outbreak parameters that indicate disease prevalence, ecology and distribution, and development of management strategies to mitigate the impact of the event on populations and ensure resilient populations.

State, Territorial, and provincial agency and Tribal government leadership in the fish and wildlife health field is supported by organizational capacity for technical and field-based work. This section provides an overview of key aspects of the technical capacity agencies should maintain to enable decision making that is aligned with fish and wildlife health program goals and objectives.

Fish and wildlife health programs should include functionality and capacity in the following areas: training of agency staff, disease surveillance and monitoring, response to fish and wildlife health incidents and emergencies, population health assessments and criteria for health, and biotic and abiotic determinants of population health.

TRAINING

Agency staff with health-related responsibilities should receive regular training to maintain technical knowledge on current and emerging threats to fish and wildlife health and response protocols for morbidity and mortality events. This training may be provided by personnel within the agency or from external partners (e.g., Regional Fish and Wildlife Health Coordinators, federal or academic partners). Training on the importance of using personal protective equipment, appropriate carcass handling, necropsy, and tissue storage protocols, as well as knowing the appropriate individuals to notify following a morbidity and mortality event, should be provided for those conducting assessments of sick or dead fish and wildlife.

DISEASE SURVEILLANCE

Wildlife health programs may consider developing disease surveillance and monitoring programs. Surveillance entails looking for evidence for the presence of disease and/or disease-causing agents, which include pathogens (viruses, bacteria, fungi, parasites, and prions), toxins, or toxicants. In other words, looking for a disease/agent that is not known to be present at the time. Surveillance can be passive or active, both of which can be used to obtain biologically or statistically relevant data on the prevalence, age, and sex distribution of hosts or geographic distribution of the disease, pathogen, toxin, or toxicant following detection and subsequent monitoring.

- Passive surveillance describes information coming from opportunistic sources, including wildlife rehabilitators, agency personnel, and the public.
- Active surveillance describes samples collected in a systematic, targeted manner to better understand prevalence and distribution.

DISEASE MONITORING

Monitoring is an expansion of surveillance following the detection of a disease or disease-causing agent. In other words, monitoring a disease or agent that is known to be present. Its aim is to look for changes in prevalence and distribution to evaluate and inform management actions.

The following items should be considered when developing surveillance and monitoring programs pertaining to a fish and wildlife health program.

- Development and management of cost-effective surveillance and outbreak investigation strategies including case-finding strategies (e.g., public reporting system) and surveillance effort (e.g., active vs passive), sample procurement and storage capabilities, testing strategies, data management, disposal requirements, and monitoring effort. See repository for:
  - A useful link to a 2012 USGS report, “Enhanced Surveillance Strategies for Detecting and Monitoring CWD in free-ranging cervids” 2012.
  - CWD surveillance model: AFWA Technical Report on Best Management Practices for Prevention, Surveillance, and Management of Chronic Wasting Disease

- Developing and identifying diagnostic capabilities and capacity– State wildlife health biologists, veterinarians, or regional health coordinators may assist with capacity and coordination. However, the following is a list of fish and wildlife diagnostic laboratories of state and Federal agencies that may assist with surveillance strategies and diagnostic capabilities:
  - State agriculture diagnostic laboratories
  - National Animal Health Laboratory Network (NAHLN) and National Veterinary Services Laboratories – USDA APHIS, USGS National Wildlife Health Center labs
  - Laboratories with disease specific (e.g., bighorn sheep respiratory disease, CWD, hemorrhagic disease, influenza) or wildlife species/taxa specific disease expertise (Reptile diseases) – see repository
  - State wildlife agency diagnostic laboratories
  - University laboratories conducting research into wildlife disease agents
  - USDA APHIS WS Wildlife Disease Diagnostics Laboratory and the WS Bioarchive Storage Facility
- Development and identification of necropsy and diagnostic sampling capacity and resources and/or partnerships
  - Training of field staff (gross necropsy, sample collection, and tissue preparation)
  - Biosecurity and biosafety training
  - Identification and procurement of necessary supplies (e.g., tools, reagents, biosafety equipment, etc.)
  - Sample storage (freezing, desiccant, formalin, alcohol, etc.)
  - Interagency coordination of sample collection (contaminant and legal cases)
  - Law enforcement protocols and chain of custody
  - Federally protected species (T&E, marine mammals, etc.) protocols
  - Packaging and shipping biological specimens
  - General and species-specific necropsy guidance and guidance on where to ship carcasses and/or tissues to diagnostic laboratories
  - Disposal guidance – carcasses, supplies (e.g., sharps containers), chemicals (e.g., formalin waste).
  - Fish and wildlife carcasses may meet the definition of solid waste
- Coordinated training for agency personnel involved in surveillance or outbreak investigations.
- Development of effective and timely communication protocols for surveillance and outbreak strategies and results to appropriate agency personnel.
- Development and management of database and statistical support
  - Identification and collection of relevant data Interpretation and communication of diagnostic results (internally and externally)
  - Connectivity to national and international reportable disease databases (USDA, CDC, WOAH) when appropriate. Data sharing agreements may be necessary.
  - Development of geospatial analytical tools
  - Development of syndromic trend analytical tools

INFRASTRUCTURE

- Standard office or workstation infrastructure for all personnel
- Laboratory space and equipment
  - At a minimum, a necropsy wet lab protected space is needed to maintain biosecurity and biosafety. The space should have running water, impermeable surfaces for easy disinfection, controlled access, and be well-ventilated. In addition, a climate-controlled location with access to cold chain (i.e., refrigerator, freezer) will help preserve sample quality.
  - Laboratory equipment for processing blood and tissues and sanitizing associated tools.
  - Additional thoughts to consider:
    - What types of testing can be done on site, and which need to be sent out?
    - What equipment will be needed for onsite testing? What is the cost: benefit ratio of purchasing equipment and conducting onsite testing vs. using an offsite established diagnostic laboratory?
    - Can agreements with universities or other groups to conduct diagnostic testing be established?
    - If testing is onsite, who will establish testing protocols and ensure that quality control practices are included and being followed?
    - Will fish health and wildlife health activities share laboratory space and equipment?

RESPONSE TO HEALTH EVENTS

- Wildlife health programs should establish response protocols for morbidity or mortality events, including outbreaks.
  - Protocols should provide guidance to support staff on how to handle reports in terms of communication and coordination and when personnel should be dispatched to investigate
  - Serious (in terms of potential population impacts) or large scale (in terms of geographic extent or agency response) events may require:
    - Implementation of Incident Command System (ICS)
    - Coordination with other state and federal agencies
    - Request of resources via interstate contacts from other state or federal programs
- In order to establish and maintain proficiency, intra- and inter-agency mock drills or exercises should be conducted regularly
- Response protocols should be reviewed and updated every 5-10 years
- After Action assessments should be conducted for significant events; lessons learned should be incorporated into future response plans (i.e., adaptive management)
- Department Staff – Ongoing education in issues related to fish and wildlife health and disease, including up-to-date online resources and the opportunity to attend and learn about research and management actions in wildlife disease and health, including the opportunity to participate in conferences, webinars, courses, workshops, and field training.
  - Example- Training staff to interact with media example is listed in the online repository

E. POLICY

NOTE TO DIRECTORS: Establishment and continual review of fish and wildlife health related agency policy is essential to maintain relevancy and to enable agile response to emerging and novel pathogens and attendant impacts on natural resources and public health. Policy related to movement of wildlife and pathogens, possession of wildlife, carcass handling, toxicant usage and distribution, humane killing and euthanasia, medical care of free-ranging wildlife, response to nuisance and sick animals and those that pose a risk to human health, hunting, fishing, and trapping, should be considered by fish and wildlife management agencies. Knowledge of and alignment with other fish and wildlife management agency policy should be considered in development and implementation of fish and wildlife management health policy. Maintenance of in-house policy staff or access to the same within the organization is recommended.

Fish and wildlife health policy guidance for fish and wildlife health program leads is integral to the administration of services and expertise provided by fish and wildlife health professionals and informs how resource agency personnel engage and interact with fish and free-ranging wildlife as they perform their duties and responsibilities. Policies may be needed to facilitate compliance with federal or state regulations or to address issues related to animal disease management, ecosystem protection, or public health.

Recognizing the value of One Health and the connectivity among people, the environment, and wild animals is integral to fish and wildlife health policy and provides an opportunity for collaboration and potential funding resources.

Natural resource agency decision-makers at field, program, division, and agency levels will regularly encounter situations and scenarios for which policy will guide response. Each point below identifies considerations towards policy development, coordination, and regulations for fish and wildlife health programs. These points can be divided into two categories: (1) compliance with an existing policy or regulation and (2) policies to be developed.

1. **Compliance with existing state and/or federal regulations**
    - Dedicated policy staff. It is important for agencies to have dedicated fish and wildlife health professionals with knowledge and expertise of federal laws and regulations regarding fish and wildlife protections that will be put into practice both internally and externally.

- Coordination with other agencies. It is important for fish and wildlife health professionals to engage with the legal and regulatory arms of their agencies, and coordinate with other regulatory fish and wildlife management agencies in development, implementation, and evaluation of policies and regulations that affect fish and wildlife health resources and their use, as well as may require a coordinated effort in a One Health response regarding any health matters.
- Engage and coordinate with federal and state lawmakers. Develop effective strategies for coordination with legislature and congress on matters that relate to fish and wildlife health.
- Regulations and policies governing the practice of veterinary medicine.
  - It is important for natural resource agency administrators, supervisors of licensed veterinarians, and staff in general to fully understand the licensing requirements and laws that govern veterinary medicine, especially when duties staff perform are reliant upon veterinary licensing authority to conduct.Not only are there federal laws, but there are likely state laws unique to each state and it is important to investigate and become familiar with those unique laws. Examples include:
    - Animal Medicinal Drug Use Clarification Act (FAQ), state pharmacy boards, Drug Enforcement Administration (DEA).
    - Veterinary medicine licensing laws and practice AVMA Resource
  - Natural resource agencies engage in or authorize capture and handling of fish and wildlife for population management or research, as well as nuisance and damage control. These actions may also include the use of or authorization for the use of controlled drugs. State and federal laws, veterinary licensing laws, and controlled substances laws inform these practices, and having Institutional Animal Care and Use Committee (IACUC) approval may be necessary in some instances.
    - Controlled drug use/AMDUCA/chemical immobilization policy and guidelines. Chemical immobilization of free-ranging wildlife using controlled drugs requires veterinary licensing, experience and oversight.Stringent policy delineating practice, procedure, and guidelines is essential to assure appropriate compliance, knowledge, training, procurement of drugs, inventory of drugs, and record keeping of storage and use.
- Regulations and policies governing animal use and animal welfare (found in the repository)
  - Animal Welfare Act regulations and the role of Institutional Animal Care and Use Committees (IACUC). Some wildlife management agencies have created their own IACUC in order to handle their research needs. If considering this, communicating with these agencies may be useful.
  - Humane care and treatment of wild animals based on the Animal Welfare Act and/or Institutional Animal Care and Use Committee.
    - USDA Animal Welfare Act site
    - Overview of Major Animals Laws: Animal Legal Defense Fund site: Laws the Protect Animals

- Humane killing and euthanasia policy and guidelines. The American Veterinary Medical Association and the American Association of Zoo Veterinarians have created guidelines based on the most current and relevant research to reduce or relieve as much pain and suffering from animals that must be euthanized.
  - AVMA Guidelines for Euthanasia are listed in the repository

- Regulations and policies addressing public and ***domestic animal*** health
  - Fish and wildlife consumption advisories. Fish and wildlife toxicology expertise is a unique skill set. It is advised to have a toxicologist(s) in the agency's organization as a staff member or under contract. Fish and wildlife are exposed to a plethora of contaminants that may pose human health risk if consumed (e.g., mercury, PCBs, PFOS, etc.). Collaboration or coordination with public health agencies is important if making public health recommendations regarding potential human health risks.
  - Animal movement. Assuring close coordination with federal and state partners with dual authorities is an important consideration (e.g. USDA APHIS VS, USFWS). Fish and Wildlife Health professionals engage in and advise on import of fish and wildlife, as well as intrastate and interstate movement. State and federal laws inform requirements for animal health inspection and certification and import permitting, as well as interstate transportation for endeavors such as wildlife translocation for reintroduction or augmentation of populations. Collaboration with public health and state/federal agricultural agencies is integral to this area of responsibility (e.g. AFWA CWD BMPs).

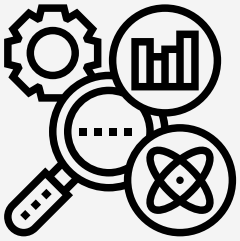
2. Policy development to prevent or control fish and wildlife diseases and prepare for emerging fish and wildlife diseases and their impacts at the population level.

- Illegally possessed wildlife policy.
  - Guidance and procedures are needed to ensure prompt response and action by staff when responding to reports and situations involving the unauthorized possession of live wild animals and the related enforcement. The need for such policy is keeping wildlife wild, healthy and in their natural habitat and not taken into personal possession as pets. Protection of public health and safety is also integral to such policies.

- Dangerous and harmful wildlife policy.
  - Guidance and procedures to ensure timely response and action by staff when responding to situations involving dangerous and harmful wild animals are critical. It is also appropriate to involve communications specialists to ensure delivery of appropriate messages to the public regarding dangerous situations between humans and wildlife.

- Scientific collection and/or research licensing/permitting. Possession and handling of public trust fish and wildlife resources generally requires some form of authorization from state agencies and in some cases federal agencies. Fish and wildlife species collection for educational or research purposes is a common area of public interest.
- Captive Wildlife Policy. Captive wildlife considerations including escaped or illegal possession of wildlife policies. Captive wildlife possession is often connected to free-ranging fish and wildlife health and is another common area of public interest. This can include practices such as wildlife rehabilitation, falconry, captive wild animal farm licensing, fish farm licensing, and species-specific licensing. Fish and Wildlife Health professionals' key areas of responsibility may include administering licensing regulations and development, and consultation related to standard operating protocols and biosecurity. Examples provided in the online repository include:
  - Florida Example: FWC Rules and Regulations for Captive Wildlife
  - Wisconsin Example: WI DNR Captive Wild Animal Farm Regulations
- Dangerous and escaped captive wildlife policy.
  - It is not uncommon for captive animals to escape their enclosures, including captive animal farms, roadside zoos, fur farms, feral pigs, etc. Having policy and standard operating procedures for natural resource agency staff to respond is strongly advised to seek to prevent potential negative impacts to native wildlife including transfer of disease, interbreeding, or establishing feral populations.
- Evaluation of policy/regulatory effectiveness.
  - Fish and wildlife health policies should be regularly reviewed and evaluated for effectiveness, efficiency, appropriateness and need and modified or acted upon accordingly. Having the capacity and expertise in a Fish and Wildlife Health program is integral. The Association of Fish and Wildlife Agencies (AFWA) collective wisdom can also help guide appropriate actions, specifically the AFWA Fish and Wildlife Health Committee and National Fish and Wildlife Health Initiative Steering Committee.
  - Best management practices have been developed by AFWA, WAFWA, IUCN, taxa associated societies (American Ornithological Society, American Society of Mammologists) and other professional organizations for animal handling, translocation, and disease mitigation.

F. RESEARCH



NOTE TO DIRECTORS: Scientific research is essential to enable fish and wildlife management agencies to effectively manage healthy fish and wildlife populations and underpins the most effective policies and actions within agencies. Therefore, fish and wildlife management agencies participation in fish and wildlife health-related research is integral. Fish and wildlife health research is costly and often requires multiple disciplines and expertise and specific technology and infrastructure. Research considerations may include understanding the indirect and direct population-level impacts of health threats, diagnostic capacity, identifying pathogens and diseases, understanding the epidemiology of disease-causing agents, modeling the impacts of disease-causing agents, and the human dimensions of health threats. Fish and wildlife management agency Collaborations and partnerships with academic institutions, research cooperatives, and nongovernmental organizations enable the most effective scientific research.

Science underpins the most effective fish and wildlife health policy and action. Fish and wildlife management agency support and participation in health-related research is therefore a critical component of an effective national fish and wildlife health strategy. The diversity of research needed to fully support effective fish and wildlife health policy and management is extensive, costly, and involves a multitude of disciplines and expertise that cannot be covered by any individual fish and wildlife management agency.

Research often involves advanced and costly technology or infrastructure supported by specialized training that is not broadly available. However, such obstacles can be overcome through collaboration. Partnership among state agencies and research partners can create useful knowledge based on research that is readily applied to field-based management. Academic, federally funded research cooperatives, and nongovernmental organizations are available to assist with research planning and implementation.

The following research-related considerations are important for fish and wildlife management agencies and fish and wildlife health research programs:

- Understanding indirect and direct fish and wildlife population impacts
  - Wildlife diseases have impacts at both the individual and population levels. They also have both direct and indirect impacts, with direct impacts including illness and death, and indirect impacts leading to changes in population dynamics without direct mortality. Such indirect impacts include decreased reproduction or fitness, changes to hunting/fishing activities, or human perceptions of wildlife.

- Globalization, habitat fragmentation and destruction, and climate change have increased the risk of transmission of diseases between fish and wildlife species, captive and domestic animals, and humans. Understanding susceptible species and transmission risks associated with wild, captive, and domestic animals and humans is a vital component to effectively minimize the impact of infectious and non-infectious diseases on fish and wildlife populations.
- Research is needed to better understand transmission risks associated with fish; wild, captive, and domestic animals; public health, and ecosystem health.

- Understanding Diagnostic Capacity
  - Diagnostic tests for infectious diseases are constantly changing, often resulting in increased sensitivity/specificity or enabling the use of new sample types. Therefore, there is a critical need to constantly evaluate and update diagnostic methods in fish and wildlife diseases systems, as well as validate them with new host species, new pathogens or pathogen subtypes, and across different sample types/storage times. Collection of such data informs interpretation of diagnostic test results, which is critical to understanding the prevalence and distribution of the pathogen or other disease-causing agents in fish and wildlife populations.
- Disease/Pathogen Identification
  - State and Tribal fish and wildlife health programs should include or have access to pathogen identification capacity. Emerging fish and wildlife diseases are growing concerns and pose unique challenges to fish and wildlife conservation and management. The effects of novel and emerging diseases are global and can contribute to population level declines and loss of biodiversity and have significant economic, public health, and agricultural impacts.
  - Collaborations among state, tribal, territorial, provincial, federal, and academic researchers are necessary to investigate fish and wildlife morbidity and mortality events and rapidly identify novel emerging diseases and pathogens. Such collaborative activities include field investigations, diagnostic measures, and laboratory testing. Early detection and rapid response measures are critical to minimize the potential negative impacts of these novel diseases on fish and wildlife management and conservation.
    - Partnering with labs that use genomic approaches to novel pathogen identification from mortality events or approaches to screen samples for unknown pathogens
    - Utilization of eDNA methods
    - When able, banking samples for future investigations when new approaches are available

- Epidemiological Support
  - Epidemiology is the science of risk and causal factors of disease. It is complex, depending on a multitude of host, agent, and environmental factors. Ongoing research is needed to collect data about such factors, in combination with surveillance for pathogens and disease on the landscape. It is important to collect such data to create evidence-based management strategies and to understand how epidemiology changes over space and time based on factors such as climate change and human activities.
  - Ongoing evaluation and improvement of sampling and surveillance techniques is needed to produce accurate data and epidemiologic conclusions.
  - Active surveillance may be more useful than opportunistic surveillance in epidemiological research because it can more readily provide answers to specific research questions.
- Modeling and Predicting Impacts.
  - Agency research scientists and university partners can provide research findings and modeling information pertaining to specific pathogens, disease, and geographies.
- Research related to improving human dimensions and health communication strategies
  - Understanding the human dimensions of wildlife diseases, including public awareness/attitudes and willingness to comply with regulations, is critical to the conservation of wildlife and management of wildlife diseases. It is important to support and conduct research into the best ways to educate members of the public to promote the success of management plans.
- Memorandums of Understanding (MOUs).
  - MOU's, contracts, and data sharing agreements can define expectations and encourage mutually beneficial research relationships where deliverables and respective roles in sample collection, data sharing, publication, etc. are established. They may be tailored to the needs of the collaborators and based on the recommendations of legal representatives of the respective organizations.
  - Links to example MOUs are provided in the online repository, including:
    - Memorandum of Understanding Between the USDA Animal & Plant Health Inspection Service, Wildlife Services and the USDA, Forest Service
    - Bovine TB Memorandum of Understanding (MOU)
  - Link to USDA-APHIS MOU template
  - Link to Best Practices Example

G. COMMUNICATION

NOTE TO DIRECTORS: Effective and reliable communication on fish and wildlife health topics through multiple platforms is essential to inform internal staff, policy makers, and the public and maintain public trust. A multifaceted approach related to fish and wildlife health, based on the best available science, and inclusive of an understanding of known public attitudes, policies, and human and financial resources is required to reach all stakeholders. Communication on complex health topics should be easily understandable, use appropriate aids to enable accessibility, include a variety of media outlets, and be coordinated with or by agency communication specialists/offices of communications.

Communication includes internal communications with agency, gubernatorial, and Tribal staff, outreach to partners and other stakeholders, and interactions with the media, including social media. Transparent communication, outreach and effective public relations of fish and wildlife health program goals and issues internally and externally is important.

One focus of communications efforts should be to effectively, honestly, and reliably communicate information related to fish and wildlife health events and outbreaks to varied audiences and across various media outlets. To do this effectively, a multifaceted approach in close coordination with agency communications teams related to fish or wildlife disease outbreaks or emergency situations is needed. In constructing the overarching goal of the campaign, clearly identify the stakeholders, acceptable risks, response path including decision nodes, and measurable outcomes along a timeline relative to what is known about the pathogen, community, and ecosystem, as well as unknowns. It is essential to use available information including known public attitudes, policy limitations, human and financial resources to describe risks based on known science.

The agency's goal should be the basis for communication to all audiences. As stated above, the goal should be based on science and defendable management strategies, but it should also acknowledge unknowns and the adaptive nature of responding to and managing disease in wild populations.

Since audiences are diverse, communications must simplify complex scientific concepts and terminology into easily understandable language. Agencies should work with their respective public information office to effectively communicate messaging in the most current and engaging formats. When possible, agencies should use visual aids such as infographics, diagrams, and charts to convey information in a visually appealing and accessible manner. Communication should include a variety of media outlets including

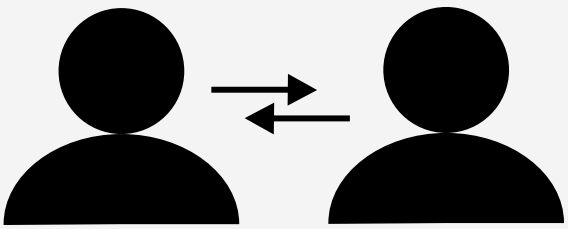
newspapers, radio, trade publications as well as social media and others. It will be necessary to vary language and messaging, based on the target audience; however, all messaging should be consistent and centered on the agency defined goal of the campaign. By implementing these strategies, wildlife management professionals will foster understanding, engagement, and support while addressing potential controversies in the field of wildlife management. Communication strategies should seek to understand and respond to the attitudes and opinions of various stakeholders.

Here are some key strategies to consider for approaching communications, including proactive strategies, identifying and preparing media liaisons, and tools for communicating with agency personnel, stakeholders, and policymakers in the event of a fish or wildlife disease outbreak.

- Human Dimensions Capabilities: Conduct and reference surveys, discussion groups and research to gauge public attitudes, knowledge and concerns regarding fish and wildlife management practices and willingness to comply with agency guidance. Use this information to identify potential challenges and issues.
- Media Liaisons: Identify Agency/Tribal staff trained in science communication for non-technical audiences. This includes media interview techniques, message delivery, and handling controversial topics. Media liaisons should develop and maintain relationships with journalists and media outlets, and regularly engage them to maintain open lines of communication and foster accurate and useful coverage of wildlife management initiatives.
  - Ability to clearly and effectively communicate scientific information to lay audiences
    - Communicating your research to a lay audience (repository)
  - Effective communication on controversial topics
    - Tips for communicative controversial topics (repository)

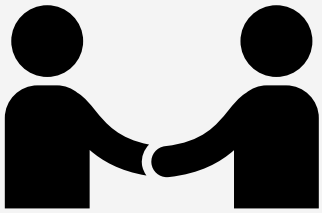
COMMUNICATION STRATEGIES

- Communication within Agencies: Foster a culture of open dialogue, including forums for questions and ideas as well as information sharing to facilitate collaboration and keep everyone informed about ongoing projects, regulations, and important updates. These may be team meetings, email updates, webinars, town halls, or digital platforms to disseminate information among agency personnel. In addition, provide clear guidelines on how to effectively communicate with colleagues and superiors, including expectations for timely and accurate training and information sharing.



- Communication to the Public: To effectively communicate with the public, including hunters, nonhunters, licensees, partner groups, and organizations, consider the following approaches:
  - Tailor messaging to specific target audiences by addressing their beliefs, concerns and interests related to wildlife management.
  - Information must be accessible and easily understandable and include management actions and recommendations emphasizing the scientific basis behind the management actions decisions. Describe what is unknown and the benefits and limitations of management strategies that are designed to be adaptive.
  - Include in these communications timelines and measures of progress, success, and failure whenever possible.
  - Effective and reliable communication with the public (e.g., hunters and nonhunters, licensees, partner groups and organizations) should consider the bullets listed below.
    - Targeted informational write-ups.
    - Using regional/local examples or tribal examples with the associated impacts.
    - Define emergency contacts if needed
    - Draft press releases
    - May create webinar series
    - Hunter- Specific Example
- Communication to Policy Makers: To engage with fellow policymakers, both internal and external, it is important to have strong relationships through regular communication and updates on wildlife management initiatives outside of outbreak conditions. . Succinct, clearly articulated scientific rationale behind management strategies highlighting the evidence supporting decision-making processes is fundamental. Example guidelines are linked in the online repository

H. PARTNERSHIPS



NOTE TO DIRECTORS: Efforts to promote wildlife health and conduct disease/pathogen investigations, surveillance, monitoring, and research are strengthened through partnerships and collaborations across fish and wildlife management agencies, non-governmental organizations, universities, and others. In advancing fish and wildlife health priorities, fish and wildlife agency leadership and staff routinely interact with these entities and each other to advance knowledge, motivate research, process field findings, and manage fish and wildlife populations for future generations.

Each of the partner agencies and organizations listed here has specifically stated roles and responsibilities in the fish and wildlife health arena. Maintaining connection to these agencies through organizational level MOU's and leadership connections, as well as individual subject matter expert relationships, cooperation in joint responses, exercises, conferences, and events, and through regulatory compliance processes all contribute to the success of fish and wildlife health missions/priorities.

Direct links to partnership entities and their associated roles for fish and wildlife health programs are provided below. State Fish and Wildlife Agencies, State Agricultural departments, and Universities will vary geographically, therefore links are not provided for all partners; contact your regional fish and wildlife health coordinators for regional and local organizations. Listed bullets below are reflected in the online repository for website information.

STATE/TERRITORIAL/REGIONAL PARTNERS:

- State Fish and Wildlife Agencies – Regulatory agencies of wildlife, wildlife health, surveillance, first responders of wildlife disease and detection
- State Agriculture Departments – Authority over captive wildlife movement and agricultural animals
  - NAHLN laboratories, and state diagnostic laboratories – Resources for testing agricultural animals, primarily conducts screening and determines negative and non-negative status of samples, provides USDA NVSL with non-negative samples for USDA program and high consequence diseases (for their confirmation on results)
- State human health departments -Intersection between human and wildlife health (e.g., rabies)
- Universities – Fish and Wildlife Departments, USGS Cooperative Research Units, Schools of Veterinary Medicine, Southeastern Cooperative Wildlife

FEDERAL PARTNERS:

- Department of Interior
  - USGS: Data collection, surveillance, diagnostic services
    - Ecosystems Mission Area
      - USGS Cooperative Research Units
      - Wildlife Disease Program
    - National Wildlife Health Center
  - US Fish and Wildlife Service – Regulatory authority of migratory birds and federally listed species, National Wildlife Refuge System, and Federal coordination.
- USDA
  - APHIS Wildlife Services – assistance in resolving wildlife damage and disease challenges to protect agriculture, property, human health and resources, and natural resources. The National Wildlife Research Center conducts wildlife disease research, and the WS Program has a Wildlife Disease Diagnostics Laboratory (a NAHLN-affiliated laboratory) and a Bioarchive Storage Unit with capacity to store up to 5 million wildlife samples. WS implements National Programs on rabies management, feral swine control, and wildlife disease surveillance and emergency response. Provides funding for CWD applied research and control efforts for wild cervids to States, Tribes, and universities.
    - National Wildlife Research Center (NWRC, Fort Collins, CO)-- the research unit of the USDA-APHIS Wildlife Services program.
  - APHIS Veterinary Services – regulatory authority to protect agricultural animal health at the Federal level, also regulates some aspects of captive/farmed cervids and other species. Provides funding for CWD applied research and control efforts for farmed cervids to States, Tribes, and universities.
    - National Veterinary Services Laboratory (NVSL, Ames, IA) – is the primary or confirmatory laboratory for certain animal diseases, receives and processes non-negative samples from NAHLN labs and NAHLN-affiliate laboratories for USDA program and high consequence diseases.
    - Coordinates and funds the NAHLN.
- Additional Federal Partners
  - CDC – CDC works closely with the US Department of Agriculture (USDA), the Department of the Interior (DOI), and many other federal agencies to exchange information and coordinate One Health activities across the US government.
  - NOAA – Marine Mammals and fish (in cooperation with states agencies)

NONGOVERNMENTAL ORGANIZATIONS AND NON-PROFIT PARTNERS

Provide resources, constituents, public awareness, communications networks, and expertise. Reference the AFWA membership roster and membership for American Wildlife Conservation Partners. Below is a list of example partners, although this list is not all inclusive (underlined words correlate to Toolkit Online Repository links).

- American Association of Wildlife Veterinarians
- Wildlife Disease Association
- Association of Zoos and Aquariums
- National Wildlife Federation
- American Fisheries Society
- Bat Conservation International
- Ducks Unlimited
- National Wild Turkey Federation
- American Fisheries Society
- The Wildlife Society
- Wildlife Management Institute
- The Boone & Crocket Club
- Regional Associations of Fish and Wildlife Agencies (NEAFWA, MAFWA, SEAFWA, WAFWA)
- AFWA

TRIBES AND TRIBAL ORGANIZATIONS

Regulatory authority on Tribal lands of Wildlife, wildlife health, surveillance, first responders of wildlife disease and detection.

- Native American Fish & Wildlife Society (NAFWS)
- Intertribal Buffalo Council (ITBC)
- Great Lakes Indian Fish & Wildlife Commission (GLIFWC)
- Northwest Indian Fish Commission (NWIFC)
- Columbia River Intertribal Fish Commission (CRITFC)
- National Congress of American Indians (NCAI)
- Affiliated Tribes of Northwest Indians (ATNI)
- United Southern & Eastern Tribes (USET)

CANADIAN PARTNERS

The Canadian Fish and Wildlife Service (CFWS) and the Provincial wildlife agencies may also partner with states, Tribes, and Federal agencies in the United States to advance fish and wildlife health priorities, especially those related to migratory birds and species that cross jurisdictional boundaries. AFWA includes the Provinces' wildlife agencies and the CFWS as members, and can provide the forum for connections between the counties' wildlife agency communities around fish and wildlife health.

- Government of Canada-Resources
- Parks of Canada
- Fisheries and Oceans Canada