New York State Department of Environmental Conservation
Division of Fish and Wildlife

Wildlife Health Program

Strategic Plan 2016-2021

This plan was developed with Federal Aid in Wildlife Restoration funds.

Free-ranging wildlife species are sentinels for environmental problems.

Introduction

The New York State Cooperative Wildlife Health Program (WHP) is a partnership started in 2010 between the New York State Department of Environmental Conservation (NYSDEC) and Cornell University's College of Veterinary Medicine (CVM). The program core personnel are based in the Wildlife Resources Center in Delmar and at the Animal Health Diagnostic Center (AHDC) in Ithaca where we have recently been designated an independent lab section under the name Cornell Wildlife Health Lab (CWHL). The program provides routine surveillance, in-depth research, disease prevention and response planning, teaching, training, and policy support. The WHP supports NYSDEC's mission to safeguard the long-term health of the wildlife populations of New York and is funded by the U.S. Federal Aid in Wildlife Restoration. Human and domestic animal health experts work with us when there are mutual concerns.

In 2011, the WHP was developed through a 6-month-long strategic planning process with a team of NYSDEC biologists, managers and Cornell Wildlife Health faculty. This original plan, **Wildlife Health Program Strategic Plan 2011-2015,** outlined nine essential program components: Program Management, Policy Development, Preparedness and Response, Training and Development, Surveillance and Monitoring, Communication, Information Management, Research, and Veterinary Health Services.
Over the first few years, the program prioritized developing an integrated system between Cornell Wildlife Health Lab and DEC for case submissions, data collection and reporting, redesigning the agency's chronic wasting disease program, improving intra- and interagency communications, and providing DEC staff with disease response and safety training. A detailed summary of our program development can be found in the NYSDEC Wildlife Health Program Review: 2011-2015.

This document outlines out program priorities for the next 5 years, building on the foundation established by our original strategic plan.

Sarcoptic mange is an emerging disease threat to New York's black bears.

Program Review 2011-2016

Health and Surveillance

Improved disease surveillance helps us to establish disease patterns and more rapidly detect and respond to new and emerging threats that can impact wildlife, human, and domestic animal health. From 2011-2016, our team of biologists and veterinarians examined nearly 6,000 submitted wildlife cases to investigate causes of mortality. Relevant case data is shared with state agricultural and human health agencies to alert them to disease issues of consequence. Significant disease events investigated include an outbreak of epizootic hemorrhagic disease (2011), red tailed hawk rodenticide intoxications (2012), songbird salmonella (2013), waterfowl winter mortality on the Great Lakes (2014 and 2015) and saxitoxin deaths in diamondback terrapins (2015).

We use a database developed specifically for wildlife data by the Canadian Wildlife Health Cooperative, which we share with the Northeast Wildlife Disease Cooperative. This allows NYSDEC staff to submit cases through an online portal which speeds data collection. Having a uniform system allows for data standardization, facilitates active monitoring of disease trends, and allows us to send finalized case reports electronically to submitters. In March 2017, we launched a program website providing case data online so that all NYSDEC biologists can rapidly access case reports, work with analytic and mapping tools, and find disease information to respond to public inquiries.

We collaborate with other agencies and organizations, such as the Cornell Lab of Ornithology, to capture information on migratory species, such as songbirds.

Disease Prevention and Response

To ensure that staff can perform their duties safely and efficiently in event of a disease outbreak, we produced a general disease response plan that outlines all the major components of wildlife disease investigation. This plan includes guidance on responding to public calls, personal protective equipment, field activities, euthanasia, decontamination, disease control, and forensic sampling. Each regional office has a "disease response kit" that contains essential equipment for staff to be immediately prepared to handle an outbreak.

A main program priority is preventing the reintroduction of CWD into the New York State wild deer herd. We conducted a field-based risk assessment and designed a weighted risk-based surveillance system that prioritizes samples in geographic areas and sex/age classes that have the highest likelihood of CWD detection. This system reduces work for field staff by focusing their efforts and by leveraging partnerships with deer processors and taxidermists to increase high value sample collection. In the past 10 years, over 44,000 deer have been tested with no positive cases identified.

We also convened an interagency team which included NYS Dept. of Agriculture & Markets and Cornell Wildlife Health Lab that produced a response plan for both wild and captive cervids that defines roles and responsibilities for a coordinated management strategy in the event of CWD detection. We also provided a CWD risk minimization (prevention) plan, which is in the final stages of agency review. This plan has regulation changes to prevent the reintroduction of CWD, actions to stop disease transmission events, and education and outreach strategies for all stakeholders.

New York State is leading the nation in surveillance and prevention of chronic wasting disease in white-tailed deer.

Research

Our research is collaborative, applied, and driven by real world issues. We have projects combining field and laboratory work with colleagues from multiple institutions including the following:

Lymphoproliferative disease virus (LPDV) distribution

Lymphoproliferative disease virus (LPDV) was identified in the US for the first time in wild turkeys in 2009. We partnered with the Southeast Wildlife Disease Study Group and SUNY-Environmental Science and Forestry to determine that up to 80% of adult turkeys in NY are infected, but signs of disease are rare. Our genetic and spatial analyses indicated that the virus was likely distributed around the state through historic wild turkey reintroduction programs.

Critical assessment of Eastern Hellbender reintroduction and chytrid vaccination efforts

Eastern hellbenders are the only giant salamanders found in North America. In the past decade, the New York population has declined by 40% across their range. We've teamed with NYSDEC field biologists, Buffalo Zoo, Buffalo State University, and Smithsonian Institute scientists to improve survival in head-start programs, conduct genetic analysis, investigate efficacy of vaccination programs, and test modified release strategies.

eDNA applications for species and pathogen detection

In 2015, we initiated a project to develop environmental DNA (eDNA) tools for detection of ranavirus and amphibian species of concern in New York. This project was supported by the Return a Gift to Wildlife funds. This new technology detects free DNA shed into water so that animals do not have to be individually captured to identify their presence. This system will greatly reduce the financial and time resources needed to map and monitor both the species and the diseases that impact them.

Moose population health

Moose populations have been declining across their range. We are collaborating on a multi- institution effort to determine how many moose exist in the Adirondacks and what factors are impacting this population. We examine samples from moose to assess reproductive status, infectious disease exposure, parasite load, and cause of mortality. Results indicated that New York moose appear to be affected mostly by parasites commonly carried by white-tailed deer (brainworm and giant liver fluke), but are not suffering from winter tick infestations, as are other Northeast moose populations.

Restoration of hellbenders in New York streams is a primary research focus.

Training and Teaching

To ensure that NYSDEC staff has up-to-date training in wildlife health, we host biennial regional workshops with field lectures and interactive exercises. Past topics included training in zoonotic (animal-to-human) disease risks, humane handing, euthanasia, field necropsy, and disease response. Regional staff provide suggestions for workshop topics, feedback on program activities, and input for future planning. Over 170 personnel from NYSDEC Bureau of Wildlife, Division of Law Enforcement, and New York State Parks, Recreation and Historic Preservation attended in 2016. The WHP also organizes an annual Safe Capture International 2-day workshop on chemical immobilization best practices. Over 120 NYSDEC personnel have completed the certificate training since 2011.

Undergraduate, graduate, and veterinary students from various institutions have the opportunity to work alongside our biologists and veterinarians. This real-world experience has provided over 45 students with a better understanding of the unique challenges associated with wildlife species as they pursue professional careers in wildlife or public health.

We also have been invited to give presentations on wildlife health topics to Nuisance Wildlife Control Operators, NY Fish and Wildlife Management Board, NYS Conservation Council, NY Bow hunters, NYS Taxidermists, and NYS Wildlife Rehabilitation Council.

Policy and Support

We regularly review research permit requests to ensure wildlife will be safely and humanely handled and to reduce the risk of disease transmission. We have given input on community deer management permits, captive breeding and release programs, rehabilitator permit examinations and treatment protocols, and Nuisance Wildlife Control Operator handling guidelines. The WHP also routinely provides support for policy and regulatory issues including species management plans, animal handling protocols, and biosafety protocols. We review regulatory language and provide language for press releases and other management decisions.

We use science to inform wildlife conservation decisions.

Strategic Plan 2016-2021

The program contract with the Cornell Wildlife Health Lab was renewed in August 2016 and extends through April 2021. The original strategic plan will continue to define the program structure, but is not included here for the sake of brevity. Over the next 5 years, we will continue to improve disease surveillance, provide targeted staff training and support, and provide research-based solutions. A program review was conducted in 2015 as part of the contract renewal process, and consultation with the Wildlife Health Team and NYSDEC management have identified four key areas for the next phase of WHP development:

1. Communications and Outreach: Improve access to wildlife health information for the agency, stakeholders, and public through the use of digital tools, scientific publications, and other media outlets
2. Applied Research and Data Analysis: Advance our ability to predict and manage disease threats to wildlife through application of advanced research and case data analysis such as landscape genetics and high throughput sequencing
3. Diagnostic Tools: Develop diagnostic tests for wildlife and increase availability of testing for wildlife to reduce costs and improve detection of species and pathogens
4. Operational Integration: increase the integration of wildlife health principles in DEC administrative activities

These initiatives have been integrated into each of the program components (Program Management, Policy Development, Preparedness and Response, Training and Development, Surveillance and Monitoring, Communication, Information Management, Research, and Veterinary Health Services) in the revised strategic plan for 2016-2021 as described below.

Program Components

Program Management

The **WHP core staff** are located at the NYSDEC Wildlife Health Unit at the Wildlife Resources Center in Delmar, the CWHL at the AHDC in Ithaca, and the NYSDEC Central Office in Albany. The WHP is advised by the Wildlife Health Team, which includes representatives from across the NYSDEC Bureau of Wildlife (BOW), Division of Law Enforcement, and the Central Office. The Team assists in program implementation and development of annual work plans to prioritize agency needs. Specialty teams comprised of both internal staff and external experts and partners are assembled as needed to develop policy recommendations.

Coordination of the program is the responsibility of the WHP Leader in Central Office. The WHP Leader manages communication internally within BOW, across division lines within NYSDEC, and externally to agencies, institutions, and private sector partners and collaborators. Final policy decisions are made by the BOW Chief in collaboration with or by the Division Management Team (DMT) or the NYSDEC Executive Office. An annual program evaluation ensures that the WHP is accountable, effective, and timely in delivery of desired results and benefits. During 2016-2021, the WHP will work to improve integration of wildlife health principles into management activities, including management plans, research projects, permit reviews, and protocols.

Goals	Strategic Initiatives
Increase the integration of wildlife health principles into administrative activities	• WHP staff will attend BOW Team meetings on an annual basis to improve communication and integration of wildlife health into NYSDEC activities • WHP will work with the Special Licenses Unit to develop a digital permit reporting system that will streamline data gathering and analysis for relevant permits and enhance disease surveillance
Secure stable and comprehensive funding that can support Wildlife Health Program needs for all wildlife taxa including amphibians and reptiles	• Improve communications and functionality between Cornell and NYSDEC accounting services to streamline invoicing and reduce errors • Explore the use of CVM resources that could be used as matching funds to allow NYSDEC to utilize additional federal funding for wildlife health activities • Review 2016 contracting process with the AHDC to identify problems areas to improve the process for 2021
Be a national leader in the field of wildlife health	• Support research and experiential programs for veterinary and wildlife biology students • Advance the Northeast Wildlife Disease Cooperative program through case data sharing, specimen archiving, staff training, outreach, and collaborative research • Annual publications in scientific journals, popular press articles, and social media outlets

Supporting DEC field staff in their duties is our primary goal.

Left: a vet student gains experience in animal handling during a Canada goose round-up.

Right: A Region 9 biologist records health data on a hellbender in the Allegany River system.

Policy Development

The WHP provides guidance and recommendations for policy development within the BOW, the NYSDEC, and other agencies and programs that may address wildlife health issues. Policy support includes: providing comments and recommendations on state and federal laws and regulations related to wildlife health; giving input on management plans and other formal agency guidance; and providing sampling, animal handling, and bio-safety protocols. Program staff provide recommendations and guidance in the form of technical documents, white papers, position papers, study and research design, animal handling protocols and informal communication. Policy development recommendations are based on sound scientific data and principles and follow the tenets of **One Health**.

Goals	Strategic Initiatives
Increase the integration of wildlife health principles in agency activities through policy development	• Provide guidance documents ("white papers") that outline best practices on policy topics of interest such as drug withdrawal times, captive rearing, and relocation and release procedures • Develop protocols and guidelines for the safe chemical immobilization of wildlife • In 2017, finalize and implement the CWD Risk Minimization Plan

We strive to ensure that all DEC staff are properly trained in the highest standards of animal handling, chemical immobilization, and euthanasia.

Preparedness and Response

Routine surveillance and monitoring are the key foundation of preparedness because they establish a structure for early detection and response in the event of a significant threat emergence. The WHP identifies these threats to wildlife and provides plans, training, and tools to mitigate the impact of disease or toxins on wildlife populations. Response plans include disease data; expert input; risk assessment; and recommendations for personal protective equipment, containment strategies, and regulatory changes. Plans define agency roles and responsibilities, as well as communication and outreach strategies. Staff receive training in emergency disease response, including real-world scenario exercises, to operate effectively in the event of a wildlife disease outbreak.

Goals	**Strategic Initiatives**
NYSDEC will be prepared to respond to wildlife health incidents in a timely and effective manner, and work cooperatively as needed with other agencies and collaborators	• In 2018, finalize the NYSDEC Disease Response Plan • Provide a specific response plan for *Batrochochytrium salamandrivorans (Bsal*) • Initiate an outreach and education program for the CWD Risk Minimization Plan • Provide a summary of equipment and staffing resource needs to effectively respond to potential wildlife health incidents. • Identify additional priorities for disease-specific prevention and response plans
Ensure DFW has appropriate supplies, equipment, and facilities to conduct wildlife health activities safely and effectively	• In 2017, provide needs assessment for facilities, equipment, and supplies; work with DMT to correct deficiencies • By 2021, ensure that the facilities (laboratories, incinerator) at the Wildlife Resources Center meet appropriate standards

Preparedness to respond to wildlife disease outbreaks is critical. Each regional office is equipped with a Disease Response Kit for a rapid and comprehensive reaction when wildlife mortalities are reported.

Training and Development

BOW field staff is frequently the first contact about a wildlife health incident, and they must be prepared to recognize disease signs in various wildlife species, respond to public inquiries, effectively conduct field investigations, collect and deliver specimens for analysis, and handle and transport live wildlife safely, effectively, and legally. All training incorporates One Health concepts as unifying principles of collaboration and cooperation. The WHP has conducts biennial training workshops to cover safe practices for handling potentially diseased wildlife and works regularly with staff to provide updated information on emerging disease threats. In the upcoming year, the WHP will develop training modules and documents that are made available on the CWHL website to improve information access and availability of training materials.

Goals	**Strategic Initiatives**
Ensure staff is provided information and training so that they can conduct wildlife health activities safely and efficiently and in compliance with all state and federal regulations, animal welfare, and bio-safety standards	• Ensure that all established staff and new hires attend workshops or access training modules in the following subject areas: o Common wildlife diseases (including zoonoses and foreign animal disease) signs and affected species o Selection and use of personal protective equipment o Proper specimen selection and packaging o The One Health concept and how it relates to wildlife management o Live animal handling best practices including biosafety protocols and humane euthanasia o Emergency response o Appropriate handling of cases with legal implications including those involving environmental pollutants o Disinfection techniques and appropriate carcass disposal • Offer an annual Safe Capture workshop to ensure active staff has training on a three-year basis to maintain fluency with current standards • Provide staff access to disease fact sheets, glossary, and analytic tools via the CWHL website to improve staff knowledge of wildlife disease and facilitate responses to public inquiries • Provide advanced workshops or lectures on specific diseases, taxonomic groups, laboratory procedures, or other topics of interest

One of our highest priorities is training DEC staff to keep them safe in the course of their job duties. We use training opportunities to educate staff and the public

Surveillance and Monitoring

The WHP provides a coordinated, structured system of disease and contaminant surveillance to mitigate impacts on wildlife, humans, and domestic animal populations. Monitoring wildlife mortalities establishes baseline patterns of endemic disease and contaminants. These data can facilitate detection of new and unusual morbidity and mortality events that are potential emerging threats. In the past five years, the WHP has developed risk-based surveillance systems for high priority diseases, such as CWD, avian influenza, and Bsal. These systems will be supplemented by molecular techniques like landscape genetics and DNA fingerprinting that will allow us to move toward predictive models of disease movement.

Goals	**Strategic Initiatives**
Ensure staff are aware of typical disease patterns and recognize emerging wildlife health issues	• Through the CWHL website, staff will be able to: o Access statewide case submission records to improve awareness of disease trends and timely reporting of diagnoses o Conduct customized data analysis and mapping to identify patterns by species, season, or geographic area o Maintain situational awareness via website subscription emails with regular case data summaries, disease information, and emerging threat alerts
Ensure policy decisions for the prevention, management, and mitigation of disease or contaminant impacts are based on sound surveillance and monitoring information	• Increase the use of high throughput sequencing of pathogens and genetic profiling of wildlife in disease surveillance and research • Provide staff and management access to online case data, permit reporting data, and program research data to facilitate information use in decision making
Disease reporting will support coordinated surveillance and monitoring activities within New York State and with national and international agencies	• Engage in national efforts to document and share information on emerging disease threats including Bsal, snake fungal disease, and avian influenza

The program will develop new testing capacity for emerging infectious disease of wildlife for New York and our state and federal partners	• In 2018, finish validation for *Bsal* and *Bd* testing at the AHDC to become an official Bsal testing laboratory • Develop important wildlife diagnostic testing at the AHDC, such as for *P. tenuis* for deer and moose, PCR and IHC for ranavirus, and PCR for LPDV • Develop kits and mechanisms to facilitate eDNA testing for NYSDEC and outside agencies • Establish an online wildlife health diagnostic portal within the AHDC for specialty testing of wildlife samples

Our team of biologists and veterinarians examines hundreds of wildlife cases each year to investigate the causes of mortality.

Real-time surveillance allows us to establish common disease patterns as well as to rapidly detect and respond to new and emerging threats that can impact wildlife, human, and domestic animal health.

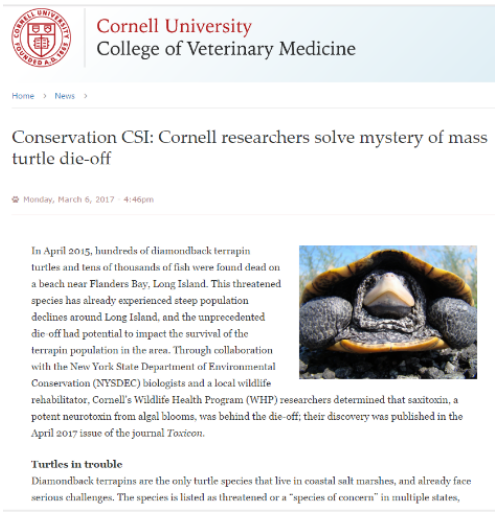
Our online case database will allow biologists to rapidly access the information and better respond to public inquiries.

Communication

The WHP has worked to establish routine communications and collaborations with other state and federal entities, educational and nonprofit organizations, and the general public. The formation of a dedicated Wildlife Health Team with representatives from all NYSDEC Regional Offices and BOW teams facilitates intra-agency communication and coordination. During the five-year program review, the DMT requested that the WHP prioritize engagement and distribution of information provided to the general public. The program will work with communications staff at NYSDEC and Cornell to increase public awareness of wildlife health issues and strengthen the profile and impact of the program in New York.

Goals	**Strategic Initiatives**
Ensure that the WHP is informed and can provide support for BOW activities that have health implications, and BOW staff are adequately informed and supportive of wildlife health programs	• Meet twice annually with the Wildlife Health Team • Have WHP staff attend BOW team and management meetings on a regular basis • Increase use of digital tools for intra-agency communications and document sharing
Maintain cooperative relationships with external agencies and collaborators for coordinated response to wildlife health issues	• Incorporate or improve the use of new methods for collecting and sharing data (e.g. digital permit reporting, CWHC database)
Increase public awareness of emerging wildlife health issues and the wildlife health program	• Increase engagement with the general public through online resources, popular press, lectures, and social media • Facilitate BOW staff responses to public inquiries by providing staff with improved information resources • Engage with communications specialists to design and implement outreach programs (CWD, Bsal, lead toxicity) • Be actively engaged in Cornell CVM strategic planning processes to improve development, communications, and programming for wildlife-related activities at the College

We use a variety of media outlets to reach the public on wildlife health issues.

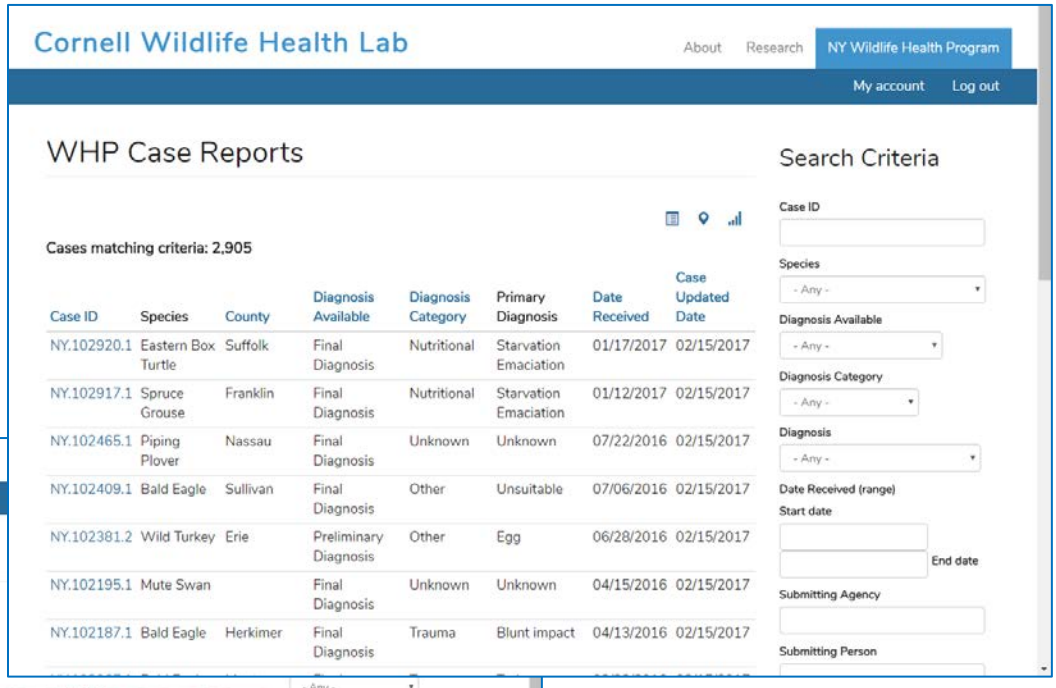


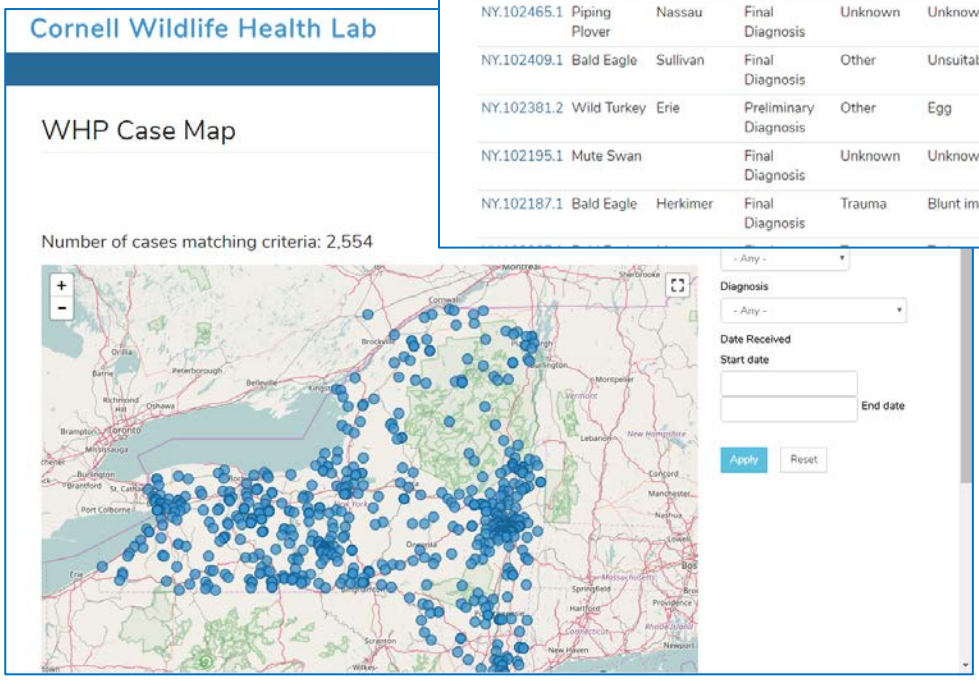
Information Management

High-quality information provides a foundation for sound science-based decisions, justification for policy recommendations, and supports program priorities. To effectively use the data and respond rapidly to emergency situations, data should be current and spatially depicted. We have taken steps to improve case data standardization and search functionality, as well as developing unique data management systems for tissue archiving, special licenses reporting, and research projects.

Goals	Strategic Initiatives
Provide BOW staff and collaborators with accurate and reliable wildlife health data that is readily available to support all program goals	• In 2017, provide staff access to real-time case data and analytic tools through the CWHL website • Provide online access to historic rehabilitator data through the CWHL website • Work with Special Licenses Unit to facilitate collection of relevant permit reports and analysis for agency use • On request, provide data summaries and analysis for information requests and policy decisions

Our online case database allows biologists to rapidly access the information and better respond to public inquiries





Research

Research is essential to understand disease introduction, transmission and potential impacts on wildlife populations in NYS. The WHP focuses on research questions that promote better understanding of wildlife health and will provide NYSDEC with information to support management decisions.

The WHP provides technical and field support to staff and guidance for the Special Licenses Unit (SLU) research permit applications. The WHP leverages internal resources, external funding, and students in training, to facilitate research projects. Establishing a source of NYSDEC funding for priority wildlife health projects would reduce time devoted to securing outside funding and speed data acquisition.

Goals	Strategic Initiatives
Conduct and support basic and applied research on wildlife health issues, and ensure that research is rigorous, goal oriented and scientifically sound	• By 2019, have a defined system for securing NYSDEC funding for high-priority wildlife health research projects • Provide guidance for wildlife health best practices in agency research projects • Participate in multi-state/interagency projects to increase understanding of disease ecology at the landscape scale

Our research is broadly collaborative, applied, and driven by real world issues. At any given time we may have more than a dozen active projects combining field and laboratory work with colleagues from around the country in a variety of disciplines. For example, we have a highly collaborative, multi-institution moose study in the Adirondacks region.

Veterinary Health Services

Handling wildlife presents the possibility for disease transmission, public or staff safety concerns, and issues of animal welfare. The WHP facilitates access to a suite of veterinary medical services, including medical care for endangered and threatened species. We support BOW staff with training and equipment for handling live wildlife, and review of all special licenses involving the take and possession of live wildlife, euthanasia and animal welfare standards, biosafety protocols, and disease management. The WHP also provides recommendations and expert opinion on proposed statutes and regulations involving the take, possession, transport, release, and euthanasia of live wildlife.

Goals	**Strategic Initiatives**
Veterinary medical "best practices" will guide the handling of live wildlife by BOW staff and the regulated community	• As needed, develop protocols for BOW and the regulated community to respond to injured, ill, or orphaned endangered and threatened species • Provide support and consultation to cooperating veterinary practitioners who can assist BOW staff and licensees with issues related to veterinary medical services for wildlife • Review current BOW practices and procedures involving the handling of live wildlife and provide standards to ensure that such practices and procedures are in compliance with veterinary medical principles • Review current licenses issued by the DFW and provide recommendations to ensure that activities conducted under the authority of such licenses are in compliance with veterinary medical principles and do not pose a threat to the wildlife resources of the state

We monitor the disease status of common species, such as raccoons, to be able to assess new and emerging threats that may affect wildlife, human, or domestic animal health.

Appendix A: Personnel

Core Program

NYSDEC Central Office *Albany*	Patrick Martin, *Program Leader*
NYSDEC Wildlife Health Unit *Delmar*	Kevin Hynes, *Wildlife Biologist* Joseph Okoniewski, *Wildlife Biologist* John Shea, *Wildlife Technician* Ashley Ableman, *Wildlife Technician* Ellen O'Malley, *Administrative Assistant*
Cornell Wildlife Health Lab Animal Health Diagnostic Center College of Veterinary Medicine Cornell University *Ithaca*	Elizabeth Bunting, *Veterinarian* Krysten Schuler, *Wildlife Disease Ecologist* Nicole Dean, *Research Aide* Jennifer Peaslee, *Communication Aide* Richalice Melendez Rivera, *Program Aide* Nicholas Hollingshead, *Data Analyst* Maria Forzan, *Pathologist* Elizabeth Buckles, *Pathologist*

Wildlife Health Team - NYSDEC Bureau of Wildlife

NYSDEC Central Office *Albany*	Patrick Martin, *Program Leader*
NYSDEC Wildlife Health Unit *Delmar*	Kevin Hynes, *Team Leader*
Cornell Wildlife Health Lab Animal Health Diagnostic Center College of Veterinary Medicine Cornell University *Ithaca*	Elizabeth Bunting Krysten Schuler
Region 1	Leslie Lupo, *Stony Brook*
Region 2	Sandy Chan, *New York*
Region 3	Jonathan Russell, *New Paltz*
Region 4	Karl Parker, *Schenectady*
Region 5	Paul Jensen, *Warrensburg*
Region 6	Blanche Town, *Potsdam*
Region 7	Thomas Bell, *Cortland*
Region 8	Jenny Landry, *Avon*
Region 9	Ryan Rockefeller, *Allegany*
Central Office & Sportsman Education	TBD
Law Enforcement	Major Matthew Revenaugh, *Cortland*

Appendix B: Glossary of Terms

Active – Targeting a particular disease or species (or group of species) with a sampling strategy and goal

Collaborator/Partner – The term "collaborator" is used when an agency or NGO is actively participating in a wildlife health response or event. The term "partner" is used when an agency or NGO is involved with or concerned about but not actively participating in a wildlife health response or event. In both cases, the terms collaborator and partner may refer to agencies or NGOs depending on the wildlife species or the disease or both.

Contaminant – Biological, chemical, physical, or radiological substance (that may or may not be present in the environment) which, in sufficient concentration, can adversely affect living organisms through air, water, soil, and/or food

Disease – An absence of health that impairs bodily function and affects populations by reducing fitness (i.e., offspring) or probability of survival; an interaction of the affected animal (the host), the pathogen causing illness (the agent), and the environmental factors influencing both of them; if enough individuals are affected, the collective effects reduce sustainability of the overall population.

"Disease is any impairment that interferes with or modifies the performance of normal functions, including responses to environmental factors such as nutrition, toxicants, and climate; infectious agents; inherent or congenital defects, or combinations of these factors." (Wobeser, 1997).

Emerging/Re-emerging – Infectious diseases whose occurrence during the past two decades has substantially increased or threatens to increase in the near future relative to the populations affected, geographic distribution, or magnitude of impacts

Enzootic (Endemic) – A disease in animals that occurs with predictable regularity and rate in a population or in an area

Epidemiology – The study of the distribution of disease in populations, and the factors that determine its occurrence. The emphasis is on populations, not any single case of disease viewed individually

Epizootic (Epidemic) – A disease in animals that is occurring in a time, place, or species where it is not expected or at a greater rate than expected based on past experience

Foreign animal disease (FAD) – More recently termed "Transboundary diseases" a disease which does not currently exist within the borders of a country but one which will have significant economic, trade and/or food security importance if it is introduced. (Transboundary Animal Diseases: Assessment of socioeconomic impacts and institutional responses. FAO 2004)

Health – The state of an organism when it functions optimally without evidence of disease or abnormality

Incident Command System (ICS) – A standardized, all-hazards incident management approach that allows for the integration of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure that enables a coordinated response and

establishes common processes for planning and managing resources. ICS is flexible and can be used for incidents of any type, scope, and complexity. (FEMA 2011; **http://www.fema.gov/emergency/nims/IncidentCommandSystem.shtm**)

Laboratory Information Management System (LIMS) – A software system that allows a laboratory to track diagnostic testing on submitted samples and to synthesize summary data from those samples

Monitoring – On-going or repeated efforts directed at assessing the health and disease status, including routine recording, analysis, and distribution of data related to health or disease, in a defined population for specific diseases or disease/health in general to ascertain changes in prevalence and determine the rate and direction of disease spread

National Incident Management System (NIMS) – A systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment. (FEMA 2011; **http://www.fema.gov/emergency/nims/AboutNIMS.shtm**)

NGO – Non-governmental organization.

One Health – Collaborative effort of multiple disciplines-working locally, nationally, and globally to attain optimal health by recognizing the interconnectedness of people, animals and our environment

Passive (opportunistic) – Examining sick or dead animals as they become available over time as a means of accumulating valuable disease tracking data

Pathogen – Any agent (organism or substance) capable of inducing abnormal structural or functional changes in the body leading to illness and clinical manifestations of disease

Risk analysis – A process for objectively assessing risks of disease introduction into a population, evaluating management options for diminishing or controlling those risks

Surveillance – Sampling individual animals in a population for a specific disease, typically used for disease incursion into a new area, where predefined action for prevention or control will be taken as soon as a specified threshold (disease prevalence or incidence) is passed

Toxicant – Man-made (synthetic) substance that presents a risk of death, disease, injury, or birth defects in living organisms through absorption, ingestion, inhalation, or by altering the organism's environment. In comparison, a toxin is produced in nature by a living animal or plant.

Vector – An organism or object capable of transferring an agent from one host to another biologically or mechanically

Wildlife Health – Multidisciplinary approach involving biologists and veterinary medicine to understand the interconnections and complexities of species and ecological health problems.

State fish and wildlife agencies are the principal front-line managers of fish and wildlife and are responsible for managing diseases in free-ranging wildlife and have in place the local knowledge,

personnel, equipment and local public support to address wildlife disease issues, including emergencies.

An effective agency will routinely conduct surveillance to detect diseases, to respond to outbreaks and to implement management programs to minimize disease impacts on wildlife and domestic animal populations.

Wildlife Health Programs – Examples of well-known state wildlife health programs: California, Colorado, Wyoming, Wisconsin, Michigan, all have established affiliations with their state veterinary college

Zoonoses –Infectious diseases that can be transmitted from animals to humans