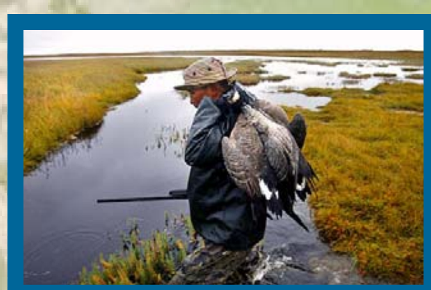
National Fish & Wildlife Health Initiative
TOOLKIT



ASSOCIATION *of* FISH & WILDLIFE AGENCIES

The Association of Fish and Wildlife Agencies—the organization that represents North America's fish and wildlife agencies—promotes sound management and conservation, and speaks with a unified voice on important fish and wildlife issues..

Responsibility of the Fish and Wildlife Health Committee

Approved by Fish and Wildlife Health Committee on March 27, 2008

It is the responsibility of the Fish and Wildlife Health Committee to provide expert advice and counsel to the members of the Association and its officers on fish and wildlife health matters; to monitor and evaluate state and federal animal health legislation and administrative actions in terms of their potential impacts on fish and wildlife resources; and to maintain a close relationship with appropriate officials of the U.S. Departments of Agriculture and Interior to assure that the interests of fish and wildlife management are taken into account in any emergency animal disease control program.

See the Association of Fish and Wildlife Agencies web site for current member list.
http://www.fishwildlife.org/

Responsibility of the National Fish and Wildlife Health Steering Committee

Approved by Fish and Wildlife Health Committee on March 27, 2008

The National Fish and Wildlife Health Steering Committee (Committee) will facilitate the design of a cooperative, nationwide program to conserve, restore, and enhance healthy fish and wildlife resources of the United States which recognizes and respects the missions, agency jurisdictions and abilities of fish and wildlife managers to address health issues. The Committee, formed under the auspices of the Association of Fish and Wildlife Agencies' Fish and Wildlife Health Committee, is a voluntary entity of government partner groups that serves to oversee the implementation of a National Fish and Wildlife Health Action Plan (Plan), as called for in the National Fish and Wildlife Health Initiative. The Committee's work shall complement the mission and core responsibilities of the Fish and Wildlife Health Committee.

Committee membership will be named by the Association of Fish and Wildlife Agencies (the Association) from nominations submitted by the Association members and partners. The Association will have final responsibility for appointment and, if necessary, removal of all Committee members, except those serving by virtue of their office.

The Committee shall consist of 12 members:
- Chairperson of the AFWA Fish and Wildlife Health Committee (1), Chair;
- Directors from each of the four Regional Associations (Northeast, Midwest, Southeast and Western) (4);
- Director of US Fish and Wildlife Service (1);
- Associate Director of Biology, USGS (1);
- Deputy Administrator of USDA APHIS VS (1);
- Deputy Administrator of USDA APHIS WS (1);
- State Veterinarian (1);
- Academic Institution (1);
- Tribal fish and wildlife management entity (1);

National Fish and Wildlife Health Steering Committee

Becky Humphries, Chair
Michigan Department of Natural Resources

Dave Schad, Director
Minnesota Department of Natural Resources
(Midwest AFWA)

Steve Ferrell, Director
Wyoming Game & Fish Department
(Western AFWA)

Dan Forster, Director
Wildlife Resources Division, Georgia Department of Natural Resources
(Southeastern AFWA)

Curtis Taylor, Chief of Wildlife Resources
West Virginia Division of Natural Resources
(Northeastern AFWA)

Dr. John Fischer
Southeastern Cooperative Wildlife Disease Study
College of Veterinary Medicine, University of Georgia

H. Dale Hall, Director
Fish and Wildlife Service, U.S. Department of the Interior

Dr. Susan Haseltine, Associate Director for Biology
U.S. Geological Survey

Dr. John R. Clifford, Deputy Administrator
APHIS Veterinary Services, U.S. Department of Agriculture

William (Bill) H. Clay, Deputy Administrator
APHIS Wildlife Services, U.S. Department of Agriculture

Gary Taylor, Legislative Director
Association of Fish and Wildlife Agencies

Dr. Robert (Bob) Gerlach, State Veterinarian
Alaska Department of Environmental Conservation

Fred Matt, Executive Director
Native American Fish & Wildlife Society

Rev. 9/3/08


National Fish & Wildlife Health Initiative

for the United States

June 2007

ASSOCIATION *of* FISH & WILDLIFE AGENCIES

The Association of Fish and Wildlife Agencies—the organization that represents all of North America's fish and wildlife agencies—promotes sound management and conservation, and speaks with a unified voice on important fish and wildlife issues..

Support for the development of the
National Fish and Wildlife Health Initiative provided by:

The William and Flora Hewlett Foundation
Turner Foundation, Inc.

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 wildlife, domestic animals, and humans. The intentional or accidental introduction of these diseases can significantly affect fish, wildlife, domestic animals or human populations and necessitate a coordinated, multi-agency response.

The mission of the National Fish and Wildlife Health Initiative (NFWHI) is to conserve, restore, and enhance healthy fish and wildlife resources of the United States by recognizing and respecting the missions, jurisdictions, and abilities of fish and wildlife managers to address health issues. This mission will be achieved by six principal strategies:

1. Identify, characterize, respect, and integrate the authorities and capabilities of cooperating partners in complementary fashion.

2. Identify state, federal and other fiscal and staff resources for state, federal, and territorial fish and wildlife health programs and facilitate their optimal use and allocation.

3. Conduct proactive, coordinated and sustained surveillance for pathogens in fish and wildlife, and respond to findings according to risk.

4. Support applied research pertinent to fish and wildlife health, development of integrated disease management strategies, and improved technology for fish and wildlife health management.

5. Establish and maintain a fish and wildlife disease Web site, uniform training for critical staff of cooperating partners, and communication plans and networks to inform policymakers and citizens about fish and wildlife health.

6. Establish a NFWHI Steering Committee to facilitate, oversee, and coordinate interactions among partners and provide the support necessary for effective implementation of the Initiative.

The two over-arching goals of this initiative are to: facilitate establishment and enhancement of state, federal, and territorial fish and wildlife management agency capability to effectively address health issues involving free-ranging fish and wildlife; and minimize the negative impacts of health issues affecting free-ranging fish and wildlife through surveillance, management, and research.

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

1. Establish or augment state, federal, and territorial fish and wildlife management agency capacities (human, financial and physical) to address fish and wildlife health issues.
2. Train fish and wildlife biologists and veterinarians as cornerstones of a comprehensive network of state, federal, and territorial fish and wildlife health programs.
3. Recognize, respect, articulate and integrate the abilities and authorities of cooperating state, tribal, territorial and federal agencies and other partners.
4. Create communication strategies to build support for this Initiative via active dialogue with other agency personnel, policymakers, stakeholders and the public about fish and wildlife health issues.
5. Prevent introduction, establishment, and spread of priority 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.

Beyond this written formulation of the Initiative, the next steps to be undertaken are:

1. Appoint a Steering Committee for the Initiative by May 2007, and
2. Steering Committee will work with the Fish and Wildlife Health Committee to oversee the development of the Implementation Plan.

DEFINITIONS

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

Pathogen: any agent (organism or substance) capable of inducing abnormal structural or functional changes in the body, which, in turn can lead to illness and clinical manifestations of disease.

Disease: Illness; an interaction of the affected animal (the host), the pathogen and /or processes causing illness (the agent), and the environmental factors influencing all of them.

Epidemiology: The study of the distribution of disease in populations and of the factors that determine its occurrence.

Risk analysis: A process for objectively assessing risks of disease introduction into a population, evaluating management options for diminishing or controlling those risks, and communicating information about those risks to all stakeholders.

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

The importance of maintaining healthy populations has long been recognized by fish and wildlife managers, and several disease issues are of growing concern to fish and wildlife, domestic animal, and public health professionals and the publics they serve. Significant diseases, such as plague, hemorrhagic disease, pasteurellosis, chronic wasting disease, botulism, viral hemorrhagic septicemia, West Nile virus, whirling disease, and others have been found in wild and farmed fish or wildlife populations in North America and can have a significant biological and economic effect on state and federal public trust resources. Reservoirs of economically important diseases including bovine brucellosis and bovine tuberculosis have inadvertently become established in native wildlife and threaten livestock industries in some areas. Foreign animal diseases eradicated from the continent decades ago, such as foot and mouth disease and classical swine fever, and those historically not reported in North American wildlife, such as highly pathogenic avian influenza, are a constant concern. Human activities (alteration of ecosystems, movement of pathogens, hosts or vectors, etc.), as well as improved recognition through advances in diagnostics and epidemiology, continually provide occasions for the discovery, emergence and resurgence of diseases at the interface of wildlife, domestic animals, and humans. The intentional or accidental introduction of new disease agents could have a significant impact on fish, wildlife, domestic animals or human populations and would necessitate a coordinated multi-agency response.

The dramatically growing importance of fish and wildlife health issues in natural resource management makes it imperative that more human, financial, and technological resources be directed toward them in the future. Responsibility and authority issues warrant greater state, federal, tribal, and territorial fish and wildlife management agency attention, as does the increasing recognition that disease agents in free-ranging fish and wildlife have implications for domestic animals and humans. In addition to more traditional fish and wildlife health issues, state, federal, tribal, and territorial natural resource management agencies must also face emerging issues, including the threats of bio- and agroterrorism, and unintentional introduction of disease agents, such as highly pathogenic avian influenza (HPAI) virus. As stewards in trust of priceless public resources, state and federal fish and wildlife management agencies must proactively take on such issues; if they do not, they are being deficient in their required public trustee duties and risk the possibility that other state or federal agencies will do so without their input or consent. Alternatively, and perhaps more ominously, they run the risk that issues of fish and wildlife health will be addressed haphazardly, inadequately, or not at all.

Responsibility and authority for conserving fish and wildlife resources rest in state and federal natural resource management agencies. Public trust stewardship is the very cornerstone of North American natural resource management as fish and wildlife are common property of the citizens of each state. Thus, successful fish and wildlife health programs must necessarily be centered in the states as well. However, there is no “one size fits all” approach to fish and wildlife health programs. Several states have had strong programs with full-time fish and wildlife health professionals for decades. Others have instituted new programs in recent years. Still others have pooled resources to create regional wildlife health cooperatives (see Exhibit 1).

Regardless of the structure of a state’s fish and wildlife health program, cooperation among local, state, tribal, territorial, and federal public health, domestic animal health, and natural resources agencies will invariably be essential because of overarching issues, shared regulatory authority, and limited resources. The greatest opportunities for addressing significant local health issues will be in programs where the state fish and wildlife management agency prioritizes the issues and collaborates with other governmental and nongovernmental organizations to address them. Through this approach, state fish and wildlife management agencies will improve their understanding and management of diseases, develop and share data useful to others, and maximize the financial, technological, and human resources that inevitably will be limited.

To accomplish these goals, we propose the implementation of the National Fish and Wildlife Health Initiative (NFWHI) by a multi-disciplinary consortium of state, tribal, territorial, federal, university, corporate, and nonprofit organizations under the leadership of the Association of Fish and Wildlife Agencies (AFWA). Although national in scope, NFWHI will not mandate programs at the state, federal, tribal, or local level. The NFWHI is dedicated to advancing the science, awareness, and fostering cooperation related to all aspects of fish and wildlife health. It is a policy framework by which all interested parties may seek both to minimize the negative impacts of disease agents in fish and wildlife, and to proactively promote healthy fish and wildlife populations. The United States Animal Health Association (USAHA) supports the development and implementation of the NFWHI, under AFWA leadership, and passed a resolution to that effect in 2005.

Guiding Principles

THE NATIONAL FISH AND WILDLIFE HEALTH INITIATIVE WILL:

- Support the AFWA vision for healthy fish and wildlife resources throughout North America managed by effective, well-funded resource agencies supported by informed and involved citizens;
- Support the AFWA mission to protect state authority and support territorial authority for wildlife conservation; promote sound science-based resource management; and strengthen state, territorial, federal, and private cooperation in conserving fish and wildlife resources;
- Recognize that free-ranging fish and wildlife have fundamental ecological and aesthetic value and that these resources and associated recreational activities have economic value and contribute significantly to the quality of life and the economy on a local, state, and national basis;
- Recognize that as the front-line managers, state fish and wildlife agencies are responsible for managing diseases in free-ranging fish and wildlife, and several already have in place much of the knowledge, personnel, equipment, and local public support to prevent, monitor, detect, and respond to disease issues;
- Foster development and maintenance of additional competencies, management tools, and training in fish and wildlife health management within state fish and wildlife agencies;
- Promote science-based management strategies for health issues that involve or impact free-ranging fish and wildlife and recognize that some disease agents found in fish and wildlife are of significance to domestic animal and human health, and vice versa;
- Recognize, articulate, and integrate the abilities and authorities of cooperating state, tribal, territorial, and federal agencies and other partners;
- Foster collaboration, coordination, and communication among fish and wildlife health jurisdictions, as well as with domestic animal health and public health agencies at the state and national level;
- Recognize that animals and disease agents do not observe political boundaries, necessitating interstate and international coordination of health management efforts;
- Recognize that state fish and wildlife management agencies are a key component in local response to biosecurity and bioterrorism threats and incidents and emphasize the importance of involvement, support, training, and planning for key agency personnel;
- Recognize fish and wildlife health management as an essential component of any fish and wildlife conservation program and emphasize the importance and efficacy of prevention, as opposed to control or eradication efforts, as a strategy for managing diseases in free-ranging fish and wildlife;
- Recognize the need to develop and disseminate science-based information to educate the public about the significance of diseases in fish and wildlife populations and the value of integrated prevention and management programs; and
- Recognize that free-ranging fish and wildlife are publicly-owned resources, and that effective guardianship of their health must necessarily take human dimensions of wildlife management into account.

Mission, Goals, and Objectives

The mission of the NFWHI is to conserve, restore, and enhance the fish and wildlife resources of the United States by providing a cooperative platform to empower fish and wildlife managers to set priorities and to manage fish and wildlife health issues of local, national and international scope. This mission will be achieved by six principal strategies:

1. Identify, characterize, respect, and integrate the authorities and capabilities of cooperating partners in complementary fashion.
2. Identify state, federal and other fiscal and staff resources for state, federal, and territorial fish and wildlife health programs and facilitate their optimal use and allocation.
3. Conduct proactive, coordinated and sustained surveillance for pathogens in fish and wildlife, and respond to findings according to risk.
4. Support applied research pertinent to fish and wildlife health, and development of integrated disease management strategies, and improved technologies for fish and wildlife health management.
5. Establish and maintain a fish and wildlife disease Web site, uniform training for critical staff of cooperating partners, and communication plans and networks to inform policymakers and citizens about fish and wildlife health.
6. Establish a NFWHI Steering Committee to facilitate, oversee, and coordinate interactions among partners and provide the support necessary for effective implementation of the Initiative.

GOALS:

1. Facilitate establishment and enhancement of state, federal, and territorial fish and wildlife management agency capability to effectively address health issues involving free-ranging fish and wildlife.

2. Minimize the negative impacts of health issues affecting free-ranging fish and wildlife through management, surveillance, and research.

OBJECTIVES:

1. Establish or augment state, federal, and territorial fish and wildlife management agency capacities (human, financial and physical) to address fish and wildlife health issues.

2. Train fish and wildlife biologists and veterinarians as cornerstones of a comprehensive network of state, federal, and territorial fish and wildlife health programs.

3. Recognize, respect, articulate and integrate the abilities and authorities of cooperating state, tribal, territorial and federal agencies and other partners.

4. Create communication strategies to build support for this Initiative via active dialogue with other agency personnel, policymakers, stakeholders and the public about fish and wildlife health issues.

5. Prevent introduction, establishment, and spread of priority 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.

Photo by Glen Smart, US FWS

Implementation Strategy

1. Identify, characterize, respect, and integrate the authorities and capabilities of all cooperating partners in complementary fashion.

⇒ Conduct a comprehensive survey of all partners to ascertain their current authorities, capabilities and spheres of influence. Make this information available to all partners, with periodic updates over time.

⇒ Identify policies needed to fill gaps in authority and capabilities and to increase efficiency of existing policies.

⇒ Identify the benefits derived by fish and wildlife resources and the public from new policies.

⇒ Work with partners to advance a legislative agenda at both the state and federal level that:

- Ensures each state fish and wildlife management agency has the legally mandated responsibility for fish and wildlife health issues within the state or territory;

- Implements necessary protective legislation and regulations to prevent pathogen importation, establishment, and/ or dispersal in fish and wildlife, and controls human activities that increase opportunities for those outcomes.

Measures of progress: Periodic reviews of national, state, tribal, and territorial health program capabilities and legal authorities; report of survey findings.

2. Identify state, federal and other (e.g., non-governmental organization, university, etc.) fiscal and staff resources for state, federal, and territorial fish and wildlife health programs and facilitate their optimal use and allocation.

⇒ Identify federal and other resources for fish and wildlife health to enhance the capabilities of federal, state, tribal, and territorial fish and wildlife agencies.

⇒ Make recommendations and provide coordination for allocation of these resources to ensure adequate capabilities in all states and efficiently address national priority issues, based on their risk.

⇒ Develop new funding options for fish and wildlife health research and to implement the Initiative.

Measures of progress: Accounts of resources committed and their distribution; development of new funding opportunities and options.

3. Conduct proactive, coordinated and sustained surveillance for pathogens in fish and wildlife, and respond to findings according to risk.

⇒ Develop an integrated infrastructure necessary to ensure rapid, accurate collection, analysis and dissemination of pathogen and disease surveillance information. Tasks include:

- Establish an integrated national surveillance network, with potential for international expansion, by connecting existing state, federal, and territorial surveillance programs and diagnostic laboratories, and promoting complementary growth.

- Implement a secure, standardized reporting system for state, federal, and territorial fish and wildlife agencies (perhaps linked to the fish and wildlife disease Web site), to increase the availability of timely, comprehensive information, and improve the efficacy of their limited resources.

- Incorporate information from human and domestic animal disease surveillance systems to monitor risk of pathogen movement between these species and free-ranging fish and wildlife.

⇒ Proactively develop contingency plans for emergency disease events, including decision and communications processes, coordinated among agencies and political jurisdictions.

⇒ Promote and facilitate the development of standardized surveillance systems for free-ranging fish and wildlife pathogens.

⇒ Develop and maintain adequate capacity for highly effective field response to pathogen introductions and disease outbreaks in free-ranging fish and wildlife.

Measures of progress: Number of states and territories implementing standardized fish and wildlife disease surveillance; accounts of state and territorial field response capacities for pathogens in fish and wildlife; numbers of contingency plans for pathogens in fish and wildlife; and annual reports of number and distribution of pathogens in fish and wildlife by state and territory.

4. Support applied research to improve technologies and strategies for detecting and managing health issues in fish and wildlife.

⇒ Consult with partners to identify priority areas of multidisciplinary fish and wildlife health research, including:

• Prevention: Manage fish and wildlife habitat and populations for optimal population health;
• Risk analysis: Quantify fish and wildlife population health risks, develop appropriate risk analysis methodology, enumerate decision support and risk management options, and identify methods for effective risk communication;
• Surveillance support: Epidemiology, pathogenesis, new rapid detection equipment and methods, and development of specific and sensitive standardized and validated fish and wildlife health diagnostic techniques, procedures, and tests;
• Disease management: Specifically identify objectives and limits, and critically evaluate available integrated | disease management methods; and
• Human dimensions: Understand factors affecting stakeholder beliefs and attitudes about fish and wildlife health and how those beliefs and attitudes influence effective disease management.

⇒ Maintain an ongoing dialogue with decision makers in government, academia and stakeholder groups to make certain fish and wildlife health priorities are included in research programs.

⇒ Apply research findings to develop improved health management options, and compile a depository of those options as reference case studies via the fish and wildlife disease Web site.


Photo by Dave Kenyon

Measures of progress: Annual reports identifying priority research topics; annual reports of number of priority research |projects proposed, funded and completed; annual reports of science-based management interventions undertaken, with outcomes over time; annual summaries of publications and technology transfers resulting from priority research projects; annual milestones to development of the depository of fish and wildlife health management options, territorial surveillance programs and diagnostic laboratories, and promoting complementary growth.

5. Establish and maintain a fish and wildlife disease Web site, uniform training for critical staff of cooperating partners, and communication plans and networks to inform policymakers and citizens about fish and wildlife health.

⇒ Expedite systematic communication, education, and coordination among partners through a fish and wildlife disease Web site, to:

• Archive accurate, science-based disease agent information for significant diseases;
• Incorporate existing infrastructure and (hyper)link partners to the Web site and to each other.
• Inform state, federal, and territorial fish and wildlife agency personnel, including field staff, administrators and policymakers, of health resources and expertise currently available and how to access them; and
• Inform partners, stakeholders and the public of impending threats and other significant developments in fish and wildlife health.

⇒ Train state and territorial fish and wildlife health specialists to build capacity, using a standardized program that provides uniform, basic training with special emphasis on regional issues.

⇒ Create, implement and evaluate standardized communication plans to inform varied audiences about general fish and wildlife population biology, ecology and health, as well as specific pathogen and disease topics. These plans must be appropriate for varied audiences to include agency staff, policymakers, stakeholders, media, and the public. The plan will ensure common, consistent, and science-based messages among state, territorial, federal and tribal agencies. Notably, communication planning will be an ongoing priority, receiving sustained attention as issues emerge, peak and wane. Specific tasks include:
• Conduct human dimensions research to better identify what target audiences think, feel and understand about fish and wildlife health issues;
• Define goals, set measurable objectives, and develop and test messages based on this research;
• Gather existing case studies and example communication plans in an easily accessible web-based location for education;
• Assemble researchers and communicators from partner organizations to develop the plans and education materials to communicate the messages successfully, and enact the plans; and
• Subject the plans to progressive evaluation and revision until research confirms desired outcomes are achieved.

Measures of progress: Milestones to development of the fish and wildlife disease Web site; annual number of fish and wildlife health specialists trained; number of communication plans developed, implemented and re-evaluated each year.


Photo by Dave Kenyon

6. Establish a NFWHI Steering Committee to facilitate, oversee, and coordinate interactions among partners and provide the support necessary for effective implementation of the Initiative.

⇒ The Steering Committee will be assembled with representation from government partner groups (see Governance section) and strive for consensus. Among its specific roles:
• Define needs based on current and emerging fish and wildlife health issues;
• Establish fish and wildlife health policies based on prioritized needs;
• Coalition building;
• Promote necessary interagency agreements to define partner responsibilities in order to effectively address fish and wildlife health issues in a particular state or territory; and
• Conflict resolution.

Measures of progress: Establishment of the Steering Committee by May 2007; establishment of Steering Committee bylaws and structure for reporting milestones; proceedings of Steering Committee meetings.

Governance

Given the diversity of the state and territorial fish and wildlife management agencies that have spearheaded development of the NFWHI, as well as the scope and complexity of fish and wildlife health issues they face, a central structure for coordination at the national level is essential. A National Fish and Wildlife Health Steering Committee (NFWHSC) and a small support staff will be established to provide this foundation.

STEERING COMMITTEE. The NFWHSC will bear responsibility to facilitate, oversee and coordinate interactions between partners and provide the support structure necessary for effective implementation of the Initiative. The Committee will be comprised of 12 representatives drawn from the partner groups as follows:

- Chairperson of the AFWA Fish and Wildlife Health Committee (1), Chair;
- Directors from each of the four Regional Associations (Northeast, Midwest, Southeast and Western) (4);
- Director of US Fish and Wildlife Service (1);
- Associate Director of Biology, USGS (1);
- Deputy Administrator of USDA APHIS VS (1);
- Deputy Administrator of USDA APHIS WS (1);
- State Veterinarian (1);
- Academic Institution (1);
- Tribal fish and wildlife management entity (1);

Initially, the Steering Committee will be named by AFWA from nominations submitted by AFWA members and partners. A Charter specifying bylaws, terms of service, procedural rules, specific responsibilities of membership and other matters will be developed by the NFWHSC. In addition, the Steering Committee will also be charged with selecting the appropriate entities from non-government organizations, associations, industry, and other private organizations to serve on a Non Governmental Organization Caucus.

Core administrative support will initially be provided by the states, through AFWA. Minimal permanent staff positions will be filled as needed during implementation of the Initiative. Funding for these staff positions will be provided by a combination of federal appropriations, intergovernmental personnel agreements, and partner contributions.

FEDERAL CAUCUS. A Federal Caucus will be named as a key advisory body to the Steering Committee. The Caucus will provide a vehicle through which federal partners can (1) jointly identify strategies and resources to support actions under the NFWHI, (2) ensure that the Initiative reflects the priorities of federal agencies, and (3) provide a communication link among cooperating federal partners. The Caucus will work to promote federal agency policy consistent with the NFWHI. The Caucus will effectively serve as a forum for articulation and refinement of federal perspectives concerning fish and wildlife health issues, and a channel for information flow between federal partners and the NFWHSC.

The Caucus will be comprised of all federal agencies interested in fish and wildlife health issues and willing to facilitate the implementation and maintenance of the Initiative. In order to obtain comprehensive and varied input, the number of members participating in the Federal Caucus will not be limited. Initially, the Caucus will be comprised of representatives from the following U.S. Departments: Agriculture (Animal and Plant Health Inspection Service - Veterinary Services [APHIS-VS] and Wildlife Services [APHIS-WS], Agricultural Research Service, Forest Service), Commerce (National Oceanic and Atmospheric Administration - National Marine Fisheries Service), Health and Human Services (Centers for Disease Control and Prevention, Public Health Service, Food and Drug Administration), Interior (Bureau of Land Management, Fish and Wildlife Service, Geological Survey, National Park Service, Bureau of Indian Affairs), and Environmental Protection Agency. Affiliates of the U.S Departments of Defense and Homeland Security will also be invited to participate. One representative from the Department of the Interior and one representative from the Department of Agriculture will serve as Federal Caucus Co-Chairs and will function as liaisons to the Steering Committee.

Exhibits

1. **EXAMPLES OF SUCCESSFUL FISH AND WILDLIFE HEALTH PROGRAMS:**

   State Fish and Wildlife Health Programs,
   Regional Fish and Wildlife Health Cooperatives,
   The Great Lakes Fish Health Committee,
   The Epizootic Hemorrhagic Disease Project, and
   Federal Support of State Fish and Wildlife Health Programs

2. **SAMPLE OF INITIATIVE PARTNERS**

3. **NATIONAL FISH AND WILDLIFE HEALTH INITIATIVE MILESTONES**

4. **NATIONAL FISH AND WILDLIFE HEALTH INITIATIVE LEADERSHIP**

EXHIBIT 1: EXAMPLES OF SUCCESSFUL FISH & WILDLIFE HEALTH PARTNERSHIPS

Currently, the ability of state and territorial fish and wildlife management agencies to prevent, detect, monitor, and manage disease and other health problems impacting free-ranging wild animals is highly variable. To progress towards the NFWHI's goal of adequate capacity in each and every state and territory (capacity under state and territorial control), improvement in funding, cooperation and outreach are all necessary. While building capacity is a common need, the numerous and diverse examples of flourishing fish and wildlife health programs shows that a variety of routes can be taken to arrive at the same successful programmatic outcome.

STATE FISH AND WILDLIFE HEALTH PROGRAMS

A cornerstone of the research and management of wildlife health is strong programs under the authority of state and territorial fish and wildlife management agencies. Such programs have been established and maintained over time in a number of states, including Alaska, California, Colorado, Michigan, New York, Wisconsin and Wyoming, among others. In 1927, the increases, and as the deliberate manage- groundwork was laid for the pioneering U.S. program in Michigan:

> As the value of our wild life resources increases, and as the deliberate management of those resources is intensified, we shall no doubt parallel the previous experience with domestic birds and mammals, and shall have to contend with an unending series of diseases and parasites. Under these circumstances it is highly desirable that Michigan should develop at home, first class facilities for research in connection with the pests, parasites and diseases of … wild life forms. It should not be necessary for us to depend upon Washington, or upon laboratories in other states, for the service of this sort.
> *(Michigan Department of Conservation, Game Division, Fourth Biennial Report, 1927-1928, pp. 265-267).*

With that independent vision, the Michigan Department of Conservation's Wildlife Disease Laboratory (WDL) was established in 1933, the first of its kind. Its initial stated role was to study starvation, nutrition and diseases of Michigan wildlife. And for over seven decades the WDL has trained veterinary and wildlife biology students at Michigan State University, monitored causes of death and illness for the multitude of game and non-game Michigan wildlife species, and carried out research and management of several significant animal diseases including bovine tuberculosis, Type E botulism, and epizootic hemorrhagic disease. This success story was possible in large measure because of substantial and sustained funding from both state (hunting and fishing license fees, State Building Authority bond funds, and general fund monies) and federal (Pittman-Robertson grants) sources. The Michigan Department of Natural Resources (MDNR) WDL is an example of how strong state wildlife health programs can benefit not only wildlife, but domestic animal and public health as well.

REGIONAL FISH AND WILDLIFE HEALTH COOPERATIVES

Several states and Canadian provinces have pooled their resources to form cooperatives. Wildlife management agencies in the Midwestern, Southeastern, and Western Associations of Fish and Wildlife Agencies have formed regional wildlife health cooperatives. The Midwestern and Western Wildlife Health Cooperatives are consortia of individual state wildlife health programs, several of which have long invested in staff positions and other dedicated infrastructure. In a similar fashion, the veterinary colleges and several governmental and non-governmental organizations in Canada have formed and support the Canadian Cooperative Wildlife Health Center. As exemplified by the Great Lakes Fish Health Committee, described below, these co-ops may bridge not only agency, but national boundaries.

The oldest of the cooperative programs is the Southeastern Cooperative Wildlife Disease Study (SCWDS). The SCWDS program began in response to a number of severe white-tailed deer mortality events in the 1950s, eventually determined to be due to hemorrhagic disease. The SCWDS program was founded at the University of Georgia, College of Veterinary Medicine by the Southeastern Association of Fish and Wildlife Agencies in 1957, with eleven original state members. Through a cooperative approach, the funds of individual SCWDS member states, which currently number sixteen plus the Commonwealth of Puerto Rico, are leveraged with dollars from each other, from the U.S. Departments of Interior (USDI) and Agriculture (USDA), and grants obtained by SCWDS faculty, to develop and disseminate wildlife health information of use to all partners. This approach allows the individual agencies supporting SCWDS to obtain much more for their investments than would otherwise be possible if working independently.

All of the above cooperatives, whatever their structure, allow for better information sharing and, in many cases, have promoted a more uniform approach to common disease problems affecting a number of different states or provinces.

THE GREAT LAKES FISH HEALTH COMMITTEE

Established in 1973 under Article VI of the Great Lakes Fishery Commission (GLFC) Convention between the United States and Canada (1955), the Great Lakes Fish Health Committee serves as the instrument of the Commission in coordinating regional efforts in the Great Lakes basin to prevent introduction and dissemination of communicable fish diseases. The Committee carries out this role by: recommending and fostering conduct of research and studies related to fish health and disease control; recommending and coordinating measures among member agencies which minimize risk of introduction and dissemination of communicable fish disease; and preparing for publication scientific and other information related to fish health protection.

The Committee consists of two representatives appointed by each agency formally cooperating with the Great Lakes Fishery Commission. Currently, these agencies represent the eight Great Lakes states, the Province of Ontario, the American and Canadian federal governments, and the tribal authorities. All positions and policies are adopted by the consensus of the member agencies. Technical advisors approved by the Committee are periodically invited to provide specialist expertise as required to enhance the conduct of the Committee's work.

In the past two decades, the Committee has made considerable progress in improving fish health management in the Great Lakes basin. Some of the achievements include:

- Development and publication of policies and protocols to reduce the risk of introducing or transferring serious disease agents into or within the Great Lakes basin (e.g. the “Great Lakes Fish Disease Control Policy and Model Program” and “Protocol to Minimize the Risk of Introducing Emergency Disease Agents with Importation of Salmonid Fishes from Enzootic Areas”);

- Providing a forum for member agencies to discuss and recommend ways to manage serious disease outbreaks and associated fisheries management decisions (e.g., where and if to stock or destroy infected hatchery fish) along with providing support for these actions;

- Increasing awareness of the importance of fish health in both wild and cultured fish through participation at GLFC and Lake Committee meetings, and through development of educational tools such as the publication "A Guide to Integrated Fish Health Management in the Great Lakes Basin" and information sheets for such pathogens as *Heterosporis* sp.; and

- Providing a focus for the development and transfer of new fish health science and technology that is in turn used to update Committee policies and protocols, as well as in the development or revision of member agency legislation and policies.

The Great Lakes Fishery Commission operates a Science Transfer Program to promote partnerships through the communication of information about Great Lakes ecosystems and their fish communities, sea lamprey control, and emerging ecological concepts and technologies to fishery researchers and managers, to governments, and to the public. The program provides a source of funding to support the Joint Strategic Plan for Management of Great Lakes Fisheries, which includes support for the Committee's research priorities. In addition, the Committee formulates a priority list of research and information needs annually and achieves increased awareness and understanding of fish health issues through extension and education efforts.

THE HEMORRHAGIC DISEASE SURVEILLANCE PROJECT: A LONG-TERM NATIONAL DATABASE

Bluetongue and epizootic hemorrhagic disease are the most important viral diseases of white-tailed deer in the United States. Clinically indistinguishable from each other in deer, they are often collectively referred to as hemorrhagic disease (HD). The importance of HD was realized in the 1950s, when focally extensive mortalities of free-ranging deer jeopardized deer restoration programs in which wildlife agencies had invested significant financial and human resources. Since first recognized, HD has caused focal but severe mortality across much of the whitetail's range in the U.S. However, understanding HD epidemiology was complicated by underreporting, inconsistent diagnostic criteria, and lack of coordinated communication between states experiencing die-offs.

Since 1980, the Southeastern Cooperative Wildlife Disease Study has sent questionnaires every year to administrators and biologists of fish and wildlife management agencies, as well as veterinary diagnosticians, in all U.S. states. The questionnaires solicited information on HD occurrence, based on four consistent diagnostic criteria, at the country level. Preliminary results were complied, and follow-up contact was made when clarification was necessary and with non-respondents to obtain nationally complete information. Each year, an interim report was prepared and sent to participating states for review and corrections, with the final annual report later delivered to all participants. The major advantages of this system were its simplicity, continuity over a long period of time, and its national scope. Above all, the benefits that participants received were greater than their contributions to the project.

Through this surveillance project, 1608 HD cases in 880 counties in 31 states were independently recorded by more than 380 state wildlife biologists in the first ten years. The data accumulated in the 25 years since inception have elucidated the geographic and temporal distribution HD across the entire nation and facilitated the identification of variable clinical response to infection first on a geographic basis and later as a function of the frequency of viral exposure and the development of resistance. In addition, HD Project surveillance has provided data for disease modeling, focused research, and efficient resource allocation. Perhaps most importantly, the Project provided opportunities for cooperative interactions among states to address a common wildlife health problem, resulting in improved training, communications, and a template for regional and national collaboration for other diseases involving wildlife.

FEDERAL SUPPORT FOR STATE FISH AND WILDLIFE HEALTH PROGRAMS

First, since the passage of the Federal Aid in Wildlife Restoration (Pittman-Robertson) Act of 1937, billions of dollars generated by an eleven percent excise tax on sporting firearms, ammunition, and archery equipment have been collected by the federal government and distributed as grants to state fish and wildlife agencies to fund wildlife conservation programs. A similar program, the Federal Aid in Sport Fish Restoration (Dingell-Johnson) Act of 1950, has generated federal grants for wild fish conservation through an excise tax on fishing equipment and small boat fuels, and import duties on fishing tackle, yachts and pleasure craft. Management and research of fish and wildlife health issues form a fundamental component within the framework of conservation. Dingell-Johnson and Pittman-Robertson monies have been put to good use in many states to supplement state funds, or to leverage state funds and allow their application to other needs.

Another excellent example of federal financial support for state wildlife management agencies to conduct disease surveillance and management has come through the USDA's Animal and Plant Health Inspection Services - Veterinary Services (APHISVS). Beginning in fiscal year 2003 and continuing to date, APHIS-VS has provided $4 to 5 million each year in direct support of state activities related to chronic wasting disease (CWD). Additionally, APHIS-VS dramatically increased the number of approved laboratories and their testing capacity for transmissible spongiform encephalopathy (TSE) in 2002 by providing equipment, reagents, training, consultation, and quality control and assurance to a total of 26 facilities. The provision of federal funds through APHIS-VS for CWD surveillance and management activities directed and conducted by state wildlife management agencies should serve as a model for cooperative federal support of state wildlife health programs.

The provision of federal personnel to assist state fish and wildlife management staff in times of peak need provides a third example. Beginning in 2004, USDA's APHIS-WS hired several wildlife disease biologists with the primary mission of assisting the states with disease surveillance. The MDNR WDL incorporated fifteen of these biologists into its bovine tuberculosis and CWD testing programs in November 2004. That help was in addition to services provided by four APHISVS veterinarians and technicians as part of a cooperative program in place now for nearly a decade. The capable assistance of these federal personnel saved MDNR an estimated $120,000 in labor costs.

EXHIBIT 2 : SAMPLE OF INITIATIVE PARTNERS (AS OF MARCH 2007)‡

FEDERAL/TRIBAL

Bureau of Land Management

Centers for Disease Control and Prevention

Department of Homeland Security

Great Lakes Fishery Commission

Great Lakes Fish Health Committee

National Park Service

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services

U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services

U.S. Fish and Wildlife Service

U.S. Geological Survey

NON GOVERNMENTAL

American Association of Wildlife Veterinarians

American Fisheries Society

American Sportfishing Association

Association of State and Territorial Health Officials

National Assoc. of State Public Health Veterinarians

National Wildlife Federation

Native American Fish and Wildlife Society

Quality Deer Management Association

Rocky Mountain Elk Foundation

U.S. Animal Health Association

The Wildlife Society

Wildlife Conservation Society

Wildlife Disease Association

STATE/UNIVERSITY

Alabama Wildlife and Freshwater Fisheries

Arizona Game and Fish Department

Arkansas Game and Fish Commission

Association of Fish and Wildlife Agencies

Clemson University

Colorado Division of Wildlife

Connecticut Department of Environmental Protection, Wildlife Division

Florida Department of Health, Department of Agriculture, and Fish & Wildlife Conservation Commission

Georgia Department of Agriculture, Division of Public Health, and Wildlife Resources

Idaho State Department of Agriculture, Department of Fish and Game

Indiana State Board of Animal Health

Iowa Department of Natural Resources

Kansas Department of Wildlife and Parks

Kentucky Department of Fish and Wildlife Resources

Louisiana Department of Wildlife and Fisheries

Maryland Department of Natural Resources, and Department of Health and Mental Hygiene

Massachusetts Department of Fish and Game

Michigan Departments of Agriculture, Community Health , and Natural Resources

Michigan State University

Mississippi Department of Wildlife

Montana Department of Fish, Wildlife and Parks

Nebraska Department of Agriculture, and Game & Parks Commission

Nevada Department of Wildlife

New Hampshire Departments of Health and Human Services, and Fish and Game

New Mexico Departments of Game and Fish, and Health

New York State Department of Environmental Conservation

North Carolina Wildlife Resources Commission

North Dakota Departments of Health, and Game and Fish Department

Pennsylvania Game Commission

South Carolina Department of Natural Resources

South Dakota Department of Game, Fish and Parks

State Environmental Health Directors

Tennessee Wildlife Resources Agency

Texas Animal Health Commission, Parks and Wildlife Department

University of Georgia, Southeast Cooperative Wildlife Disease Study

Utah Division of Wildlife Resources

Utah State University, Jack H. Berryman Institute

Vermont Departments of Fish & Wildlife, and Department of Health

Virginia Department of Game & Inland Fisheries

West Virginia Division of Natural Resources

Wisconsin Departments of Agriculture, Natural Resources, and Division of Public Health

Wyoming Department of Health, Game and Fish Commission, and Livestock Board

‡ Partners list is incomplete and provided here as an illustration of the breadth of partners who have participated in the regional Initiative meetings or have provided written comments on the Initiative.

EXHIBIT 3: NATIONAL FISH & WILDLIFE HEALTH INITIATIVE MILESTONES

In view of the increasing need for fish and wildlife managers to effectively address disease issues, a National Fish and Wildlife Health Initiative (NFWHI) was developed under the leadership of the Association of Fish and Wildlife Agencies (AFWA) and in cooperation with governmental agencies and non-governmental organizations. The NFWHI is nested within AFWA's infrastructure and process and is under the formal direction of the AFWA.

Development of the National Fish and Wildlife Health Initiative began in 2005 when an ad hoc group met to discuss the Initiative's core concepts. The Guiding Principles presented earlier were devised from these core concepts. During fall 2005, resolutions were passed by the AFWA and USAHA supporting development and implementation of a National Fish and Wildlife Health Initiative under AFWA leadership. The AFWA also adopted the Guiding Principles for the NFWHI. In January 2006, a core work group met in Lansing, Michigan to develop a framework for the Health Initiative. In an effort to gather input on the draft Initiative, add content, and build a collaborative process, a series of four regional meetings were held during spring and summer 2006. Professionals from federal and state agriculture, public health, and fish and wildlife management agencies were invited to attend these meetings and provide comments on the Initiative. A fifth meeting was held in Washington, D.C. to gather input from various non-governmental organizations. During January 2007, a small work gathered in Washington, DC to further refine the Initiative specifically focusing on the Governance section.

EXHIBIT 4: NATIONAL FISH & WILDLIFE HEALTH INITIATIVE LEADERSHIP

Core Work Group

Gregg Arthur, Wyoming Game and Fish Commission

Jordan Burroughs, Michigan State University

David Cobb, North Carolina Wildlife Resources Commission

John Fischer, Southeastern Cooperative Wildlife Disease Study

Dan Forster, Georgia Department of Natural Resources, Wildlife Resources Division

Rebecca Humphries, Michigan Department of Natural Resources

Terry Mansfield, Idaho Department of Fish and Game

Mike Miller, Colorado Division of Wildlife

Bruce Morrison, Nebraska Game and Parks Commission

Dan O'Brien, Michigan Department of Natural Resources

Steve Schmitt, Michigan Department of Natural Resources

Gary Taylor, Association of Fish and Wildlife Agencies

Gary Whelan, Michigan Department of Natural Resources

ASSOCIATION of
FISH & WILDLIFE
AGENCIES

The Association of Fish and Wildlife Agencies—the organization that represents all of North America's fish and wildlife agencies—promotes sound management and conservation, and speaks with a unified voice on important fish and wildlife issues..

ADDENDUM TO NATIONAL FISH AND WILDLIFE HEALTH INITIATIVE

ASSOCIATION of FISH & WILDLIFE AGENCIES

CHARTER

NATIONAL FISH AND WILDLIFE HEALTH STEERING COMMITTEE

I. BACKGROUND

The National Fish and Wildlife Health Steering Committee (Committee) will facilitate the design of a cooperative, nationwide program to conserve, restore, and enhance healthy fish and wildlife resources of the United States which recognizes and respects the missions, agency jurisdictions and abilities of fish and wildlife managers to address health issues. The Committee, formed under the auspices of the Association of Fish and Wildlife Agencies' Fish and Wildlife Health Committee, is a voluntary entity of government partner groups that serves to oversee the implementation of a National Fish and Wildlife Health Action Plan (Plan), as called for in the National Fish and Wildlife Health Initiative. The Committee's work shall complement the mission and core responsibilities of the Fish and Wildlife Health Committee.

II. MISSION AND GOALS

The purpose of the Committee is to facilitate, oversee, and coordinate interactions among partners and provide the support structure necessary for effective implementation of a Plan.

The Committee’s mission is to enable the state and federal agencies to better conserve, restore, and enhance the fish and wildlife resources of the United States by providing a platform for multidisciplinary cooperation that will position states to establish fish and wildlife health priorities and to manage issues of local, national, and international scope in cooperation with federal partners.

The Committee’s goal is to assist with implementation of the six principle strategies. Specifically, the Committee’s charge is to:

- Define needs based on current and emerging fish and wildlife health issues;
- Establish fish and wildlife health policies based on prioritized needs;
- Coalition building;
- Promote necessary interagency agreements to define partner responsibilities in order to effectively address fish and wildlife health issues in a particular state or territory;
- Conflict resolution; and

- Select appropriate entities from non-government organizations, associations, industry, and other private organizations to serve on a Non Governmental Organization (NGO) Caucus.

III. COMMITTEE BYLAWS

A. Appointment

Committee membership will be named by the Association of Fish and Wildlife Agencies (the Association) from nominations submitted by the Association members and partners. The Association will have final responsibility for appointment and, if necessary, removal of all Committee members, except those serving by virtue of their office.

B. Membership

1. Members - the Committee shall consist of 12 members.

2. State Government Representatives – The Committee shall include five state fish and wildlife agency representatives and one state veterinarian representative. Each of the four regional Associations of Fish and Wildlife Agencies (Northeast, Southeast, Midwest, and Western) shall nominate a representative to the Association for approval. The fifth state representative shall be the Chairperson of the Association's Fish and Wildlife Health Committee who will also serve as Chair of the Committee.

3. Federal Government Representatives – The Committee shall include four federal agency representatives. These shall include the Associate Director for Biology, U. S. Geological Survey, the Deputy Administrator for U. S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), Wildlife Services, the Deputy Administrator for U. S. Department of Agriculture, APHIS, Veterinary Services, and the Director of the Fish and Wildlife Service, Department of the Interior, who shall serve by virtue of their office.

4. Indian Tribal Representation – The Committee shall include at least one representative from an Indian tribal or native Alaskan government.

5. University Representation – The Committee shall include at least one representative from an academic institution.

C. Terms of Service

1. Normal Term – Committee members shall serve at the pleasure of the Association for an indefinite term.

2. Vacancies – Any vacancy among the committee members shall be filled through appointment by the Association.

D. Procedures

1. Meetings – The Committee shall meet at the call of the Chair, but at least twice a year. The Chair shall endeavor to establish a proposed meeting schedule identifying potential meeting dates. Meeting notice must be provided in writing, but may be delivered by email or facsimile to each committee member. The chair, with due cause, may call the Committee for emergency meetings, provided, however, that business of the meeting must be restricted to the reasons for which the meeting is called.

2. Quorum – A majority of the current membership of the Committee shall constitute a quorum for the transaction of business.

3. Participation and Attendance – If a Committee member is not able to attend a Committee meeting he or she may appoint a designee provided a proxy is signed and presented to the Committee Chair. If a Committee member, other than a Committee member who serves by virtue of office, fails to attend three consecutive regularly scheduled meetings, the Chair, in consultation with the Association, may remove that person from the Committee and request that the Association appoint a replacement. A Committee member may participate in a Committee meeting by conference call with the prior approval of the Chair. If a Committee member, other than a Committee member who serves by virtue of office, attends three consecutive regularly scheduled meetings by conference call, the Chair, in consultation with the Association, may remove that person from the Committee and request that the Association appoint a replacement.

4. Voting – The Committee should strive to achieve consensus on all actions proposed. If consensus cannot be achieved within the time frame allotted to the action on the agenda, all actions must be approved by the vote of two-thirds of all members present (in person or by conference call) and voting. Each Committee member shall have one vote. All voting shall proceed under Robert's Rules of Order. The Committee may extend the discussion period for items on the agenda, or consider items not on the proposed agenda for a meeting, provided that such changes to the agenda must be approved by a vote at the time they are proposed.

5. Other Procedures – The Committee shall establish other procedures as needed to schedule meetings, develop agendas, and otherwise facilitate and conduct business.

6. Chair's Responsibilities – In addition to such duties established elsewhere in these bylaws, the Chair shall:

a. Prepare a written agenda of all matters to be considered by the Committee at any meeting;
b. Prepare and issue all notices, including notices of meetings, required to be given to the Committee;
c. Preside at all meetings of the Committee and, unless otherwise directed by the Committee, present items of business for consideration by the Committee in the order listed on the agenda for the meeting.
d. Conduct all meetings in accordance with Robert's Rules of Order and these bylaws;
e. Appoint subcommittees as required; and
f. Perform other duties as requested by the Committee.

7. Appointment of Vice-Chair – The Committee shall elect a Vice-Chair from among the Committee membership. In the absence of the Chair, or in the event of the Chair's inability to act, or in a conflict of interest for the Chair, the vice-chair shall perform the duties of the chair, and when so acting, shall have all the powers of and be subject to all the restrictions upon the Chair. The Vice-Chair shall perform such other duties as from time to time may be assigned by the Chair or by the Association. The Vice-Chair shall serve at the pleasure of the Committee.

E. Committee Responsibilities

1. Coordination – The Committee will coordinate agency and stakeholder involvement at the national level and establish national partnerships that may provide funding and other resources to the subcommittees and other efforts of the Plan.

2. Partnerships – The Committee will develop and amend, as appropriate, a strategy to encourage the formation of a Non Governmental Caucus (NGO Caucus).

3. Evaluation Criteria – The Committee will establish national measures of success and evaluation criteria guidelines for the Plan and Plan process.

4. Funding – The Committee will develop and implement strategies to increase public and private funding for fish and wildlife health initiatives, provided that the responsibilities for implementation of such strategies by any Committee member shall be limited by any legal or administrative restrictions that may apply to the activities of any such member.

F. Coordination and Support

1. Staff – The Committee shall accept staff support provided by the States, through the Association. The Chair, in consultation with the contributing

entities shall act on behalf of the Committee in directing the activities of the staff. The Chair, in consultation with the Committee, may accept additional staff or other support from other entities. The contributing entities shall take measures as they deem appropriate to facilitate communication, cohesiveness, and efficient operations for the benefit of the Committee.

2. Non Governmental Caucus – The Committee shall coordinate with the broadest possible range of non governmental organizations, associations, industries, and other interested private organizations to increase involvement and support for the conservation, restoration, and enhancement of healthy fish and wildlife resources at local, national, and international scales.

G. Subcommittees

The Committee may establish and otherwise manage subcommittees as needed to carry out the responsibilities of the Committee. Such subcommittees may include individuals who are not members of the Committee.

H. Committee and Subcommittee Expenses

Committee and subcommittees members will not be compensated for their time working on Committee or subcommittee business or traveling to meetings. Travel expenses generally should be borne by the agency or other entity that employs the committee or subcommittee member, but reimbursement arrangements may be made if funds for this purpose are available.

IV. PROCEDURE TO AMEND CHARTER

The Committee may decide to amend this charter by consensus or a two-thirds vote of all members present and voting. Any proposed change to this charter must be noted on the draft agenda that is sent out at the time the meeting is scheduled.

Where do States get their authority to manage wildlife?

In general, the States possess broad trustee and police powers over fish and wildlife within their borders, including fish and wildlife found on Federal lands within a State.
Since Roman times jurisdiction and access to wildlife have been the subject of legal debate. Questions of ownership and access to wildlife have been addressed in principles surrounding the Public Trust Doctrine. The traditional public interests protected by the public trust doctrine were navigation, commerce, and fishing. Court cases have primarily addressed these three interests. However, Geer v. Connecticut (1896) added "wild fowling" (wildlife) within a state's trustee relationship. Although partially reversed in Hughes v. Oklahoma (1979), state statutes and state courts continue to assert state ownership of wildlife.

The Public Trust Doctrine has also been recognized as a fundamental cornerstone of what has come to be known as the North American Model of Wildlife Conservation. The North American model has two basic principles: that our fish and wildlife belong to all North American citizens, and are to be managed in such a way that their populations will be sustained forever and to further advocate for the doctrine of primacy of state management authority for resident wildlife. The Doctrine establishes a trustee relationship of government to hold and manage natural resources for the benefit of both the resource and the public. This Public Trust Doctrine has been codified in many state statutes and constitutions.

The federal government has the constitutional ability to preempt state fish and wildlife management on State or Federal lands through the Commerce Clause, the Treaty Clause, and the Property Clause of the United States Constitution or when Congress specifically exempts federal lands from state law, such as it has done with the National Park Service lands. The federal law permits the National Park Service to restrict or ban fishing, hunting, or trapping within national parks. Other examples of Congress speaking on the subject of state fish and wildlife management on federal land are on National Wildlife Refuges Land. In this case, the Fish and Wildlife Service may allow sport hunting and fishing on the refuges in any manner consistent with state law. The rule is that Fish and Wildlife Service regulations must follow state law if the state law is consistent with federal management objectives and the primary purpose for which the refuge was established. U. S. Forest Service and Bureau of Land Management lands are governed by the multiple-use philosophy. As a general principle, public uses should be consistent with state law. Both federal agencies have ambiguous closure authority to ban hunting or fishing for public safety or administrative reasons. (43 CFR 24)

Sample Language from Minnesota Statutes - Wildlife Disease Response

Subd. 11. Power to prevent or control wildlife disease.

(a) If the commissioner determines that action is necessary to prevent or control a wildlife disease, the commissioner may prevent or control wildlife disease in a species of wild animal in addition to the protection provided by the game and fish laws by further limiting, closing, expanding, or opening seasons or areas of the state; by reducing or increasing limits in areas of the state; by establishing disease management zones; by authorizing free licenses; by allowing shooting from motor vehicles by persons designated by the commissioner; by issuing replacement licenses for sick animals; by requiring sample collection from hunter-harvested animals; by limiting wild animal possession, transportation, and disposition; and by restricting wildlife feeding.

(b) The commissioner shall restrict wildlife feeding within a 15-mile radius of a cattle herd that is infected with bovine tuberculosis.

(c) The commissioner may prevent or control wildlife disease in a species of wild animal in the state by emergency rule adopted under section 84.027, subdivision 13.

USDA APHIS Veterinary Services Authorities

Our authority to carryout our mission comes from several laws:

AHPA: The Animal Health Protection Act (AHPA) of 2002 consolidates laws related to animal health and quarantine, some of which dated back to the late 1800s. Under the AHPA, VS has legal authority to regulate aquaculture and provide services for aquaculture and animal livestock. The AHPA includes key provisions for VS animal health programs and services.
The AHPA authorizes APHIS to prohibit or restrict the importation, entry, exportation, and interstate movement of any animal, means of conveyance, or other article if the prohibition or restriction is necessary to prevent a disease or pest of livestock from being introduced into, or disseminated within or from, the United States.
The AHPA authorizes additional actions in extraordinary emergencies.
It also provides for inspections, seizures, quarantines, and disposal, as well as measures to detect, control, and eradicate diseases and pests of livestock, and for a veterinary accreditation program.
The Agricultural Bioterrorism Protection Act of 2002 added responsibilities for overseeing agents or toxins deemed a severe threat to animal health.

SHPA: In addition, the Swine Health Protection Act (SHPA) of 1980, as amended, regulates food waste containing any meat products fed to swine. Compliance with this act ensures that all food waste fed to swine is properly treated to kill disease organisms. Raw meat may transmit numerous infectious or communicable diseases to swine. Raw meat can transmit exotic animal diseases such as foot-and-mouth disease, African swine fever, classical swine fever, and swine vesicular disease.

VSTA: VS also derives authorities from the 1913 Virus-Serum-Toxin Act (VSTA) as amended by the 1985 Food Security Act. Under the VSTA, APHIS regulates veterinary biologics (vaccines, bacterins, antisera, diagnostic kits, and other products of biological origin) to ensure that the veterinary biologics available for the diagnosis, prevention, and treatment of animal diseases are pure, safe, potent, and effective.

These laws give us the authority to promulgate regulation

USDA

SEP 22 2008

United States
Department of
Agriculture

Animal and Plant
Health Inspection
Service

Washington, DC
20250

Dear Stakeholder:

Veterinary Services (VS) recently updated an internal policy memorandum regarding the program's animal health policy as it relates to wildlife. This update was made with the intent to reinforce the concept that disease transmission occurs between domestic livestock and wildlife. In addition, I would like to take this opportunity to clarify the purpose and content of that document.

This VS memorandum was initially developed to provide guidance and clarification to VS personnel concerning the role of wildlife populations in animal disease control and eradication programs in 2006. The memorandum is not a statement of statute or of regulation, and it does not establish any formal change in disease control and eradication programs.

The document promotes the established tradition of VS personnel's collaboration with State and Federal agencies that have wildlife authority in animal disease situations. We deeply appreciate the critical role that our State and Federal partners have in managing animal diseases successfully, and VS is committed to continue to cooperate together in carrying out this work. In all animal disease programs, VS has always collaborated with State and Federal agencies and acknowledged the need to consider wildlife management issues in control and eradication efforts. The VS memorandum outlines several approaches that would promote further cooperation among VS and State and Federal agencies with wildlife authority.

We recognize that appropriate measures for managing diseases in livestock and in wildlife are inherently different and that disease occurrences in livestock and in wildlife must be handled accordingly. We also recognize that State wildlife authorities have primary authority and responsibility for managing free-ranging wildlife. We continue to value the expertise of our State and Federal partners and are committed to working cooperatively to safeguard the health of our Nation's agricultural animals.

Sincerely,

John R. Clifford
Deputy Administrator
Veterinary Services

USDA

United States Department of Agriculture

Animal and Plant Health Inspection Service

Veterinary Services

Washington, DC

VETERINARY SERVICES MEMORANDUM NO. 573.1

TO: Veterinary Services (VS) Management Team

FROM: John R. Clifford
Deputy Administrator
Veterinary Services

John R Clifford

SEP 16 2008

SUBJECT: U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), VS Animal Health Policy in Relation to Wildlife

I. PURPOSE

This memorandum outlines VS' animal health policy in relation to wildlife.

II. CANCELLATION

VS Memorandum No. 573.1, dated March 2, 2006, is hereby canceled.

III. POLICY STATEMENT

The fundamental goal of VS is to prevent, control, or eliminate infectious agents/diseases/vectors in animal agriculture and wildlife, as appropriate. All VS activities related to wildlife will be conducted in collaboration with Federal, Tribal, and State wildlife agencies. For the purposes of this policy, VS defines wildlife as all free ranging animals, including native and exotic wildlife species, as well as feral domestic animals. This definition does not include privately-owned captive wildlife, whether native or exotic, nor does it include zoological collections, which are defined as captive animals. A wildlife reservoir may be defined as a population of free ranging/free living species in which an infectious agent/vector has become established, lives, and multiplies and is therefore a potential source of infection/infestation to other domestic and free ranging species. VS recognizes that the initial source of infection of a wildlife reservoir may be an agricultural animal population.

In cases where VS policy supports eradication of an infectious agent/disease/vector, VS will seek measures, through (1) movement and testing requirements; (2) herd plans; and (3) emergency response plans, to keep wildlife and livestock apart and to eradicate the disease from all potential reservoirs when eradication is deemed technically feasible. Regardless of the current official disease status of a State or zone, the program should require States or zones to include effective efforts to survey, prevent, control, and eliminate the causative agent/vector from wildlife. VS' emergency management plans for response to foreign animal disease (FAD) incursions must explicitly address the eradication of the infectious agent/disease/vector from affected wildlife.

For VS control programs whose current objective is something less than complete eradication of a causative agent, VS will address the occurrence of the particular causative agent in wildlife populations through (1) surveillance; (2) mitigation measures; and (3) movement controls. Finally, for infectious agents/diseases/vectors for which VS has no formal control program, VS will support surveillance efforts in wildlife populations on a case-by-case basis.

IV. GENERAL

VS manages many infectious agents/diseases/vectors through its eradication and control programs. When no formal program exists for a particular infectious agent/disease/vector, VS may conduct surveillance, if requested and supported by the State animal health agencies and industry stakeholders.

Infectious agents/diseases affecting animal agriculture are often transmitted between free-ranging wildlife and other species. As a result, the design and management of livestock and/or poultry health programs have increasingly encompassed concerns involving wildlife interactions and the potential for disease transmission. Such transmission has historically been bi-directional. Many diseases of concern were first transmitted from livestock and/or poultry to free-ranging wildlife and have remained in wildlife reservoirs even after being eliminated or reduced in the livestock and/or poultry population. A wildlife reservoir may be defined as a population of free ranging/free living species in which an infectious agent/vector has become established, lives, and multiplies and is therefore a potential source of infection/infestation to other domestic and free ranging species.

The fundamental goal of VS is to prevent, control, or eliminate infectious agents/diseases/vectors in animal agriculture and wildlife, as appropriate. This VS policy represents a measured approach to infectious disease/vector occurrence in U.S. wildlife populations. In cases where VS policy supports eradication of the disease agent/vector, VS will work with State and Federal wildlife agencies to eliminate it from all potential reservoirs that might re-introduce infection/infestation, in order to protect the health of domestic and wild animals and the public health, and to provide assurances to other animal health authorities and stakeholders that eradication has been achieved. If eradication is not technically feasible at the time, measures must be taken to keep these potential reservoirs (wildlife and feral animals) separate from domestic livestock until research efforts can develop improved procedures to eliminate the disease from the wildlife/feral populations. In cases where VS policy is to control rather than eradicate an infectious agent/vector, VS' policy will be to also collaboratively control the agent/vector in wildlife populations in partnership with wildlife agencies. If there is no formal VS control program for an infectious agent, then no domestic animal disease/vector concerns would apply to U.S. wildlife populations.

For the purposes of this policy, VS is including in the definition of wildlife all free-ranging animals, including native and exotic wildlife species, as well as feral domestic animals.

The natural history of each infectious agent/disease/vector determines which wildlife species should be considered. If a species of wildlife is susceptible to infection by a particular infectious agent/disease/vector then, as a general rule, this VS policy must apply to that wildlife species, when they are in an area where the disease/vector occurs. This wildlife definition does not include privately-owned captive wildlife, whether native or exotic, nor does it include zoological collections, because they would be enclosed by fences and would be defined as captive animals.

VS recognizes that State fish and wildlife management agencies have primary authority and responsibility for managing free-ranging wildlife. VS also recognizes that this authority and responsibility extends to most Federal lands, except designated National Parks, and that Congress has affirmed this through enabling legislation for several Federal agencies. In general, States manage the fish and wildlife while the Federal agencies, as landowners, own and manage the habitat. Congress has given some Federal agencies (e.g., U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration – Fisheries) certain statutory responsibility for selected fish and wildlife conservation programs, such as threatened and endangered species, migratory birds, and anadromous fish (fish born in fresh water that spend a portion of their life history in marine waters before returning to fresh water to spawn, e.g., salmon), but the States retain concurrent jurisdiction with the Federal agencies for those species. Congress has given exclusive jurisdiction to Federal agencies for marine mammals <u>only</u>.

VS has statutory authority in the Animal Health Protection Act to implement disease control and/or eradication actions for wildlife under certain conditions. In the case of an extraordinary disease emergency, the Secretary of Agriculture has broad and expansive authority to seize and dispose of any animal, including wildlife. However, if fish or wildlife are affected by control or eradication measures proposed by the Secretary, the Secretary will consult with officials of the State agency having authority for protection and management of such wildlife. Therefore, it is important to clarify that VS will implement and coordinate this policy in cooperation with the appropriate wildlife agencies to address infectious agents/diseases within wildlife populations. VS will also aggressively pursue non-lethal approaches for eliminating disease in wildlife whenever possible.

V. INSTRUCTIONS

A. Cooperation with Federal, Tribal, and State Wildlife Entities

VS managers' efforts to prevent, control, or eliminate transmission of infectious agents/diseases/vectors between animal agriculture populations and wildlife requires a collaborative relationship with the respective wildlife agencies. Such a relationship may allow VS to contribute to overall wildlife and public health risk mitigation while focusing on its own program goals. In order to develop such relationships, VS has created institutional links to wildlife agencies and wildlife disease professionals. These include the VS Wildlife Disease Liaison positions, formal ties with the Southeastern Cooperative Wildlife Disease

Study, partnerships with APHIS' Wildlife Services, and regular interaction with the International Association of Fish and Wildlife Agencies.

VS managers and employees should use these resources to build communication channels with wildlife agencies and professions to develop measures that reduce risks of disease transmission. In addition, VS managers must contact their respective wildlife managers within the States to develop and maintain effective working relationships – including collaboration, assistance, and coordination of disease management – prior to an occurrence of a disease of concern in wildlife.

B. Infectious Agents/Diseases that are the Subject of Eradication and/or Emergency Programs

In cases where VS policy supports eradication of the infectious agent/disease, VS will seek, in collaboration with livestock and poultry producers, wildlife management agencies, and other partners, measures to keep wildlife and livestock apart and to eradicate the disease from all potential reservoirs when eradication is deemed technically feasible. Funding for the costs of mitigation, biosecurity and eradication will be determined by each program. Such programs include: the Bovine Tuberculosis Eradication Program; Swine and Bovine Brucellosis Eradication Programs; Pseudorabies Eradication Program; Scrapie Eradication Program; and all the FADs encompassed by Emergency Programs. If eradication is not technically feasible at the time, VS will, in collaboration with producers, wildlife management agencies, and other partners, seek measures to keep the wildlife (and feral animals) separate until eradication can be achieved. Funding for these costs will be determined by each program and will include cost sharing with the producers and agencies.

Specific sections of the *Code of Federal Regulations* (CFR), applicable Uniform Methods and Rules (UM&Rs), and various Memoranda of Understanding (MOUs) will incorporate language that reflects this VS policy regarding wildlife. These policies should be in place within 12 months of issuance of this memorandum.

1. Movement and testing requirements

VS' eradication programs' requirements to achieve particular State or zone status levels and testing (and other) requirements for interstate movement should factor in the occurrence of the infectious agent/disease/vector in wildlife populations. Regardless of the current official disease status of a State or zone, the program should require States or zones to include effective efforts to survey, prevent, control, and eliminate the causative agent/vector from wildlife. Interstate movement requirements for livestock and/or poultry, including captive animals, should require States or zones with known wildlife reservoirs of the causative agent/vector to conduct more extensive mitigation activities than States or zones of equivalent status that do not have a wildlife reservoir.

The program staff, in collaboration with wildlife disease experts and State wildlife agencies, would determine the susceptible species and the domestic and wildlife species that would be surveyed in order to determine whether infection/infestation exists in the animal population. Minimum surveillance standards would be collaboratively developed by VS and the respective State/Federal wildlife agencies involved. VS would not pay indemnity for any wild free-ranging wildlife sampled for surveillance purposes. VS could reimburse wildlife agencies for some or all costs involved in surveillance activities, provided program funding is available.

2. Herd plans

Herd plans are used in eradication programs to manage known affected herds and to manage accredited herds in areas where wildlife reservoirs are known to exist. These herd plans should incorporate requirements to prevent transmission or reintroduction of the causative agent between a known wildlife reservoir and agricultural animal populations.

3. Emergency response plans

VS' emergency management plans for response to FAD incursions must explicitly address the eradication of the infectious agent/disease/vector from affected wildlife. Eradication measures will vary widely depending upon disease characterization, pathology, epidemiology, level of risk, and other factors.

C. Infectious Agents/Diseases that are the Subject of Control Programs

Programs such as the Johne's Disease Program; Chronic Wasting Disease Program; National Poultry Improvement Program; and other programs whose current objective is something less than complete eradication of a causative agent must address the occurrence of the particular causative agent in wildlife populations.

Specific sections of the CFR, applicable UM&Rs, and various MOUs will incorporate language that reflects this VS policy regarding wildlife.

Control programs are usually applied at a herd or animal level, intending to limit the transmission of infectious agents/diseases/vectors from known-affected/infested herds or animals. Ultimately, these programs serve to reduce the prevalence of a causative agent to an acceptably low level and may be precursors to eventual eradication. Nevertheless, these programs do not intend to eradicate the causative agent/vector from animal agriculture. Therefore, the VS policy regarding wildlife infected with these infectious agents/diseases/vectors is to collaborate with wildlife agencies to simply control or limit their propagation among wildlife and between wildlife and animal agriculture populations. Although the objective of control programs is something less than complete elimination of a causative agent/vector, these programs still endeavor to control transmission and the consequence of infection/infestation; therefore, the role of wildlife in transmission cannot be ignored.

1. Surveillance

For domestic/captive herds known to be affected with an infectious agent/disease/vector, the role of wildlife as a source of infection, or as a vector of transmission, should be examined in each case. At minimum, control programs must require that potential wildlife reservoirs surrounding known affected livestock herds or poultry flocks be surveyed in collaboration with wildlife agencies to determine if the disease/vector has spread between the wildlife and domestic/captive animal populations. Such surveys should be conducted in a manner to reasonably demonstrate the absence, presence, or prevalence of the disease in the wildlife and the species affected. If wildlife infections/infestations are detected, then preventive measures should be instituted to reduce the incidence of infection within the domestic and wildlife herd or flock.

2. Mitigation measures

Disease preventive measures in infected/infested wildlife will depend on several factors: physical and geographical conditions under which free-ranging animals exist; complex dynamics of wildlife behavior; sentiments of public opinion; conflicts over jurisdiction; and wildlife management philosophies of State, Tribal, and Federal land management authorities. Such factors will require discussion and consensus to develop a successful strategy that can be incorporated into a VS control program.

3. Movement controls

Herd-level or animal-level interstate movement testing requirements should be bolstered when a wildlife reservoir is known to exist in an area surrounding the herd or origin of the shipment. Specific requirements will depend on the infectious agent and its epidemiology.

D. Infectious Agents/Diseases/Vectors Not Currently the Subject of Formal Control Programs

VS' policy regarding the occurrence in wildlife of infectious agents/diseases/vectors for which no formal control program exists is to support surveillance efforts on a case-by-case basis. Decisions about surveillance for these infectious agents/diseases/vectors will be made by the VS Deputy Administrator after receiving input from animal health and wildlife agencies.

Infectious agents, such as bluetongue virus, Porcine Reproductive and Respiratory Syndrome virus, Anaplasma rickettsial organisms, and many others, are important in terms of international trade or as disease agents within U.S. animal agriculture. Nevertheless, for a variety of reasons, these infectious agents/diseases are not subjects of formal VS programs.

Periodic surveillance of animal agriculture for these diseases/agents/vectors is sometimes used to facilitate international trade. Some are reportable diseases in many States. Often, veterinarians in private practice identify these agents.

Regardless of how the diseases/agents/vectors are identified, the VS response to reported infection in livestock and/or poultry is usually limited to consultation on available local methods for preventing or controlling infection. However, if a severe outbreak is determined to warrant VS involvement, it is possible that wildlife surveillance conducted in cooperation with wildlife agencies may be included in the VS action plan. There may also be other circumstances under which the VS Deputy Administrator may elect to include wildlife in his/her plan for responding to these types of infectious diseases/vectors.

WS Authority: WS is the Federal program authorized by law to reduce damage caused by wildlife (the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c)). The Act of March 2, 1931, as amended (7 U.S.C. 426-426c; 46 Stat. 1468) provides that:

> "The Secretary of Agriculture is authorized and directed to conduct such investigations, experiments, and tests as he may deem necessary in order to determine, demonstrate, and promulgate the best methods of eradication, suppression, or bringing under control on national forests and other areas of the public domain as well as on State, Territory or privately owned lands of mountain lions, wolves, coyotes, bobcats, prairie dogs, gophers, ground squirrels, jackrabbits, brown tree snakes and other animals injurious to agriculture, horticulture, forestry, animal husbandry, wild game animals, furbearing animals, and birds, and for the protection of stock and other domestic animals through the suppression of rabies and tularemia in predatory or other wild animals; and to conduct campaigns for the destruction or control of such animals. Provided that in carrying out the provisions of this Section, the Secretary of Agriculture may cooperate with States, individuals, and public and private agencies, organizations, and institutions."

Since 1931, with the changes in societal values, WS policies and its programs place greater emphasis on the part of the Act discussing "bringing (damage) under control", rather than "eradication" and "suppression" of wildlife populations. In 1988, Congress strengthened the legislative mandate of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

> "That hereafter, the Secretary of Agriculture is authorized, except for urban rodent control, to conduct activities and to enter into agreements with States, local jurisdictions, individuals, and public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammals and birds species that are reservoirs for zoonotic diseases, and to deposit any money collected under any such agreement into the appropriation accounts that incur the costs to be available immediately and to remain available until expended for Animal Damage Control activities."

This latter part specifies WS' authority for participating in wildlife health issues.

Endangered Species Act (ESA). It is Federal policy, under the ESA, that all Federal agencies shall seek to conserve threatened and endangered (T&E) species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). The act prohibits the accidental or intentional harassment, harm or killing (i.e., take) of any federally listed threatened or endangered species except under a very limited set of circumstances defined by the Act and USFWS regulations. Federal agencies conduct Section 7 consultations with the U.S. Fish & Wildlife Service to use the expertise of the USFWS to ensure that "any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species". Issuance of permits for the intentional take of a federally listed species is addressed in Section 10 of the ESA.

State Agencies are required to comply with the ESA. However, Section 6 of the ESA, allows the USFWS to enter into cooperative conservation agreements with state wildlife management agencies for the study, protection and enhancement of federally-listed endangered species populations. These cooperative conservation agreements allow state agencies to conduct certain nonlethal management actions such as live capture and testing for disease without requiring a Section 10 permit from the USFWS.

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora, 27 U.S.T. 108) -- Establishes a system of import/export regulations to prevent the over-exploitation of plants and animals listed in three appendices to the Convention. Different levels of trade regulations are provided depending on the status of the listed species and the contribution trade makes to decline of the species. Procedures are provided for periodic amendments to the appendices. Implementing legislation for the United States was provided by enactment of P.L. 93-205, the Endangered Species Act of 1973.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 03-711; 40 Stat. 755), as Amended. The Migratory Bird Treaty Act (MBTA) provides the USFWS regulatory authority to protect families of birds that contain species which migrate outside the United States. The law prohibits any handling and lethal "take" of these species by any entities, except as permitted or authorized by the USFWS. Unlike the ESA, individuals with bird damage problems can use nonlethal methods like harassment without a permit from the USFWS. The Migratory Bird Treaty Reform Act of 2004 clarifies the original purpose of the MBTA as pertaining to the conservation and protection of migratory birds native to North America and directs the USFWS to establish a list of bird species found in the United States which are non-native, human-introduced species and therefore not federally protected under the MBTA. The USFWS issues permits to requesters for the purpose of conducting scientific research on migratory bird species afforded protection under the MBTA, such as the capture and handling of birds for AI surveillance. The MBTA applies to state and federal agencies. The MBTA does not apply to non-migratory gamebird species such as quail, pheasants, chuckar partridge, etc.

The Eagle Act (also known as the Bald and Golden Eagle Protection Act), originally passed in 1940, prohibits the take, possession, sale, purchase, barter, offer to sell, purchase, or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit (16U.S.C 668(a); 50 CFR 22). "Take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" a bald or golden eagle. The term "disturb" under the Eagle Act was recently defined via a final rule published in the Federal Register on June 5, 2007 (72 Fed. Reg. 31332). "Disturb" means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

Fish and Wildlife Coordination Act (16 U.S.C. 661-667e). The Fish and Wildlife Coordination Act obligates all Federal agencies to consult with State resource agencies on actions related to wildlife conservation, The Act of March 10, 1934, authorizes the Secretaries of Agriculture and Commerce to provide assistance to and cooperate with Federal and State agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife. Includes but is not limited to actions "minimizing damages from overabundant species". In addition, this Act authorizes the preparation of plans to protect wildlife resources, the completion of wildlife surveys on public lands, and the acceptance by the Federal agencies of funds or lands for related purposes provided that land donations received the consent of the State in which they are located. The amendments enacted in 1946 require consultation with the Fish and Wildlife Service and the fish and wildlife agencies of States where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified" by any agency under a Federal permit or license. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources."

Federal Aid in Wildlife Restoration Act (Pittman-Robertson (or "P-R"): At the urging of organized sportsmen, State wildlife agencies, and the firearms and ammunition industries, Congress extended the life of an existing 10 percent tax on ammunition and firearms used for sport hunting, and earmarked the proceeds to be distributed to the States for wildlife restoration. The result was called the Federal Aid in Wildlife Restoration act, better known as the Pittman-Robertson (or "P-R") Act after its principal sponsors The measure was signed into law by President Franklin D. Roosevelt on September 2, 1937. Congress in the early 1970's expanded the P-R revenue base to include handguns and archery equipment, and authorized States to spend up to half those revenues on hunter education and target ranges.

Federal Funding from P-R pays for up to 75 percent of project costs, with the States putting up at least 25 percent. Of the P-R funds available to the States, more than 62 percent is used to buy, develop, maintain, and operate wildlife management areas. P-R has aided greatly aided in a nationwide effort to enlist science in the cause of wildlife conservation. About 26 percent of P-R funding to the States is used for surveys and research. Although Pittman-Robertson is financed wholly by firearms users and archery enthusiasts, its benefits cover a much larger number of people who never hunt but do enjoy such wildlife pastimes as birdwatching, nature photography, painting and sketching, and a wide variety of other outdoor pursuits. Almost all the lands purchased with P-R money are managed both for wildlife production and for other public uses. Recent estimates indicate about 70 percent of the people using these areas are not hunting, and in some localities the ratio may go as high as 95 percent.

Federal Aid inSport Fish Restoration Act (16 U.S.C. 777-777k, 64 Stat. 430), as amended. This August 9, 1950, Act has been amended several times and is commonly called the Dingell-Johnson Act or Wallop-Breaux Act. It provides Federal aid to the States for management and restoration of fish having "material value in connection with sport or recreation in the marine and/or fresh waters of the United States." In addition, amendments to the Act provide funds to the states for aquatic education, wetlands restoration, boat safety and clean vessel sanitation devices (pumpouts), and a nontrailerable boat program. Funds are derived from a 10-percent excise tax on certain items of sport fishing tackle (Internal Revenue Code of 1954, sec. 4161), a 3-percent excise tax on fish finders and electric trolling motors, import duties on fishing tackle, yachts and pleasure craft, interest on the account, and a portion of motorboat fuel tax revenues and small engine fuel taxes authorized under the Internal Revenue Code (Sec. 9503). To be eligible to participate in the Federal Aid in Sport Fish Restoration program, states are required to assent to this law and pass laws for the conservation of fish which include a prohibition against the diversion of license fees for any other purpose than the administration of the state fish department. Funds for the permanently appropriated States sport fish program are apportioned on a formula basis for paying up to 75 percent of the cost of approved projects which include acquisition and improvement of sport fish habitat, stocking of fish, research into fishery resource problems, surveys and inventories of sport fish populations, and acquisition and development of access facilities for public use. Funds for the remaining programs under the Act must be authorized to be appropriated from the Sport Fish Restoration Account by Congress.

Lacey Act Amendments of 1981: Under this law, it is unlawful to import, export, sell, acquire, or purchase fish, wildlife or plants taken, possessed, transported, or sold: 1) in violation of U.S. or Indian law, or 2) in interstate or foreign commerce involving any fish, wildlife, or plants taken possessed or sold in violation of State or foreign law. The law covers all fish and wildlife and their parts or products, and plants protected by the Convention on International Trade in Endangered Species and those protected by State law. Commercial guiding and outfitting are considered to be a sale under the provisions of the Act. As amended May 24, 1949, 18 U.S.C. 42 (63 Stat. 89, September 2, 1960; P.L. 86-702; 74 Stat. 753; and November 29, 1990, P.L. 101-646, 104 Stat. 4772) prohibits importation of wild vertebrates and other animals listed in the Act or declared by the Secretary of the Interior to be injurious to man or agriculture, wildlife resources, or otherwise, except under certain circumstances and pursuant to regulations.

Wild Bird Conservation Act Title I of P.L. 102-440, signed October 23, 1992 (106 Stat. 2224) establishes a new Federal system to limit or prohibit U.S. imports of exotic bird species, as follows:

- Imposes an immediate moratorium on the importation of certain exotic bird species identified by the Convention on International Trade in Endangered Species (CITES), and provides procedures for the Secretary to suspend trade in any CITES listed bird species and to remove trade suspensions on species.
- Directs the Secretary to publish in the Federal Register a list of exotic bird species for which trade is allowed, and provides procedures for determining such species.
- Provides criteria for the Secretary to determine whether exotic bird breeding facilities in other nations are "qualified" to export species to the U.S.
- Directs the Secretary to periodically review the trade in non-CITES species, and authorizes the Secretary to impose emergency moratoria or quotas if determined necessary for species conservation. Procedures are provided for this action and for removal of such quotas or moratoria.
- Within a month of enactment (by November 23, 1992), the Secretary is directed to request from exporting nations information on their conservation programs for wild birds.
- Provides guidelines regarding petitions that may be submitted to the Secretary, and procedures the Secretary shall follow in considering each petition.
- Sets forth purposes for which the Secretary may issue permits (i.e. exemptions) for the importation of exotic birds.

- Establishes guidelines for the assessment of civil penalties by the Secretary, and prescribes criminal penalties for violations of this law. Also directs the Secretary to develop regulations to carry out this Act.
- Establishes an Exotic Bird Conservation Fund and directs the Secretary to select for assistance, projects in countries of wild bird origin. Also requires the Secretary, in consultation with others, to review opportunities for additional wild bird conservation programs and report to Congress within 2 years of enactment (by October 23, 1994).
- Authorizes the Secretary to develop marking or record-keeping regulations to assist enforcement of and compliance with prohibitions under this Act.
- Authorizes appropriations to the Secretary of up to $5 million for each of Fiscal Years 1993 through 1995.

Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j, not including 742 d-l; 70 Stat. 1119), as amended, establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry but also with a direction to administer the Act with regard to the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, it directs a program of continuing research, extension, and information services on fish and wildlife matters, both domestically and internationally. This Act and it's amendments eventually lead to the creation of the agencies that were to become the USFWS and WS.

Fish and Wildlife Improvement Act of 1978 (16 U.S.C. 742l; 92 Stat. 3110) -- Public Law 95-616, approved November 8, 1978, authorizes the Secretaries of the Interior and Commerce to establish, conduct, and assist with national training programs for State fish and wildlife law enforcement personnel. It also authorized funding for research and development of new or improved methods to support fish and wildlife law enforcement. The law provides authority to the Secretaries to enter into law enforcement cooperative agreements with State or other Federal agencies, and authorizes the disposal of abandoned or forfeited items under the fish, wildlife, and plant jurisdictions of these Secretaries. It strengthens the law enforcement operational capability of the Service by authorizing the disbursement and use of funds to facilitate various types of investigative efforts. Public Law 105-328, signed October 30, 1998, amended the Act to allow the Fish and Wildlife Service to use the proceeds from the disposal of abandoned items derived from fish, wildlife and plants to cover the costs of shipping, storing and disposing of those items. Expanded the use of fines, penalties and forfeiture funds received under ESA and Lacey Act to include the costs of shipping, storing and disposing of items. Specifically prohibits the selling of items whose sale is banned under other laws.

Marine Mammal Protection Act of 1972 established a Federal responsibility to conserve marine mammals with management vested in the Department of Interior for sea otter, walrus, polar bear, dugong, and manatee. The Department of

Commerce is responsible for cetaceans and pinnipeds, other than the walrus. With certain specified exceptions, the Act establishes a moratorium on the taking and importation of marine mammals as well as products taken from them, and establishes procedures for waiving the moratorium and transferring management responsibility to the States. The 1972 law exempted Indians, Aleut, and Eskimos (who dwell on the coast of the North Pacific Ocean) from the moratorium on taking provided that taking was conducted for the sake of subsistence or for the purpose of creating and selling authentic native articles of handicraft and clothing. In addition, the law stipulated conditions under which the Secretaries of Commerce and Interior could issue permits to take marine mammals for the sake of public display and scientific research.

Anadromous Fish Conservation Act (16 USC 757a-757g; 79 Stat. 1125) as amended -- Public Law 89-304, October 30, 1965, authorizes the Secretaries of the Interior and Commerce to enter into cooperative agreements with the States and other non-Federal interests for conservation, development, and enhancement of anadromous fish, including those in the Great Lakes, and to contribute up to 50 percent as the Federal share of the cost of carrying out such agreements. Authorized are investigations, engineering and biological surveys, research, stream clearance, construction, maintenance and operations of hatcheries and devices and structures for improving movement, feeding and spawning conditions. Also authorized is construction by the Bureau of Reclamation and the Army Corps of Engineers of water resource projects needed solely for such fish.

Cave Resources Protection Act Public Law 100-691 (16 U.S.C. 4301 et seq.; 102 Stat. 4546) established requirements for the management and protection of caves and their resources on Federal lands, including allowing the land managing agencies to withhold the location of caves from the public, and requiring permits for any removal or collecting activities in caves on Federal lands.

Fish and Wildlife Conservation Act Fish and Wildlife Conservation Act ("Nongame Act"; 16 U.S.C. 2901-2911; 94 Stat. 1322) -- Public Law 96-366, approved September 29, 1980, authorizes financial and technical assistance to the States for the development, revision, and implementation of conservation plans and programs for nongame fish and wildlife.

National Environmental Policy Act (NEPA). All Federal actions are subject to NEPA (Public Law 91-190, 42 U.S.C. 4321 et seq.). NEPA sets forth the requirement that Federal actions with the potential to significantly affect the human environment be evaluated in terms of their impacts for the purpose of avoiding or, where possible, mitigating and minimizing adverse impacts. USDA, APHIS and the USFWS prepare analyses of the environmental effects of program activities to meet procedural requirements of this law. The law also requires the agencies consider the environmental impacts of alternatives for meeting the stated need for action.

Since NEPA only applies to Federal Actions, it does not apply directly to state agencies per se. However, state agencies requesting grant money or a federal permit for a specific project may be required to assist the federal agency with it's NEPA analysis or do all the work on the NEPA analysis. However, the final decision based on the analysis is made by the federal agency. At present, WS includes state cooperator actions in our state specific WS NEPA analyses.

Coastal Zone Management Act of 1972, as amended (16 USC 1451-1464, Chapter 33; P.L. 92-583, October 27, 1972; 86 Stat. 1280). This law established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans. Funds were authorized for cost-sharing grants to states to develop their programs. Subsequent to Federal approval of their plans, grants would be awarded for implementation purposes. In order to be eligible for Federal approval, each state's plan was required to define boundaries of the coastal zone, to identify uses of the area to be regulated by the state, the mechanism (criteria, standards or regulations) for controlling such uses, and broad guidelines for priorities of uses within the coastal zone. In addition, this law established a system of criteria and standards for requiring that Federal actions be conducted in a manner consistent with the federally approved plan. The standard for determining consistency varied depending on whether the Federal action involved a permit, license, financial assistance, or a Federally authorized activity.

Great Lakes Fish and Wildlife Restoration Act Public Law 101-537 (104 Stat. 2370, 16 U.S.C. 941 note, enacted November 8, 1990) establishes goals for the U.S. Fish and Wildlife Service programs in the Great Lakes and requires the Service to undertake a number of activities specifically related to fishery resources. The law recognizes the successful partnerships in the Great Lakes region and provides the process for achieving on-the-ground restoration activities to benefit fish, wildlife and plants in the Great Lakes.

Migratory Bird Hunting and Conservation Stamp Act (16 U.S.C. 718-718j, 48 Stat. 452), as amended -- The "Duck Stamp Act," as this March 16, 1934, authority is commonly called, requires each waterfowl hunter 16 years of age or older to possess a valid Federal hunting stamp. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations. Funds appropriated under the Wetlands Loan Act (16 U.S.C. 715k-3 - 715k-5; 75 Stat. 813), as amended, are merged with duck stamp receipts and provided to the Secretary for the acquisition of migratory bird refuges under provisions of the Migratory Bird Conservation Act (16 U.S.C. 715 et seq.; 45 Stat. 1222), as amended, and since August 1, 1958, (P.L. 85-585; 72 Stat. 486) for acquisition of "Waterfowl Production Areas."

National Wildlife Refuge System Administration Act (16 U.S.C. 668dd-668ee) -- This Act, derived from sections 4 and 5 of Public Law 89-669 (October 15, 1966; 80 Stat. 927), constitutes an "organic act" for the National Wildlife Refuge

System. It was recently amended by P.L. 105-57, "The National Wildlife Refuge System Improvement Act of 1997." Public Law 105-57, approved October 9, 1997, (111 Stat. 1253) gives guidance to the Secretary of the Interior for the overall management of the Refuge System. The Act's main components include: a strong and singular wildlife conservation mission for the Refuge System; a requirement that the Secretary of the Interior maintain the biological integrity, diversity and environmental health of the Refuge System; a new process for determining compatible uses of refuges; a recognition that wildlife-dependent recreational uses involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation, when determined to be compatible, are legitimate and appropriate public uses of the Refuge System; that these compatible wildlife-dependent recreational uses are the priority general public uses of the Refuge System; and a requirement for preparing comprehensive conservation plans.

<u>Neotropical Migratory Bird Conservation Act of 2000.</u> (P.L. 106-247) The act provides grants to countries in Latin America and the Carribean, and the United States for the conservation of neotropical migratory birds that winter south of the border and summer in North America. The law creates a competitive grants program to be administered by the Secretary of the Interior, through the Director of the Fish and Wildlife Service. The authorization of appropriations is $5 million per year through 2003, with 3% or $80,000, whichever is greater, allocated for administration. At least 75% of the funds must be spent outside of the United States and the non-federal match is 3 to 1. The law encourages habitat protection, education, researching, monitoring, and capacity building to provide for the long-term protection of neotropical migratory birds.

<u>Wilderness Act of 1964 (16 U.S.C. 1131-1136)</u>. This Act establishes a National Wilderness Preservation System (NWPS) which is composed of federally owned areas designated by Congress as "wilderness areas." The Act directs each agency administering designated wilderness to preserve the wilderness character of areas within the NWPS, and to administer the NWPS for the use and enjoyment of the American people in a way that will leave these areas unimpaired for future use and enjoyment as wilderness. Wilderness is defined in section 2(c) of the Wilderness Act: "A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. Some areas where agencies may wish to conduct AI surveillance may be official Wilderness Areas. The act sets restrictions for the types of activities which may be conducted in wilderness areas and the methods which may be used to access these sites. Wilderness Area restrictions apply to State and Federal agencies. *Some sites where folks may want to conduct AI surveillance activities could be wilderness areas*

<u>Airborne Hunting Act:</u> This Act, Public Law 92-159, approved November 18, 1971 (85 Stat. 480) and subsequently amended by P.L. 92-502, approved October

28, 1972 (86 Stat. 905) added to the Fish and Wildlife Act of 1956 a new section 13 (16 U.S.C. 742j-1), which is commonly referred to as the Airborne Hunting Act or Shooting from Aircraft Act, prohibits shooting or attempting to shoot or harrassing any bird, fish, or other animal from aircraft except for certain specified reasons, including protection of wildlife, livestock, and human life as authorized by a Federal or State issued license or permit. States authorized to issue permits are required to file reports with the Secretary of the Interior containing information on any permits issued.

Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990: This Act, Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 -- Title I of P.L. 101-646 (104 Stat. 4761, 16 U.S.C. 4701, enacted November 29, 1990) established a broad new Federal program to prevent introduction of and to control the spread of introduced aquatic nuisance species and the brown tree snake. The U.S. Fish and Wildlife Service, the U.S. Coast Guard, the Environmental Protection Agency, the Army Corps of Engineers, and the National Oceanic and Atmospheric Administration all were assigned major, new responsibilities, including membership on an Aquatic Nuisance Species Task Force established to develop a program of prevention, monitoring, control, and study. The 1996 amendments also authorize the Director of the Fish and Wildlife Service to make grants to states with approved state or interstate invasive species management plans (110 Stat. 4089,4091).

Sikes Act (16 USC 670a-670o, 74 Stat. 1052), as amended, Public Law 86-797, approved September 15, 1960, provides for cooperation by the Departments of the Interior and Defense with State agencies in planning, development and maintenance of fish and wildlife resources on military reservations throughout the United States. It requires the Secretary of each military department to use trained professionals to manage the wildlife and fishery resources under his jurisdiction, and requires Federal and State fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations. It also modified the timber reserve account and provides that any sale or lease of land or forest products from a military reservation be compatible with a cooperative plan.

Executive Order 13186 of January 10, 2001 "Responsibilities of Federal Agencies to Protect Migratory Birds." This Order states that each Federal agency, taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations, is directed to develop and implement, a MOU with the USFWS that shall promote the conservation of migratory bird populations. WS has developed a draft MOU with the USFWS as required by this Order and is currently waiting for USFWS approval. WS will abide by the MOU once it is finalized and signed by both parties.

Executive Order 13112 of February 3, 1999. This order directs Federal agencies to use their programs and authorities to prevent the spread or to control populations of invasive species that cause economic or environmental harm, or harm to human health. To comply with Executive Order 13112, WS may cooperate with other Federal, State, or Local government agencies, or with industry or private individuals to reduce damage to the environment or threats to human health and safety. occupational Safety and Health Act of 1970. The Occupational Safety and Health Act of 1970 and its implementing regulations (29CFR1910) on sanitation standards states that, Every enclosed workplace shall be so constructed, equipped, and maintained, so far as reasonably practical, as to prevent the entrance or harborage of rodents, insects, and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected. This standard includes mammals that may cause safety and health concerns at workplaces.

State Wildlife Management Agency Responsibility for Managing Diseases in Free-ranging Wildlife

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Introduction

State wildlife management agencies have primary management responsibility for most free-ranging wildlife in the United States. Given their local nature, their knowledge of resident wildlife, personnel and equipment resources, and their public support, they remain the appropriate agencies exercising primary responsibility for management and research of diseases in free-ranging wildlife. However, in order to fully meet these responsibilities, states need cooperation, communication, collaboration and funding assistance from appropriate federal agencies; whereas, challenges to the traditional authority of state agencies are unnecessary and invariably detrimental. Recent history provides examples of federal-state interactions that have proven counterproductive and examples of highly successful support and cooperation.

Good frameworks for state-federal cooperation for more effective management and research of diseases in free-ranging wildlife exist, and existing state and regional wildlife disease programs provide excellent models. Unfortunately, the full potential of these state and regional programs to effectively and efficiently manage wildlife diseases is not currently being met. Federal funding to states for wildlife disease work should not be politically driven. It should be based on need, on a fundamental recognition of the independent value of healthy, free-ranging wildlife populations, and on willingness to maintain strong state and regional wildlife disease programs over the long term. States should be encouraged to develop their own local programs, but recognition of the value of coordinated federal guidance and oversight, along with timely state reporting, are appropriate.

Primacy of State Fish and Wildlife Agencies

In the United States, free-ranging wildlife is a public resource, and state wildlife management agencies have broad constitutional and statutory trustee authority for the conservation of the fish and wildlife within their borders. Conservation of wildlife resources implicitly recognizes their fundamental and independent value, and it includes primary responsibility for preserving their health and well-being for future generations. Thus, it is entirely appropriate that state wildlife management agencies remain the lead agencies in dealing with diseases, just as they are in other aspects of wildlife conservation.

State fish and wildlife agencies are the principal front-line managers of fish and wildlife for the benefit, use and enjoyment of the state's citizens and, collectively, the nation. They 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. Many state fish and wildlife agencies have disease experts, such as wildlife veterinarians, on staff. Most states now 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. In addition, state wildlife agencies commonly maintain management programs to respond to wildlife-human conflicts and to mitigate damage of agricultural commodities.

State fish and wildlife agency authority extends to federal lands (excepting national parks) as well, with states managing the fish and wildlife and federal agencies, as landowners, the habitat. This has been affirmed by Congress through enabling legislation for several federal agencies. Only for marine mammals has Congress given exclusive jurisdiction to federal agencies. Although Congress has given federal agencies, such as the U. S. Fish and Wildlife Service

(USFWS) and the National Oceanic and Atmospheric Administration (NOAA)-Fisheries, certain statutory responsibility for selected conservation programs (e.g., threatened and endangered species, migratory birds, and anadromous fish), states retain concurrent jurisdiction for those species. Even in the case of an extraordinary disease emergency, in which the Secretary of the U.S. Department of Agriculture (USDA), under the federal Animal Health Act of 2002, has broad authority to seize and dispose of any animal, including wildlife, Congress has affirmed and directed that, "If fish or wildlife is affected by control or eradication measures proposed by the Secretary. . .the Secretary will consult with officials of the State agency having authority for protection and management of such wildlife." Congress has further constrained the Secretary's authority, stating unequivocally that, "nothing in this section or in this title should be construed as impliedly vesting in the Secretary authority to manage fish and wildlife populations."

Managing Wildlife Disease Issues: What Has Not Worked

While acknowledging the primacy of the state fish and wildlife agencies, the sheer scope of such diseases as brucellosis, bovine tuberculosis and chronic wasting disease points out the opportunity for, and the necessity of, cooperative, multiagency wildlife disease control efforts. A cooperative approach is far preferable to any single agency attempting to assume sole legal authority over, or unwittingly assuming it has the resources to manage, significant wildlife disease problems (Thorne et al. 2000). Moreover, conflicts of legal authority over wildlife diseases effectively mean that no single agency alone can control them. The protracted and still unresolved case study of brucellosis in the Greater Yellowstone Area provides ample evidence of this (Keiter and Froelicher 1993; Thorne et al. 1997). Attempts by agencies to seize sole control will inevitably cause unanticipated and counterproductive outcomes, such as erosion of crucial public support, unwanted intervention by legislatures and years of draining litigation. Institutional memories of such attempts may persist for decades, further hampering the interagency cooperation necessary to resolve wildlife disease problems. Meanwhile, the spread and virulence of these diseases seems unlikely to pause to accommodate interagency bickering.

Interagency relations concerning the federal Animal Health Act of 2002 provide another relevant example. The sweeping authority granted under this act to seize and dispose of wildlife has already been noted, as have the checks on that authority that have been afforded to the states, constraints of which federal administrators are well aware. However, these administrators and field staff often operate in very different spheres. And, in the field, it has not been unusual to find both federal and state agriculture agency staff who have interpreted the act as conferring autonomy upon USDA in matters of wildlife disease control. In not so subtle fashion, this subjective interpretation has sometimes been presented to state fish and wildlife agencies as fact, arguably in order to coerce policy decisions favored at the federal level but unpopular, and sometimes untenable, at the state level. "Showing the horse the whip," has created confusion, concern and resentment among state fish and wildlife management agencies. Whether real or imagined, these specters of usurping state authority are enormously counterproductive and can exacerbate any existing mistrust. Given a background where USDA's wildlife disease related activities are already viewed by some as an inherent conflict of interest, considering the agency's primary mission of promoting the agriculture industry, it is understandable how misconceptions take root and grow. An unequivocal acknowledgment on the part of USDA of the fundamental and comparable values of free-ranging wildlife and livestock might help to allay such misconceptions.

Yet another example of what has not worked in managing wildlife disease issues is attributable to the states themselves. The high profile of such diseases as chronic wasting disease and bovine tuberculosis has led a number of states to initiate wildlife disease surveillance programs of varying scope. Not uncommonly, a single person, often a veterinarian, is hired to oversee the program but instead ends up being the entire program. With little management or administrative support, an uncertain budget, and no commitment on the part of state government for its sustained support, such programs frequently have not survived. Although strength and persistence are usually improved by involving other states cooperatively as regional partners, even this does not assure success in the absence of committed and sustained support. For example, the Northeastern Research Center for Wildlife Diseases, in Storrs, Connecticut, was established as a cooperative venture with funding from several state fish and wildlife agencies in the region. However, the lack of full participation by some nearby states, coupled with a lack of federal agency cooperators (Nettles and Davidson 1996), as well as other factors, eventually led to the group's dissolution.

A final example can be drawn from the realm of wildlife disease research. In response to some of the more conspicuous wildlife disease outbreaks, such as bovine tuberculosis and chronic wasting disease, federal agencies have approached state fish and wildlife agencies with funds available for collaborative research. In some cases, however, collaboration has fallen short of its promise with the states providing ideas and data and with the federal agencies consuming those, and all ostensibly available research funding, internally. This can still be productive if the federal agency pursues projects that the states have identified as being of high priority. When this does not happen, scarce research funds may be spent on studies that were unlikely from the outset to produce meaningful results, essentially reproducing outcomes already known with confidence, or studies which, due to design problems, produce no meaningful or useful outcomes. As fuel for driving practical, applied research, there is no substitute for an intimate, local understanding of what is, and what is not, an important question to answer. Far more often than not, such an understanding is likely to originate in the network of field personnel comprising the heart of state fish and wildlife management agencies, a network no federal agency has equaled.

Managing Wildlife Disease Issues: What Has Worked

Though challenges remain, there are also many examples of state-federal agency interactions that have worked quite well, to the benefit of all. The first and most prominent example is the provision of significant and sustained federal funding for wildlife disease surveillance and management programs administered and carried out by state fish and wildlife agencies. A pair of success stories come to mind. First, since the passage of the Federal Aid in Wildlife Restoration (Pittman-Robertson) Act of 1937, proceeds from an 11 percent excise tax on sporting firearms, ammunition and archery equipment have been collected by the federal government and have been distributed to state fish and wildlife agencies as grants to fund wildlife conservation programs. As noted, management and research of wildlife disease issues fit well within the framework of conservation. To that end, Pittman-Robertson monies have been put to good use in many states to supplement state funds or to leverage state funds and to allow their application to other needs.

Second, USDA's Animal and Plant Health Inspection Service-Veterinary Services (APHIS-VS) branch made more than $5.4 million available to state wildlife agencies in fiscal year 2004 for chronic wasting disease testing of free-ranging cervid populations (Goeldner 2004). This was the second year these funds were available, and all 50 states received funding based on risk. Over 2 years in Michigan, for example, $161,000 in APHIS-VS funds were used to support testing of over 1,400 wild cervids, comprising nearly 12 percent of all free-ranging Michigan cervids tested for chronic wasting disease over the period. By showing admirable flexibility in the development of cooperative agreements with individual states, APHIS-VS funding helped both state and federal agencies better characterize the geographic distribution and intensity of chronic wasting disease and of the attendant risk. In return, it is the responsibility of the states to provide accurate and timely reporting to USDA on the use of these funds.

Another example of fruitful state-federal cooperation has been the provision of federal personnel to assist state fish and wildlife management staff in times of peak need. USDA's Animal and Plant Health Inspection Service-Wildlife Services (APHIS-WS) recently hired 23 wildlife disease biologists to assist the states with disease surveillance, particularly for chronic wasting disease. The Michigan Department of Natural Resources Wildlife Disease Laboratory (MDNR-WDL) incorporated 15 of these biologists into their bovine tuberculosis and chronic wasting disease testing programs in November 2004. Their help was in addition to services provided by four APHIS-VS veterinarians and technicians as part of a cooperative program in place now for nearly a decade. The capable assistance of these federal personnel saved MDNR-WDL an estimated $120,000 in labor costs.

Other success stories can be found in the area of research. When communication between state and federal agencies has been unhindered, abundant problem-oriented, practical research has been generated by federal agencies to address questions generated by state wildlife agency disease control personnel. Bovine tuberculosis in Michigan serves as a perfect case in point. Since soon after the discovery of endemic bovine tuberculosis in the state's white-tailed deer (*Odocoileus virginianus*), a highly productive cooperative relationship has existed between the MDNR-WDL and researchers at the USDA Agricultural Research Service's National Animal Disease Center (ARS-NADC), in Ames, Iowa. By taking the time to ask MDNR-WDL personnel what research questions were relevant for bovine tuberculosis management in wildlife, in a span of only a few years, ARS-NADC scientists experimentally documented both direct (Palmer et al. 2001a) and indirect (Palmer et al. 2004b) deer-to-deer transmission of bovine tuberculosis, characterized its pathogenesis (Palmer et al. 2002a,d), described aerosol (Palmer et al. 2003) and milk-borne (Palmer et al. 2002b) transmission, set the stage for premortem tuberculosis testing and vaccination of white-tailed deer (Palmer et al. 2001b; Palmer et al. 2004a) and helped clarify the role of raccoons (*Procyon lotor*) in bovine tuberculosis ecology (Palmer et al. 2002c). Every one of these studies produced valuable information that found immediate application in management, policy and public education related to tuberculosis in Michigan. No other group of researchers—state, federal or academic—has come close to producing the advances in our understanding of bovine tuberculosis in U.S. wildlife that have resulted from this highly successful state-federal collaboration.

A cornerstone of the research and management of wildlife diseases is strong state programs under the authority of state wildlife management agencies. Such programs have been established and have been maintained in a number of states, including Alaska, California, Colorado, Michigan, New York, Wisconsin and Wyoming. In 1927, the groundwork was laid for the pioneering U.S. program: "As the value of our wild life resources increases, and as the deliberate management of those resources is intensified, we shall no doubt parallel the previous experience with domestic birds and mammals, and shall have to contend with an unending series of diseases and parasites. . . .Under these circumstances it is highly desirable that Michigan should develop at home, first class facilities for research in connection with the pests, parasites and diseases of . . .wild life forms. It should not be necessary for us to depend upon Washington, or upon laboratories in other states, for the service of this sort" (Michigan Department of Conservation 1928:265–7). With that independent vision, the Michigan Department of Conservation's Wildlife Disease Laboratory was established in 1933, the first of its kind. Although its initial role was to study starvation, nutrition and diseases of Michigan wildlife, within two decades, the laboratory's activities were breaking new ground on regional and national issues. In 1937, the laboratory established a course on wildlife diseases to train veterinary and game biology students at Michigan Agricultural College. In the early 1950s, Michigan became only the second state to experience an outbreak of epizootic hemorrhagic disease in white-tailed deer, and the laboratory was involved in its research and diagnosis (Fay et al. 1956). In 1961, the first large-scale, nationwide testing of wildlife for a USDA program disease was carried out by the laboratory, a survey for brucellosis in mule deer (*O. hemionus*) and white-tailed deer (Fay 1961). Over

16,000 blood samples were processed. The laboratory was also the first wildlife disease program to identify type E botulism in piscivorous wild birds (Fay 1966), the first to publish the use of carfentanil and naltrexone as immobilizing-reversal agents for moose (Seal et al. 1985; Schmitt and Dalton 1987), and the first to describe the spillover and subsequent self-sustaining maintenance of bovine tuberculosis from cattle to white-tailed deer (Schmitt et al. 1997). Since that last discovery in 1995, the laboratory's surveillance program for tuberculosis has, with the help of its state, federal and university partners, tested more than 141,000 free-ranging Michigan deer, elk (*Cervus elaphus*) and noncervids, the largest surveillance effort for a single wildlife disease in North American history. The laboratory has also become a leader in the field research and management of bovine tuberculosis in North American wildlife (Bruning-Fann et al. 2001; O'Brien et al. 2001, 2002, 2004a, 2004b; de Lisle et al. 2002). Less known, but equally important, is the laboratory's original mission to monitor causes of death and illness for the multitude of game and nongame Michigan wildlife species, carried out on an ongoing basis for over 7 decades. This success story was possible in large measure because of substantial and sustained funding for the laboratory from both state (hunting and fishing license fees and general fund monies) and federal (Pittman-Robertson grants) sources. The MDNR-WDL is a perfect example of how state-federal funding partnerships can synergize to the benefit of both and, indirectly, to the benefit of the agricultural community.

A final example of what has worked well in the realm of cooperative wildlife disease programs is the regional cooperative, as exemplified by the Southeastern Cooperative Wildlife Disease Study (SCWDS). Established in 1957 by the Southeastern Association of Game and Fish Commissioners in response to several dramatic mortality events in white-tailed deer, SCWDS quickly became a partnership involving the University of Georgia's College of Veterinary Medicine and 11 southeastern state fish and wildlife management agencies. SCWDS membership now includes 16 state natural resources agencies and the Puerto Rico Department of Natural Resources. Federal support for SCWDS began in 1963 with annual appropriations through the U.S. Department of the Interior and, in 1979, through annual cooperative agreements with APHIS-VS (Nettles and Davidson 1996). Recently, annual cooperative agreements were initiated with APHIS-WS. Currently, a variety of other sources, of both governmental and nongovernmental granting organizations, also provide some funding support.

Primary functions at SCWDS have remained the same for several decades: determining the cause of morbidity and mortality in free-ranging wildlife, defining impacts of disease and parasites on wildlife populations, delineating disease interrelationships among wildlife and domestic animals, and determining the role of wildlife in the epidemiology of human diseases. These functions are pursued within a broader context of working for the benefit of wildlife resources, animal health and public health. The accomplishments of SCWDS in diagnostic, research and instructional activities are far too numerous to adequately treat here. For our purposes, it suffices to say that SCWDS serves as a prominent example of how the philosophy of state-federal cooperation has provided synergistic benefits far beyond what could have been accomplished by an individual entity.

Summary

Good frameworks exist for state-federal cooperation for more effective management and research of diseases in free-ranging wildlife. Existing state and regional wildlife disease programs provide excellent models. Unfortunately, the full potential of these state and regional programs to effectively and efficiently manage wildlife diseases currently is not being met. Federal funding to states for wildlife disease should not be politically driven but should be based on need, on a fundamental recognition of the independent value of healthy, free-ranging wildlife populations, and on willingness to maintain strong state and regional wildlife disease programs that are sustainable over the long term. States should be encouraged to develop their own local programs where funding is adequate, but recognition of the value of coordinated federal guidance and oversight, along with timely state reporting, are appropriate.

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PROCEEDINGS

ONE HUNDRED AND FOURTH ANNUAL MEETING

of the

UNITED STATES ANIMAL HEALTH ASSOCIATION

SHERATON CIVIC CENTER HOTEL

BIRMINGHAM, ALABAMA

October 20-27, 2000

CONFLICTS OF AUTHORITY AND STRATEGIES TO ADDRESS WILDLIFE DISEASES

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Introduction

Although the same basic methods are used to study, diagnose, and manage diseases of domestic animals and wild animals, managers of wild animal diseases face significant difficulties that are relatively unimportant in management of diseases of domestic animals (Wobeser, 1994). Some of these difficulties are inherent in the wild nature of truly free-ranging animals, while others are related to a lack of knowledge and/or tools necessary to effectively manage diseases of concern. All these difficulties are compounded by varying perceptions of ownership and management jurisdiction. In addition, wild animals capture the interest of diverse constituencies, including some advocacy groups that have little concern for the health of domestic animals.

For the purposes of this discussion regarding management of diseases of wild animals, we will limit our comments to free-ranging North American wild ruminants, or big game. We use examples of diseases of wild ruminants because they are most likely to be important to domestic livestock health and, therefore, are of economic (and sometimes of human health) importance because they are often the subject of federal disease control programs, and because they are of direct concern to the United States Animal Health Association. Furthermore, we will restrict our discussion to issues of authority and responsibility for wildlife disease management, strategies for managing important wildlife disease problems, and examples of ongoing management programs for wildlife diseases.

Conflicts of Authority

There is considerable debate over which agency, or agencies, has jurisdictional authority to manage diseases in wildlife. This question has been addressed in great depth regarding brucellosis in bison and elk in the Greater Yellowstone Area (GYA) (Keiter and Froelicher 1993, Carlman 1994, Keiter 1997, Melcher 2000); brucellosis in the GYA has resulted in more litigation (Keiter and Froelicher 1993) and controversy than any other recent regional environmental issue. Similar questions have been raised more recently with respect to managing bovine tuberculosis (TB) in white-tailed deer in Michigan (Salman et al. 2000).

Traditionally, states have been responsible for wildlife management on U.S. Forest Service and Bureau of Land Management multiple use federal lands, as well as state and private lands (Coggins and Ward 1981). Federal law governs wildlife management on national park and national wildlife refuge lands (Coggins and Ward 1981). But federal law does not address brucellosis, or other diseases, in wildlife (Keiter 1997). However, based on discussions with General Counsel attorneys who advise the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), Melcher (2000) maintained that APHIS has authority over wildlife that are infected with or are carriers of diseases contagious to domestic livestock. This, apparently, is based on quarantine laws from the 1880s modified by subsequent statutes. In the case of diseased wildlife on national park and wildlife refuge lands, APHIS would seek concurrence of the U.S. Department of Interior before exercising its authority. Elsewhere, APHIS regulations would be administered in cooperation with the appropriate state(s) (Melcher 2000).

According to Keiter and Froelicher (1993), Keiter (1997), and Salman, et al. (2000), jurisdictional authority for diseases of wildlife is fragmented among many state and federal agencies. We will use brucellosis in elk and bison of the GYA as an example because management and control involve more federal (APHIS, National Park Service, U.S. Fish and Wildlife Service, U.S. Forest Service, Bureau of Land Management) and state (Wyoming State Livestock Board and Game and Fish Department; Montana Board of Livestock and Department of Fish, Wildlife and Parks; and Idaho Department of Agriculture and Department of Fish and Game) agencies than possibly any other wildlife disease issue and because it was recently reviewed from a legal perspective (Keiter and Froelicher 1993, Carlman 1994, Keiter 1997).

In shaping federal law " "Congress passed the Animal Industry Act of 1884 authorizing the Secretary of Agriculture to regulate contagious animal diseases to prevent their interstate dissemination (21 U.S.C. §111). Congress has since amended the Act to authorize the Secretary "...to control and eradicate any communicable diseases of livestock or poultry including...brucellosis of domestic animals" (21 U.S.C. §114A). To protect livestock against communicable diseases, the Secretary is also empowered to seize, quarantine, and destroy infected animals moving in interstate commerce (21 U.S.C. §134a (a)). The term "animals" includes "...all members of the animal kingdom ...whether domestic or wild" (21 U.S.C. §134(b)) (Keiter 1997:182)." " However, enabling legislation for the National Brucellosis Eradication Program and the Uniform Methods and Rules for Brucellosis Eradication address domestic livestock and do not apply to free-ranging wildlife, which is regulated by states (Parker Land and Cattle Co., Inc. vs. United States 1992, Keiter 1997).

Within the GYA, the immediate location of brucellosis-exposed or infected bison and elk determines prevailing legal standards (Keiter and Froelicher 1993). The Yellowstone National Park organic act contains a wildlife preservation provision (16 U.S.C. §26) and clearly provides legal authority over wildlife within the park. However, special enabling legislation for Grand Teton National Park provides that the National Park Service and state of Wyoming share responsibility for protecting elk and allows for hunting of elk within the park under specific statutory limitations (16 U.S.C. §673c); this does not apply to bison. On the National Elk Refuge, which is managed by the U.S. Fish and Wildlife Service, responsibility for elk management is currently the subject of heated litigation (State of Wyoming v. Babbitt, 10th Circuit Court of Appeals, No. 99-8089). On national forests, the U.S. Forest Service is responsible for habitat management and states are responsible for wildlife management (16 U.S.C. §528; U.S.C. §1732(b)). In Parker Land and Cattle Co., Inc. vs. United States (1992) a Dubois, Wyoming, rancher sued the federal government under the Federal Tort Claims Act (28 U.S.C. §2671 et seq.) for monetary damages because he believed his cattle became infected with brucellosis from federally managed wildlife. Although the court denied the claim because it was not convinced federally managed wildlife were responsible, it did send a strong message that federal land managers should take positive steps to protect livestock from brucellosis-infected wildlife (Keiter 1997).

The Wyoming Game and Fish Department is responsible for managing wildlife of the state under Wyoming law (Wyo. Stat. §23-1101 et seq.). Although brucellosis is not directly addressed in either this statute or the wildlife-caused damages law (Wyo. Stat. §23-1-901(c)), the state supreme court has concluded the state could be liable if elk were proven responsible for transmission of brucellosis to livestock (Parker Land and Cattle Co., Inc. vs. Wyoming Game and Fish Commission 1993). In Montana, responsibility for managing wildlife lies with the Department of Fish, Wildlife and Parks (Mont. Code Ann. §87-1-201), but a relatively recent statute provided shared jurisdiction with the Montana Department of Livestock over bison that have been exposed to brucellosis (Mont. Code Ann. §87-1-215). Idaho has only recently recognized a problem with brucellosis in elk; the Department of Fish and Game has jurisdiction, but has cooperated with the Governor's office and state veterinarian in preparation of a brucellosis management plan for elk. The Idaho Department of Agriculture has been given responsibility for shooting or removing wild bison that pose a significant threat to livestock or property (Idaho Code §25-618) (Keiter 1997).

In the GYA, absence of clear legal authority over brucellosis-exposed wild animals provides opportunities for flexibility to administratively develop a regional, multi-agency, cooperative brucellosis management policy (Keiter and Froelicher 1993, Keiter 1997). That is being accomplished, at least in part, through the Greater Yellowstone Interagency Brucellosis Committee

(GYIBC) (Petera et al. 1997, Hillman 1999). Similarly, Salman et al. (2000) recognized that no single agency can control tuberculosis in white-tailed deer in Michigan and that state and federal wildlife management and animal health agencies must cooperate to resolve the problem. A cooperative approach is far preferable to a single agency attempting to assume sole legal authority over, or assuming it has the resources to manage, significant wildlife disease problems. We believe such an approach would be doomed to many years of litigation in the courts, adverse public reaction, or Congressional resolution, and would ultimately fail because none of these options or institutions is likely to arrive at a satisfactory resolution to wildlife disease problems.

Strategies to Address Wildlife Diseases

Wobeser (1994) extensively reviewed disease management in wild animals and provides a valuable reference for anyone contemplating such a program. Disease management for domestic and wild animals readily fits into three categories:

- **Prevention** encompasses measures taken to prevent individuals and/or populations from harboring or being affected by certain diseases. Wild animals benefit from efforts of state and federal animal health officials and livestock producers to prevent introduction of foreign animal diseases, such as foot and mouth disease.
- **Control** encompasses measures taken to restrict distribution and/or frequency of occurrence of diseases at tolerable levels. There may be disagreement about acceptable levels of occurrence within domestic and wild animal populations, and inherent with disease control is acceptance that it must last forever or until a different category is reached.
- **Eradication** encompasses the complete elimination of an existing disease. It usually follows some stage of control and may be a prerequisite for prevention.

It is important to recognize some of the problems that are more-or-less unique to managers of wildlife diseases and to appreciate the difficulties inherent in developing and implementing strategies to manage wildlife diseases. Detecting the presence of important diseases in wildlife can be surprisingly difficult. Surveillance by serologic tests (where available) is feasible, but may be expensive and time-consuming because of difficulties inherent in obtaining sera from hunter-killed and trapped animals; retesting of "suspect" animals is usually impossible. Sensitivity and specificity of serologic tests developed for domestic animals and used on wild animals frequently are not known, and often they are not the same. Few wild animals are individually marked for re-identification, and they are seldom controlled by fences, corrals, etc. Many wild animals are seasonally migratory and they never respect jurisdictional boundaries or property lines. Carcasses of wild animals are frequently recycled back into the environment before they are located and submitted for necropsy; consequently, a disease outbreak might not be detected until quite advanced. Compared to domestic animals, live wild animals are intractable, and restraint and manipulation for veterinary procedures may induce a spectrum of perturbations, such as capture myopathy, not encountered with domestic animals; these physiologic processes may confound diagnostic and disease management procedures. Moreover, it is rarely possible to capture all, or even a majority, of all the individuals in a free-ranging population. A major obstacle to disease prevention is that vaccines and vaccine delivery systems developed for domestic animals may not be safe, effective, or suitable for wild animals. Finally, there is a unique human relations factor relative to disease management with wild animals. While there is strong personal or economic incentive to control diseases of domestic animals, wild animals are often viewed as belonging to everyone or belonging to no one and capable of overcoming diseases on their own if we simply restore the balance of nature or remove domestic animals. By domestic animal standards, these factors as well as others not listed make epidemiology and disease management considerably more difficult with wild animals. If such factors are taken into consideration, however, attempts to manage important wildlife diseases may be more effective.

Whether it is even desirable to manage diseases is more difficult to resolve with wild animals than with domestic animals. There are some people and groups that believe diseases of wild animals are natural and a part of the balance of nature. To them any disease management strategy is unnatural interference and, therefore, inappropriate. The common failure of disease management advocates to consider or plan for mitigation of resources impacted or lost in the course of such activities may help foster such sentiment. This philosophical obstacle to disease management is seldom, if ever, encountered for domestic animals (Wobeser 1994). Desirability of wildlife disease management is complicated further in western states with large public land holdings. There, some people believe that not only is disease management unnatural, but that the only necessary strategy is to eliminate public land grazing and remove all livestock from public lands, thus eliminating any threat to domestic animals. This short-sighted viewpoint ignores the fact that wild animals, along with domestic animals, also depend on private lands and that the philosophy of multiple use on federal land, including grazing, is well established in law.

Feasibility is often perceived to be an obstacle to attempting disease management in wild animals (Wobeser 1994). To some people, it is not practical to address diseases in wild animals because it is difficult or impossible to treat or immunize wild animals, or because such strategies are unnatural. However, many environmental, habitat, and population factors influence diseases of wild animals and can be manipulated as disease management strategies. Investments in research and development of practical tools for aiding in detection and management of diseases in free-ranging wildlife could help diminish inaction based on the perceived futility of such attempts.

Desirability and feasibility aside, Wobeser (1994) provided three major reasons to control diseases in wild animals:

- Diseases have deleterious effects on species considered important to man; pasteurellosis in bighorn sheep and hemorrhagic disease in white-tailed deer are examples.
- Diseases can constitute threats to human health; brucellosis in elk and bison and bovine TB in white-tailed deer are examples.
- Diseases can threaten health of domestic animals; again brucellosis and bovine TB are examples.

Among wild animals there are three basic determinants of disease: the disease agent, the host, and the environment. Management strategies are based on manipulation of one or more of these determinants, as appropriate, and on influencing human activities. Wobeser (1994) extensively discussed strategies that have been or could be used for management of diseases of wild animals:

- **Controlling the causative agent** of a disease or its vector is the most direct strategy. A disease eradication program has an ultimate objective of time- and place-specific elimination of a causative agent. The screw worm (*Callitroga hominovorax*) program in Florida, the southwest U.S., and Mexico eliminated the fly through release of irradiated, sterile but sexually active males. Although this highly successful program was intended primarily to benefit domestic animals, it also greatly reduced screw worm-induced losses of deer, especially fawns, by controlling the agent (Strickland et al. 1981).
- **Manipulation of host populations** for disease management can occur through restrictions on distribution, selective removal (i.e., culling) of diseased animals, and reduction of population density. Disease- and host-specific factors may influence the potential efficacy of respective strategies (Barlow 1996). Population manipulation is generally intended to reduce or prevent disease transmission; but at its extreme, which is depopulation, it may eliminate a disease.
- Disease management **through treatment or immunization** may have application under certain circumstances. Treatment of wild animals is rarely attempted, but has occasionally been used with individuals or small populations of species at risk or of critical concern. Immunization of wild animals may have greater utility under appropriate conditions (Barlow 1996), but requires safe and effective vaccines and delivery systems that will reach a sufficiently large portion of the population to protect exposed individuals and/or reduce transmission. Vaccination of free-ranging elk to control brucellosis in Wyoming is an example.

- **Environmental and habitat modifications** are strategies that may be used to manage diseases of wild animals. Objectives generally are to reduce survival of specific disease agents or vectors, or lower population densities and reduce transmission rates. Habitat modifications usually should not be expected to produce rapid results, but the results should be relatively long lasting. Habitat enhancements to disperse bighorn sheep in winter serve to reduce disease transmission.
- Finally, diseases of wild animals may be managed by **influencing human activities**. The best example is taking measures to be sure diseases are not moved or introduced through translocation and reintroduction of wild or domestic animals. Specifically, some western states have restrictions on translocation of white-tailed deer from the east to prevent introduction of meningeal worm (*Paraelaphostrongylus tenuis*) to the west. Of greater long-term importance may be modifying public opinion through education and information programs to improve acceptance of disease management in wild animals.

Ongoing Wildlife Disease Management Programs

Currently there are at least three examples of important diseases of free-ranging wild animals, which are being cooperatively managed by multiple agencies using a variety of strategies specific for wild animals. Two of these, brucellosis in elk and bison of the GYA and bovine TB in white-tailed deer of Michigan, have important domestic animal and human health ramifications, and the third, chronic wasting disease (CWD) of cervids in southeast Wyoming and northeast Colorado, has national significance because of its uniqueness as a transmissible spongiform encephalopathy (TSE) in wild animals.

Chronic Wasting Disease of Cervids in Wyoming and Colorado

Chronic wasting disease is a TSE of native deer and elk that is endemic throughout northeastern Colorado and southeastern Wyoming. It was first recognized among captive cervids in the late 1960s and was diagnosed in free-ranging deer and elk during the 1980s (Williams and Young 1992). Estimated infection rates range from <1-15% in deer and $\leq$1% in elk residing in these endemic areas (Miller et al. 2000). Models suggest CWD has been present in free-ranging populations in areas of Colorado and Wyoming for more than 30 years (Miller et al. 2000). Although CWD occurs in three species of cervids, there is no evidence that humans (World Health Organization 2000) or domestic livestock are susceptible to CWD by natural routes of exposure.

Through the 1980s and early 1990s, the presence of CWD in Colorado and Wyoming led to considerable interagency cooperation at the state wildlife management level. Surveillance for CWD in free-ranging deer began in

Wyoming in 1983 and has been continually expanded in both states over-time. Following the onset of the bovine spongiform encephalopathy (BSE) epidemic in the United Kingdom and with the recognition of the relationship of variant Creutzfeldt-Jacob disease of humans and BSE, interest in the TSEs in general, and CWD in particular, greatly increased. This led to expansion of agencies and industries with legitimate concern about this disease and increased interagency communication and cooperation. An *ad hoc* committee (the Colorado-Wyoming Interstate Forum on CWD) was formed for exchanging information on CWD and included representatives from the Colorado Division of Wildlife, Wyoming Game and Fish Department, Colorado and Wyoming Departments of Agriculture, State Veterinarians of both states, USDA/APHIS, University of Wyoming, Colorado State University, Colorado and Wyoming Public Health Departments, and representatives of cattle, sheep, and alternative livestock industries. Meetings among the wildlife management agencies of Colorado, Wyoming, South Dakota, and Nebraska to discuss CWD have occurred periodically. Yearly meetings specifically to address advances in CWD research involve scientists from across the country representing a spectrum of state and federal institutions and agencies.

There is no precedent for attempting to manage a TSE in free-ranging wildlife. Programs for managing or eliminating scrapie of domestic sheep have proven only marginally successful to date, and the epidemiologic differences between CWD and other TSEs make such programs rather poor models for prospective CWD management. Limited understanding of the epidemiology of CWD makes development and implementation of strategies to prevent, control, and eradicate CWD extremely difficult. Therefore a primary goal of the wildlife management agencies in Colorado and Wyoming has been to invest resources in applied research to understand the epidemiology, distribution, and prevalence of CWD in affected areas (e.g., Miller and Kahn 1999). Common sense preventive measures have been instituted, including bans on relocation of cervids from the CWD endemic areas, halting artificial feeding of deer and elk by the public in areas where CWD occurs, and culling of deer and elk showing clinical signs of CWD. It may be possible to manage affected deer or elk populations to reduce CWD prevalence in endemic foci (Gross and Miller 2000), but prevalence reduction will require a long-term commitment and may not eliminate CWD from endemic areas. A cooperative experiment assessing the efficacy of alternative deer management strategies in changing CWD prevalence is underway in two game management units with high CWD prevalence in Colorado and Wyoming. Considering the difficulties inherent in addressing disease in free-ranging wildlife, an adaptive resource management approach (Holling 1978, Walters and Holling 1990) to test candidate strategies for reducing CWD prevalence and distribution is imperative.

CONFLICTS OF AUTHORITY AND STRATEGIES TO ADDRESS WILDLIFE DISEASES

Bovine Tuberculosis in Michigan Wildlife and Livestock

Since 1994, the state of Michigan has recognized a problem with bovine TB, caused by *Mycobacterium bovis*, in free-ranging white-tailed deer from an 11 county area in northeastern Lower Michigan. A total of 41,500 free-ranging deer have been tested and 285 were positive for *M. bovis*. The disease has been found in other wildlife species, including 8 coyotes, 2 raccoons, 2 opossums, 2 bobcats, 1 black bear, and 1 red fox, and beginning in 1998, in domestic cattle. To date 9 beef and 2 dairy cattle herds have been diagnosed with bovine tuberculosis.

Recognizing the potential economic and public health consequences of bovine tuberculosis to the state, the governor issued orders to eradicate *M. bovis* from the state's deer population. Unfortunately, the situation is unique in that there have never been reports of self-sustaining bovine TB in a wild, free-ranging cervid population in North America. There are no existing control programs for bovine TB in free-ranging deer, and there is much about bovine TB in deer that is currently unknown. Scientists, biologists, epidemiologists, and veterinarians that have studied this situation have concluded that the most logical explanation is that high deer densities, the focal concentration caused by baiting (the practice of hunting deer over feed), and feeding are the factors most likely responsible for the establishment of self-sustaining bovine TB in free-ranging Michigan deer (Schmitt et al. 1997). By repeatedly concentrating deer into close contact with each other, baiting and feeding provide ideal conditions for the transmission of bovine TB via both inhalation of infectious aerosols and ingestion of bovine TB contaminated feed (Whipple and Palmer 2000).

The extremely important goal of eliminating bovine TB from free-ranging deer is likely to be difficult to accomplish. It will require cooperation and collaboration of state and federal animal health and wildlife resource agencies. Animal health agencies do not have sufficient expertise in wildlife biology and management techniques to address the situation independently, while the same can be said for wildlife resource agencies faced with diseases in domestic animal populations. Therefore, multiple agencies must rely on each other and work collaboratively to deal with the control of disease in wildlife; unilateral efforts cannot be expected to succeed. It should be understood that wildlife resource agencies want their free-ranging wildlife populations to be free of disease just as much as animal health agencies want domestic animals to be free of disease.

A management strategy recommended by a multi-agency committee composed of individuals with disease expertise and jurisdiction included surveying wildlife populations, testing livestock, educating the public about bovine TB, eliminating feeding and baiting of deer, reducing the deer density through legal hunting in areas of Michigan where bovine TB has been found, and banning the transport of free-ranging deer from the infected area.

A comprehensive statewide program of surveillance of free-ranging deer populations is necessary to identify areas that will need intensified management practices and to monitor success of management strategies. Continued evaluation of the prevalence of the disease allows the Michigan Department of Natural Resources to determine the reservoir of existing disease, define geographic areas of infection, and assess trends in disease occurrence. Such information will need to be collected for many years in order to interpret trends. The deer surveillance plan focuses on areas that are most likely to have bovine TB-positive free-ranging deer. The plan is science-based using past and present livestock infection rates, locations of livestock, areas of deer density, and appropriate sample sizes for statistical analysis. It is coordinated with surveillance in livestock conducted by the Michigan Department of Agriculture, and it is practical in terms of manpower, money, and laboratory capacities.

A strong education program is necessary to bring about public understanding of, develop support for, and encourage participation in the TB eradication project. Improved communications, both at the grass roots level and through statewide marketing, is vital to success of the education program. Continued and enhanced contact with key audiences (i.e. livestock producers, industry representatives, media, hunters, and recreational wildlife viewers) will lead to an understanding of the recommended strategies for *M. bovis* eradication in white tailed deer and livestock populations. Examples of ongoing education efforts include Michigan Department of Natural Resources/ Michigan Department of Agriculture/Michigan State University extension training sessions, bovine TB brochures and newsletters, the annual Bovine TB in Michigan Conference, bovine TB web site, infomercials, satellite training sessions, and press packets.

Methods employed for eradicating bovine TB from free-ranging Michigan deer should decrease the transmission of bovine TB among deer. Reduction of transmission can be enhanced in two ways: reduction in the number of infected animals and reduction in the amount of contact (direct or indirect) between infected and susceptible animals. Increasing the hunter harvest of deer will reduce the overall number of deer as well as reduce the average age of the deer population. Hunting regulations should be liberalized to remove greater numbers of antlerless deer in order to control deer populations and to remove greater numbers of adult males because a higher prevalence of bovine TB has been observed in adult male deer in Michigan. The goal of liberalized hunting regulations should be a smaller deer herd with a younger age structure.

Elimination of baiting and supplemental feeding of deer will reduce the deer population as the herd density approaches the carrying capacity of the land, as well as decrease contact among deer. Artificial feed supplies (baiting and supplemental feeding) increase the density of deer populations beyond the carrying capacity. Even if the deer herd density is not artificially inflated, the presence of feed and bait encourage unnatural congregation of the animals, thereby increasing contact among deer and enhancing the transmission of infectious agents. Large numbers of animals in close proximity for extended periods of time are more likely to inhale infected aerosolized droplets or to consume food contaminated by coughing and exhalation (Schmitt et al, 1997).

In summary, the two main strategies for eradicating bovine TB from free-ranging Michigan deer are to minimize concentrations of deer by eliminating baiting and feeding and to reduce deer numbers through hunting to the biological carrying capacity. Baiting and feeding have been banned since 1998 in counties where the disease has been found. In addition, the deer herd has been reduced by 50% in the endemic area with the use of unlimited antlerless permits. The measures of apparent bovine TB prevalence have decreased by half since 1997, providing hopeful preliminary evidence that eradication strategies are succeeding.

Brucellosis in Bison and Elk of the Greater Yellowstone Area

The GYA is the largest and most nearly intact ecosystem and encompasses some of the most inaccessible and rugged country in the lower 48 states. It occupies approximately 7.3 million ha in Wyoming, Montana, and Idaho. Within the GYA there are approximately 120,000 elk, about 25,000 of which are artificially maintained during the winter by feeding hay on the National Elk Refuge and on 23 additional feedgrounds managed by the Wyoming Game and Fish Department. In addition, there are 3,000 to 4,000 free-ranging bison, most belonging to the Yellowstone population. Almost all the GYA's elk and bison are migratory to one degree or another. Over 1 million cattle occur in the GYA, and most are managed as cow-calf operations.

Brucellosis was first detected in bison of Yellowstone National Park in 1917 (Mohler 1917) and in elk on the National Elk Refuge in 1930 (Murie 1951), and brucellosis has probably been present in the GYA's elk and bison herds for around 100 years. Brucellosis is now recognized to be present in all 25 elk populations and the two bison populations of the GYA, and for many years it has been the source of controversy and conflict (Hillman 1999, Toman et al. 1997, Thorne et al. 1997). The problem is extensively discussed in Thorne et al. (1997) and other publications.

Each of the 13 state and federal agencies with management authority over animals and lands in the GYA is developing or participating in implementation of strategies to address the brucellosis problem. It is not the purpose of this summary to describe all strategies in play in the GYA.

The federal agencies must comply with the National Environmental Policy Act (42 U.S.C. §4321-61) (NEPA) for most federal actions, and much of their efforts to date have gone into Environmental Impact Statement (EIS) preparation and participating in implementation of interim plans until EISs are completed. In Montana, strategies to manage brucellosis-exposed bison that leave Yellowstone National Park have included agency destruction by shooting and slaughter of known test-positive bison, pregnant potentially latently infected female bison, and exposed bison of uncertain status; confining exposed bison until they can be returned to the park; hazing bison back into the park; allowing bison to stay outside the park for limited periods and in specific areas so that temporal and spatial separation from cattle can be assured. Research on feasibility of vaccinating bison is ongoing. With the minor exception of population manipulation through destruction of bison and removal of test-positive animals, both of which occur on a small scale relative to the population's size, these strategies are accomplishing little to control brucellosis within Yellowstone's bison. But they are managing the disease to nearly eliminate risk to cattle.

In Idaho, bison from Yellowstone are not tolerated and are removed as soon as they enter the state, but this is a very rare event. Idaho has a relatively small number of elk on the western edge of the GYA that use feedgrounds in winter and are infected or exposed to brucellosis. Idaho has prepared and implemented a management plan that employs disease management strategies of removal of test-positive elk, population density reduction by hunting, and habitat manipulation to provide alternatives to feedgrounds. These strategies are intended to eliminate brucellosis from Idaho elk as soon as possible.

The largest number of brucellosis infected and exposed elk occur in Wyoming. In addition, Wyoming has the relatively small Jackson Bison Herd, and a few bison exit the east gate of Yellowstone National Park into the state. In addition to an extensive research program initiated in 1971, a number of disease management strategies have been implemented. East of Yellowstone National Park, only a small number of male bison are tolerated in an area where there are no cattle, and female bison and excess males are removed by hunting regardless of brucellosis status. The Jackson Bison Herd summers in Grand Teton National Park and winters on feedlines on the National Park Refuge. Litigation by the Fund for Animals has precluded population reduction as disease management, except for a very few animals hunted on U.S. Forest Service and private lands under Wyoming Game and Fish regulations. The litigation also has prompted federal agencies to embark on an extensive, controversial NEPA process. Grand Teton National Park, where enabling legislation provides for cattle grazing during summer, manages cattle grazing times and locations and bison distribution to preclude brucellosis transmission to cattle. None of the strategies currently implemented in Wyoming serve to control brucellosis in bison.

The Wyoming Game and Fish Department has implemented numerous strategies to control brucellosis in elk with a goal of eventual elimination of the disease and reducing the threat of transmission to cattle. This is done under an integrated program called the Brucellosis-Feedground-Habitat program. Some strategies have been in place for decades, and draft Brucellosis Management Action Plans are being revised, updated, and formalized. Strategies to reduce the risk of transmission of brucellosis to cattle include feeding elk on feedgrounds so they do not commingle with cattle in winter; hazing elk away from private property with wintering cattle; fencing hay stored for cattle so it will not attract elk in winter; removal of elk from private property with wintering cattle by special depredation hunts and agency removal; and manipulation of winter habitat to attract elk away from cattle. These strategies greatly reduce risk to cattle, but with the exception of habitat manipulation, these strategies do not control the occurrence of brucellosis in elk, and feeding elk during winter encourages elk to elk transmission of brucellosis by artificially crowding them during mid-pregnancy.

Management strategies to control brucellosis in Wyoming elk include ballistic vaccination of feedground elk with strain 19 vaccine delivered via biobullet; moving elk feedlines to new, clean snow daily, if possible; habitat manipulation to encourage elk to leave feedgrounds earlier in the spring and to attract some elk away from feedgrounds; and monitoring for prevalence of brucellosis by testing hunter-killed non-feedground elk and testing trapped feedground elk to determine brucellosis management priorities and measure program success. These strategies, especially vaccination, have been demonstrated to be successfully reducing the occurrence of brucellosis. As an example, at Greys River Feedground, where elk have been vaccinated since 1985, seroprevalence has been reduced from a pre-vaccination (1971-1976) level of 46 percent to a post-vaccination (1993-2000) level of 11 percent.

Two notable strategies common to all agencies and states are to not translocate any elk or bison from the GYA and to participate in the GYIBC. With limited success, the GYIBC provides coordination and encourages implementation of brucellosis management strategies. It also encourages coordinated research necessary to develop additional strategies (Hillman 1999).

Summary

In summary, we believe many important wildlife disease problems may be successfully managed for the benefit of both wildlife and livestock interests. Success will depend on sharing both responsibility and support for such management among a broad range of agencies and constituencies, on setting realistic goals and timetables for disease management in free-ranging populations, and on recognizing and overcoming technical challenges unique to managing the health and viability of valuable wildlife resources.

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Managing Bovine Tuberculosis in Minnesota's Wild Deer

Background

Since 2005 bovine tuberculosis (TB) has been discovered in eleven cattle operations in northwestern Minnesota. The strain is consistent with bovine TB found in cattle in the southwestern U.S. and Mexico.

The Minnesota Department of Natural Resources (DNR) conducted surveillance for the disease in hunter-harvested deer within a 15-mile radius of the infected farms every fall since 2005. To date, the disease has been confirmed in 17 free-ranging deer, including 4 deer harvested in fall 2007. All infected deer have been adult animals, and were taken within five miles of a cluster of four bovine TB-infected cattle operations.

Because of these discoveries, the U.S. Department of Agriculture (USDA) downgraded the state's bovine TB status from "free" to "modified accredited advanced" in 2006. As a result, cattle producers across the state face mandatory testing of cattle and restrictions on cattle movement. The discovery of two additional bovine TB-infected livestock operations, as well as the increased number of infected wild deer, has put the state at greater risk to drop another level in status to "modified accredited" in 2008. The DNR is committed to assisting the Minnesota Board of Animal Health (BAH) in regaining the state's bovine TB-Free status.

Current Efforts to Manage Bovine TB in wild deer

Following the discovery of more infected deer in fall 2006, DNR decided to take more aggressive action to minimize the disease in wild deer. As a first step, recreational feeding of wild deer and elk was banned in a 4,000mi^2 area in northwestern Minnesota, as a preventative measure to minimize disease transmission. Secondly, a Bovine TB Management Zone was created to focus management efforts based on current knowledge of prevalence and geographic location of the disease in wild deer.

In February 2007, DNR contracted with USDA-Wildlife Services for assistance with deer removal within the Bovine TB Management Zone, with focus in a 140mi^2 core area that encompassed all the locations of infected deer found to date. The primary method of deer removal by USDA in these critical areas was sharp shooting. The goal with this deer removal effort was to reduce the opportunity for deer-to-deer or deer-to-livestock transmission of bovine TB by removing potentially TB-positive deer through a reduction of deer densities in critical areas. The BAH, the Minnesota State Cattlemen's Association (MSCA), and the Minnesota Deer Hunters Association (MDHA) all support this method of deer removal and believed it was immediately necessary to accomplish our goal. This was NOT an effort to eradicate all the deer, rather eradicate the disease.

Just prior to the start of the deer removal efforts, DNR conducted an aerial survey to assess deer numbers and distribution within the Bovine TB Management Zone and the core area. This survey work was done to help guide deer removal efforts by focusing on key areas with high deer concentrations. A population estimate of 923 ± 150 deer was determined for the 140mi^2 core area alone. Also, 29 illegal deer feeding sites on 22 properties were identified during the survey operation and led to enforcement investigations aimed at stopping these illegal activities.

Trained DNR staff examined all deer and lymph nodes were extracted for further testing for bovine TB. A total of 488 deer, nearly 50% of the local deer population, were removed in the core of the Bovine TB Management Zone. Six deer were found infected with the disease and were harvested within 5 miles of previously infected cattle operations.

In fall 2007, DNR created a new deer permit area, DPA 101, which encompassed the Bovine TB Management Zone to assist with management of the disease. To increase the harvest of deer in DPA 101, DNR created both an October early antlerless season and a special January 16-day hunt, in addition to the tradition 16-day November firearm season. In total, 1,166 hunter-harvested deer were tested for bovine TB in the surveillance zone; 4 deer were confirmed positive. Although the discovery of additional infected deer was unfortunate, the prevalence of the disease remains low (0.37%) and the geographic distribution of infected animals is confined to the core of the Bovine TB Management Zone.

Future Plans

DNR repeated the aerial survey of the 164mi^2 core area in late-January 2008, and a population estimate of 803 ± 133 deer was determined. Even though a large number of deer were harvested from this area in 2007, DNR did not achieve a significant reduction in deer abundance from 2006 to 2007; thus, DNR plans to continue putting pressure on this deer herd by removing potentially positive animals by sharp shooting in winter 2008 as well as continued liberal hunting seasons in the fall. Additionally, enforcement of the recreational feeding ban will continue.

A deer-proof fencing program, currently being managed by DNR, has provided up to $5,000 worth of fencing materials to help farmers protect their stored agricultural feed from wild deer. To date, 15 fences on 10 farm sites have been erected and an additional 10 farms are scheduled for fencing in 2008. DNR will continue to promote risk minimization of disease transmission between deer and livestock through help from state and federal agencies and key stakeholder groups (e.g., MSCA, MDHA).

DNR will continue monitoring for the disease through sampling of hunter-harvested deer. DNR is planning to conduct hunter-harvested surveillance within the larger bovine TB surveillance zone in fall 2008, with a sampling goal of 1,000 deer. This level of surveillance will continue every fall until we have two consecutive years of no positives. At that time, DNR may suspend surveillance efforts for a three-year period and then sample deer again to be sure the infection is eliminated is wild deer.

For more information on bovine tuberculosis contact Dr. Michelle Carstensen, DNR wildlife disease coordinator, (651) 296-2663.

Chronology of Wildlife-related Bovine TB Events and Actions in Minnesota
Minnesota Department of Natural Resources

Fall – Spring 2005-2006 (2 bovine TB positive deer confirmed)

- November 2005 – after discovery of bovine tuberculosis (TB) in 5 cattle operations in northwestern Minnesota, the DNR conducted bovine TB surveillance of hunter-harvested white-tailed deer within a 15-mile radius of the first 4 infected farms.
- 474 deer were tested in the surveillance program; 1 was positive for bovine TB (apparent prevalence of 0.2%; SE = 0.2%); the infected deer was harvested 1 mile southeast of Skime, in close proximity to 3 of the infected cattle operations.
- Late Winter - Spring 2006 – 90 deer were taken through landowner shooting permits on the infected farms; 1 additional positive deer was found.
- Fall-Spring – 4 adult bull elk, 1 yearling bull elk and 1 calf elk tested for bovine TB, no positives

Fall – Spring 2006-2007 (11 bovine TB positive deer confirmed)

- November 2006 – bovine TB surveillance of hunter-harvested deer was conducted in a surveillance zone encompassing a 15-mile radius of 7 infected farms
    - Of 942 deer tested, 5 were positive for the disease (apparent prevalence of 0.5%; SE = 0.2%). All positive deer were harvested within 5 miles of an infected farm.
- November 2006 – statewide bovine TB surveillance of hunter-harvested deer was also conducted, with a stratified sampling scheme that more heavily weighted northern Minnesota; no bovine TB positive deer were found outside the core area within the surveillance zone
- November 2006 (continuing to present) – Feeding of wild deer and elk was banned by expedited rule in a 4,000 mi^2 area in northwestern Minnesota as a preventive measure to help minimize disease transmission.
- Early February 2007 – fixed-wing aerial survey of deer in the bovine TB management zone was conducted; resulted in an estimated 923 ± 150 deer in the 164 mi^2 core area (considered a minimum estimate because it is uncorrected for visibility bias).
- February-April 2007 – Sharpshooting of deer by USDA/APHIS-Wildlife Services contractors, with focus in a 164 mi^2 core area that encompassed all the locations of infected deer found to date. Landowner shooting permits were again offered.
    - A total of 483 deer were removed by sharpshooting and 5 under landowner shooting permits
    - An additional 6 positive deer were confirmed
- Fall-Spring – 5 adult cow elk and 2 yearling cow elk tested for bovine TB, no positives

Fall – Spring 2007-2008 (5 bovine TB positive deer confirmed; 6-8 pending)

- October 2007 – special antlerless only hunt was held in mid-October in a new “disease management area” (Deer Area 101). 60 deer were harvested
- November 2007 –firearms deer season was held in bovine TB Deer Area 101 with no limit on the number of deer that could be taken; 1,449 deer were harvested, 5 confirmed positive for bovine TB
- November 2007 -- bovine TB surveillance of hunter-harvested deer was conducted in the surveillance zone encompassing a 15 mile radius of the previously infected farms
    - Of 1,166 deer tested, 5 were positive for the disease (apparent prevalence of 0.4 %)
- January 23-25, 2008 – fixed-wing aerial survey of deer in the bovine TB core area resulted in an estimated deer population of 806 ± 133 deer (considered a minimum estimate because it is uncorrected for visibility bias).
- January-April 2008 – Deer removal continued by a variety of methods after the regular hunting seasons closed, as follows:
    - Wildlife Services sharpshooting – 546 deer
    - Private contractor aerial shooting – 416 deer
    - Landowner shooting permits/emergency rule – 125 deer
    - Late season (January) special hunt – 120 deer
    - An additional 6-8 deer are suspects, final results pending
- March-August – Landowner/tenant shooting rule continues in effect
- Fall-Spring – 2 adult bull elk, 2 adult cow elk tested for bovine TB, results pending (including 1 wild cow elk that had been translocated from Alberta to Ontario as part of a reintroduction project and that subsequently moved into NW Minnesota)

A Case History of Chronic Wasting Disease (CWD) in West Virginia

Prepared by the West Virginia Division of Natural Resources
Wildlife Resources Section
September 7, 2008

SITUATION AND BACKGROUND

On August 25, 2005, the West Virginia Division of Natural Resources (WVDNR) received notification from the Southeastern Cooperative Wildlife Disease Study located at the University of Georgia, College of Veterinary Medicine that a lymph node sample from a 2½-year-old male road-kill deer collected as a part of routine Chronic Wasting Disease (CWD) surveillance in Hampshire County, West Virginia had an abnormal test result suggesting the animal could be positive for the CWD agent. According to protocol, the Southeastern Cooperative Wildlife Disease Study sent samples to the U.S. Department of Agriculture's National Veterinary Services Laboratories, which reported positive CWD test results on September 2, 2005.

CWD is a neurological disease found in deer, elk and moose that belongs to a family of diseases known as transmissible spongiform encephalopathies (TSE). The disease is thought to be caused by abnormal, proteinaceous particles called prions that slowly attack the brain of infected deer, elk and moose, causing the animals to progressively become emaciated, display abnormal behavior and invariably results in the death of the infected animal. There is no known treatment for CWD, and it is always fatal for the infected deer, elk or moose. It is important to note that currently there is no evidence to suggest CWD poses a risk for humans or domestic animals.

The origin of CWD is unknown. It was first recognized as a syndrome in captive mule deer in Colorado during the late 1960s, but it was not identified as a TSE until the 1970s. At the present time, CWD is found in captive herds in 10 states and 2 Canadian provinces and in free-ranging deer, elk and moose in 11 states and 2 Canadian provinces. The source of infection for wild and captive deer and elk in new geographical areas is unknown in many instances, but the spread through the translocation of live deer and elk has been documented. While it is not known exactly how CWD is transmitted, lateral spread from animal to animal through shedding of the infectious agent from the digestive tract appears to be important, and indirect transmission through environmental contamination with infective material is likely. At the present time, the origin of this disease in West Virginia is unknown.

The discovery of CWD in Hampshire County, West Virginia represents a significant threat to the state's white-tailed deer. The disease does not cause an immediate wide spread die-off of deer, but models indicate if allowed to spread will cause long-term damage to the herd. Those that have tried to predict the outcome of the disease on a deer population have described the disease as a 30 to 50 year epizootic. Due to the uncertain ramifications that CWD may have on the state's white-tailed deer resource, the WVDNR has taken immediate and appropriate actions as described in its CWD – Incident Response Plan.

CWD – INCIDENT RESPONSE PLAN

The WVDNR immediately implemented its CWD – Incident Response Plan to identify and describe the WVDNR's immediate response to the confirmation of a positive CWD deer in Hampshire County, West Virginia. While there are many scientific uncertainties regarding the basic biology and ecology of CWD that may hinder development of efficient strategies for combating this disease in free-ranging deer, the actions outlined in this Plan are designed to accomplish the following goals.

- Determine the distribution and prevalence of CWD through enhanced surveillance efforts.
- Communicate and coordinate with the public and other appropriate agencies on issues relating to CWD and the steps being taken to respond to this disease.
- Initiate appropriate management actions necessary to control the spread of this disease, prevent further introduction of the disease, and possibly eliminate the disease from the state.

ACTIONS TAKEN UNDER THE CWD – INCIDENT RESPONSE PLAN

Specific action items identified in the WVDNR's CWD – Incident Response Plan have been implemented to date and include the following.

- An initial public informational meeting dealing with the topic of CWD was conducted on September 13, 2005 in Romney, West Virginia. Subsequent public informational meetings dealing with ongoing and proposed CWD management activities were held on August 4, 2006 in Romney, West Virginia and on September 27, 2007 in Slanesville, West Virginia.
- News releases were prepared and distributed in an effort to provide the public with the most up-to-date and accurate information relating to the ongoing CWD situation in Hampshire County. Numerous media contacts were made to provide accurate and timely information relating to the CWD situation in Hampshire County. This information was subsequently made available to the public through television, radio and the print media.
- Close coordination and collaboration with appropriate state and federal agencies (e.g., West Virginia Department of Agriculture, West Virginia Bureau for Public Health and U.S. Department of Agriculture) and adjacent state fish and wildlife agencies (e.g., Virginia Department of Game and Inland Fisheries, Maryland Department of Natural Resources and Pennsylvania Game Commission) and the Southeastern Cooperative Wildlife Disease Study at the University of Georgia's College of Veterinary Medicine were initiated and are ongoing.
- CWD deer collection teams, comprised of personnel from the Wildlife Resources and Law Enforcement Sections, initiated and completed deer collection efforts within portions of Hampshire County during the months of September and October 2005. A total of 195 animals were sampled by these collection teams.
- CWD sampling teams, comprised of personnel from the Wildlife Resources Section, operated 9 biological checking stations throughout Hampshire County and collected CWD samples from 1,016 hunter-harvested animals during the first 3 days of the 2005 buck season and portions of the 2005 archery deer season.

- CWD deer collection efforts were reinitiated in March and April 2006, and these teams collected 85 adult deer and 40 fawns for sampling purposes within portions of Hampshire County.
- CWD sampling teams, comprised of personnel from the Wildlife Resources Section, operated 9 biological checking stations throughout Hampshire County and collected CWD samples from 1,357 hunter-harvested animals during various segments of the 2006 deer seasons.
- CWD deer collection efforts were reinitiated in March and April 2007, and these teams collected 101 adult deer and 42 fawns for sampling purposes within portions of Hampshire County.
- CWD sampling teams, comprised of personnel from the Wildlife Resouces Section, operated 9 biological checking stations throughout Hampshire County and collected CWD samples from 1,285 hunter-harvested animals during various segments of the 2007 deer seasons.
- CWD deer collection efforts were reinitiated in March and April 2008, and these teams collected 193 adult deer and 66 fawns for sampling purposes within portions of Hampshire County.

CWD SURVEILLANCE RESULTS

To date, CWD surveillance efforts conducted by the WVDNR have resulted in a total of 31 deer being confirmed positive for CWD in Hampshire County, West Virginia (i.e., 1 road-killed deer confirmed in 2005, 4 deer collected by the DNR in 2005, 5 deer collected by the DNR in 2006, 1 hunter-harvest deer collected in 2006, 3 deer collected by DNR in 2007, 6 hunter-harvested deer collected in 2007, and 11 deer collected by DNR in 2008). These include the following.

- On September 2, 2005, the first confirmed positive CWD deer in West Virginia was reported. The animal was a 2.5-year-old male collected as a road kill near Slanesville, West Virginia during routine surveillance for the disease.
- On September 29, 2005, three more deer were confirmed positive for CWD. These animals were collected by CWD deer collection teams operating in the Slanesville area. The positive animals were all female and included one 1.5-year-old and two 2.5-year-old animals.
- On November 18, 2005, a fifth deer was confirmed positive for CWD, a 2.5 year-old female deer collected by the DNR in the Slanesville area. This animal was initially reported as a sick 7.5-year-old female to our agency. The animal did not exhibit the classical CWD clinical sign of being emaciated, but it was reported as displaying clinical signs associated with the central nervous system. Subsequent confirmation of this fifth positive sample by the USDA National Veterinary Services Laboratories in Ames, Iowa revealed that a sample numbering cross reference error had occurred at the University Of Minnesota laboratory and the fifth positive deer was actually the 2.5 year-old female deer collected by DNR and not the 7.5 year-old female.
- Five (5) more deer tested positive for CWD from DNR collections that took place in Hampshire County during March and April of 2006.

- One (1) hunter-harvested deer was collected during the bucks-only deer season in Hampshire County during November of 2006.
- Three (3) more deer tested positive for CWD from DNR collections that took place in Hampshire County during March and April 2007.
- Six (6) hunter-harvested deer were collected during the bucks-only deer season in Hampshire County during November 2007.
- Eleven (11) more deer tested positive for CWD from DNR collections that took place in Hampshire County during March and April 2008.
- From September 2005 through April 2008, a total of 4,380 deer have been tested for CWD. These samples consisted of 1,016 hunter-harvested deer taken during the 2005 fall hunting season, 195 deer collected by the DNR in the fall of 2005, 125 deer collected by the DNR in 2006, 1,357 hunter-harvested deer taken during the 2006 fall hunting season, 143 deer collected by the DNR in 2007, 1,285 hunter-harvested deer taken during the 2007 fall hunting season, and 259 deer collected by the DNR in 2008. CWD was not detected in any of the 1,016 hunter-harvested deer collected in 2005. Four (4) of the 195 deer collected by the DNR in the fall of 2005 were confirmed to have the CWD agent, 5 of the 125 deer collected by the DNR in 2006 tested positive for CWD, 1 of the 1,357 hunter-harvested deer collected in 2006 tested positive for CWD, 3 of the 143 deer collected by the DNR in 2007 were confirmed to have the CWD agent, 6 of the 1,285 hunter-harvested deer collected in 2007 tested positive for CWD, and 11 of the 259 deer collected by the DNR in 2008 had the CWD agent.
- Prior to the hunter-harvested samples collected in 2007, analysis of the CWD surveillance data indicated the disease appeared to be found in a relatively small geographical area located near Slanesville, West Virginia. The CWD positive deer had all been collected within a 5½-mile radius of the first positive deer and within the Hampshire County CWD Containment Area (i.e., that portion of Hampshire County located North of U.S. Route 50). In 2007, it was determined that one CWD positive deer was harvested outside the CWD Containment Area but still within Hampshire County near Yellow Springs, West Virginia (i.e., 11.4 miles southeast of the closest known CWD location).

CWD MANAGEMENT STRATEGIES IMPLEMENTED

Based upon the CWD surveillance findings noted above, the WVDNR has taken the steps necessary to implement appropriate management actions designed to control the spread of this disease, prevent further introduction of the disease, and possibly eliminate the disease from the state. The following disease management actions have been implemented by the WVDNR within the affected area of Hampshire County.

- Continue CWD surveillance efforts designed to determine the prevalence and distribution of the disease.
- Lower deer population levels to reduce the risk of spreading the disease from deer to deer by implementing appropriate antlerless deer hunting regulations designed to increase hunter opportunity to harvest female deer.

- Establish reasonable, responsible and appropriate deer carcass transport restrictions to lower the risk the disease will be moved to other locations.
- Establish reasonable, responsible and appropriate regulations relating to the feeding and baiting of deer to reduce the spread of the disease from deer to deer.

SUMMARY OF PROGRAM STRENGTHS

- Our agency received outstanding technical support from the wildlife researchers and veterinarians stationed at the Southeastern Cooperative Wildlife Disease Study located at the University of Georgia, College of Veterinary Medicine in Athens, Georgia.
- Our deer project leader received his Ph.D. from the University of Georgia working for the Southeastern Cooperative Wildlife Disease Study, and he provides significant in-house capacity to our agency on various wildlife diseases issues, including CWD.
- Our agency has a strong district base of operations that allows for structured communication, a clear chain of command, effective tactical planning and efficient implementation of action items identified in the CWD – Incident Response Plan.
- Our agency has been able to effectively communicate with the public (e.g., hunters, landowners, etc.) and coordinate with state and federal agencies on issues relating to CWD and the steps being taken to manage the disease.
- Landowner and hunter cooperation associated with the WVDNR's CWD surveillance efforts in Hampshire County remain high, and this has been an essential element of our agency's success. The WVDNR remains committed to keeping the public informed and involved in these wildlife disease management actions.
- Collaboration and communication with other state fish and wildlife agencies on issues relating to CWD surveillance and management actions appeared to be successful and well received.
- Contact with the media has been completely transparent, upfront and timely with regard to the exchange of information associated with our CWD surveillance and management activities.
- Our Wildlife Biologists, Wildlife Managers and Conservation Officers are working diligently to fully implement the WVDNR's CWD – Incident Response Plan, which is designed to effectively address this wildlife disease threat. Anecdotal evidence indicates hunters, landowners and other members of the public feel confident that we have some of the best wildlife biologists and veterinarians in the world, including those stationed at the Southeastern Cooperative Wildlife Disease Study in Athens, Georgia, working collaboratively on this situation.

SUMMARY OF PROGRAM WEAKNESSES

- Our agency lacks human dimensions expertise, and we have not secured sound, science-based information relating to the views, opinions and concerns of hunters, landowners and others interested in the ongoing CWD situation and our agency's management actions.
- Political pressures precluded our agency from fully implementing a science-based, CWD

containment zone designed to effectively regulate deer carcass transport and the baiting and feeding of wildlife within designated areas.

- Expanded opportunities to harvest additional antlerless deer, remove females from the population and reduce deer densities have only achieved moderate success due at least in part to the land ownership patterns in this portion of Hampshire County (i.e., numerous landowners holding small acreages).
- A lack of funding has precluded our agency from conducting DNA-based research designed to determine the movement patterns of deer across the landscape. If we could determine the genetic flow of this material, we might be able to implement more effective management options to reduce the spread of CWD.
- Enhanced CWD surveillance efforts have placed an extreme burden on existing programs in terms of manpower allocations and budget constraints, especially within the Game Management Unit.

CONTACT INFORMATION

For additional information regarding implementation of the WVDNR's CWD – Incident Response Plan and our agency's efforts to manage this disease, please contact the following personnel.

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MICHIGAN SURVEILLANCE AND RESPONSE PLAN FOR HIGHLY PATHOGENIC AVIAN INFLUENZA IN FREE-RANGING WILDLIFE

Michigan Department of Natural Resources
Wildlife Division

Photo Credit: U.S. Department of the Interior/ U.S. Geological Survey

January 27, 2006

Great Lakes, Great Times, Great Outdoors
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Michigan Surveillance and Response Plan for Highly Pathogenic Avian Influenza in Free-ranging Wildlife

Michigan Department of Natural Resources, Wildlife Division

Avian influenza (AI) is a disease caused by a virus found in wild birds, especially waterfowl and shorebirds. The virus is found only in small numbers of birds in the wild, and infection typically causes few, if any, symptoms. The virus is shed in fecal droppings, saliva and nasal discharges. Since 2003, a strain of AI virus capable of causing particularly severe disease has emerged in Asia, the Highly Pathogenic AI (HPAI) H5N1 virus. HPAI H5N1 probably originated from domestic poultry in Asia. It is of critical concern because: 1) it poses a threat to domestic poultry, especially chickens; 2) it has caused illness in approximately 150 persons, including the deaths of at least 74 people as of January 6, 2006; and 3) the emergence of HPAI H5N1 in humans poses a potential global pandemic (i.e., worldwide epidemic) influenza threat. Most human HPAI H5N1 cases are thought to have acquired HPAI H5N1 virus infection through direct handling of infected poultry, consumption of uncooked poultry products or contact with virus-contaminated surfaces/materials. Limited person-to-person transmission of HPAI H5N1 has also been documented. Avian influenza viruses other than HPAI H5N1 have been found in many bird species, but are most often found in migratory waterfowl. However, the only documented mortality event in wild birds, prior to the current MPAI H5N1 outbreak, killed common terns in South Africa in 1961.

This document proposes a broad outline of activities to be undertaken by the Michigan Department of Natural Resources (DNR), Wildlife Division, to:

- Determine whether or not HPAI H5N1 virus currently exists in wild birds in Michigan, and its geographic extent, if present;
- Provide a framework for ongoing surveillance to detect introduction of HPAI H5N1 virus into wild birds in the future;
- Act promptly if HPAI H5N1 is present in wild birds, to limit propagation of the virus among wild birds, and transmission of the disease to domestic poultry and humans.

The DNR activities can be broadly divided into two categories: Surveillance and Response. Early detection and the rapid, accurate diagnosis of disease set the stage for response activities to follow. These are accomplished by surveillance of wild populations to detect sick or dead birds through diagnostic testing. Once surveillance has provided a basic understanding of the distribution of the disease and its magnitude, specific response activities can be formulated. These are used to control the spread of disease, prevent exposure of susceptible but as yet unexposed hosts, and, where possible and desirable, eradicate the disease.

Communications and education activities will change tone and direction depending on circumstance, but are active, ongoing functions related to both surveillance and response modes. Continual communication and education activities, directed at lawmakers, key constituency groups, the media and the general public will raise public awareness of HPAI, increase understanding of the disease, and help ensure broad-based public support for DNR HPAI activities.

I. **Introduction**[1]

A. *The agent*: Avian influenza is usually an inapparent or subclinical viral infection of wild birds. It is caused by a group of viruses known as type A influenza. In nature, these viruses change rapidly by continuously mixing their genetic components (mutating) to form slightly different virus subtypes. Collectively, avian influenza infections are caused by these slightly different viruses rather than by any single virus type. The virus subtypes are identified and classified on the basis of two broad types of antigens, hemagglutinin (denoted as H) and neuraminidase (N); 16 H and 9 N antigens have been identified among all of the known type A influenzas. Thus, there are 144 (16 × 9) different virus subtypes of AI currently known.

B. *Species susceptibility*: Avian influenza viruses have been found in many bird species, but are most often found in migratory waterfowl (ducks, geese, and swans). Other wild birds known to be capable of harboring influenza viruses include shorebirds, gulls, quail, pheasants, and ratites (e.g., ostrich and rhea). Experimental infections of domestic birds (e.g., chickens, ducks, etc.) with virus subtypes isolated from free-ranging wildlife do not cause mortality. Similarly, virus subtypes that cause disease in domestic fowl do not normally cause mortality in wild waterfowl. However, recent mortality in wild birds due to HPAI H5N1 has been reported in China, Turkey and Mongolia. Avian influenza viruses can also infect certain mammals such as pigs, horses, dogs and humans.

C. *Transmission*: Various AI virus subtypes circulate among wild birds worldwide. Certain birds, particularly water birds, act as hosts for influenza viruses by carrying the virus in their intestines. Infected birds shed virus in saliva, nasal secretions, and feces. Susceptible birds can become infected with AI virus when they have contact with nasal, respiratory, or fecal material from infected birds. Fecal-to-oral transmission is the most common mode of spread between birds. Most often, wild birds that host the virus do not get sick themselves but can spread AI to other birds (termed inapparent or subclinical infection).

Infection with certain AI viruses (e.g., some H5 and H7 strains) can cause widespread disease and death among some species of domesticated birds. Domestic poultry may become infected with some AI subtypes through direct contact with infected free-ranging waterfowl or other infected poultry, or through contact with surfaces (such as soil or cages) or materials (such as water or feed) that have been contaminated with the virus. People, vehicles, and other inanimate objects can spread influenza virus from one farm to another. Avian influenza outbreaks among poultry occur sporadically worldwide.

D. *Epidemiology*: Susceptibility to AI infection appears relatively uniform between sexes. However, juvenile waterfowl have a higher AI isolation rate than adult birds. The highest occurrence of infection is in the late summer months in juvenile waterfowl when they assemble for their first southward migration. The number of infected waterfowl decreases in the fall as birds migrate toward their southern wintering grounds, and is lowest in spring, when only about one bird in 400 is infected during the return migration north. In contrast, the number of shorebirds and gulls infected is highest during May and June. Infection in shorebirds is also high in September and October.

E. *Symptoms and gross lesions*: Avian Influenza viruses causing severe disease in wild birds are rarely found, and observable signs of illness have not been described. Only once before the current HPAI H5N1 outbreak in Asia has mortality in wild birds due to AI

[1] Some of the following material is drawn from a Report to the Homeland Security Council Policy and Coordination Committee entitled *Highly Pathogenic Avian Influenza Early Detection*, Interagency Working Group, December 28, 2005; United States Geological Survey Wildlife Health Bulletin 05-03; Alaska Department of Fish and Game, *What Hunters Should Know About Avian Influenza*; *Field Manual of Wildlife Diseases*, USGS Information and Technology Report 1999-2001; and USDA-US Policy to Ensure the Protection of Personnel Involved in Highly Pathogenic Avian Influenza Control and Eradication Activities.

been noted. Common terns that died of AI in South Africa in 1961 did not have gross lesions, but a few birds had microscopic evidence of inflammation of the membrane that covers the brain (meningoencephalitis).

Signs of disease in domestic poultry may appear as respiratory, digestive, or reproductive abnormalities. Included are such nonspecific manifestations as decreased activity, food consumption, and egg production; ruffled feathers; coughing and sneezing; diarrhea; and nervous disorders, such as tremors.

F. *Diagnosis*: Infected birds are detected by isolating virus from cloacal swabs, and growing it in embryonated chicken eggs, as well as by serological testing of blood for antibody. The latter test indicates whether a bird was exposed to these viruses at some point in its life, but not whether it is currently infected or carries the disease. Reference antisera to all of the subtype antigen combinations are used to determine the specific subtype of virus. However, the ability of a specific virus subtype to cause severe disease, termed virulence, cannot initially be determined by antigenic subtype alone. Laboratory and animal inoculation tests are required. Measurement of virulence is based on an index established for domestic poultry. Both virulent and non-virulent strains of the same virus subtype can circulate in nature, so isolation of a particular virus subtype does not necessarily portend the severity of disease that subtype is likely to cause.

G. *Control*: The role of wild birds in the spread of HPAI H5N1 remains unresolved. There is currently no evidence that HPAI H5N1 infection in humans has been acquired from wild birds. Circumstantial evidence suggests limited local infections of resident wild birds, but spread of HPAI H5N1 outside initial outbreak zones by migratory birds has not been substantiated. Complete eradication of HPAI H5N1 from Asia is probably precluded by its presence in wild bird populations, because control of infections in wild birds is not feasible. Culls of wild birds are highly unlikely to stop disease spread and are extremely difficult, if not impossible, to implement effectively. On the contrary, culls have the potential to make outbreaks worse by dispersing infected individuals and stressing healthy birds, making them more susceptible to disease. Moreover, despite their remote likelihood of success, culls divert limited resources away from more effective disease control and management efforts.

II. **Surveillance Plan**

The DNR will conduct three types of surveillance (i.e. testing to determine the presence/absence and extent of disease) in free-ranging wild birds:

- Examination of carcasses from mortality events (i.e., die-offs) affecting wild birds
- Sampling of live-caught wild birds
- Sampling of hunter-harvested wild birds

The primary strength of investigations of mortality events is based upon the observation that HPAI H5N1 differentially kills particular species of wild birds. As such, a wild bird die-off serves as a “trigger event” that immediately focuses investigation on a particular area and species. Further, because the current form of HPAI H5N1 circulating in Asia will be new to North America, HPAI H5N1 will likely be detected if it is the cause of a die-off in the presumably susceptible North American wild bird population. Therefore, recovery of carcasses and samples from wild bird die-offs affords an efficient and timely means of detecting HPAI H5N1.

Live bird surveillance provides the opportunity to detect inapparent infections, and so offers the potential for early detection of arrival and spread of HPAI H5N1. Because of Michigan’s size and the number of resident and transitory species, careful scientific consideration will be needed to identify appropriate species and locations for live bird sampling.

Hunter-harvested birds will provide an opportunity to augment live bird surveillance by providing large numbers of birds for sampling with reduced effort. However, because a limited number of species are targeted for hunting, the choice of species and locations for sampling should be based on likelihood of exposure and susceptibility, not solely on ease of collection.

Because the primary goal of this Plan is the earliest possible detection of HPAI H5N1 in free-ranging wild birds, all of the strategies described are important. However, not all strategies are practical to conduct in all areas of Michigan. To be effective, all will require considerably greater monetary and personnel resources than are currently available. The greatly increased number of sample submissions will require diagnostic laboratories to be prepared in advance. Surveillance of live birds would be most effective when used to determine the pattern of geographic spread subsequent to a HPAI H5N1-caused die-off. While wild bird die-offs are important to investigate for a variety of reasons, HPAI H5N1 will not be the cause of most of the mortality events investigated. Other diseases that are transmissible to humans and/or important to wildlife conservation or agriculture may also be detected.

A. **Investigation of morbidity and mortality events in free-ranging wild birds**

Overview: The systematic investigation of morbidity and mortality events in wild birds offers the highest probability of detecting HPAI H5N1 efficiently if it is introduced into the United States (US) by migratory birds. There is increasing evidence that HPAI H5N1 is capable of killing wild birds in substantial numbers, which is not typical of other AI virus subtypes. As such, the movement of the virus through Asia and into Europe thus far has been documented in part through the investigation of mortality events in wild migratory birds.

The initial detection of a mortality event is critically dependent upon the public and well-trained and observant field personnel. These people in turn must communicate with an experienced staff of disease investigation specialists that obtain the maximum amount of information from the event. Depending upon the significance, scope and severity of the mortality event, these highly-trained individuals may conduct field investigations to obtain information first hand. In addition to establishing a diagnosis, disease investigation specialists provide useful wildlife management recommendations to potentially limit further morbidity and mortality.

In the event HPAI H5N1 is detected in free-ranging wild birds, it will be important to investigate the proximity of domestic poultry and swine operations to initiate activities to minimize their contact with wild birds. Morbidity and mortality of wild birds are most likely to occur where migratory birds mingle, particularly in wetlands. Early outbreaks of HPAI H5N1 would most likely occur in Alaska and along the Pacific Flyway of the United States and Canada, where migratory birds from Asia congregate in the summer and early fall prior to migration within North America (Figure 1). However, given that migrants also move from Alaska to other parts of North America (albeit less frequently), surveillance strategies should include other flyways as well (Figure 2).

Methodology: The success of this surveillance strategy is contingent upon: 1) early detection of morbidity and mortality; 2) rapid reporting and submission of appropriate biological specimens to qualified diagnostic facilities; 3) immediate epidemiological assessment of the field event; 4) rapid, accurate, and consistent diagnosis and confirmation; 5) immediate reporting of diagnostic results once confirmed; and 6) pre-planned contingency and response training.

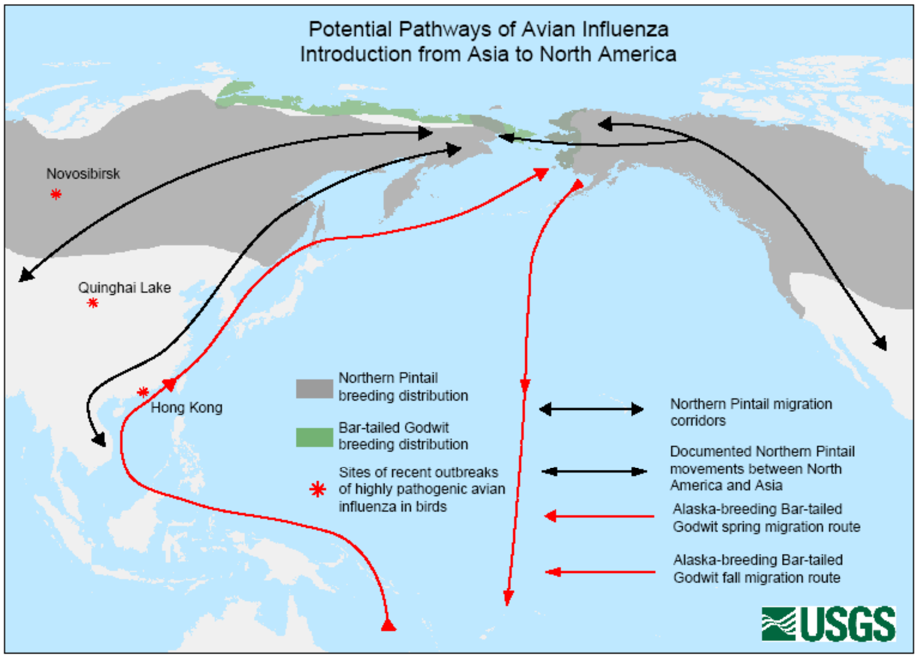

Figure 1. Potential Disease Transmission Across Continents. From the document: *Highly Pathogenic Avian Influenza Early Detection;* Interagency Working Group Report to Homeland Security Council Policy and Coordination Committee, August 18, 2005

Specific steps that will be necessary to facilitate early detection of HPAI H5N1 include:

1. DNR personnel will be instructed to increase vigilance and to establish routine and systematic monitoring of wild bird populations for morbidity and mortality events.

2. A uniform protocol for reporting mortality events will be developed with instructions for the safe handling and shipment of specimens to the DNR Wildlife Disease Laboratory (WDL). Field and response personnel will be trained in their proper use. A centralized database of investigation and testing data will be maintained and summarized in a form suitable for public dissemination.

3. Personnel will respond to mortality events with field investigations to determine onset, course, duration, distribution, affected species, and other epidemiological and environmental conditions associated with mortality events.

4. Representative carcasses and other biological samples will be submitted to the DNR WDL located in the Diagnostic Center for Population and Animal Health (DCPAH) on the Michigan State University campus for immediate necropsy and laboratory analyses. Guidelines will be developed to ensure that the appropriate number and types of samples are collected. Necropsies, histology, and laboratory investigations (virus isolation, hemagglutination inhibition tests, and molecular testing) will be performed to detect HPAI H5N1 at DCPAH, with confirmation testing done at the United States Department of Agriculture (USDA), National Veterinary Services Laboratory (NVSL).

5. HPAI H5N1 is a US Centers for Disease Control (CDC)/USDA Select Agent, thus the CDC/USDA Select Agent Program will be notified immediately upon confirmation of HPAI H5N1, and all Select Agent guidelines will be followed as required. Because

HPAI H5N1 is also a reportable disease, the State Veterinarian, the USDA Area Veterinarian in Charge (AVIC), and Office International Des Epizooties (OIE) will be informed simultaneously of the discovery. Public release of information will occur only after the confirmed final results are thus reported.

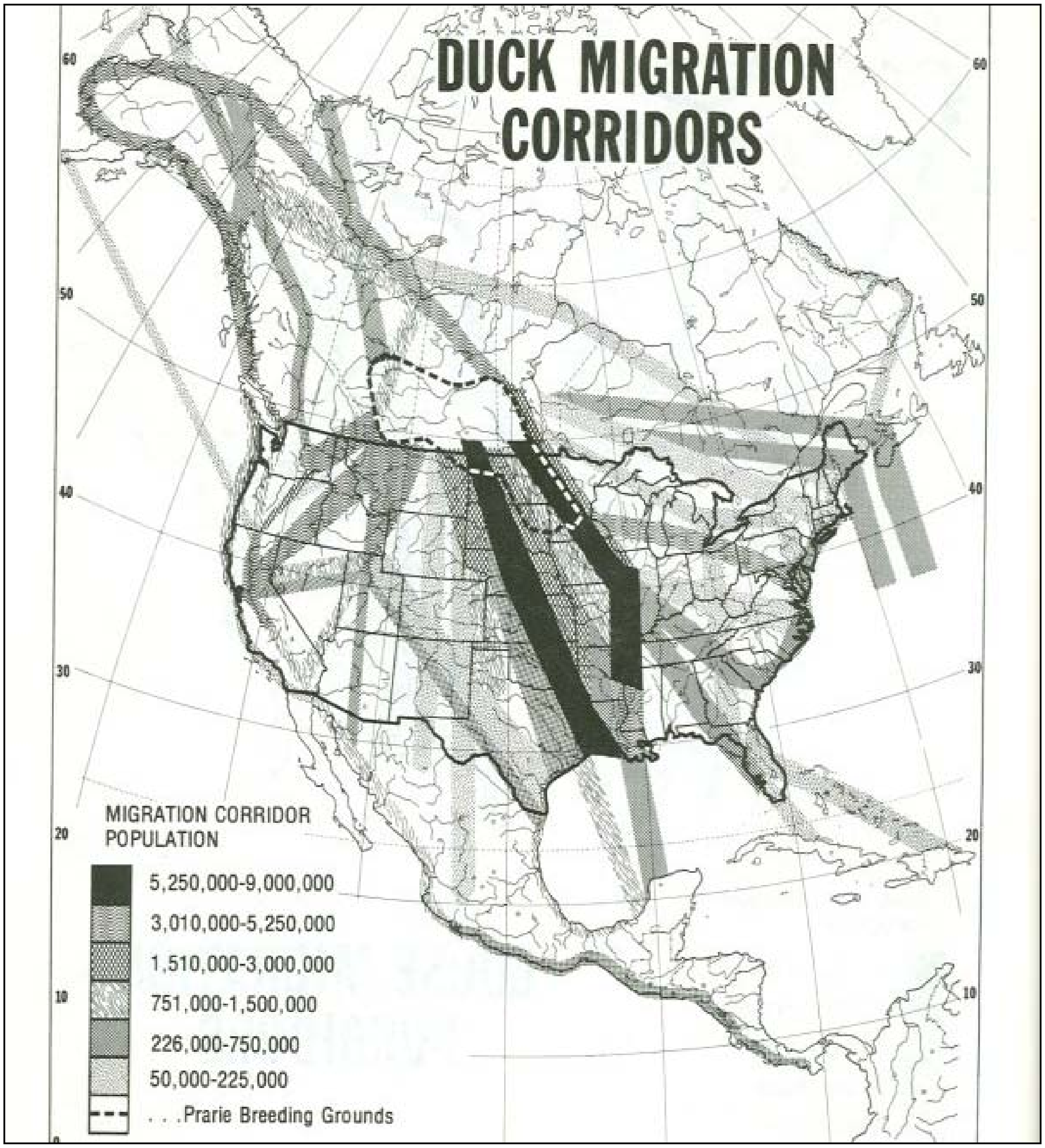

Figure 2. North American duck Migration Corridors. From*: Ducks, Geese & Swans of North America,* Frank C. Bellrose, 1980, Stackpole Books.

B. **Targeted surveillance for HPAI H5N1 in live free-ranging wild birds**

Overview: This strategy incorporates sampling of live-captured, apparently healthy migratory birds to detect the presence of HPAI H5N1 or antibodies to HPAI H5N1. Virus isolation from cloacal or fecal samples is a common and widely used method for detecting AI. Serologic testing for specific antibodies is particularly useful because it may detect previous exposure to HPAI H5N1 in cases where a fecal sample is negative by virus isolation. The combination of virus isolation and serology offers a high degree of sensitivity for AI virus detection. This effort targets bird species in Michigan that represent the highest risk of exposure to or infection with HPAI H5N1 because of their migratory patterns. This includes birds that migrate directly between Asia and North America or birds that may be in contact with species from areas with reported outbreaks.

Alaska and adjacent areas in the Russian Far East represent a unique case where major flyway systems cross continental boundaries. Two major Asian flyways (the East Asian-Australasian and East Asian) include both Southeast Asia and the arctic regions of Siberia and Alaska. The East Asian-Australasian Flyway extends from the Asian arctic to Australia and New Zealand, covering 20 countries. Similarly, in North America, the Pacific Flyway extends from arctic Asia and North America to South America. The overlap at the northern ends of these flyways establishes a path for potential disease transmission across continents and for exchange of genetic material among AI subtypes from Eurasia and North America. Such transport is not unreasonable, as the contribution of Eurasian AI subtypes to viruses in North American wild birds has already been demonstrated. While some concern exists about the potential spread of HPAI H5N1 westward from Asia to the United States via Europe, there is less movement of wild birds between Europe and North America. If migratory birds are to introduce the virus subtype to the United States, it is far more likely to arrive in Alaska first.

Methodology: Birds will be sampled in conjunction with existing banding operations (Figure 3.) when possible, with additional bird captures as necessary to provide broad species and geographic surveillance. Efforts will focus on species that could travel directly to Alaska from Southeast Asia, those breeding in Alaska, and those that

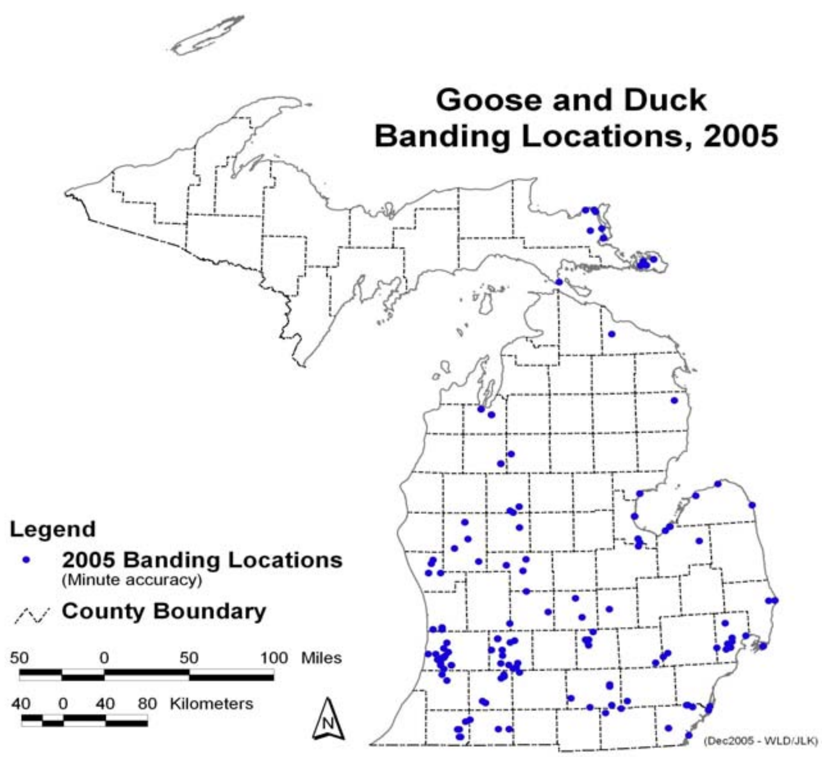

Figure 3. DNR Goose and Duck Banding Locations, 2005.

commingle in Alaska prior to migration down the Mississippi Flyway. Examples include northern pintail, common merganser, red-breasted merganser, snow geese, American widgeon and green-winged teal, scaup, northern shoveler and mallard. Other species will be sampled if surveillance elsewhere indicates exposure to or infection with HPAI H5N1.

Fecal samples will be collected via cloacal swabs using standard methods. Swabs will be inserted into pre-labeled tubes of Viral Transport Medium and kept chilled or frozen overnight for shipment to the DCPAH. Blood samples will also be collected and tested at the DCPAH for evidence of exposure to AI viruses. All birds sampled will be banded. A target sample size of 200 individuals per species will be sought (this sample size will be difficult for many of the target species), allowing sufficient power to detect a HPAI H5N1 prevalence of ≥1.5% with 95% confidence. However, it must be realized that the main species captured during banding operations are Canada geese, wood ducks and mallards.

Upon receipt at the DCPAH, cloacal swabs will be labeled and moved to a storage freezer at -80º C until processing. Batches of 10 to 20 swabs will be thawed, ribonucleic acid (RNA) extracted and subjected to polymerase chain reaction (PCR) assay for HPAI H5N1 virus (or AI viruses as a group) by standard methods. Alternatively, liquid from swab specimens will be filtered and inoculated onto cell cultures or embryonated chicken eggs for virus isolation, with isolates then analyzed by PCR. Bird sera will be tested for AI antibody by agar-immunodiffusion. Positive sera will be submitted to NVSL for identification of H and N viral subtypes.

C. **Targeted surveillance for HPAI H5N1 in hunter-killed free-ranging wild birds**

Overview: Check stations and opening-day bag checks for waterfowl hunting are operated by the DNR to collect information on harvest (Figure 4). Hunter check stations provide an efficient and cost effective means to collect additional samples for surveillance

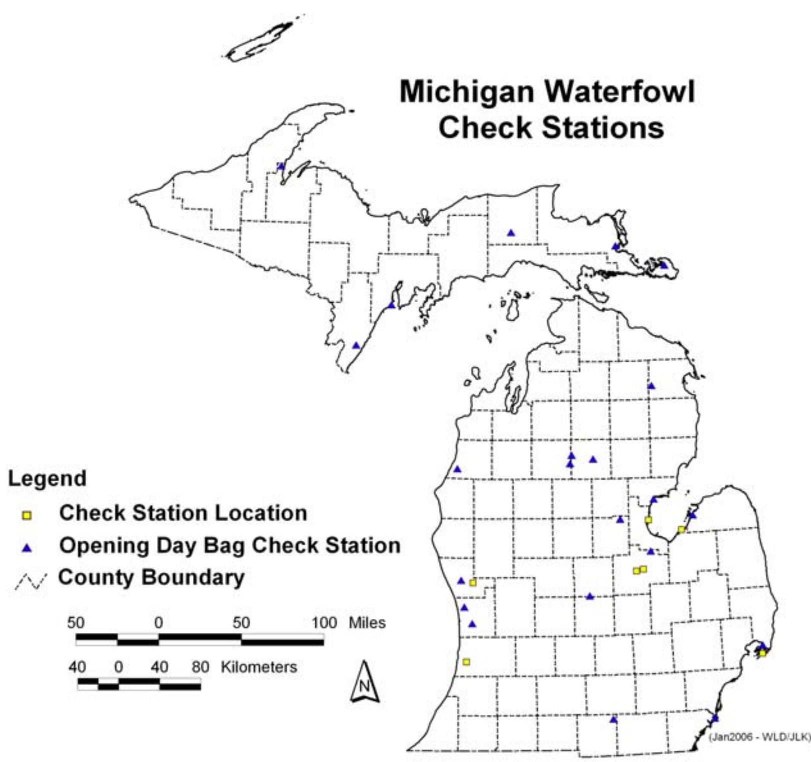

Figure 4. Michigan Waterfowl Check Stations and Opening-Day Bag Check Locations, 2005. DNR Wildlife Division.

of HPAI H5N1 (and other AI subtypes) to supplement surveillance in live-captured migratory birds, increasing the number of species, geographic locations and time periods represented.

Methodology: Like surveillance in live-captured birds, testing of hunter-killed birds will focus on hunted species most likely to be exposed to HPAI H5N1 in Asia that have relatively direct migratory pathways to Alaska ("primary" species). Additional samples collected on wintering grounds in the lower 48 states will include both primary species and species that mix with them in Alaskan staging areas (secondary species). In Michigan, the northern pintail is the likely primary species for sampling, while secondary species include American widgeon, green-winged teal, northern shoveler, mallard and lesser scaup. Currently, the probability of HPAI H5N1 transmission from primary to secondary species in the wild is poorly understood. However, AI viruses are known to remain viable for months in cold freshwater. If secondary transmission proves efficient, a very large number of species could potentially be involved. Thus, sampling efforts will target the species, populations and wintering areas where research and field experience suggest HPAI H5N1 is most likely to be detected. The complete design and implementation of this strategy requires closer coordination with other states through the Flyway Council system. Unlike other approaches, the use of hunter-harvested birds will be highly visible to the public, and consequently should be discussed in advance with hunting organizations to ensure their cooperation.

A sample size of 200 birds per species throughout the state will be sought, allowing detection of HPAI H5N1 at a prevalence of ≥1.5% with 95% power. Cloacal swabs will be collected, processed and tested by PCR as previously noted.

D. **Education/outreach/communications for surveillance activities**

During surveillance, DNR officials will focus on new ways to educate Michigan residents about HPAI H5N1 and plans for surveillance and response. All communicators should understand and be able to discuss basic HPAI H5N1 pathogenesis, how it impacts wildlife, surveillance and testing procedures, and how policies can help prevent the introduction and spread of the disease. Communication and education activities should include:

1. Appropriate staff designated by the DNR, attending local meetings of constituency groups at a regional level to make informational presentations and answer questions.

2. Natural Resources Commissioners discussing the issue at public meetings and special events to raise awareness of and build support for surveillance efforts and prevention goals.

3. The DNR raising public awareness and broad-based public support through guest editorials in daily newspapers, radio and television interviews, and other public speaking opportunities.

4. State agency personnel will have already presented an overview and update on HPAI H5N1 to the Michigan Legislature. Ongoing updates will keep policy-makers informed of recent developments.

5. Preparation of an HPAI H5N1 brochure and fact sheets for public distribution and publication of HPAI H5N1 information in the *Michigan Hunting and Trapping Guide* and other publications.

6. Continual provision of up-to-date information on the DNR and Emerging Diseases web sites.

III. **Response Plan**

If HPAI H5N1 is diagnosed in free-ranging wild birds in Michigan, the Joint Avian Influenza Management Team will be activated, and will meet regularly to coordinate decision-making for state agencies by:

- Revising the surveillance and response plan as needed;
- Attempt to secure financial resources for response;
- Working with the Governor's Office and Legislature;
- Reviewing current science concerning HPAI H5N1;
- Keeping the public informed; and
- Monitoring and reporting the progress of response efforts.

A. **If HPAI H5N1 is diagnosed in free-ranging wild birds**

The DNR response efforts are designed to limit transmission from wild birds to domestic poultry and possibly humans. All translocation of wild birds will be stopped until surveillance suggests HPAI H5N1 virus is no longer circulating among free-ranging wild bird populations.

1. *Limit Transmission from Free-ranging Wild Birds to Humans*

There is currently no evidence that human HPAI H5N1 infections have been acquired from free-ranging wild birds. However, in the face of uncertainty, precautionary measures to limit human exposure are prudent. Theoretically, the greatest potential risk of exposure to the public is to waterfowl hunters. There is also a risk to agency personnel involved in surveillance and response activities, and this is covered in section IV. The *Michigan Hunting and Trapping Guide*, *Michigan Waterfowl Guide*, Avian Influenza Brochure, DNR Frequently Asked Questions, and the DNR and Emerging Diseases websites should all carry consistent recommendations for hunters.

Because viruses like HPAI H5N1 are shed in fluid discharges and feces, avoiding contact with these materials while plucking and cleaning birds is recommended. Most viruses can be neutralized with heat, by drying, and with disinfectants such as bleach. In addition, even apparently healthy wild birds can be infected with other potentially infectious microorganisms and parasites. Practical food hygiene recommendations to hunters include:

1. Do no handle or butcher birds that are obviously sick or are found dead.

2. Do not eat, drink, or smoke while cleaning animals.

3. Wear rubber gloves and washable clothing when cleaning game.

4. Wash hands thoroughly with soap and water or disinfectant wipes immediately after handling game, and before eating, smoking, urinating or defecating.

5. Wash tools and working surfaces with soap and water, then disinfect with a 10% solution of chlorine bleach.

6. Cook all meat thoroughly – birds should reach an internal temperature of 155-165ºF as measured by a meat thermometer.

2. *Limit Transmission from Free-ranging Wild Birds to Domestic Poultry*

The DNR will increase wild bird surveillance for HPAI H5N1 within a 10-mile radius around targeted large poultry operations to determine presence of the virus in those areas. The DNR will collaborate with the Michigan Department of Agriculture (MDA) on biosecurity recommendations for poultry facilities in affected areas.

The capability of AI viruses in domestic poultry to develop into forms causing severe disease is well documented. In contrast, AI viruses are almost always of low pathogenicity in wild birds. HPAI H5N1 in Asia is suspected to have spread via three routes: 1) the domestic poultry industry, 2) trade in captive wild birds, and 3) migratory birds. The evidence for spread via the domestic poultry industry is overwhelming, and the evidence for spread in the wild bird trade is extensive. Locations of the vast majority of outbreaks of HPAI H5N1 in Asia do not match the migratory patterns of wild birds, but rather are associated with major road or rail routes, both pathways for legal and illegal trade in domestic poultry and wild birds. Transmission of HPAI H5N1 is promoted in domestic flocks by high densities and constant close contact with feces and secretions by which the viruses can be transmitted. Husbandry methods in southeast Asia where domestic poultry are allowed to mix freely with free-ranging wild birds, especially waterfowl, have facilitated transmission to migratory water birds, leading to several reported die-offs.

By contrast, the evidence for spread of HPAI H5N1 viruses via migratory birds is circumstantial at best, and the epidemiological role of free-ranging wild birds remains poorly characterized. Some evidence suggests limited local infections of wild birds resident in areas of HPAI H5N1 outbreaks among domestic poultry, but transfer of HPAI H5N1 viruses outside these outbreak zones by migratory birds has not yet been substantiated. Moreover, aggressive and widespread control of infections in wild birds is not a feasible option. Culls of wild birds are highly unlikely to stop HPAI H5N1 spread and are extremely difficult and expensive to implement. Culls have the potential to facilitate geographic spread by dispersing infected individuals and stressing healthy birds, making them more susceptible to disease. Moreover, culls would divert monetary and personnel resources away from disease control and management efforts having a much greater likelihood of success.

B. **If HPAI H5N1 is found in domestic poultry**

1. Surveillance will be carried out by the DNR within a 10-mile radius of the positive facilities to determine presence or absence of the HPAI H5N1 virus in free-ranging wild birds. Personnel will sample 200 ducks of an appropriate species in the surveillance area, allowing detection of a virus prevalence $\geq$1.5% with 95% confidence. Cloacal swabs and blood samples will be collected and sent to the DNR's WDL as outlined above.

2. In the event that the MDA requests assistance to deal with a large number of HPAI H5N1 positive poultry facilities, the DNR has personnel and equipment to help depopulate flocks and bury carcasses on site. Field personnel will be issued personal protective equipment (PPE) appropriate for exposure to the HPAI H5N1 virus and trained in its use. The amount of DNR involvement with MDA activities will vary depending on the scope of the outbreak.

C. **Education/outreach/communications for response activities**

In the event HPAI H5N1 is detected in Michigan, communication will play a critical role. The handling of the situation in the first 10 days will have a lasting impact on public perception of the state’s ability to adequately control the disease. The DNR will designate a limited number of knowledgeable spokespeople, including the Public Information Officers (PIOs), and work with other state agency PIOs to provide the most up-to-date information to the media, public, and other non-governmental entities. Regardless of whether HPAI H5N1 is detected in free-ranging birds, domestic poultry or humans, the Michigan Department of Community Health (MDCH), MDA, DNR and other state agencies will all be involved in a series of key actions and communications, including:

1. Security: Notification will take place upon official NVSL confirmation of HPAI H5N1 positive test results.

2. Notification: Interagency communication will begin immediately, proceeding up the divisional chain of command to each Department Director. The Directors will inform the Governor's press, legislative, and policy offices; the Natural Resources Commission; and the Commission of Agriculture.

3. Key representatives from MDCH, MDA and DNR, the Governor's office, the Natural Resources Commission, and the Commission of Agriculture will meet expeditiously to arrange a public announcement of the discovery and implement disease response.

4. A media advisory will then be issued to announce a press conference, to be held in Lansing at one of the state buildings (Capitol, Romney, Mason, Constitution Hall).

5. Agency directors or designees will inform key constituency/stakeholder groups, including counterparts in other Great Lakes states, appropriate federal agencies, legislators, and local municipality officials where HPAI H5N1 is detected.

6. The MDCH, DNR and MDA Directors, and possibly the Governor, will conduct the press conference to confirm the presence of HPAI H5N1 in Michigan and outline the state's response plan. Media packets will provide reporters with background information, a history of surveillance efforts, and other materials as appropriate.

7. In the days following the announcement, public interest (and media attention) will be at peak levels. The agency PIOs will coordinate participation in public appearances or interviews on television and radio, as well as ensuring availabilities for print reporters and articles in stakeholder/trade publications. Continual public communication will maximize public and media understanding of the situation.

8. Within 10 business days of the press conference, each agency will reactivate communication teams employed during surveillance to continue working as needed with local constituencies, facilitating communications, answering questions, and providing updates on progress.

9. Each agency's Communications Office will collect and analyze news stories to help determine the effectiveness of communication and outreach efforts, and modify them as necessary.

10. Comprehensive information on the state's HPAI H5N1 activities will be maintained on the Emerging Diseases website, http://www.michigan.gov/emergingdiseases.

Agency officials must execute a coordinated effort to address the situation, and maintain continual public communications to explain and update actions and goals.

IV. **Occupational Safety for personnel involved in HPAI surveillance of free-ranging wild birds, or depopulation and disposal of domestic poultry**

Personnel involved in HPAI H5N1 surveillance of free-ranging wild birds, or in control activities on known or potentially affected premises, are at increased risk for exposure to HPAI H5N1 virus because of potentially prolonged and direct contact with infected birds and/or contaminated materials. To mitigate the risk of exposure or infection, all DNR personnel will follow appropriate occupational safety procedures which are based on the degree of risk known to be associated with various levels and types of exposure. These procedures are based on what is currently deemed optimal to protect against both illness and viral re-assortment (i.e., mixing of genes from human and HPAI viruses).

Personal Protective Equipment (PPE): In areas where HPAI H5N1 has not been detected, field personnel will follow recommendations of the National Wildlife Health Center's *Guidelines for Handling Birds* (http://www.nwhc.usgs.gov/research/WHB/WHB_05_03.html). Personal protective equipment will include boots, coveralls, gloves, eye protection and N95 respirators. In areas where HPAI H5N1 has been detected, especially during a mass mortality event, field personnel will follow the latest CDC guidelines (http://www.cdc.gov/flu/avian/professional/protect-guid.htm). PPE will include complete coveralls, gloves, boots or boot covers that are either disposable or easily disinfected, eye protection, N95 respirators, as well as a mandatory health monitoring plan.

Occupational Conduct Guidance: Transmission of HPAI H5N1 virus to humans and subsequent infection, though a rare occurrence, is presumed to be due to exposure to infected birds, feces, respiratory secretions, and/or contaminated materials. Although there is evidence of limited person-to-person transmission of HPAI H5N1 infection, sustained and efficient transmission has not yet been documented.

The following summarizes recommendations developed by the CDC, the World Health Organization (WHO), and the US Occupational Safety and Health Administration (OSHA).

1. All personnel should wash their hands with soap and water frequently and immediately after gloves are removed.

3. Environmental clean up should be carried out in areas of culling, with appropriate PPE and hygiene.

4. Unvaccinated personnel should immediately receive the current season's influenza virus vaccine (to reduce the possibility of dual infection with AI and human influenza), as well as a specific human HPAI H5N1 vaccine, if available.

5. Workers should receive an approved prophylactic influenza antiviral drug daily for the duration of exposure and continuing 5-7 days thereafter. The choice of drug should be based on sensitivity testing when possible. In the absence of sensitivity testing, a neuraminidase inhibitor (e.g. oseltamivir) is the first drug of choice, since the likelihood is smaller that the virus will be resistant to this class of antiviral drugs.

6. Close contacts (e.g., family members of workers) should also receive influenza vaccines and antiviral drugs.

7. Potentially exposed workers should be monitored for development of fever, respiratory symptoms, and eye infections for 1 week after last exposure to HPAI H5N1virus-infected or exposed birds or potentially contaminated materials. Individuals who become ill should seek prompt medical care and give notification prior to arrival at the health care provider that they may have been exposed to HPAI

H5N1 virus. Patients or health care providers that wish to report possible human cases of HPAI H5N1 should consult with the MDCH.

8. To prevent HPAI H5N1 virus from being spread to other areas, disposable PPE should be discarded properly, and non-disposable items cleaned and disinfected according to outbreak-response guidelines.

9. To minimize risk of transmission of HPAI H5N1 virus to close contacts, especially household members, ill persons should practice good respiratory and hand hygiene as outlined by the CDC (www.cdc.gov/flu/protect/covercough.htm).

Conduct Guidance for Veterinary Laboratory Workers: Highly-pathogenic AI viruses are classified as Select Agents and must be handled in USDA-approved laboratories under biosafety level (BSL) 3 enhanced or BSL-3 agriculture laboratory standards. The Diagnostic Center for Population and Animal Health is a USDA-approved BSL-3 laboratory. These standards include controlled access, double door entry with change room and shower out, use of respirators when working with specimens outside a biological safety cabinet, and decontamination of all wastes. Clinical specimens from suspect HPAI H5N1 cases may be tested by PCR using standard BSL-2 work practices in a Class II biological safety cabinet. Commercial antigen detection testing influenza viruses may be conducted under BSL-2 levels.

V. **Resources required for implementation of this Plan**

To increase early detection and response capabilities to the extent necessary to protect Michigan from HPAI H5N1, enhancements to current capabilities must include field personnel and systematic methods to intensively monitor for and investigate die-offs and conduct surveillance, as well as surge capacity at WDL and DCPAH. Specifically, additional funding will be required in FY 2006 and beyond to support free-ranging wild bird surveillance activities, including:

- Sample collection at waterfowl check stations and opening-day bag checks
- Logistics to mount effective live bird capture
- Travel, field supplies and equipment for sample collection
- Laboratory personnel, supplies and equipment for sample processing

The specific costs cannot be precisely determined and may vary greatly depending on the scope of wild bird surveillance and whether the DNR participates in control activities in domestic poultry. Under any scenario, even if the DNR redirects limited funds from other vital programs, *existing agency funds will not be adequate to implement this Plan*. Provision of additional state and federal funds will be necessary to protect Michigan's citizens, wildlife resources and the poultry industry from the threat of HPAI H5N1.

Michigan Department of Natural Resources

______________________________	January 27, 2006
Rebecca A. Humphries, Director	Date

MICHIGAN SURVEILLANCE AND RESPONSE PLAN FOR CHRONIC WASTING DISEASE OF FREE-RANGING AND PRIVATELY-OWNED/CAPTIVE CERVIDS

Wildlife Division, Michigan Department of Natural Resources
Animal Industry Division, Michigan Department of Agriculture

August 26, 2002

Michigan Surveillance and Response Plan for Chronic Wasting Disease of Free-Ranging and Privately-Owned/Captive Cervids[1]

Wildlife Division, Michigan Department of Natural Resources
Animal Industry Division, Michigan Department of Agriculture

Chronic Wasting Disease (CWD) poses a serious threat to the health of Michigan's deer and elk populations, both free-ranging and privately-owned (PO)/captive[2], and to their long-term management. In PO/captive herds, CWD infections, and the quarantines that follow, limit the value of those animals for trade and research, as well as the economic contribution of the cervid industry to the overall economy. Indemnification of infected animals, when available, constitutes a substantial economic burden for governments. Infection of free-ranging cervid populations may establish long-term foci of infection that may make cervid farming economically infeasible in those areas. Moreover, the negative impact of herd infection on the lives of cervid farmers cannot be overlooked. Implications of CWD for free-ranging cervid populations may be even more dire. While the long-term effects on the dynamics of these populations are not known, modeling suggests they could be dramatically negative. Surveillance and control programs necessitated by CWD are demanding of both monetary and personnel resources of wildlife management agencies, which are often quite limited. Perhaps most ominously, public and agency concerns about potential human health risks associated with CWD, while thus far groundless, may nevertheless undermine participation in hunting, with potentially marked effects on local and state economies, habitat degradation, and the ability of wildlife agencies to manage free-ranging cervid herds.

Rationale: This document proposes a broad outline of activities to be undertaken by the Wildlife Division, Michigan Department of Natural Resources (MDNR), and the Animal Industry Division, Michigan Department of Agriculture (MDA), to:

- Determine whether or not CWD currently exists in PO/captive and free-ranging deer and elk, and its geographic extent, if present;
- Provide a framework for ongoing surveillance to detect introduction of CWD into PO/captive and free-ranging cervid populations in the future, assuming the disease is not already present;
- Act promptly to kill infected and exposed animals if the disease is present, with the intent of limiting further transmission of the disease, and ultimately eradicating CWD from PO/captive and free-ranging populations.

The MDNR and MDA activities can be broadly divided into two categories: Surveillance and Response. Communications and education activities will change tone and direction depending on circumstance, but are active, ongoing functions related to both surveillance and response modes. Most media accounts work to draw basic public understanding of the disease by linking it with Bovine Spongiform Encephalopathy (BSE, "Mad Cow Disease"). Continual communication and education activities, directed at lawmakers, key constituency groups, the media, and the general public will raise public awareness of CWD, increase understanding of the disease, and help ensure broad-based public support in the event that the state moves from a surveillance mode to a response mode.

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[1] Animals of deer family such as deer and elk.
[2] Under Michigan law, farmed deer and elk are referred to as "privately-owned," and not the more common term of "captive."

I. Introduction[3]

A. The agent: Chronic Wasting Disease is one of a group of diseases called transmissible spongiform encephalopathies (TSEs) or prion diseases. These diseases are believed to be caused by infectious, self-propagating "prion" proteins. Prions are normal cell proteins whose shape has been transformed in such a way that they can cause disease. Much of their biology is poorly understood. Chronic Wasting Disease is closely related to, but different than, other TSEs in other species, including Scrapie in sheep, Bovine Spongiform Encephalopathy (BSE) in cattle, and Creutzfeldt-Jakob Disease (CJD) and new variant Creutzfeldt-Jakob Disease (nvCJD) in humans.

B. History: It is quite plausible that CWD arose in PO/captive and/or free-ranging cervids 40 or more years ago. Chronic Wasting Disease was first recognized as a disease in 1967 in captive mule deer at a wildlife research facility in Fort Collins, Colorado (CO). In 1977, CWD was determined to be a TSE. The disease was first diagnosed in free-ranging elk, mule deer, and white-tailed deer in CO and Wyoming (WY) in 1981, 1985, and 1990, respectively. The first diagnosis of CWD in PO/captive elk was made in Saskatchewan (SK) in 1996. Canadian investigations have suggested that infected elk were apparently imported into Canada from South Dakota (SD) in the late 1980s, if not earlier. To date, CWD has been diagnosed in PO/captive cervid facilities in Alberta, CO, Kansas, Montana, Nebraska (NE), Oklahoma, SK, and SD, and in free-ranging cervids in CO, NE, New Mexico (NM), SD, SK, Wisconsin, and WY. The connection between CWD in PO/captive cervids and free-ranging cervids is inconclusive.

C. Species susceptibility: Moose, pronghorn, bighorn sheep, mouflon, mountain goats, and a blackbuck which had contact with CWD-infected deer and elk or lived in premises where CWD occurred have not developed the disease, nor have domestic cattle, sheep, and goats that have shared research facilities with CWD-affected deer and elk for prolonged periods. Cattle intensively exposed to CWD-infected deer and elk under experimental conditions have remained healthy for over four years. A variety of species can be experimentally infected with CWD when it is injected directly into their brains, but the epidemiologic significance of this route of infection is questionable. No cases of human disease have been epidemiologically associated with CWD. Examination of the available data has led the U. S. Centers for Disease Control and Prevention and the World Health Organization (WHO) to conclude that there is no scientific evidence CWD can infect humans. As a precaution, the WHO recommends no part of a deer or elk diagnosed with CWD be eaten by people or other animals.

D. Transmission: Although CWD is clearly infectious, details of transmission have not been determined. Available evidence suggests transmission of CWD is via animal-to-animal contact and/or contamination of feed/water with infectious saliva, feces, and possibly urine. Maternal transmission may occur, but it appears to be relatively uncommon and insufficient to maintain outbreaks currently observed in the wild.

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[3] Some of the following material is drawn from a synopsis of the scientific literature presented by Dr. M. Miller, Colorado Division of Wildlife, to the U. S. House of Representatives in testimony given May 16, 2002, and from Williams, E. S. and Miller, M. W. (2002), Chronic wasting disease in deer and elk in North America, Rev. Sci. Tech. O. I. E. 21(2):305-316.

Prion contaminated environments likely play a role in epidemics and the recurrence of CWD. In some cases, the CWD agent apparently persisted in heavily contaminated environments for years after all infected cervids had been removed. Transmission appears more likely where cervids are crowded or congregate at supplemental feed stations.

E. Epidemiology: Susceptibility to CWD infection appears relatively uniform among susceptible species (i.e., elk, mule deer and white-tailed deer), sexes, and age classes, but species-specific behavioral differences may influence transmission. There appears to be some genetic predisposition in elk but not deer. Chronic Wasting Disease appears to be maintained naturally in both PO/captive and free-ranging cervid populations; epidemics persist in the absence of exposure to contaminated feeds or other likely outside sources of infection. In high density PO/captive herds, CWD can reach high prevalence and result in high mortality; in one study, more than 90% of mule deer living on an infected premise for >2 years either died or were euthanized due to CWD. In free-ranging deer and elk populations, epidemic models available to date indicate that CWD may lead to total local extinctions of those populations.

F. Symptoms and course of infection: Cervids with natural CWD infections are generally infected for 20-30 months before they show obvious symptoms, but incubation may be somewhat shorter (16 months) or considerably longer (60 months +) in individual cases. Symptoms include severe weight loss, excessive salivation, increased drinking/urination, and abnormal behavior (e.g., stumbling, trembling, depression). Infected deer and elk may allow unusually close approach by humans. Subtle changes in behavior (e.g., increased or decreased social interactions, repetitive movements, periods of sleepiness) may precede end stage disease. Once symptoms appear, the course of CWD varies from a few days to a year, with most animals surviving from a few weeks to 3 or 4 months. This course is probably somewhat shorter in free-ranging deer and elk than those in captivity, due to predation and the inability to forage effectively. No antibody response to the CWD agent has been detected. Chronic Wasting Disease is inevitably fatal once symptoms appear. No treatment or vaccine is available.

G. Diagnosis: Other health problems, particularly pneumonia and injury, may appear outwardly similar to CWD. Consequently, laboratory diagnosis is essential to confirm infections in suspect animals. There is no validated live animal test for CWD; definitive diagnosis must be made by immunohistochemical (IHC) testing of brain, lymph node, and/or tonsil tissue from a dead animal.

II. <u>Surveillance Plan</u>:

A. For Free-Ranging Cervids. The MDNR will conduct surveillance (i.e. testing of animals to determine the presence/absence and extent of disease) of free-ranging cervids which will consist of two types:

1. Targeted surveillance: Continuation of current Division activities to identify and test free-ranging cervids statewide that have been observed by the public or Division staff as showing symptoms consistent with CWD (emaciation, abnormal behavior/nervous system symptoms, excessive salivation, etc.). These animals will be collected by Division staff and transported to the Rose Lake Wildlife Disease Laboratory (RLWDL) for sampling. Testing will proceed as outlined in

points 2.f.i-iii., below. Disposal of specimens from targeted surveillance will be via incineration at the Diagnostic Center for Population and Animal Health (DCPAH) at Michigan State University (MSU).

2. Active surveillance: Testing of outwardly healthy cervids harvested by hunters during normal seasons, harvested via crop damage permits, or killed by vehicle collisions.

    a. For administrative convenience and public understanding, surveillance will be carried out on a county basis.

    b. Because the monetary and personnel resources available for testing are limited, not all counties will be sampled in one year. Counties targeted for earliest sampling will be determined by:

        i. The number of PO/captive cervid facilities present in the county;
        ii. The presence of cervid research facilities;
        iii. Geographic location.

        Counties scheduled for sampling beginning autumn 2002 are shown in Figure 1.

    c. All 83 Michigan counties will be sampled at some point during a three-year period. Counties judged on the basis of epidemiological factors to be of higher risk may be sampled repeatedly during that period.

    d. Initially, approximately 50 deer will be tested from each of 40 counties. This sample size will provide sufficient statistical power to be 95% confident of detecting CWD if it is present in a county at a prevalence of at least 5%. In addition, 50 elk will also be tested annually.

    e. Heads of deer and elk will be collected by Division staff, uniquely identified with a numbered jaw tag (similar to those currently used for bovine tuberculosis [TB] testing), and transported to the RLWDL for testing. The importance of obtaining, and maintaining, fresh specimens will be emphasized, in order to maximize the effectiveness of diagnostic tests.

    f. Testing will consist of:

        i. Removal of the brainstem and medial retropharyngeal lymph nodes (MRLN) from the head. A specific region of the brainstem (the obex) and the MRLN are the currently preferred anatomic sites for CWD testing.

        ii. Data from each animal's jaw tag (e.g., number, age, sex, geographic location of sampling to the section level, and hunter contact information) will be recorded in a computerized database housed at the RLWDL. Hunters will be notified in writing if their deer is negative, and via phone and in writing if it is positive. Test results will be compiled and analyzed using appropriate epidemiological and statistical methods, with results communicated as outlined in the Communications section, below.

iii. Tissues will be pooled for each animal, packaged individually in formalin, and shipped to DCPAH (or other U.S. Department of Agriculture [USDA]-certified laboratory) where sections will be made, stained by immunohistochemical methods, and screened for the presence of characteristic CWD prion protein. Other scientifically-validated methods may also be used in the future, as they become available. Suspects will be forwarded for confirmation to a second laboratory, the U.S. Department of Agriculture's (USDA) National Veterinary Services Laboratory (NVSL) in Ames, Iowa. After examination of the lymph nodes of the heads for TB, heads will be disposed of via landfill until such a time as CWD is identified in the state[4].

[4] Although this practice will entail a small risk of sending the head of a positive animal to a landfill, this risk will be far outweighed by the conservation of resources that would otherwise be spent on the unnecessary incineration of thousands of negative heads. Those resources can then be directed to additional surveillance, increasing the likelihood of detecting the disease if it is present. Should the disease be found at some point, the routine means of disposal will then become incineration at DCPAH.

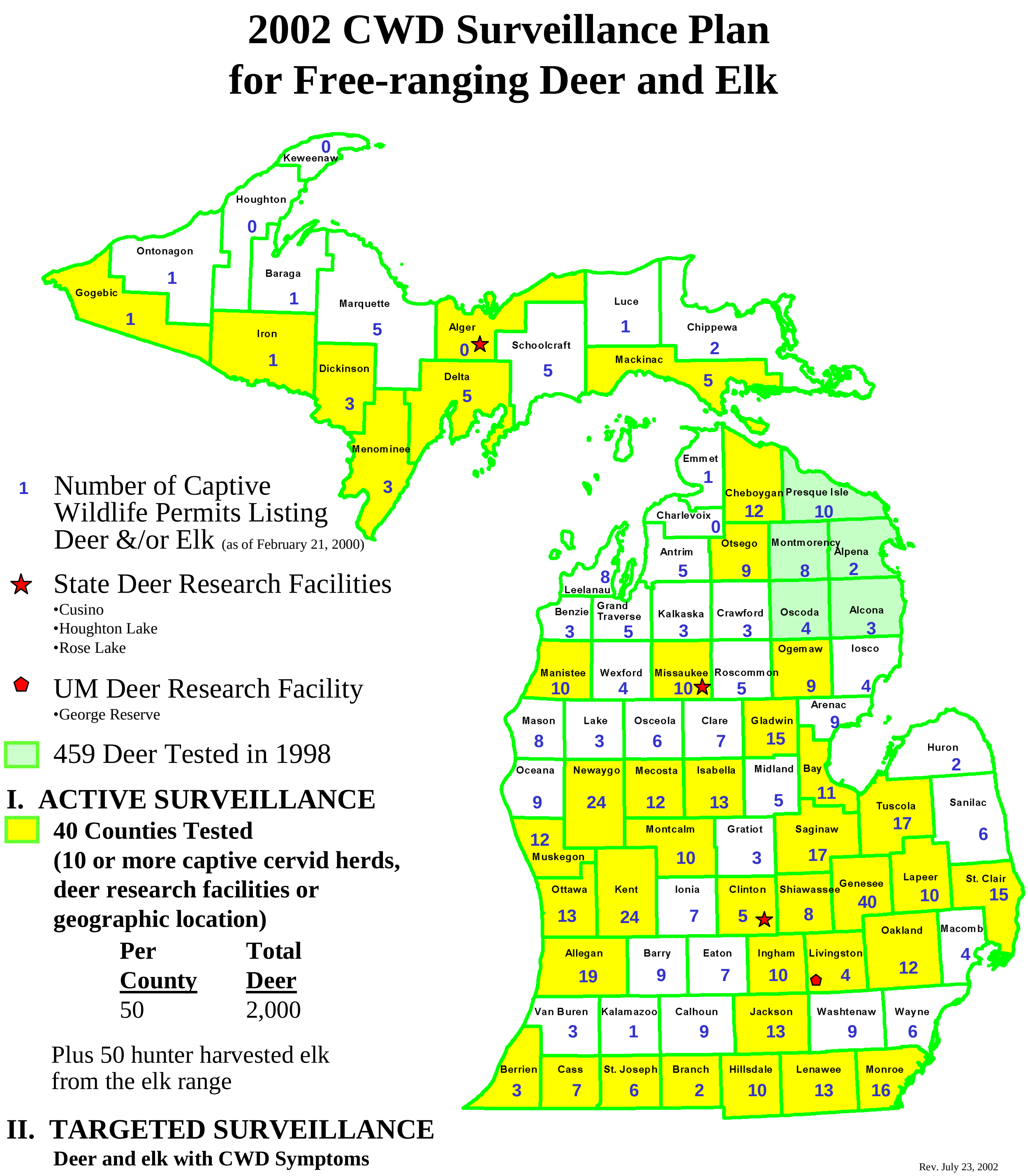


Figure 1. MDNR Wildlife Division's CWD Surveillance Plan for Autumn 2002.

B. For PO/captive cervid herds. The MDA will conduct surveillance on PO/captive herds. (NOTE: Michigan has 900 to about 1,000 PO/captive cervid operations with about 25,000 animals.)

1. Currently, no cervids can be imported into Michigan, based on a one-year moratorium established by MDA on April 27, 2002.

2. Prior to this ban, MDA had:
   a. Banned on all cervid imports from Wisconsin effective March 2002;
   b. Required a prior entry permit;
      - Must identify point and area of origin and herd of destination;
      - Must inform MDA of health status of animal and herd of origin;
   c. Prohibited animals to be imported from areas where CWD has been diagnosed;
   d. Prohibited animals to be imported that have been exposed to CWD.

3. Protocol for Michigan herds that received Wisconsin cervids 1999 through present
   a. Identify Wisconsin herds of origin;
   b. Identify Michigan facilities that received the animals;
   c. Form a CWD surveillance team;
   d. Purchase, remove, and test Wisconsin imported animals;
   e. The trace will be considered completed if all tests are negative.

4. CWD Mandatory Surveillance
   a. Perimeter fence requirements;
   b. Animals identified by two approved methods;
   c. Mandatory death reporting;
   d. Surveillance testing of animals over 16 months of age that die, are sick, and a percentage of culls and slaughter animals;
   e. Positive diagnosis is based on testing proper segments of the brain at a certified lab;
   f. Positive animals - quarantine herd until the herd can be depopulated.

5. CWD Accreditation Program (Voluntary)
   a. Fencing requirements;
   b. Record keeping requirements;
   c. Animal movement restrictions;
   d. Surveillance testing of all animals over 16 months of age that die;
   e. Annual verification of animal inventory by state veterinarian;
   f. Mandatory death reporting;
   g. Animals identified by two approved methods;
   h. Positive diagnosis is based on testing proper segments of the brain at a certified lab;
   i. Positive animals - quarantine herd until the herd can be depopulated;
   j. Herd status based on years of surveillance;
   k. This is a six-year plan to achieve CWD free accredited status for a herd.

5. As an additional note, all PO cervid facilities are regulated under Public Act 190 of 2000. This requires:
   a. Mandatory registration of all facilities;

b. Requirements for minimum fence heights and acceptable fence materials;
c. Mandatory fence inspection;
d. Mandatory yearly submission of fence inspection reports;
e. Mandatory record keeping;
    - Maintaining records of all additions to herd;
    - Maintaining records of all losses from the herd;
    - Maintaining records of all health certificates and test results;
    - All cervids must be officially and individually identified;
f. Mandatory yearly submission of animal inventories;
g. Recovery protocol for escaped cervidae;
h. MDA maintains a database of all cervid facilities with location, size, type, contact number, and number of animals present;
i. Instate movement restrictions based on registration class.

6. CWD is a reportable disease. Per 1998 PA 466, any owner, veterinarian, or member of the public who *suspects* CWD must report it to the MDA immediately. The MDA veterinarians trained in the diagnosis of the disease will be dispatched to do the follow-up on the report.

C. Education/Outreach/Communications on Surveillance Activities – During the surveillance period, MDNR and MDA officials will focus on new ways to educate Michigan residents about CWD and Michigan's plans for surveillance and response. All communicators should understand and be able to discuss CWD (basic pathogenesis and how it impacts wildlife), the testing procedure, Michigan's surveillance efforts, and how preventative policies can help prevent the introduction and spread of the disease. Key messages will focus on individual management actions to prevent CWD in Michigan. Communication/Education activities should include:

1. Appropriate staff, designated by the MDNR and MDA, working at a regional level, attending local meetings of respective constituency groups to make presentations and answer questions.

2. Natural Resources Commissioners and Agriculture Commissioners discussing the issue at public meetings and special events to raise support and awareness about the state's surveillance efforts and prevention goals.

3. MDNR/MDA raising public awareness and broad-based public support through guest editorials in daily newspapers, radio and television interviews, and other public speaking opportunities.

4. MDNR/MDA staff have already presented an overview and update on CWD to the Michigan Legislature. These information updates should be an ongoing activity, to keep policy-makers informed of recent developments.

5. Preparation of a CWD brochure/fact sheets for public distribution, publication of CWD information in the *Michigan Hunting and Trapping Guide*, and other publications.

6. Continual, up-to-date information on MDNR/MDA web sites.

III. Response Plan:

The MDA/MDNR efforts are aimed at quick identification and response to limit further transmission of the disease and eradicate CWD from both PO/captive and free-ranging cervids. If CWD is diagnosed in the wild or in a PO/captive cervid facility, the Joint MDA/MDNR CWD Management Team will be activated. This Team will meet on a regular basis to coordinate the decision-making process of the MDNR and the MDA.

- Revise the contingency plan as needed;
- Attempt to secure financial resources for response;
- Work with executive office and legislature;
- Review current science of the disease;
- Keep public informed;
- Monitor and report the progress or lack of our response.

A. For Free-Ranging Cervids. The MDNR (Figure 2) CWD response efforts (i.e. management and field actions to promptly kill infected and exposed animals with the intent of limiting further transmission of the disease and eradicating CWD from free-ranging cervids) will be triggered by one of two scenarios:

1. Identification of an infected PO/captive cervid facility: The primary objective of Wildlife Division response efforts will be to determine if free-ranging cervids in the vicinity of the PO/captive herd are also infected with CWD and, if so, the magnitude and geographic extent of that infection. In the event an infected PO/captive cervid is identified, the following measures will be implemented as rapidly as possible:

    a. Geographic Information Systems (GIS) methods will be used to map the location of the infected PO/captive cervid and herd (index case). A five-mile radius circle will be drawn around the index case, defining an ~79 mi^2 surveillance zone for free-ranging cervids.

    b. Approximately 300 free-ranging deer ≥18 months of age will be killed expeditiously in the surveillance zone and tested for CWD. Efforts will be made to ensure the sample is geographically representative. This sample would provide sufficient statistical power to be 95% confident of detecting the disease if it is present in the area at a prevalence of at least 1%. Two methods may be used to obtain the sample, one preferred, the other alternative, to be used only if the preferred method fails to gather the needed number of animals:

        i. Preferred: Landowners will be recruited to harvest deer from private land, with Wildlife Division staff available to assist landowners on request. Wildlife Division staff will harvest deer on public land.

        ii. Alternative: Wildlife Division and MDNR management will expeditiously seek a Declaration of Emergency from the Governor in order to gain legal access to private lands of individuals choosing not to cooperate in surveillance. Subsequently, Wildlife Division staff will harvest deer on those lands.

        In addition to these animals, deer harvested by hunters in the surveillance zone will also be subject to mandatory testing.

c. Heads of all deer will be tested for CWD by methods noted in point II. A.2.e-f., above.

d. Disposal of all unused tissues will be via incineration at DCPAH.

e. Two possible scenarios may result from sampling in the surveillance zone surrounding the index case:

   i. No infected free-ranging cervids are found. In this event, sampling in the 79 mi^2 surveillance zone will be carried out as noted above. Long-term sampling will focus on deer/elk harvested by hunters during normal hunting seasons for a period to be determined by epidemiologic analyses of surveillance data and findings from the index PO/captive herd, but for not less than three years. Deer not harvested in the hunt will be tested opportunistically as they become available.

   ii. Infected free-ranging cervids are found. In this event, full-scale disease response operations will commence, with the primary goal being to kill all free-ranging cervids within the 79 mi^2 area surrounding the index case.

      A) Killing will be carried out by whatever means are deemed most effective.

      B) Killing will be carried out by Wildlife Division staff, with the assistance of personnel from other agencies as needed. Assistance of Law Enforcement Division (LED) and the Michigan State Police (MSP) will be requested to restrict public access to, and provide security in and around, the depopulation area.

      C) All animals ≥18 months of age will be tested for CWD by methods noted above.

      D) It is recognized that even with the objective of killing all the deer in the depopulation area, approximately 5-10% of the free-ranging population will likely survive.

      E) Two possible scenarios may result from testing animals killed in the depopulation zone:

         1) No additional infected free-ranging cervids are found. In this event, using GIS mapping, new 15-mile radius surveillance zones (each encompassing an area of ~707 mi^2) will be established around the two index cases (infected PO/captive cervid herd and infected free-ranging cervid).

            a) Within each of these new surveillance zones, checking of all hunter-harvested deer by Wildlife Division staff will be mandatory for a period of no less than three years.

b) From that sample, approximately four cervids/section ≥18 months of age will be tested for CWD by the methods described above.

c) The tested sample will be representative of the sex ratio of cervids in the surveillance zone.

d) Composition of the tested sample may also reflect results of epidemiologic analyses.

e) Experience with CWD in Colorado has shown the disease may be persistent in the environment, and that its transmission involves some environmental component(s), although these are poorly defined at this time. Recognizing this:

i) Long-term disease management efforts will necessitate maintenance of low densities of free-ranging cervids (as low as technically possible to a target level of zero) in the surveillance zones for a prolonged period of time. The length of that period will be based to the extent possible on current research results and the experience of other states, but will be five years at a minimum.

ii) As effective environmental decontamination methods are identified by research or the experience of other states, efforts will be made to apply them to the surveillance zones.

iii) Habitat management in the surveillance zones will emphasize practices that discourage the presence and growth of cervid populations.

2) Additional infected free-ranging cervids are found. In this event, using GIS mapping, new depopulation zones will be defined within five-mile radii of each newly discovered infected cervid.

a) Within each of these new depopulation zones, killing of all free-ranging cervids, followed by testing, will be carried out as described in points III.A.1.e.ii.A)-D), above.

b) Following depopulation:

i) If no additional infected free-ranging cervids are found, new 15-mile radius surveillance zones (each encompassing an area of ~707 mi^2) will be established around the location from which each infected cervid was taken. Surveillance will proceed as described in point III.A.1.e.ii.E)1), above.

ii) If additional infected free-ranging cervids are found, control activities will proceed as described in point III.A.1.e.ii.E)2), until no additional infected free-ranging cervids are identified.

2. Identification of an infected free-ranging cervid: The primary objective of Wildlife Division response efforts will be to determine the magnitude and geographic extent of CWD infection in the free-ranging population. Response measures will be proceed as already described for the scenario of a PO/captive cervid index case, with the exception that the initial five-mile radius surveillance zone will be drawn around the location from which the first infected free-ranging cervid was found. Killing of all free-ranging cervids (depopulation) will be triggered by the finding of a second CWD infected free-ranging cervid within that 79 mi^2 surveillance zone. If no additional infected free-ranging cervids are identified, surveillance will proceed as in point III.A.1.e.ii.E)1), above (i.e., 15-mile radius surveillance zone established around index case location, mandatory deer check for at least three years, etc.).

3. The finding of a CWD infected index case (either a PO/captive cervid or a free-ranging cervid) will also trigger the following surveillance and control measures:

   a. Heightened active surveillance in counties adjacent to the county in which the index case was found (index county). The number of free-ranging deer tested per county will increase to 300, with this quota being sampled from each county that shares any part of any border with the index county. This sample would provide sufficient statistical power to be 95% confident of detecting the disease if it is present in a county at a prevalence of at least 1%. The majority of samples will be obtained from hunter-harvested animals during regular hunting seasons, with non-hunter harvested animals tested opportunistically as they become available. This heightened surveillance will continue for a period of no less than five years.

      In the event one or more of the 15-mile radius surveillance zones noted in points III.A.1. and III.A.2., above, crosses county lines into a county adjacent to the index county, the 300 deer testing quota will be drawn from animals harvested in the remainder of the adjacent county not falling in that 15-mile radius zone.

      If a positive CWD case is identified in any county adjacent to the index county, the 300 deer surveillance quota will also apply to any county sharing any part of any border with the county adjacent to the index county.

   b. Heightened active surveillance statewide. The number of free-ranging deer tested per county will increase to 50, with this quota being sampled from each of the 83 Michigan counties not subject to a heightened surveillance for adjacent counties described in point III.A.3.a., above. The majority of samples will be obtained from hunter-harvested animals during regular hunting seasons, with non-hunter harvested animals tested opportunistically as they become available.

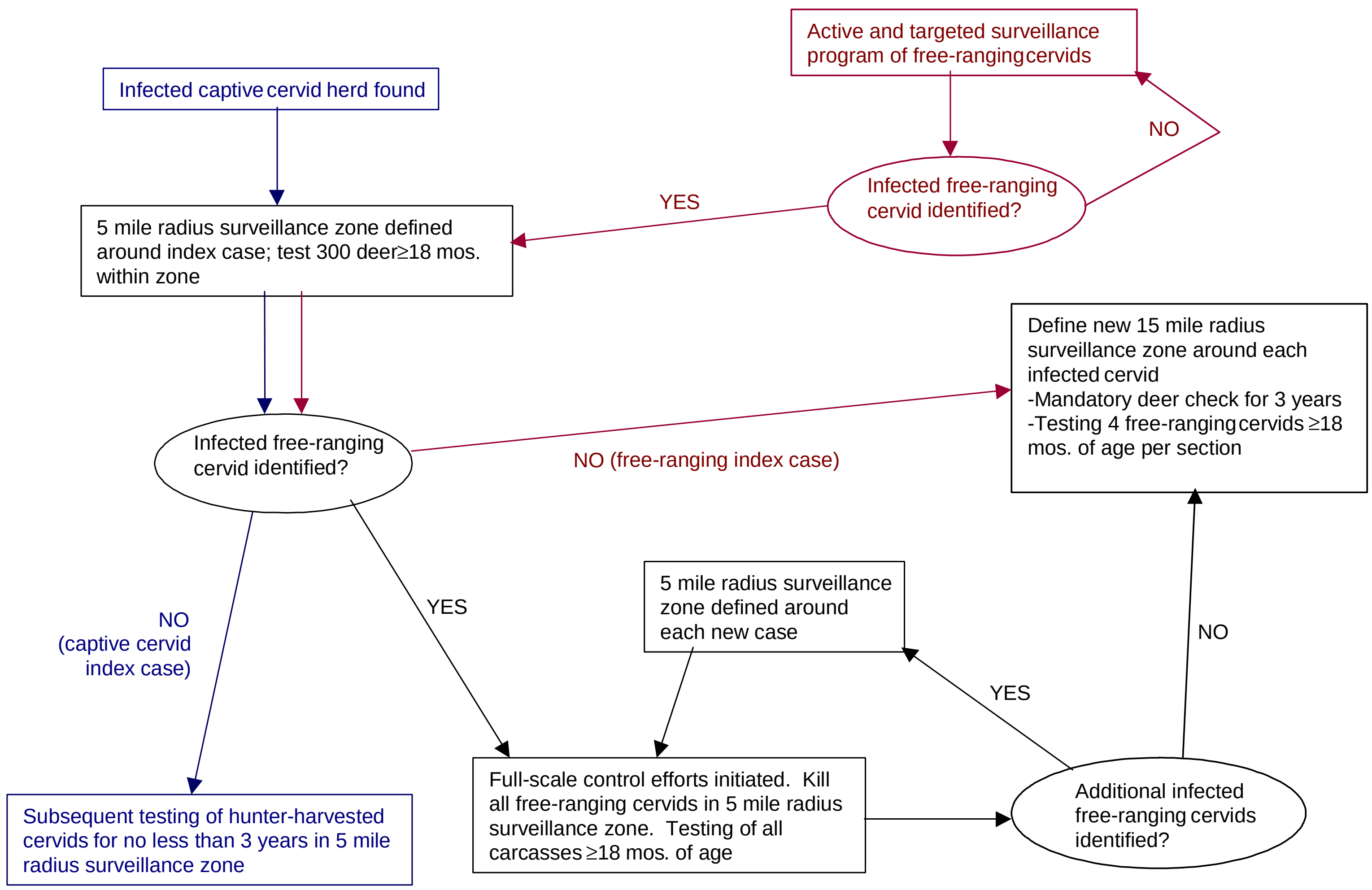
c. Only boned meat, capes, and antlers of harvested free-ranging cervids will be allowed to leave the 15-mile radius surveillance zone(s) surrounding each index case.

d. Rehabilitation of free-ranging cervids will become illegal statewide, as will transport of live free-ranging cervids anywhere in the state. Assistance of LED and MSP will be sought for vigorous enforcement.

e. With the cooperation of local county road commissions, collection of road-killed cervids will be coordinated and carried out by Wildlife Division staff within the 15-mile radius surveillance zone(s) surrounding each index case. These animals will be tested for CWD by methods previously described, with the remains transported to DCPAH for incineration.

4. In the event CWD is documented within Michigan or within 50 miles of Michigan's border with another state or Canadian province, the MDNR Director shall issue an interim order banning the use of bait and banning the feeding of deer and elk within the peninsula adjacent to the adjoining state or province with CWD or containing CWD.

Figure 2. Flowchart of Chronic Wasting Disease response activities to be undertaken by Wildlife Division on free-ranging Michigan Cervids.



B. For PO/captive cervid herds. The MDA CWD response efforts will entail:

1. If CWD is diagnosed in the wild or PO/captive cervids, the state veterinarian will set up an MDA CWD response team. The team will consist of the following:
   - A veterinarian based in the Lansing office will be the team leader. This veterinarian will assist the state veterinarian as follows:
     - Coordinate response between MDNR and MDA;
     - Coordinate with USDA and other state veterinarians;
     - Coordinate response of private veterinarians;
     - Coordinate response with MSU College of Veterinary Medicine and PCPAH;
     - Keep the state veterinarian informed of all CWD team actions;
     - Work with the field leader.
   - A veterinarian that will be a field leader for the field veterinarians. Duties as follows:
     - Coordinate work load of staff;
     - Coordinate supplies and equipment;
     - Monitor bio-security measures being used to protect staff;
     - Be available to solve problems in the field;
     - Keep field veterinarians informed;
     - Keep team leader informed;
     - Ensure a sufficient number of field veterinarians to initiate and carry out the CWD response.

2. CWD diagnosed in free-ranging cervid (one positive animal in 15-mile radius)
   a. Define a 15-mile radius around each positive case and identify all PO/captive cervids.
   b. Biannual herd inspection by state or federal personnel with removal and testing of any suspect animals for CWD. Indemnity will be paid for these animals if available.
      i. CWD testing of all death losses of animals 16 months and older.
      ii. Surveillance will continue for 60 months.

3. CWD diagnosed in free-ranging cervids (two or more positive animals within a 15-mile radius)
   a. Define 5-mile radius surveillance zone around each positive case and identify all PO/captive cervids.
      i. If feasible depopulate, with indemnity if available, all PO/captive cervids over 16 months of age and test for CWD.
      ii. Do epidemiological investigation to determine possible exposure of PO/captive cervids to infection.
      iii. If depopulation is not possible due to economics or the number of positive cases:
         A) Quarantine facility.
         B) Do epidemiological investigation to determine possible exposure of PO/captive cervids to CWD.
         C) Monthly herd inspection by state or federal personnel with removal and testing of any suspect animals for CWD. Indemnity will be paid for these animals if available.

        D) CWD testing of all death losses of animals 16 months and older.
        E) Surveillance will continue for 60 months.

  b. Define a 15-mile radius around each positive case and identify all PO/captive cervids between the 5-mile radius and the 15-mile radius.
     i. Do epidemiological investigation to determine possible exposure of PO/captive cervids to CWD.
     ii. Biannual herd inspection by state or federal personnel with removal and testing of any suspect animals for CWD. Indemnity will be paid for these animals if available.
     iii. CWD testing of all death losses of animals 16 months and older.
     iv. Surveillance will continue for 60 months.

4. CWD diagnosed in PO/captive cervid herd
   a. The state veterinarian shall conduct a complete epidemiological investigation to determine the specific cause, source of disease, population exposed, and population infected.
   b. Depopulate the herd with indemnity if available.
      i. Quarantine the facility
      ii. CWD test all animals 16 months of age and older
      iii. Incinerate all carcasses
      iv. The positive herd premises shall be cleaned and disinfected according to directions prescribed by the state veterinarian that are designed to minimize the spread of CWD. The facility will be released from quarantine and repopulation will be allowed when the state veterinarian determines that the re-infection of animals with CWD is no longer likely.
   c. Trace forward of exposed animals
      i. Remove exposed animal, with indemnity if available, and test for CWD
      ii. If the exposed animal is positive, the entire herd is positive
      iii. If the exposed animal is negative, routine CWD surveillance (testing of death losses over 16 months of age) will continue.
   d. Trace back of exposed animals
      i. Quarantine the herd for 60 months from the last case traced back to the herd
      ii. Monthly inspection of the herd by state or federal personnel with euthanasia and testing of any suspect animals. Indemnity will be paid for these animals if available. Disposal of animals must follow a protocol set by the state veterinarian.
      iii. Surveillance (testing all death losses over 16 months of age) will continue for 60 months.
   e. Biosecurity Measures.
      i. Animal health biosecurity issues will be addressed using the latest information available and consulting with the MDA Biosecurity Committee.
      ii. Staff Biosecurity, Required Apparel
         A) Masks
         B) Gloves
         C) Coveralls
         D) Boots

C. Education/Outreach/Communications on Response Activities – In the event of a CWD confirmation in Michigan, communication will play a critical role. The state's handling of the situation in the first 24 hours and the ensuing 10 days will have a lasting impact on public perception of the state's ability to address and control the disease. The MDNR and MDA will designate limited knowledgeable spokespeople and work through agency Public Information Officers (PIOs) to provide the most up-to-date information to the media, public, and other non-governmental entities.

   Regardless of whether it is in a free-ranging or PO/captive cervid population, confirmation of a CWD infection in Michigan will involve MDA and MDNR in a series of actions and communications. Developments in other states with CWD have shown that ambitious depopulation plans can be controversial. Agency officials from MDNR and MDA must outline a coordinated effort to address the situation, and maintain continual public communications to explain and update actions and goals. Key communication activities which will need to undertaken include, but are not limited to:

   1. Security: Notification will take place upon official laboratory confirmation of CWD-positive test results.

   2. Notification: Interagency communication will begin immediately, with notice proceeding up the divisional chain of command to each Department Director. The Directors will inform the Governor's press, legislative, and policy offices; the Natural Resources Commission (NRC); the Commission of Agriculture; and the Director, Department of Community Health.

   3. A meeting of key representatives from MDNR, MDA, the Governor's office, the NRC, and the Commission of Agriculture will be arranged as soon as possible to arrange a public announcement of the discovery and implement disease response strategies.

   4. A media advisory will be issued following the meeting to announce a press conference. The press conference will be held in Lansing at one of the state buildings (Capitol, Romney, Mason, Constitution Hall).

   5. Agency directors or designees will make calls to key constituency/stakeholder groups, including counterparts in other Great Lakes states, appropriate federal agencies, legislators, local municipality officials where the discovery is made, and university collaborators, to inform them of the CWD confirmation and impending announcement.

   6. The MDNR and MDA Directors, and possibly the Governor, will confirm the presence of CWD in Michigan and outline the state's response plan. The press conference will include media packets providing reporters with background information on CWD, a history of Michigan's surveillance efforts, and other materials as deemed needed or appropriate.

   7. In the days following the announcement, public interest (and media attention) will be at peak levels. The PIOs for both agencies will coordinate efforts to have agency directors/designees engaged in public appearances or interviews in television and radio programs, as well as ensuring availabilities for print reporters

and coordinating articles in stakeholder/trade publications to discuss the state's actions. Continual public communication will maximize public and media understanding of the situation.

8. Within 10 business days of the initial confirmation announcement, each agency will reactivate the communication teams employed in the surveillance plan to continue working as needed with local constituencies, facilitating communications, answering questions, and providing updates on Michigan's progress.

9. Each agency's press office will collect and analyze news stories to help determine the effectiveness, and modify as needed, the communication and outreach efforts. News and feature stories, as well as editorials and letters to the editor, will help indicate public awareness and understanding.

MICHIGAN DEPARTMENT OF AGRICULTURE

Signed	8/26/02
Dan Wyant, Director	Date

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

Signed	8/26/02
K. L. Cool, Director	Date

Great Lakes Fish Health Committee
Viral Hemorrhagic Septicemia (VHS) Update and Management Recommendations

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Issue: To update the Council of Lake Committees about the current status of Viral Hemorrhagic Septicemia (VHS) in the Great Lakes Basin and provide the CLC with a set of recommended management actions and information needs to contain this disease.

Background: VHS is viral hemorrhagic septicemia, a viral fish disease that has caused large scale mortalities in rainbow trout and turbot aquaculture operations in Europe and in Pacific herring and pilchard populations along the Pacific Coast of North America. The disease is caused by a rhabdovirus, Viral Hemorrhagic Septicemia Virus (VHSv). This virus has a number of identified isolates grouped in four types; three from Europe and one from North America. Each appears to have unique effects with specific pathogenicity on certain species. The isolate found in the Great Lakes Basin here is most similar to the VHS strain previously isolated from the Atlantic Coast in Eastern North America.

VHS is a reportable disease that requires notification of Michigan Department of Agriculture (MDA), United States Department of Agriculture – Animal and Plant Health Inspection Service (USDA- APHIS), and OIE (International Organization for Animal Health). It is also listed as an emergency disease by the Great Lakes Fishery Commission - Great Lakes Model Program. If this disease gets into a fish production facility, the facility must be de-populated and all fish destroyed.

This virus is more active in colder water (< 10 C) and mortalities attributable to this pathogen will be seen during cold water periods, in particular immediately after ice-out when coolwater fish are frequently stressed. Fish exhibit hemorrhaging in the skin including large red patches, particularly in on sides and anterior portion of the head. However, infected fish will sometimes exhibit very minor external hemorrhaging (pin-point spots called petichia) or no external signs at all. Internally, all organs are often congested with multiple hemorrhages in the liver, spleen, and intestines. The swim bladders are also often extremely congested with hemorrhages, giving the otherwise transparent membrane a mottled appearance. Sick fish will often appear listless, swim in circles, or hang just below the surface based on staff observations made this past spring.

VHS was first confirmed in 2005 in the eastern part of the Great Lakes Basin during a large scale mortality of freshwater drum occurred in the Bay of Quinte, Lake Ontario in Ontario. In the spring of 2006, the virus had clearly spread to the center part of the Great Lakes Basin as evidenced by large scale fish mortalities in Lake St. Clair (Great Lakes muskellunge and yellow perch), St. Clair River (gizzard shad), Detroit River (Great Lakes muskellunge and gizzard shad), Lake Erie (west-freshwater drum and central basins-yellow perch), Lake Ontario (round goby) and St. Lawrence River (Great Lakes muskellunge). VHSV isolated from the affected fish has been confirmed to be of Type 4 (North American isolate).

A number of other Great Lakes species have been identified as carrying VHSv, but were not symptomatic of the disease including: smallmouth bass (confirmed - Lake Erie and Lake St. Clair); rock bass (confirmed - Lake St. Clair); silver redhorse (confirmed - Lake St. Clair); bluegill (confirmed – Lake St. Clair); northern pike (confirmed - Lake St. Clair); walleye (confirmed – Lake Erie); white bass (confirmed – Lake Erie) and shorthead redhorse (confirmed - Lake St. Clair). Mortalities have not been observed for these species. While freshwater drum mortalities were not found in Lake St. Clair, these fish have been found to be positive for VHSv. Emerald shiners, trout perch and smelt from Lake Erie and black crappie from Lake St. Clair were presumptive cases but later analyses could not confirm the pathogen. It is likely that the virus is found throughout at least the coolwater fish communities from Lake St. Clair to the St. Lawrence River.

It currently very unclear what the risk is to all Great Lakes fish stocks from this pathogen as susceptibility and virulence studies have not been done on this isolate. It is possible that VHS virus infections will initially result in increased natural mortality for the stocks involved, similar to largemouth bass virus (LMBv) outbreaks, but will not result in any appreciable long-term changes in population abundance levels. Fish that have recovered from the infection are likely to serve as reservoirs to maintain the virus for future outbreaks which will have fish management implications for the use of fish from infected waters. The worse case is that the pathogen causes annual mortalities that will need to be factored into fisheries management plans. It also appears that there are a wide range of potential carriers for the pathogen which will need to be factored into fisheries management options. Another very large unknown is whether this isolate has the ability to cross over to salmonids and cause disease in these species in the wild, although preliminary lab challenges to lake trout, Chinook salmon and steelhead indicate the pathogen can kill up to 25% of the individuals. Finally since this is a reportable and emergency disease, it is critical to keep this pathogen out of all potential broodstock sources and out of all fish production facilities, both public and private.

Recommendation:

In anticipation of CLC member agency needs for guidance in managing this new pathogen, the Great Lakes Fish Health Committee (GLFHC) has developed a set of management recommendations that we request be considered for adoption by all member agencies. The adoption of these recommendations will slow the spread of this pathogen, providing additional time for new options to be developed to more effectively contain this pathogen.

Most of the recommendations had full consensus by all GLFHC and these are requested to be immediately adopted by all CLC member agencies. GLFHC could not reach consensus on a few recommendations because of: differences in management approaches; likely inability of the member agency to be able to effectively implement the recommendations; or other large scale priorities that must be considered such as sea lamprey control. With respect to these recommendations where consensus could not be reached, we recommend that the adoption of the recommendation is up to the discretion of the individual management agencies as they are more protective actions that enhance the recommended actions with consensus.

There are a large number of information needs on this virus and the GLFHC has developed a list of the most important needs for consideration by the Great Lakes Fishery Commission in their research programs along with those of member agencies.

GLFHC Consensus Recommendations

<u>Fish Health Testing</u>

1. GLFHC member agencies should use the most sensitive cell lines in all samples processed for VHS virus.
2. GLFHC member agencies should request that all laboratories used by the agencies conducting VHS virus sample analysis undertake cell line susceptibility analysis, determine best performing cells, clone them, and distribute among all Great Lakes laboratories for sample analysis.
3. GLFHC member agencies should require that periodically all laboratories testing for VHS virus will share cell lines with at least one other laboratory to allow for quality control and assurance analysis to be conducted on the cell lines.

<u>Hatchery Operations – Coolwater Culture</u>

1. GLFHC members should refrain from taking non-salmonid eggs and sperm from any waters that are positive for the VHS virus until more is known about the success of disinfection methods with these species and the VHS virus.
    a. If there are no feasible alternatives to using wild broodstock from waters that are positive for VHS virus and the fish are absolutely necessary for fish management purposes, production fish beginning with egg and sperm from waters positive for VHS virus can be stocked back into those waters already determined to be positive for VHS virus.
2. All non-salmonid eggs from Great Lakes wild fish sources would be surface treated with iodophor during water hardening in using a known effective concentration and duration.
3. All non-salmonid broodstock lots should be tested annually using standard fish health inspection protocols for VHS virus prior to the stocking of their production lots, where possible, and production fish from positive broodstock lots should be tested for VHS virus.
4. All production lots should be at minimum annually tested for VHS virus using standard fish health sampling protocols and those production lots found to be positive for VHS virus should not be stocked at this time.
5. All fish in a given hatchery will carry the same hatchery fish health designation to ensure full disclosure of potential fish health concerns.
6. GLFHC member agencies should strongly consider the development of protected Great Lakes non-salmonid broodstock lines using isolation or quarantine facilities and holding them in either captive situations or in isolated inland lakes.

Hatchery Operations - Salmonid Culture

1. All GLFHC members should disinfect all salmonid eggs during water hardening from Great Lakes waters using iodophor compounds using a known effective concentration and duration.
2. All adult salmonid broodstock lots should be sampled annually using standard fish health inspection protocols during egg take operations and tested for VHS virus.
3. All production lots with fish larger than fry size should be tested for VHS virus prior to stocking. Those production lots found to be positive for VHS virus should not be stocked.
4. All fish in a given hatchery will carry the same hatchery fish health designation to ensure full disclosure of potential fish health concerns.
5. All GLFHC member agencies consider the development of protected Great Lakes salmonid broodstock lines using isolation or quarantine facilities and holding them in either captive situations or in isolated inland lakes.

General Hatchery Guidance

1. GLFHC member agencies should destroy all fish at hatchery facilities that are found to be infected with VHS virus based on a management plan developed after consultation with GLFHC member agencies.
2. All eggs moved between GLFHC member agency facilities must be surface disinfected using an iodophor compound prior to transfer.
3. GLFHC member agency hatchery equipment and trucks should be fully disinfected after each use and between uses between hatcheries.
4. GLFHC member agencies should not allow the use of untreated water for moving fish from Great Lakes Basin waters testing positive for VHS virus.

Fish Management Activities – Fish Transfers

1. GLFHC members should test all species targeted for transfer from all potential donor waters before fish transfers occur.

Fish Management Activities – Others

1. All GLFHC member agencies should clean and disinfect all sampling gear, personal protective clothing and boots, boats and vehicles after sampling VHS virus positive waters.
2. All investigators under GLFHC member agency control that are sampling VHS positive waters under some type of sampling or collectors (investigators or harvesters) permit should be required to clean and disinfect all sampling gear, personal protective clothing and boots, boats and vehicles after sampling as a condition of any such permit.

Commercial Fishing Activities

1. GLFHC member agencies should periodically test all species of fish used in the live commercial fish trade for the presence of VHS virus.
2. GLFHC member agencies should prohibit the transfer of live fish species that are known to be from fish populations infected with VHS virus and are moving from Great Lakes commercial fishing operations to either live markets or fee-fishing lakes.
    a. Alternatively, GLFHC members should appropriately test individual shipments from waters positive for VHS virus and prohibit the transfer of shipments that test positive for VHS virus from commercial fishing operations.
3. GLFHC member agencies should require that all live fish shipments from commercial fishing operations being imported for use in public waters be tested for and be certified free of VHS virus.
4. GLFHC members should ensure that all waste products from processed fish collected by commercial fisheries from waters positive for VHS be properly disposed of in either sanitary sewer systems or in licensed landfills.

Bait Industry

1. GLFHC member agencies should at minimum annually test, using standard fish health inspection protocols and proper timing, all wild Great Lakes Basin baitfish sources for VHS virus to determine which locations are positive for the pathogen.
2. GLFHC member agencies should test, or require testing of all imported baitfish sources in the Great Lakes Basin, prior to importation, for VHS virus to determine which vendors' facilities and sources are infected using standard fish health inspection protocols and proper timing to best detect the pathogen.
3. GLFHC member agencies should prohibit the importation of bait that is found to be infected by VHS virus.
4. Any baitfish source testing positive for VHS virus should not be allowed to be sold in any GLFHC member agency jurisdiction.

Non-member Agency Aquaculture Operations

1. All fish tested for VHS virus by non-member agency aquaculture operations for stocking in Great Lakes Basin public waters should use the most sensitive cell line for VHS virus.
2. GLFHC member agencies should recommend or ensure the destruction of all fish at non-member hatchery facilities that are found to be infected with VHS virus based on a management plan developed after consultation with GLFHC member agencies.
3. GLFHC member agencies should ensure or recommend that non-member hatchery equipment and trucks should be fully disinfected after each use and between uses between hatcheries.

Public Information

1. All GLFHC member agencies should jointly develop information sheets, boat launch information, and a website on VHS virus and other pathogens to highlight how the public can prevent their spread.

2. GLFHC member agencies should take every opportunity to inform the public about VHS virus and its potential affects in press interviews, press releases and popular articles.
3. GLFHC member agencies or the GLFC should sponsor a 1-800 number and a website on fish pathogens, their potential affects, and current distribution.
4. The GLFC should assist the GLFHC in using the existing internal website for the posting of information to allow for the rapid dissemination of public information materials among member agencies.
5. The GLFHC strongly encourages the development of a North American website for the posting of current and emerging fish pathogen information that is jointly managed by state, provincial, tribal and federal fisheries agencies.

<u>Other Preventive Measures</u>

1. GLFHC member agencies should undertake all possible measures to prevent the discharge of untreated ballast water within Great Lakes waters.
2. GLFHC member agencies should use the U.S. Coast Guard abilities to prohibit ballast water exchange in areas of high pathogen density and in areas of active mortality events.
3. GLFHC member agencies strongly encourage all possible measures to prevent the use of untreated water for any purpose from Great Lakes Basin waters positive for VHS virus that maybe possibly discharged into waters not yet exposed to VHS virus.

GLFHC Recommendations – Without Full Consensus

<u>Fish Management Activities – Fish Transfers</u>

1. GLFHC members should not move fish from waters positive for VHS virus.
2. GLFHC members can move fish that test negative for VHS virus from waters with other positive VHS virus detections in fish to other waters that have tested positive for VHS virus in fish.
3. GLFHC members can move fish lots that test negatively for VHS virus from waters with positive VHS virus detections in other fish to any water.

<u>Bait Industry</u>

1. GLFHC member agencies can allow the use of bait collected from waters testing positive for VHS virus in fish in other waters testing positive for VHS virus in fish.

Key Information and Management Needs

1. Systematic wild fish surveys to determine the location of VHS virus in the Great Lakes Basin.
2. Improved understanding of host-pathogen-disease relationship for key management species with a high priority on sea lampreys.
3. The length of time VHS virus is viable in the environment.
4. Geographic distribution of VHS virus for all affected fishes in the Great Lakes.
5. The effectiveness of iodophor disinfection of non-salmonid eggs.

    a. Appropriate safe levels of disinfection need to be determined for each non-salmonid species and that physical manipulation at this stage will not kill the newly fertilized non-salmonid embryos.
6. Determination of which non-salmonid species are susceptible, infectious and carrier species.
7. Improvements in the detection tests for VHS virus
    a. Evaluation of all available cell lines to determine the most sensitive.
        i. Most sensitive should be cloned and provided to all fish health labs in the Great Lakes region
    b. Full development of rapid field and laboratory virus detection tools to include rPCR tests.
    c. General methodology improvements are needed to include which is the best tissue to test and what is the best way to ship and store samples.
8. Develop a full understanding of the extent of the live fish market for commercially caught fish along with distribution network for these fish to greatly improve trace-back options.
9. Develop a full set of options to use Aquatic Nuisance Species and Department of Homeland Security funds to combat fish health problems that could affect commercially important species.
10. Understand how the baitfish industry operates, the effects of the above recommendations on bait availability for anglers, and extent of bait importation into and movement around the Great Lakes.
11. Understand the seasonal variability of infection in key baitfish species, in particular lake emerald shiners and golden shiners.
12. A systematic survey of VHSv and other pathogens carried in Great Lakes ballast water.
13. An analysis of the movement of fish, pathogens and ballast materials through the Great Lakes should be conducted to examine if any relationships exist among these factors that could inform management decisions.

The Great Lakes Fish Health Committee recommendations were approved by the Great Lakes Fishery Commission - Council of Lake Committees for implementation in October 2006. The recommendations have been implemented in ways that are appropriate to the eight states, one Canadian province and the three key federal agencies. Only the recommendations that had full consensus were approved and others without consensus were left in the document for information. The document also includes a list of research recommendations, many of which we have been successfully implemented.

Wildlife Veterinarian

Duties and Responsibilities:

Plan, direct, coordinate, and implement statewide programs for the detection, control, and management of diseases occurring in wildlife populations.

- Direct the development of strategies for detection, control, and eradication of wildlife diseases.
- Monitor potential wildlife disease patterns and prioritize disease areas requiring epidemiological investigation in order that resources for disease control are utilized for the most severe and/or preventable risk factors.
- Analyze data, using the principles of epidemiology and biostatistics, to assess the effectiveness of wildlife disease surveillance and management measures, and to identify risk factors for disease transmission.
- Recommend Statute and Rule changes as necessary to monitor and manage wildlife diseases.
- Recommend and develop professional working agreements with other agencies to enhance the agencies efforts to address wildlife diseases, and where necessary, to obtain diagnostic and other professional services.
- Represent the agency at both technical and policy levels regarding wildlife disease issues. Design, conduct, and supervise wildlife disease research projects.
- Maintain technical expertise and licensure in wildlife disease management.

Coordinate and develop wildlife population health monitoring programs including but not limited to:

- Routine health monitoring programs to meet wildlife management needs.
- Performing necropsies and standard laboratory examinations as requested by research and management biologists to determine animal condition, age, sex, cause of death, nature of disease or injury and general health status, manage budgets associated with health monitoring.
- Lead epidemiological investigations into disease outbreak and morbidity/mortality events to determine causative agents and provide corrective measures to limit effects on wild populations
- Produce reports and updates to division staff, managers, administrators and the public, as appropriate.

Assist and advise other Wildlife Management personnel in activities including mark/recapture techniques, chemical immobilization, and research study design.

- Procure regulated pharmaceuticals for fish and wildlife anesthesia, immobilization and euthanasia.
- Distribute and monitor use of all drugs used in the tranquillization of wild animals by agency personnel.

- Must be able to operate firearms and specialized capture equipment; be able to work effectively with large and potentially dangerous wildlife performing daily care, captures, administering treatments, and collecting biological samples.

Minimum Qualifications:

This position requires a Doctorate degree in Veterinary Medicine from an AVMA approved college or university; a Bachelors or Masters degree in Fish and Wildlife Management, or a related field (a degree in Wildlife Biology, Veterinary Science, or Epidemiology, or a combination of these degrees), is preferred; 1-2 years work related experience. Other combinations of education and experience, which could provide such knowledge, skills and abilities, will be evaluated on an individual basis.

Selection Criteria:

- Knowledge of wildlife disease management principles and methodologies, pathology and diagnostic principles and methodologies, epidemiology principles and methodologies, as well as research methodologies for disease investigations.
- Extent of experience working with free-ranging wildlife populations and issues related to their health.
- Relevance of experience in facilitating collaborations amongst individuals from multiple organizations, government bodies, NGOs, Universities, and national programs related to wildlife disease eradication programs.
- Quality of both oral and written communication skills on technical issues.
- Demonstrated ability to develop/design proposals, manage projects, track budgets, monitor progress, review and approve final reports at the completion of projects.
- Demonstrated ability to be an effective decision maker and negotiator, proficient in conflict resolution.
- Must be eligible for DEA Controlled Substance Registration Certificate. Must have valid drivers license.

Wildlife Health Specialist

Duties and Responsibilities:

Plan, direct, coordinate, and implement statewide programs for the detection, control, and management of diseases occurring in wildlife populations.

- Direct the development of strategies for detection, control, and eradication of wildlife diseases.
- Monitor potential wildlife disease patterns and prioritize disease areas requiring epidemiological investigation in order that resources for disease control are utilized for the most severe and/or preventable risk factors.
- Analyze data, using the principles of epidemiology and biostatistics, to assess the effectiveness of wildlife disease surveillance and management measures, and to identify risk factors for disease transmission.
- Recommend Statute and Rule changes as necessary to monitor and manage wildlife diseases.
- Recommend and develop professional working agreements with other agencies to enhance the agencies efforts to address wildlife diseases, and where necessary, to obtain diagnostic and other professional services.
- Represent the agency at both technical and policy levels regarding wildlife disease issues. Design, conduct, and supervise wildlife disease research projects.
- Maintain technical expertise and licensure in wildlife disease management.

Coordinate and develop wildlife population health monitoring programs including but not limited to:

- Routine health monitoring programs to meet wildlife management needs.
- Performing necropsies and standard laboratory examinations as requested by research and management biologists to determine animal condition, age, sex, cause of death, nature of disease or injury and general health status, manage budgets associated with health monitoring.
- Lead epidemiological investigations into disease outbreak and morbidity/mortality events to determine causative agents and provide corrective measures to limit effects on wild populations
- Produce reports and updates to division staff, managers, administrators and the public, as appropriate.

Assist and advise other Wildlife Management personnel in activities including mark/recapture techniques, chemical immobilization, and research study design.

- Must be able to operate firearms and specialized capture equipment; be able to work effectively with large and potentially dangerous wildlife performing daily care, captures, administering treatments, and collecting biological samples.

Minimum Qualifications:

This position requires a Masters degree in Fish and Wildlife Management, or a related field (a degree in Wildlife Biology, Veterinary Science, or Epidemiology, or a combination of these degrees), a degree in Veterinary Medicine or a Doctorate degree is prefered; 1-2 years work related experience. Other combinations of education and experience, which could provide such knowledge, skills and abilities, will be evaluated on an individual basis.

Selection Criteria:

- Knowledge of wildlife disease management principles and methodologies, pathology and diagnostic principles and methodologies, epidemiology principles and methodologies, as well as research methodologies for disease investigations.
- Extent of experience working with free-ranging wildlife populations and issues related to their health.
- Relevance of experience in facilitating collaborations amongst individuals from multiple organizations, government bodies, NGOs, Universities, and national programs related to wildlife disease eradication programs.
- Quality of both oral and written communication skills on technical issues.
- Demonstrated ability to develop/design proposals, manage projects, track budgets, monitor progress, review and approve final reports at the completion of projects.
- Demonstrated ability to be an effective decision maker and negotiator, proficient in conflict resolution.

Fish Health Specialist

Duties and Responsibilities:

Position manages all aspects of a comprehensive fish health program and includes:

- Inspecting, diagnosing, and prescribing treatments for fish in both state hatcheries and outlying rearing ponds.
- Investigating the distribution and patterns of diseases and disease outbreaks in wild fish, reptiles and amphibian populations.
- Serving as the Department's technical member of the Fish Health Committee that advises on matters of fish health for the interstate and international waters.
- Developing close work relationships with Wildlife Division staff that work on similar issues in wildlife.
- Assisting with fish health issues in private aquaculture and the bait industry.
- Conducting fish health research and investigations with other fish health professionals
- Provides certification services necessary for fish health management.
- Program budget, assure that adequate equipment and supplies are available to completed needed fish health assessments; hire and supervise a technician and temporary employees.

Oversee the development of fish health plans for all state fish production facilities to ensure appropriate biosecurity measures are in place and implemented, appropriate Hazard Analysis and Critical Control Point (HACCP) plans are prepared for all facilities, and disinfection and depopulation procedures are in place.

Provide diagnostic services for state fish production facilities and feral fish populations as required to include:

- Overseeing and ensuring quality control of lab work for isolation and identification of pathogenic organisms including parasites, fungi, bacteria, and viruses.
- Evaluating and interpreting laboratory results and providing fish health recommendations to the Division based on these results.
- Conducting site visits as needed to properly assess fish health problem(s) and approprite actions.
- Performing necropsies, preparing tissues for analysis and conducting analytical tests to determine the cause of mortalities, and recommending necessary treatment or disease control methods.

Perform and/or cooperate in various research projects to develop an understanding of fish disease progression and ecology to include:

- Designing and carry out specific research projects as needed.
- Working with other fish health professionals to carry out other research projects; and to developing epidemological analyses and studies to fully understand disease emergence and progression in cultured and wild fish.

- Prepare and write reports on findings for publicaton in scientific journals and state reports.

Fully develop and oversee a statistically valid wild fish disease survey to provide needed baseline information for State Fish Health Committee Model Program diseases as well other diseases and pathogens that are emerging or potential threats.

- Ensuring the appropriate study and data collection design.
- Investigate disease problems in natural waters
- Performing needed necropsies, tissue preparation and overseeing analytical tests to determine cause(s) of problems.

Develop a working relationship with the state department of agriculture to oversee Division requirements for the stocking of public waters by private entities and to ensure that pathogens are appropriately controlled in the private aquaculture industry of the state.

Stay abreast with state and federal authorities and mandates provided by the Endangered Species Act, Sustainable Fisheries Act, Clean Water Act, and National Environmental Protection Act.

Minimum Qualifications:

This position requires a Masters degree with emphasis on fishery biology, fish culture, or fish disease, a DVM, or a combination of these degrees . Two years of experience in a fish health or animal diagnostic lab are preferred. Knowledge of aquatic life support systems (construction, maintenance, monitoring) preferred.

Selection Criteria:

- Knowledge of fish disease management principles and methodologies, pathology and diagnostic principles and methodologies, epidemiology principles and methodologies, invasive species detection and control management principles and methodologies.
- Extent of experience working with wild fish monitoring and sampling schemes to determine trends and emerging fish health issues in wild fish populations.
- Demonstrated ability to work as a technical member of a Fish Health Committee to advise on matters of fish health for state or federal waters.
- Relevance of experience in facilitating collaborations amongst individuals from multiple organizations, government bodies, NGOs, Universities, and national programs related to fish disease and invasive species eradication programs.
- Quality of both oral and written communication skills on technical issues.
- Demonstrated ability to develop/design proposals, manage projects, track budgets, monitor progress, review and approve final reports at the completion of projects.
- Demonstrated ability to be an effective decision maker and negotiator, proficient in conflict resolution.

Model State Wildlife Health Programs

A growing number of states have wildlife health programs of variable age. In addition, several states in the Southeastern United States pooled their resources in 1957 to establish a regional wildlife health program, the Southeastern Cooperative Wildlife Disease Study (SCWDS). The following descriptions of three state programs and SCWDS are included as examples of some of the ways that state wildlife management agencies currently are addressing wildlife health issues. No two programs are alike and they can be tailored to fit the needs of individual states. These program descriptions were submitted by the corresponding states and additional information on them can be obtained from the Virginia Department of Game and Inland Fisheries, the Nevada Department of Wildlife, and the Oregon Department of Fish and Wildlife, as well as from the Southeastern Cooperative Wildlife Disease Study.

A. VIRGINIA WILDLIFE HEALTH PROGRAM

PROJECT STATEMENT

GRANT TITLE:	WILDLIFE CONSERVATION PROGRAM	**GRANT NO:** WE-99-R
PROJECT TITLE:	WILDLIFE HEALTH PROGRAM	**PROJECT NO:** XVII
PERSONNEL:	Virginia Department of Game and Inland Fisheries Wildlife Veterinarian Jonathan Sleeman performs all three jobs listed within this program.	

NEED: There is an increasing need for wildlife health and veterinary input into the management and conservation of natural resources. Emerging wildlife diseases are an increasing concern for the conservation and management of natural resources as well as a threat to human and animal health necessitating increased emphasis on wildlife mortality investigation and active disease surveillance. In addition, increasingly overlapping human and wildlife populations in Virginia have resulted in a greater number of human-wildlife conflicts necessitating an increased need for the safe capture and chemical immobilization of wildlife.

OBJECTIVE: To determine the etiology of unusual wildlife mortality events in Virginia and conduct appropriate disease control, eradication and prevention measures as deemed necessary and feasible. To conduct active surveillance for diseases of greatest concern such as Chronic Wasting Disease (CWD) and highly pathogenic avian influenza and conduct appropriate disease control, eradication and prevention measures as deemed necessary and feasible. To provide veterinary technical expertise to assist in the safe capture and chemical immobilization of wildlife.

EXPECTED RESULTS AND BENEFITS: Results from the wildlife mortality investigations and active disease surveillance will allow the agency to apply timely disease control, eradication and prevention measures that will mitigate and reduce the impact of wildlife diseases on human, domestic animal and wildlife health. In addition, the results will allow the agency to provide information about wildlife diseases in Virginia to the public, relevant stakeholders and other government agencies. Providing veterinary anesthesia expertise will ensure that all wildlife captures and chemical immobilizations are conducted safely, with minimal risks to the animals and agency personnel, as well as ensuring that the most up-to-date techniques are used that will minimize the probability of anesthetic death. This will also ensure that the agency complies with all relevant state and federal laws pertaining to the use of controlled substances.

APPROACH AND EVALUATIONS:

1) Wildlife Health Program Coordination. This job will be evaluated by documenting the administrative overhead necessary to manage the Wildlife Health Program. This work will require a synthesis and use of information from multiple Wildlife Health Program jobs. This proposed activity is new for the upcoming grant period.

2) Wildlife Mortality Investigations and Active Disease Surveillance. This job will involve the investigation of wildlife mortality events; maintaining annual payments to the Southeastern Cooperative Wildlife Disease Study (SCWDS) for diagnostic services; evaluating diagnostic results; conducting active disease surveillance for epizootic hemorrhagic disease, CWD, avian influenza, and other diseases as necessary; conducting disease control, eradication and preventive measures as necessary; maintaining disease databases; conducting research on wildlife disease ecology and epidemiology; maintaining disease information on the agency's Web site; and disseminating information on wildlife diseases to the public, stakeholders and other government agencies. This proposed activity is new for the upcoming grant period.

3) Wildlife Anesthesia and Immobilization. This job will involve ordering anesthetic drugs as necessary; maintaining controlled drug logs and inventory; supplying anesthetic agents to field biologists; providing training to field biologists in the use of anesthetics and drug delivery systems; consulting with field biologists on the appropriate choice of anesthetics for various circumstances, and maintaining data sheets on anesthetic use by the agency. This proposed activity is new for the upcoming grant period.

JOB NO: 1 WILDLIFE HEALTH PROGRAM COORDINATION

NEED: The Wildlife Health Program will require appropriate management and administration. Specific activities will include project planning meetings, employee training and supervision, time accounting, travel and Federal Aid reports, as well as purchasing. Additionally, representation at professional meetings and on interagency committees, media interviews, public education and outreach, special analyses for regulations and management, research and publication, and cooperation with relevant non-governmental organizations and stakeholders. This work will require a synthesis and use of information from multiple Wildlife Health Program jobs.

JOB OBJECTIVE: TO PROVIDE ADMINISTRATION, MANAGEMENT, COORDINATION, OUTREACH, AND PROFESSIONAL SUPPORT FOR THE WILDLIFE HEALTH PROGRAM.

APPROACH:

- Complete monthly, routine and special reports as needed.
- Manage purchases and budget.
- Conduct personnel management and training activities.
- Represent the agency and the agency's Wildlife Health Program at professional and technical meetings and on committees.
- Conduct education and outreach, and media interviews as needed.

JOB NO: 2 WILDLIFE MORTALITY INVESTIGATIONS AND ACTIVE DISEASE SURVEILLANCE

NEED: Emerging wildlife diseases are an increasing concern for the conservation and management of natural resources as well as a threat to human and animal health. Consequently, there is increasing need to investigate unusual wildlife morbidity and mortality events to determine the cause of the outbreak (outbreaks can be due to a variety of infectious agents such as rabies, canine distemper, bovine tuberculosis, West Nile virus or noninfectious diseases such as poisonings, or contaminants, or nutritional deficiencies and novel emerging diseases) as well as determine the significance and implications of the event. Should it be determined that the disease event could have significant negative impacts on natural resources or human and animal health then appropriate disease control, eradication, and prevention measures will need to be devised including, but not limited to, public awareness and education, the delineation of wildlife disease management, surveillance, and quarantine areas, the reduction of selected wildlife populations, the restriction in the movement of wildlife or parts thereof, the prohibition of feeding of wildlife or use of animal-based products such as attractants, the prohibition of rehabilitation and release of selected wildlife species and the manipulation or modification of environmental conditions as well as modifications of hunting seasons and bag limits. In addition, active surveillance for the diseases of greatest concern such as epizootic hemorrhagic disease, CWD, highly pathogenic avian influenza, and other diseases of concern will need to be performed to detect these diseases as early as possible in the event they are introduced into Virginia to allow for effective disease control measures to be implemented.

OBJECTIVE: 1. TO DETERMINE THE ETIOLOGY OF UNUSUAL WILDLIFE MORTALITY EVENTS IN VIRGINIA AND CONDUCT APPROPRIATE RESEARCH, DISEASE CONTROL, ERADICATION AND PREVENTION MEASURES AS DEEMED NECESSARY AND FEASIBLE. 2. TO CONDUCT ACTIVE SURVEILLANCE FOR DISEASES OF GREATEST CONCERN SUCH AS EPIZOOTIC HEMORRHAGIC DISEASE, CWD, HIGHLY PATHOGENIC AVIAN INFLUENZA, AND OTHER DISEASES OF CONCERN, AND CONDUCT APPROPRIATE RESEARCH, DISEASE CONTROL, ERADICATION AND PREVENTION MEASURES AS DEEMED NECESSARY AND FEASIBLE.

APPROACH:

- Conduct field investigations of reported wildlife mortality events.
- Conduct field necropsies on affected animals and collect, preserve, and submit diagnostic samples to the appropriate diagnostic laboratories including, but not limited to, Southeastern Cooperative Wildlife Disease Study (SCWDS), National Wildlife Health Center, and the Virginia Department of Agriculture and Consumer Services.
- Assess the diagnostic results and determine significance.
- Disseminate the results and interpretation to appropriate agencies and stakeholders.
- With USFWS approval, design and implement appropriate disease control, eradication and prevention measures as necessary and feasible.

- Maintain a database of mortality events and diagnostic results.
- With USFWS approval, design and implement research on wildlife disease ecology that helps elucidate etiology, epidemiology and implications for wildlife populations and ecosystems. Publish results in peer-reviewed journals.
- Design and conduct active surveillance for epizootic hemorrhagic disease, CWD, highly pathogenic avian influenza, and other diseases of concern.
- Submit surveillance samples to appropriate diagnostic laboratories.
- Assess the results and inform appropriate agencies and stakeholders of any positive results.
- Maintain response plans for diseases for which active surveillance is being conducted and activate these plans in the event a disease of concern is detected.
- Maintain a database of surveillance data, and generate reports on surveillance activities.
- Disseminate wildlife disease research results and other disease-related activities via scientific presentations and peer-reviewed journals.

JOB NO: 3 WILDLIFE ANESTHESIA AND IMMOBILIZATION

NEED: Increasing human and wildlife populations in Virginia have resulted in a greater number of human-wildlife conflicts necessitating an increased need for the safe capture and chemical immobilization of wildlife. In addition, the confiscation and removal of illegally held captive wildlife will require the use of appropriate methods of capture and chemical immobilization.

JOB OBJECTIVE: TO PROVIDE VETERINARY TECHNICAL EXPERTISE TO ASSIST IN THE SAFE CAPTURE AND CHEMICAL IMMOBILIZATION OF WILDLIFE. TO PROVIDE VETERINARY ANESTHESIA EXPERTISE WILL ENSURE THAT ALL WILDLIFE CAPTURES AND CHEMICAL IMMOBILIZATIONS ARE CONDUCTED SAFELY, WITH MINIMAL RISKS TO THE ANIMALS AND AGENCY PERSONNEL, AS WELL AS ENSURE THAT THE MOST UP-TO-DATE TECHNIQUES ARE USED THAT WILL MINIMIZE THE PROBABILITY OF ANESTHETIC DEATH.

APPROACH:

- Order anesthetic drugs as necessary.
- Maintain controlled drug logs and inventory.
- Supply anesthetic agents to field biologists as necessary.
- Provide training to field biologists in the use of anesthetics and drug delivery systems
- Consult with field biologists on the appropriate choice of anesthetics for various circumstances
- Maintain data sheets on anesthetic use by the agency.

B. NEVADA WILDLIFE HEALTH PROGRAM

In 2007, following recruitment of a wildlife veterinarian (Wildlife Health Specialist), the Nevada Department of Wildlife (NDOW) began development and implementation of a comprehensive health plan focused on the state's wildlife resources. The plan approaches health management in both game and non-game species of importance in Nevada specifically, and the Great Basin Ecosystem (GBE) in general.

Emerging infectious diseases (EID) are recognized as a significant manifestation of diminishing ecological health and NDOW believes that habitat loss, climate change, inappropriate land use and chemical pollution in the GBE all contribute to disease outbreaks. The degree to which environmental changes over the past several decades have affected the health of terrestrial animals in the GBE is largely unknown because information is lacking on diseases present prior to these changes.

NDOW recognizes the importance of paying close attention to the risks of disease (both infectious and noninfectious) and the need to factor these risks into fish and wildlife management models. Baseline data on diseases of animal populations are considered crucial for NDOW to accurately predict changes in today's changing climate.

Consistent with the proposed National Fish and Wildlife Health Initiative, the state plan therefore emphasizes the following:

A. Development of long-term, consistent disease monitoring programs in key wildlife species in Nevada and the GBE
B. Detection, elucidation and reporting of the causes of morbidity and mortality in wildlife species in Nevada and the GBE
C. Evaluation of the impact of infectious and non-infectious diseases and parasites upon wild animal populations in Nevada and the GBE
D. Investigation of disease interrelationships between wildlife and domestic livestock
E. Evaluation of the role of wildlife in zoonotic disease in Nevada and the GBE

The wildlife health plan emphasizes identification and development of productive working relationships with state, federal, tribal and other partners. Recent adoption of a Memorandum of Agreement between the Nevada Departments of Wildlife and Agriculture and the University of Nevada, Reno regarding disease interactions between domestic sheep and goats and wild bighorn sheep and close collaboration with Tribal entities in Nevada in disease surveillance in wildlife (chronic wasting disease, avian influenza, West Nile virus) illustrate the early success of this approach.

The Nevada Department of Wildlife's mission is to protect, preserve, manage and restore wildlife and its habitat for its aesthetic, scientific, educational, recreational, and economic benefits to citizens of Nevada and the United States. Financial support from the Nevada Wildlife Heritage Fund, federal agencies (USDA, USGS, USFWS, USFS, BLM, NPS), sportsmen's groups and NGOs and the development of strong working relationships within NDOW and with these partners have allowed the Department to build capacity, increase the level of professionalism within its staff and implement the wildlife health plan, thereby positioning NDOW to effectively fulfill its mission. In order for NDOW to achieve the long-term goals set forth in this plan and sustain long-term data collection, a strategic 5-year plan, business design and sound financial strategy are currently being developed to ensure adequate program support into the future.

Consistent with the goals of the National Fish and Wildlife Health Initiative, the Department is now committed to conducting proactive, coordinated and sustained surveillance for pathogens in wildlife species of importance in Nevada, and responding appropriately; developing policy and protocols for early detection and rapid response; developing integrated disease management strategies and contingency plans for emergency disease events; identifying appropriate technologies relevant to wildlife health management; initiating and conducting research relevant to wildlife health in Nevada and communicating and disseminating relevant health-related information to NDOW staff, agency partners, the public of Nevada and other interested parties through participation of Wildlife Health Specialist and staff in meetings and workshops, and through presentations, regular discussion, email and website updates.

C. OREGON WILDLIFE HEALTH PROGRAM

The Oregon Department of Fish and Wildlife's (ODFW) Wildlife Health Program is based out of Oregon State University (OSU) which consists of several offices, a necropsy room and a biosecurity level 2 laboratory. The program is lead by a supervisor level senior wildlife veterinarian with a staff veterinarian and a laboratory biologist who supports the veterinary staff and conducts statewide aging and reproductive management-based studies. Annually, the program also supports up to 10 volunteers and temporary personnel working on management and research projects including fisheries and wildlife undergraduate and graduate students and veterinary students conducting externships and wildlife health research projects. The Wildlife Health Laboratory (WHL) works closely with the Oregon State University Veterinary Diagnostic Lab (OSU VDL) and the Oregon Department of Agriculture Animal Health Lab. The WHL is located adjacent to the ODFW Fish Pathology Lab, with both labs in close proximity to the OSU VDL.

The veterinary staff coordinates and directs the statewide program for wildlife animal health and animal disease management and control. The program principally supports both the Game and Wildlife Diversity Programs and also provides prescription assistance in the fisheries hatchery program. The program is directly supervised by a regional supervisor with Division Administrators directing many of the veterinary staff activities.

Specifically, veterinarians within Oregon's program conduct state level, federally-funded surveillance programs (e.g. avian influenza and chronic wasting disease). During morbidity and mortality events, the veterinary staff provides the expertise for epidemiological investigations and proper handling of pathological samples for diagnosis. Within the Wildlife Health Lab, Oregon's veterinarians conduct necropsies, prepare tissues for further diagnostic workup, and provide final diagnosis to field staff and administration. Veterinarians answer disease questions and calls from the field staff, administrators and the public on a daily basis and directly monitor a toll-free phone line that also provides 24/7 access to the supervisory veterinarian in the event of emergencies. When requested, veterinary staff provides animal health and disease opinions and technical information to Commissioners and Legislators.

During high profile or sensitive field operations (media-covered wildlife confiscations, shipment of orphaned wildlife to zoos) veterinarians are utilized to ensure efficient and effective immobilizations, provide health evaluations and write certificates of veterinary inspection for interstate movement of animals. They also provide training and veterinary services related to agency wildlife relocation efforts including capture and immobilization, disease sampling, necropsy, humane euthanasia, and treatment of wildlife. The use of personal protective equipment and proper sanitation procedures when handling wildlife are included in annual training exercises for field staff. An important duty of the program's veterinarians is to provide agency acquisition, record keeping and compliance of prescription and scheduled drugs used for handling and capture of wildlife.

On a broader scale, Oregon's veterinary staff assists administration with input on policies and procedures related to wildlife health issues and provide advice during development of administrative rules concerning control of intrastate movement of wildlife species to prevent the introduction of disease to Oregon wildlife. The wildlife health program veterinarians maintain surveillance of the general welfare of Oregon wildlife as influenced by national and international activities and coordinate with the Oregon Department of Agriculture on issues of animal quarantine involving captive wildlife premises as may be necessary for the control or eradication of program diseases that could occur in wildlife.

Wildlife Health Program veterinarians consult with many intra- and inter- state and federal agencies in disease control activities affecting or involving wildlife and consult with wildlife health specialists and veterinarians, non-governmental organizations, public interest groups at both state and national levels to discuss problems and devise plans for the control of contagious and infectious diseases involving wildlife. Veterinary staff present at several professional venues annually to provide updates on Oregon wildlife health issues and to relay information back to administration and staff on current national wildlife health issues and initiatives.

The Wildlife Health Program provides the state with wildlife disease surveillance capability to efficaciously and expediently identify threats and react with defined management protocols. The program provides administrators with the ability to formulate policy and rules to institute proactive measures to protect the state's wildlife resource from infectious diseases, contaminants, and negative influences of internal and external actions and policies affecting the health of Oregon's wildlife populations.

D. SOUTHEASTERN COOPERATIVE WILDLIFE DISEASE STUDY

The Southeastern Cooperative Wildlife Disease Study (SCWDS) is the first regional research and diagnostic laboratory established specifically for wildlife diseases**.** Formed in 1957 by the Southeastern Association of Game and Fish Commissioners in response to several dramatic mortality events in white-tailed deer, SCWDS quickly became a partnership involving the University of Georgia's (UGA) College of Veterinary Medicine and 11 southeastern state fish and wildlife management agencies. Today, SCWDS membership includes the wildlife management agencies of 13 Southeastern states and Puerto Rico, two Midwestern states, and one Northeastern state.

Since 1963, SCWDS has received support from entities in addition to the original member states and the University of Georgia. Federal support for SCWDS began in 1963 with annual appropriations through the U.S. Department of the Interior and, since 1979, through annual cooperative agreements with USDA-APHIS-Veterinary Services. Recently, annual cooperative agreements were initiated with USDA-APHIS-Wildlife Services. Additionally, SCWDS personnel currently include seven UGA faculty members who successfully obtain competitive research and service grants. Using this cooperative approach, SCWDS leverages contributions of each member state with the funds of other state and federal supporters to provide benefits far beyond what could be accomplished by any individual state or other entity.

SCWDS has worked for the benefit of wildlife resources, animal health, and public health by pursuing the same four objectives for five decades:

- Detect the cause of morbidity and mortality in free-ranging wildlife
- Define impacts of disease and parasites on wildlife populations
- Delineate disease interrelationships among wildlife and domestic animals
- Determine the role of wildlife in the epidemiology of human diseases.

SCWDS objectives are accomplished through a combination of research, service, and instruction. Research achievements of SCWDS are recognized nationally and internationally and focus on the population implications of diseases in wild animals, as well as the role of wildlife in the epidemiology of livestock, poultry, and human diseases. Diseases and parasites that first appeared in mortality investigations have become the topics of deeper investigation. Examples include hemorrhagic disease, mycoplasmal conjunctivitis of finches, and avian vacuolar myelinopathy. The dramatically growing importance and increased funding availability surrounding emerging zoonotic diseases involving wildlife have expanded SCWDS research opportunities in avian influenza, West Nile virus, ehrlichioses, and other disease of concern. SCWDS currently is conducting avian influenza virus research in wild birds that is directed at refining surveillance strategies, as well as determining the likelihood that native waterfowl and gulls can carry highly pathogenic flu viruses over long distances and/or serve as long-term reservoirs of the viruses if they reach North America.

Service activity is a prominent feature of the SCWDS mission: SCWDS provides wildlife mortality investigations, including complete diagnostic work-ups, and conducts surveillance for diseases of special concern to wildlife managers, animal health officials, public health authorities, and others. In addition, SCWDS provides consultation about many facets of wildlife diseases on a daily basis to wildlife management personnel, policy-makers, regulatory veterinarians, public health officials, academicians, private practitioners, journalists and private citizens. Wildlife disease workshops are provided for wildlife biologists and state and federal veterinarians to increase recognition and understanding of wildlife diseases. Informational brochures, a quarterly newsletters, and a comprehensive field manual on wildlife diseases have been produced and revised to inform biologists, managers, administrators, veterinarians, and others of wildlife health issues.

SCWDS is one of the leading organizations in training wildlife veterinarians and wildlife health specialists. SCWDS faculty members participate in the education of veterinary students at UGA and provide advanced training in wildlife diseases to graduate students in the College of Forestry and Natural Resources and the College of Veterinary Medicine. The research projects and assistantship duties of all graduate students associated with SCWDS are entirely directed toward wildlife health issues, including those that may impact the health of humans and domestic animals.

SCWDS personnel currently number around 35 faculty, technical and administrative staff, and students. SCWDS is a multi-disciplinary scientific organization with field and laboratory expertise in wildlife biology and management, veterinary medicine, epidemiology, parasitology, microbiology, pathology, diagnostic testing, and public health. Now in its sixth decade, SCWDS serves as a prominent example of how the philosophy of state-federal cooperation and leveraging the funds of individual sponsors can yield benefits far beyond what any of them could have obtained individually.

Model State Fish Health Programs

The following descriptions of two state programs are included as examples of some of the ways that state agencies currently are addressing fish and aquatic animal health issues. No two programs are alike and they can be tailored to fit the needs of individual states. These program descriptions were submitted by the corresponding states and additional information on them can be obtained from the Vermont Fish and Wildlife Department and the Michigan Department of Natural Resources Fisheries Division.

A. VERMONT'S FISH HEALTH PROGRAM

A comprehensive fish health program must have many initiatives (or individual programs) working in unison to reduce the threat fish pathogens pose to the natural resource. The following identify the initiatives/programs that contribute to an overall fish health program with the following objectives:

Objectives:

Development and implementation of a comprehensive fish health program that's objectives are to prevent the introduction of fish pathogens into Vermont, the movement fish pathogens within Vermont, and/or the elimination or restriction of fish pathogens in Vermont.

- Prevent the importation into, or transfer within Vermont, of fish infected with certain listed pathogens as defined in the New England Fish Health Guidelines and/or the Northeast Fish Health Committee Guidelines for Fish Importation,
- Identify the distribution of pathogens in state waters and in the fish culture program (state, federal and commercial).
- Restrict or eliminate fish pathogens wherever practicable.
- Discourage the rearing of infected or diseased fish.
- Prevent the release of clinically diseased fish.

Initiatives/Programs

1. Participate in and implement within Vermont two regional fish health programs
    - New England Fish Health Committee
    - Northeast Fish Health Committee

Vermont has historically participated on the New England Fish Health Committee. The committee recently expanded to the Northeast Fish Health Committee. These committees provide uniform guidance in fish health management on a regional scale to assist in reducing the introduction or distribution of pathogens. In addition, participation on these committees provides access to technical expertise and frequently support to a state's fish health program that individual states could not achieve.

The New England Fish Health Committee developed the New England Fish Health Guidelines. The New England Fish Health Guidelines provided relatively comprehensive guidance in fish health management for hatcheries and fish movement particularly for salmonids. The Northeast Fish Health Committee developed the Northeast Guidelines for Fish Importation. The Northeast Guidelines for Fish Health Importation provides guidance in the fish health requirements for fish importation and has been expanded to include most common families of fish that could be imported.

2. Importation regulations requiring permits for all fish imported into the state.
    - Multiple years of fish health inspections are required.
    - No wild fish can be imported into the state.

Vermont developed the regulations necessary to implement the New England and later the Northeast Fish Health Committees Guidelines for Fish Importation to reduce the risk of pathogens being introduced into the state. All pathogens listed in these guidelines must be inspected for. Wild fish (including bait) are not permitted to be imported unless the department determines that the intent of such importation is for scientific purposes or for purposes of re-establishment of fish populations.

3. Annual fish health inspections at state, federal and commercial hatcheries and routine diagnostic work when there is any concern with fish health for state (federal and if requested commercial) fish culture stations.

All fish culture stations in Vermont are required to have annual fish health inspections. This ensures pathogens are not moved between facilities or to waters of the state where they not been found before. It also provides some management options for moving fish or eggs (e.g. disinfected eggs can moved from a facility positive for furunculous to a facility that is negative with almost no risk of transferring the pathogen). Often the detection of a pathogen is during routine diagnostic work rather than through the annual inspection. This provides an additional tool to determine the presence of pathogens and the need to manage for those pathogens.

4. Bio-security plans for all state hatcheries.

State fish culture stations (and federal) have biosecurity plans to decrease the risk of introducing or spreading fish pathogens. All state fish culture supervisors and staff have had several fish health training programs. In addition, Hazard Analysis and Critical Control Point (HACCP) training was provided to supervisors of the state fish culture stations and some commercial growers and bait fish dealers.

5. Review all stocking to ensure that hatcheries do not stock any "listed" pathogens in waters of the state where they had not been stocked in the past.

To limit the distribution of pathogens all state (and federal) stocking is reviewed before stocking to ensure pathogens are not moved to waters where they have not been found in the past.

6. Survey waters of the state to determine the presence and distribution of pathogens including investigating fish kills.

In order to limit the distribution of pathogens or prevent the introduction into new areas it is important to know their distribution. This also provides information on the fish health status of a wild population for fishery managers to consider when managing a fish population.

7. Requiring multiple years of fish health inspections of the wild fish populations if the state is transferred fish from one water body to another.

If fish are moved from one water body to another within the state a fish health survey on the wild fish is conducted for several years to ensure that pathogens are also not being moved.

8. Regulations preventing the movement of live sports caught fish so they cannot be introduced to other water bodies.

To prevent the public from inadvertently moving fish pathogens by moving angled fish from one water body to another, fish caught by anglers are not allowed to be transported alive.

9. Regulations preventing the movement of bait fish have been adopted.

Bait fish can only be used in the waterbody where collected. Anglers are not allowed to leave the water body with live bait. Commercial harvesters can only sell the bait for use on the water body collected.

Staff/ Facilities

- Laboratory facilities capable performing virological, bacteriological and parasite testing.
- Two fish health biologist (certified American Fisheries Society Fish Health Inspectors).
- Various department teams/fishery mangers have developed management plans for different pathogens.

B. MICHIGAN'S FISH AND AQUATIC ANIMAL HEALTH PROGRAM

Program Background

Program Overview

Fish and aquatic animal health programs must cover all potential areas ranging from biosecurity to pathogen detection to disease management recommendations. The Michigan Department of Natural Resources Fisheries Division Fish Health Program has the following components that address all of the key areas:

1) Biosecurity
2) Disease Prevention
3) Pathogen Surveillance and Testing
4) Disease Treatment
5) Epidemiology
6) Decision Support

Program Administration

The Michigan Department of Natural Resources' Fish Health Program is embedded into the Fish Production Section of the Fisheries Division as one of six programs administered by the Fish Production Section. This is a common location for the administration of this program. There are two of reasons for this: 1) problems with fish health are manifested with high density and stress environments so hatcheries in general must be continuously monitored with respect to fish health to produce healthy fish within the hatchery system; and 2) it is critical that public fisheries agencies with public trust responsibilities are not a factor in spreading fish pathogens that may jeopardize the public trust resources.

Resources

The Michigan Department of Natural Resources' Fish Health Program has a planned staffing of a Fish Pathologist or Veterinarian and a Fish Health Technician. The Fish Pathologist/Veterinarian roles are: to ensure that all samples are properly collected for lab analysis; to conduct some pathogen and disease testing; to ensure the laboratory work is properly conducted; to analyze the laboratory results; and to provide fish health management recommendations to Fisheries Division. The Fish Health Technician's duties are to: collect samples in accordance to accepted collection practices; properly catalog and store samples; ensure chain of custody is maintained; ensure the proper shipping and delivery of all samples; assist the Fish Pathologist/Veterinarian in laboratory analyses; and properly record all data into databases.

These assets are to be backed up with additional expertise and lab support at the Michigan State University Aquatic Animal Health Laboratory under Dr. Mohamed Faisal. The Michigan State University assets are currently contracted at $167,000 annually, a bare minimum of funding. To properly fund this contract, approximately $240,000 is needed given the current distribution of work between Michigan State University and Fisheries Division staff. Additional capacity to handle fish health work is being developed at Lake Superior State University and future plans are to contract appropriately $25,000 per year of work with this University. The long term plan is to have emerging fish pathogen and advanced fish pathogen analysis conducted with the state-of-the-art facilities and expertise at Michigan State University with most of the more routine pathogen work being handled by Lake Superior State University.

There are a number of key advantages to having these University contracts. The first is the availability of state-of-the-art analytical facilities that are very difficult for state agencies to maintain and operate. The second is that it is very difficult and expensive for state agencies to keep up with the ever changing laboratory regulations. The third is the availability of a large pool of inexpensive labor at the Universities to handle laboratory work. The fourth is that Universities have much greater ability to leverage assets that in turn attract additional funding for fish pathogen and disease research. Finally, Universities have staff fully versed in the latest information on fish pathogens and diseases which brings the very best information to the decision process.

Currently, both of Fisheries Division positions are vacant and most of the policy development and decision support is handled by the Fish Production Manager and the Fish Health Program Manager with the assistance of Michigan State University staff. This is not an ideal way to handle these tasks but is manageable. To fully operate this program in a state with the water resources of the State of Michigan, there should be an allocation of: 2 FTEs; a contracting budget of $225,000; and an overall annual operating budget of $500,000. Current funding for this program which covers the minimum fish health needs of Fisheries Division is approximately $225,000 and it is entirely covered by U.S. Fish and Wildlife Service - Federal Aid in Sport Fish Restoration dollars.

Program Components

Biosecurity

The Michigan Department of Natural Resources has implemented a broad range of biosecurity measures at our Fish Production facilities and for our field fisheries management staff. These measures include:

1) A strict program of facility sanitation at hatcheries to remove organic matter that promotes pathogen growth;
2) Strategically located foot baths in hatcheries to prevent pathogen movement between raceway areas;
3) The use of individual rearing unit nets and other gear with no sharing of equipment between rearing units at hatcheries;
4) Disinfection of all rearing units after a lot of fish has been moved from it to another rearing unit;

5) Disinfection of all boats and equipment after sampling bouts;
6) Disinfection of all fish planting units when units are transferred between hatcheries and after each stocking trip; and
7) Limitation of publically accessible hatchery locations to prevent the accidental movement of pathogens by the visiting public.

Disease Prevention

A broad range of disease prevention measures have been implemented by the Michigan Department of Natural Resources. These measures are focused on reducing stress and the direct prevention of the pathogen coming into our facilities. Specific measures include:

1) All outdoor raceway units are covered and screened to reduce sun exposure and predator harassment, both key stressors;
2) A focus on the production of quality fish instead of maximum numbers which requires lower rearing densities and reduces stress;
3) Screening of all coolwater and coldwater broodstocks for key fish pathogens. Examples include the QELISA screening of all salmonid broodstocks for bacterial kidney disease; and the screening of all coolwater broodstock for Viral Hemorrhagic Septicemia virus (VHSv);
4) Vaccination of susceptible coldwater fish species against key pathogens including furunculous and bacterial kidney disease; and
5) Fish mortalities are monitored daily in all rearing units and when daily mortalities reach 0.2%, additional attention is paid to the affected lot.

Pathogen Surveillance and Testing

The Michigan Department of Natural Resources - Fisheries Division conducts pathogen surveillance on both hatchery stocks of fish and on wild fish. The pathogen surveillance of hatchery fish ensures that Fisheries Division does not stock fish that could spread known disease agents to wild fish populations thus placing public trust resources at risk. Surveillance on wild fish provides: information on emerging pathogens; potential natural mortality problems on the horizon; areas where fish can be transferred; potential new wild broodstocks to be avoided or at minimum carefully handled; and information on fish populations at risk from epizootic events.

All stocked fish are certified free of specific pathogens as stated in the Great Lakes Fishery Commission – Great Lakes Fish Health Committee (GLFHC) Model Fish Health Program. This includes all coldwater and coolwater broodstock (both feral and captive) and production fish lots. The coolwater fish testing follows the recommendations in the draft GLFHC Model Fish Health Program currently in review. All testing meets or exceeds the recommendations provided in the American Fisheries Society – Fish Health Section Blue Book and is conducted at the Michigan State University – Aquatic Animal Health Laboratory.

Surveillance is focused on key pathogens (whirling disease, largemouth bass virus, bacterial kidney disease (BKD), *Piscirickettsia* sp., and VHSv to name a few) to: track their current distribution in our state; to determine if epizootics are probable; to determine the effectiveness of salmonid broodstock culling efforts with respect to BKD; and to evaluate fish kill events to determine if these are related to specific pathogens. Efforts have been made to couple fish pathogen surveillance as part of standard fisheries survey work but this has been slowed because of funding issues. Future aquatic pathogen surveillance will entail having fish and other aquatic organism pathogen samples collected during Status and Trends surveys that sample all components of a waterbody (water chemistry, habitat, invertebrates and fish). This will allow for a holistic analysis of aquatic pathogens and place them in the appropriate ecological context.

Currently, we test appropriately 150 lots of fish (typically 60 fish per lot) from Fish Production facilities. This includes: 35 production and 20 broodstock lots for fish disease certification purposes; 50 production and 15 broodstock lots for virology (typically for VHSv); 30 broodstock lots for BKD screening and culling; and another 30 production lots and 5 broodstock lots for diagnostic work related to specific fish disease issues.

Approximately 195 lots of fish are annually examined from wild populations. This includes: 5 salmonid and 9 coolwater broodstock lots; 5 lots for determining if fish transfers can occur; 160 lots for VHSv and other pathogen surveillance; and 15 lots to investigate fish kills.

Disease Treatment

Once fish pathogens are detected in Fish Production facilities, there are a broad range of responses that can be employed. The initial step used by Fisheries Division is to reduce stress on the affected fish and to remove clinically sick fish from the rearing unit. If the pathogen is viral, little can be done with respect to direct treatment. Bacterial pathogens are examined for sensitivity to approved antibiotics then appropriate antibiotics are used under the guidance of a licensed veterinarian from Michigan State University. Other appropriate and approved treatments are conducted for other pathogens such as external parasites and fungal infections following the directions of a veterinarian. Fisheries Division uses a broad range of approved antibiotics and chemicals to treat fish disease outbreaks under the guidance of a licensed veterinarian from Michigan State University.

Fisheries Division also is an active participant in a number of INADs which allow for the use of the best and latest treatment chemicals for pathogens. Fisheries Division and Michigan State University staff are trained and knowledgeable about all of the required steps in using an new investigatory chemical or drug and all of the required information that must be provided. Being involved in INADs is an essential part of any state fisheries agency's disease treatment strategy.

Fisheries Division does not attempt to treat wild fish but is trying to understand how to manage against certain key pathogens. In the future, Fisheries Division will be looking for opportunities to break disease cycles and to actively manage natural mortality.

Epidemiology

Once an epizootic event occurs, a critical part of the Michigan Department of Natural Resources – Fisheries Division Fish Health Program is to conduct full epidemiological analyses to understand all aspects of the disease outbreak. Most of this work is done by Michigan State

University – Aquatic Animal Health Laboratory staff in cooperation with Fisheries Division staff, particular the Fish Production and Fish Health Program Managers. In the future, this would be a task for the Fish Pathologist/Veterinarian but funding limitations prohibit this at this time. This work includes: tracing back lots of fish to determine disease origin; determining potential and known disease vectors; understanding the disease progression to provide management opportunities and options; risk assessment of pathogens; and providing best estimates on the disease rate and progression. This information is used when possible for real-time disease management and is critical for developing future disease management scenario.

Research

The Michigan Department of Natural Resources – Fisheries Division actively pursues research opportunities with Michigan State University on key fish pathogen and health issues. Fisheries Division is a close partner and assists in sample collection, data analysis and report/paper publication. Michigan State University – Aquatic Animal Health Laboratory staff focus on study design, laboratory analysis, and are usually the lead authors on reports/paper publication. A key role played by Fisheries Division is to find funding opportunities (which occasionally maybe the Michigan Department of Natural Resources) and then to support Michigan State University staff in obtaining research funding to answer fish health issues.

Recent research collaboration includes projects to: develop new rapid detection methods for VHSv; to determine species susceptibility to VHSv; to determine the distribution of Piscirickettsia sp. in Lake St. Clair muskellunge populations; to determine if disease is a contributing factor in the reduction of *Diporeia* sp. numbers; and to determine the ecosystem sinks for bacterial kidney disease in Great Lakes systems. The information generated from these efforts is used directly in understanding and managing fish pathogens in Michigan waters.

Decision Support

Once all of the information is generated on a particular epizootic event or an emerging pathogen, Michigan Department of Natural Resources - Fisheries Division with Michigan State University – Aquatic Animal Health Laboratory staff support develop risk assessments or fish health management options to support decision and policy makers. Information is developed both to inform trained fisheries staff and the general public to ensure that all parties are fully informed on pathogens and their effect on public trust resources of the State of Michigan. It is critical to develop clear scientific information that is approachable for the general public to ensure that are not stampeded into poor conclusions.

Michigan Department of Natural Resources - Fisheries Division with Michigan State University – Aquatic Animal Health Laboratory staff support actively engages in fish health policy through the Great Lakes Fishery Commission – Great Lakes Fish Health Committee. This Committee provides fish health policy and procedure recommendations to the Great Lakes fisheries managers. It is critical for fisheries agencies to directly participate in these forums to ensure the best information is available to decision makers.

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Commission/Board Members	State Fish and Game Agency & State Dept. of Agriculture				
Director	State Fish and Game Agency				
Director	State Dept. of Agriculture				
State Veterinarian					
Director	State Public Health Agency				
State Attorney General/Staff	State Attorney General Office				
Federal Area Veterinarian-in-Charge	USDA-APHIS-Veterinary Services				
State Director	USDA-APHIS-Wildlife Services				
Land Administrator or a federally-protected species	US Fish and Wildlife Service				
Land Administrator	US National Park Service				
Land Administrator	US Bureau of Land Management				
Land Administrator	US Army (Military Lands)				
Key Conservation Leaders	Various Organizations				
Key Agricultural Leaders	Various Organizations				
Staff	State Fish and Game Agency				
Staff	State Dept. of Agriculture				

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DRAFT

National Animal Health Emergency Management System Guidelines
U.S. Department of Agriculture

2005

Operational Guidelines

Wildlife Management

The National Animal Health Emergency Management System Guidelines provide an operational framework for use in dealing with an animal health emergency in the United States

The guidelines are produced by the
Veterinary Services Unit of the Animal and Plant Health Inspection Service,
U.S. Department of Agriculture

These guidelines are under ongoing review. Please send questions or comments to:

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Veterinary Services
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PREFACE

"Wildlife Management," a component of APHIS' National Animal Health Emergency Management System (NAHEMS) Guidelines series, is designed for use in the event of a major animal health emergency such as an incursion of a foreign animal disease or a natural disaster in the United States. The NAHEMS guidelines provide information for use by any emergency animal disease eradication organization and for integration into the preparedness plans of other Federal agencies, State and local agencies, and additional groups involved in animal health emergency management activities. Topics covered in the guidelines include:

- Field investigations of animal health emergencies
- Operational procedures for disease control and eradication
- Site-specific emergency management strategies for various types of facilities
- Administrative and resource management
- Educational resources

The NAHEMS guidelines provide a foundation for coordinated national, regional, State, and local activities in an emergency situation. As such, they are meant to complement non-Federal preparedness activities. The guidelines are being reviewed and updated on an ongoing basis, and comments and suggestions are welcome.

"Wildlife Management" provides guidelines for wildlife professionals and associated personnel responsible for wildlife related activities. The guidelines are meant for use as a practical guide rather than as a comprehensive reference resource.

The general principles provided in the guidelines are intended to serve as a basis for making sound decisions. However, deviations from the guidelines are encouraged, if necessary, to address a given situation effectively. In addition, information provided in various sections may need to be combined to meet the requirements of a particular situation.

Acknowledgments

"Wildlife Management" reflects the efforts of a number of individuals, including an APHIS Veterinary Services (VS) Writing group, additional APHIS staff members, and a wide-range of reviewers. These reviewers include Federal and State Veterinarians, members of APHIS' animal health emergency response teams, officials of other Federal agencies, representatives of industry, and additional experts.

Also acknowledged with appreciation are the efforts of USDA staff and external reviewers involved with the development of the VS animal health publications ("red books") and similar documents that have served as information sources for the NAHEMS guidelines. The contributions of each individual are appreciated.

Contents

I. Introduction

This manual provides guidelines for the Wildlife Section of the Animal Emergency Response Organization (AERO), Emergency Programs (EP), Veterinary Services (VS), Animal and Plant Health Inspection Service (APHIS), United States Department of Agriculture (USDA), during a Foreign Animal Disease/Emerging Disease Incident (FAD/EDI). These guidelines describe a risk assessment to determine if a potential exists for wildlife involvement in a FAD/EDI, and subsequent surveillance and control procedures where such a potential is found. The guidelines are based on a presumption that a FAD/EDI incident initially would be detected in domestic animals, but can be adapted to other scenarios. Additional aspects of the wildlife response within the AERO framework are covered in this manual, including quarantine issues, personnel and Wildlife Section roles and responsibilities.

Wildlife is defined for this manual as all free-ranging native, feral, and exotic animals in the United States. Wildlife may be involved in the maintenance and/or transmission of livestock and poultry diseases, and may complicate demonstration of freedom from such diseases at the conclusion of an eradication program. There is a paucity of information available for decision-making in regards to wildlife and FADs, and development of epidemiological information regarding wildlife will be necessary during a FAD/EDI.

Risk assessment, wildlife surveillance, and disease control in wildlife are presented sequentially in this manual, but these activities may occur simultaneously. These guidelines are written as a model, can be adapted to various FAD/EDIs, and the activities can be replicated where multiple FAD/EDIs occur over a widespread geographic area. However, local circumstances will dictate the specific course of action in a given area. The intent of this manual is to provide procedural structure for an immediate but measured response aimed at preventing the spread of a FAD/ED, and for development of information on which to base decisions and justify actions.

II. Wildlife Section Objectives

GOAL: To prevent transmission of a FAD/ED.

OBJECTIVES:

a. Assess the presence of susceptible wildlife in the affected areas.
b. Assess the potential for spread of the FAD/ED in wildlife.
c. Determine if wildlife surveillance is needed.
d. Develop a protocol for wildlife surveillance.
e. Determine if the FAD/ED is spreading from domestic animals to wildlife.
f. Determine if the FAD/ED is spreading among wildlife.
g. Determine if wildlife management is necessary.

Where disease control relating to wildlife is necessary, additional objectives will apply.

a. Minimize risk of dispersal of wildlife from infected premises.
b. Reduce density of susceptible wildlife populations in affected areas if necessary.
c. Implement measures to prevent mechanical spread of the FAD/ED.
d. Develop protocols for long-term surveillance.
e. Develop information on the current role of wildlife in the epidemiology of the disease.
f. Develop information on the current impact of the disease on wildlife.
g. Develop information on the impact of disease control and eradication measures on wildlife.
h. Provide justification for wildlife surveillance and control measures.
i. Assist the state wildlife agency and emergency response system in developing public support for Wildlife Section actions.
j. Evaluate and recommend hunting season, recreation and public lands use modifications or closures.
k. Assist in appraisal of wildlife resources destroyed in disease control operations.

III. Personnel and Equipment

The Wildlife Section will include a Wildlife Coordinator (WC), one or more Wildlife Officers (WO), a State Wildlife Liaison Officer (SWLO) from each affected state, and field personnel.

The WC will be assigned by EP, VS, USDA, and will be located at the Emergency Management Operations Center (EMOC), APHIS, USDA. The WC will be a wildlife health specialist with AERO training and experience.

Wildlife Officers are assigned by the Eastern and Western AEROs, and will be located at the AERO headquarters or other AERO units. Wildlife Officers will be wildlife health specialists with AERO training and experience. SWLOs are assigned by their respective state wildlife agency and will work in coordination with the WO in the AERO. Additional wildlife biologists may be assigned to provide direction and insight into mitigating wildlife conflicts. All procedures and equipment used by members of the Wildlife Section will be approved by the WO.

Field personnel will be selected from state and/or federal wildlife agencies or other sources at the discretion of the WO and SWLO and the AERO. Wildlife surveillance requires persons trained and proficient in wildlife capture, collection, and restraint. Wildlife surveillance requires specialized experience in handling wildlife combined with all other aspects of the AERO including specimen collection, handling, and biosecurity.

Field personnel initially will be expected to provide equipment for wildlife surveillance and control activities through their respective agencies. Specialized and additional equipment will be provided by the AERO. Equipment required for field teams may include vehicles, ATVs, boats, helicopters, firearms, traps, laptop computers, cell phones, GPS units, radios, and clothing. Field teams may be operational at day or night, and in adverse weather conditions, and will need to be provided with appropriate gear for field collections and surveillance.

IV. Roles and Responsibilities

Operations of the Wildlife Section will be a cooperative effort involving state level wildlife management, agriculture, public health and emergency response agencies, as well as APHIS and other appropriate federal agencies. This cooperative effort will not always be all inclusive, and some situations will only include the necessary state and federal agencies.

The Wildlife Section will include a WC located at the EMOC, and a WO and SWLO located in the state or area where the FAD/EDI is occurring. The WC will facilitate nationwide coordination and communication among units of the AERO and the APHIS Emergency Operations Center (AEOC). The WC also will facilitate communication between federal wildlife agencies. The WO will lead the Wildlife Section in the respective state or area. In the event that an outbreak occurs in several states, a WO will be assigned to each state, or a WO may oversee operations in several states. The SWLO will represent the state wildlife management agency and will provide liaison between the Wildlife Section and the state wildlife management agency.

All Wildlife Section activities will be conducted in compliance with applicable federal, state, and local laws. The WO will be responsible for ensuring compliance. Wildlife Section activities will be highly coordinated with other elements of the emergency response including Diagnosis and Investigation, Disposal, Cleaning and Disinfection, and Biosecurity, and must be in compliance with all protocols.

The Wildlife Coordinator will:

-Provide for communication between the Wildlife Section of the AERO(s) and AEOC regarding wildlife issues,

-Provide for communication and consistency among operational areas,

-Provide for communication and consistency between federal wildlife agencies, and

-Likely be located in the AEOC.

The Wildlife Officer will:

-Supervise operations of the Wildlife Section in a given state or area,

-Act as liaison between the Wildlife Section and other units or sections of the emergency response,

-Determine operational needs for the Wildlife Section,

-Request permits from state and federal agencies as needed,

-Ensure that all Wildlife Section personnel fulfill all regulatory, biosecurity, and operational responsibilities,

-Coordinate activities with the SWLO,

-Ensure that appropriate methodologies are used for surveillance, specimen collection and submission, and wildlife management,

-Report all Wildlife Section activities to the WC, and

-Likely be located at the Incident Command Center.

The State Wildlife Liaison Officer will:

-Mobilize state wildlife management agency resources,

-Identify state personnel to serve in the Wildlife Section,

-Provide information regarding wildlife in the affected areas,

-Assist with the duties of the WO, and

-Assist with state permits required for wildlife management.

V. **Quarantines and Movement Control**

The geographic area in the vicinity of an infected premises will be identified and assigned a status relative to quarantines and movement control as dictated by the incident. Wildlife Section activities will be conducted in the identified quarantine areas as well as outside the quarantine areas due to unconfined movements of free-ranging wildlife. All policies and procedures relative to quarantine and movement control will apply to the Wildlife Section. Terminology used by the Quarantine and Movement Control Working Group, APHIS, USDA is used in this manual. Additional terms may be defined as needed by the WC or WO. Current terminology used is defined as follows:

Infected Premises (IP): A premises with one or more infected animals.
Infected Zone (IZ): Area within a 10 km radius of the IP.
Directly Exposed Premises: Premises exposed to susceptible animals from an IP.
Indirectly Exposed Premises: Premises exposed to non-susceptible animals or fomites from an IP.
Surveillance Zone (SZ): A 10 km wide area around the IZ.

VI. **Wildlife Risk Assessment**

An initial objective of the Wildlife Section is to determine if there is a risk for infection of wildlife or disease transmission by wildlife. This risk will be dependent upon the wildlife species present, susceptibility of these species to the disease agent, presence of vectors, and the level of exposure to infected domestic animals and/or the disease agent. It will be critical to assemble all available information relative to wildlife in the affected area, and it may be necessary to conduct surveys to determine the presence of wildlife and disease vectors. Wildlife surveillance will be implemented when there is a reason to suspect that a potential for spread of the disease agent to susceptible wildlife exists. Surveillance of other potential wildlife and disease vectors, including mechanical vectors, may also be implemented, but will be secondary to surveillance of susceptible wildlife.

The following items summarize information and evaluations necessary to determine if surveillance of wildlife is necessary. These items may be addressed simultaneously, but some of the necessary information may not be available. The assessment is intended to provide for an immediate response regarding the need for wildlife surveillance and will be completed with the available information. Additional information can be added as acquired.

1. Disease agent: Collect information on transmission and other epidemiologic factors related to the disease agent.

2. Domestic animals affected: Obtain information on species, numbers, and locations of all susceptible domestic animals within the Infected Zone (IZ) and the Surveillance Zone (SZ).

3. Land use: Obtain maps that detail land use and habitat in the IZ and SZ.

4. Susceptible wildlife:

    a. Obtain information on experimental and natural infection of wildlife with the disease agent.

    b. Obtain information on transmission by wildlife and carrier status of wildlife.

    c. Obtain information on arthropod vectors

    d. Obtain information on wildlife species as mechanical vectors.

5. Wildlife species present:

    a. Obtain maps, other published information and data on the distribution of susceptible wildlife species for the IZ, SZ and state.

b. Obtain information on wildlife species present and distribution within the IZ and SZ area from local sources.

6. Risk for wildlife exposure:

   a. Evaluate available data to determine which wildlife species are of potential importance in terms of maintenance or spread of the disease agent.

   b. Evaluate the association of susceptible domestic animals with susceptible wildlife, and determine the potential for exposure of susceptible wildlife.

   c. Determine if the exposed wildlife population is isolated from other susceptible domestic animals or wildlife populations, or if the wildlife population is contiguous with other susceptible populations of the same or other species.

   The above information and evaluations can be used to determine if there is a risk for infection of wildlife in the IZ and SZ, and if such exposure could result in maintenance or spread of the FAD/ED via wildlife. When such a risk is present, immediate and intensive surveillance is indicated.

As part of the Risk Assessment, the Wildlife Section will work with the state wildlife agency to determine the potential economic losses relative to wildlife (resulting from FAD involvement and from possible disease management activities) and potential costs of the proposed surveillance and control activities. This information will be provided to the WC and Incident Command.

VII. Wildlife Surveillance

The protocol for surveillance of wildlife for a FAD/ED must be adapted to the prevailing circumstances in the affected area. Each incident will require specific modifications.

Wildlife surveillance will include active and passive methods deemed appropriate by the Wildlife Section and approved by the state or federal agency with management authority. The WO will coordinate with the SWLO to determine the best approaches for surveillance. Active surveillance methods may include collection of susceptible wildlife, carcass searches, and road-kill surveillance. Passive surveillance may include investigation of reports of wildlife morbidity and/or mortality.

A. ACTIVE SURVEILLANCE

a. Wildlife Collection: Capture or lethal collection of wildlife will likely be necessary to determine the infection or exposure status of free-ranging wildlife during a FAD/EDI. Section VII.A.d. represents a framework for developing surveillance for a specific geographic location. This framework can be applied to multiple infected premises.

b. Carcass Searches: Carcass searches may be useful in small geographic areas where wildlife collections cannot be conducted or when the FAD/ED is known to cause wildlife mortality. Carcass searches can be incidental or systematic. Incidental searches involve casual observations made within a given area. Incidental observations may result in detection of new cases, but cannot be used to estimate mortality or to determine that mortality has not occurred. Systematic carcass searches are labor intensive, include the use of transects, search efficiency estimates, abundance estimates, and estimates of carcass removal by scavengers and can be used to estimate mortality or determine if mortality has occurred in a given area.

Personnel conducting carcass searches must fulfill all Wildlife Section training, reporting, specimen collection, disinfection, and biosecurity requirements as deemed appropriate by the AERO and listed below in Section VII.A.d.

Personnel conducting carcass searches may include wildlife collection team personnel, personnel assigned specifically to carcass searches, or other AERO surveillance personnel.

c. Road-kill Surveillance: Road-kill surveillance may be used in some circumstances to supplement other surveillance activities. Necessary conditions for road-kill surveillance would include weather conditions that do not preclude the use of specimens collected from carcasses. Removal of road-killed animals will be covered by the Cleaning and Disinfecting Section of the Incident or in conjunction with road-kill surveillance.

Personnel conducting surveillance of road-killed animals must fulfill all Wildlife Section training, reporting, specimen collection, disinfection, and biosecurity requirements as outlined for wildlife collections below in Section VII.A.d.

Personnel examining road-kills may include wildlife collection team personnel, personnel assigned specifically to road-kill surveillance, or other AERO surveillance personnel.

d. Active surveillance sampling protocol:

Species: Surveillance will include all species determined to be at risk for infection or implicated in the transmission of the FAD/ED.

Sampling priorities: Sampling will be conducted throughout each designated SZ; however, sampling will be targeted toward animals at highest risk of infection. Wildlife at highest risk within the SZ include wildlife species with relatively high levels of susceptibility that have direct contact with infected domestic animals or share pastures, feed, or water with infected domestic animals.

Sampling zones: The geographic area from which wildlife will be sampled will depend on the following factors:

Number and distribution of infected domestic animals,
Epidemiology of the FAD/ED,
Habitat, land use, and geographic features,
Cultural practices of domestic animal and wildlife use,
Wildlife species to be sampled,
Density and distribution of wildlife,
Movement patterns, home range, and behavior of wildlife species,
Length of time the FAD/ED has been present, and
Locations of IZs and SZs.

The geographic location of wildlife surveillance will be determined by the Wildlife Section in coordination with the AERO and Incident Command. The area of surveillance must be large enough to include wildlife physically associated with the infected premises, wildlife that move between the infected premises and surrounding area, and wildlife displaced from the infected premises by surveillance and control activities. Surveillance will be conducted in all suitable habitats within a prescribed distance of the premises. If a sample is confirmed positive, the area of surveillance may be expanded relative to the geographic location of the positive animals. In general, in an isolated outbreak involving a single premises, the prescribed distance may be twice the Predicted Maximum Distance Moved (PMDM) for the species in question given the available habitat and season. The PMDM is an estimate of the longest distance an individual of a given species will travel in a given time period under the prevailing circumstances. When multiple premises are affected in a local area, the area of surveillance will include all of the infected premises and an additional area that extends from the outermost infected premises for a distance of twice the PMDM.

Sample size: The determination of sample size will be an adaptive process. To determine that a FAD/ED is not present, sample sizes must be adequate to produce significant epidemiological data. Sample size will depend on a combination of factors to include, but not limited to, the following:

Sampling statistics,
Size of the population at risk,
Epidemiology of the FAD/ED,
Availability of field and laboratory resources,
Collection methods,
Predicted prevalence of infection in wildlife,
How long the FAD/ED has been present,
When the risk of transmission from domestic animals is controlled,
Size of the IZ and SZ, and
Diagnostic test sensitivity.

Sample size determinations will take into account ongoing observations of animals and animal sign, collection efficiency, abundance data, and epidemiological information from other affected areas. Sample size will be determined by the Wildlife Officer with assistance from the Epidemiology Section.

Sampling time and duration: Wildlife surveillance will begin as soon as possible, and will continue until an adequate sample size is obtained, and for at least two incubation periods after the risk of transmission from domestic animals has ended. Timing and duration are based on the epidemiology of the FAD/ED and must account for potential differences between domestic animals and wildlife. Exposure of wildlife may be delayed, and FAD/ED spread may occur more slowly in wildlife than in domestic animals. Surveillance may be repeated at selected intervals to account for the possibility of delays in transmission. Survey activities for long-lived organisms such as ticks may last for a year or more to account for the life cycle of the organism. Active surveillance involving lethal collection could reduce the density of susceptible wildlife, and may slow the spread of the FAD/ED, or make transmission less likely. Active surveillance may also cause infected animals to relocate out of the surveillance zone. This may increase sampling time and duration.

Model Protocol for Wildlife Surveillance

The following provides basic operational considerations for lethal collection or capture of wildlife during a FAD/EDI. Additional considerations may be included per individual FAD/EDI.

1. Premises: Surveillance will be conducted in the IZ and SZ surrounding each premises where wildlife exposure is determined as possible by the risk assessment.

2. Permits: Surveillance will be conducted under the authority of state and federal wildlife agencies and/or the emergency management authority. State and federal permits will be obtained as needed. Law enforcement personnel need to be made aware of collection activities that involve firearms or collections at night. Some collections may require the use of immobilizing agents, and proper permits and certifications would also be required.

3. Training needs: All Wildlife Section personnel will receive training on general FAD/EDI orientation, disinfection, biosecurity, disposal, specimen collection and processing at an assigned facility before conducting wildlife section activities. Specialized training prior to the incident must be approved by the WO prior to use at the incident or investigation.

4. Daily reporting: All wildlife surveillance teams will report to the Wildlife Section leaders in their respective area on a daily basis. All requested data will be included on the data sheets provided. All collection locations will be identified using GPS or other appropriate mapping methods.

5. Land access: All landowners and land managers in the quarantine zones where surveillance is to take place will be notified by Law Enforcement with follow-up by the surveillance teams as to collection activities to be conducted in their areas. Permission must be granted prior to access or collection on all properties and land.

6. Equipment needs: Wildlife Section personnel representing state or federal agencies will provide equipment from their respective agencies for use during surveillance. All equipment must receive approval by the WO prior to use. This may include firearms, traps, radios, vehicles, ATVs, boats, and clothing, although some of this equipment may be provided by the AERO. Equipment including laptop computers, cell phones, GPS units, coveralls, gloves, boots, disinfectant, spray equipment and supplies for collection and handling of specimens will be provided by the AERO.

7. Surveillance teams: Each team may include wildlife biologists, veterinarians and law enforcement personnel. Personnel for field teams will be provided by state and federal wildlife agencies. The number of teams needed will be based on the extent of the outbreak, the need for wildlife surveillance as determined by the risk assessment, and the available resources.

8. Surveillance team distribution: Teams will be assigned to work areas by the Wildlife Unit Leaders on a daily basis. Teams will be assigned to work in IZs, SZs, or other areas as determined by the WO.

9. Wildlife Collection methods: Collection methods will be as approved by the WO. Collection methods may vary by situation and could include a variety of capture tools and techniques. Only approved methods, tools, and techniques are allowed for wildlife and sample collection.

10. Specimen collection: Animals will be examined for lesions and diagnostic specimens will be collected. Training will be provided through Orientation & Training, and additional training will be provided via trained FAD diagnosticians. Specimens will be collected, processed, and submitted as directed.

11. Data sheets: Data sheets will be provided by the Wildlife Section. Data sheets will be completed in full by all Wildlife Section field personnel, and submitted to the Wildlife Section Leaders as requested.

12. Carcass disposal: Carcass disposal will be as per AERO guidelines.

13. Disinfection: Cleaning and disinfection will be as per AERO guidelines. Teams will follow disinfection protocols provided via Orientation & Training.

14. Summaries and Final Report: Wildlife Section personnel are responsible for producing situational reports and providing these to the WO. In addition, the WO will provide summary reports as requested by the AERO. A final report summarizing all activities of the Wildlife Section will be produced and provided to the AERO.

B. PASSIVE SURVEILLANCE

Morbidity/Mortality Surveillance: Passive surveillance may in some circumstances be the most efficient method of sampling wildlife. Reports of wildlife morbidity and mortality may be received by the AERO from inside and outside of the IZ and SZ. Investigation of these reports will be at the discretion of the AERO and/or Wildlife Section, and will depend on the geographic location of the report, species involved, and status of surveillance in the given area.

Reports of morbidity/mortality among susceptible species within an IZ or SZ will be investigated as possible FAD/ED cases by the Wildlife Section in coordination with the Surveillance Section. These investigations will follow all sampling and biosecurity requirements. Reports of morbidity/mortality of non-susceptible species from within the IZ and SZ may be investigated under the same sampling and biosecurity requirements if determined necessary.

Investigations of reported morbidity/mortality of susceptible species from outside the IZ and SZ will be based on the geographic location of the incident and the clinical signs and lesions reported. Such investigations may be conducted by Wildlife Section personnel or by other AERO personnel as determined by the WO and AERO.

VIII. Wildlife Management

If wildlife is determined to be a significant risk factor for persistence or dissemination of a FAD/ED, and/or infected wild animals are found, wildlife management may be necessary. Wildlife management may include efforts to reduce local wildlife populations to a density at which transmission is unlikely, or to reduce contact between infected livestock, wildlife, and uninfected domestic animals.

Decisions to begin control measures will be based on the risk assessment, results of surveillance, prevailing circumstances in the area of concern, and feasibility of conducting successful control measures. Feasibility of successful control is based on the species involved, density of the species, geographic distribution of the species, topography of the area, cooperator support, acquisition of state and federal permits, availability of resources, and practicalities of applying control measures under local circumstances.

Control programs may require immediate and aggressive actions that may have significant impacts on local wildlife and environments. However, short-term and localized impact must be weighed against the long-term and widespread consequences of allowing a FAD/ED to become established or spread in wildlife. These actions may protect both domestic livestock and wildlife. Opposition to population reduction/elimination and wildlife management should be anticipated from interest groups as diverse as hunters and animal rights activists. Also, it is important to recognize that disease control in wildlife populations will be extremely difficult, expensive, time consuming, and labor intensive, and may not be successful.

Wildlife Management Methods

Population control

Shooting: Lethal collection initially will be an extension of the wildlife collections for surveillance described above. Various methods of lethal collection by shooting may be used depending on the prevailing circumstances. Where shooting is used, it will be important to ensure that the control efforts do not result in unacceptable dispersal of targeted animals. Firearms used in lethal control must meet approval by the WO. Dogs may be used to aid lethal collection by shooting. The use of dogs may increase efficiency in the collection of certain wildlife species, but may increase the risk of dispersal. If dogs are to be used, agreements and contracts must be established prior to use. Personnel using dogs to aid lethal collection would be required to complete all AERO training and observe all biosecurity requirements. Organized hunting may also be included in lethal collection measures.

Trapping: Various types of traps and nets can be used to successfully capture wildlife. Only personnel experienced in the use of traps and nets will be approved to use such techniques and tools for wildlife capture. Decisions to euthanize wildlife after live-capture will be determined by the Operations and Planning Sections. Euthanized wildlife will be disposed of according to Carcass Disposal Section Guidelines.

Pesticides/Toxicants: Most pesticides and toxicants used to manage wildlife are restricted use and require prior permitting. Applicators must be approved and trained prior to administering any pesticides or toxicants. Only well-trained and experienced personnel will be allowed to use pesticides and toxicants.

Chemical Immobilization: Wildlife may be chemically immobilized to aid in capture, and decisions to euthanize animals will be predetermined by the Operations and Planning Sections. Various agents are approved for chemical immobilization of wildlife, and approval for use must be obtained by the WO prior to use. In addition, all training and permitting must be successfully completed prior to use. Only well-trained and experienced personnel will be allowed to use chemical immobilization for wildlife management.

Population barriers

Depopulation buffer: Susceptible wildlife may be depopulated from a predetermined area in order to provide a buffer zone between infected and uninfected animals. Depopulation to create a buffer zone will follow the guidelines established by the Wildlife Section.

Vaccination buffer: Vaccination of wildlife to provide a buffer zone of vaccinated animals between infected and uninfected animals may be useful in some circumstances. Such effort could only be used when vaccination of domestic animals had been approved, vaccine and delivery methods had been validated for wildlife, and when such treatment would not complicate serological surveillance. Vaccination might also be conducted under these circumstances within an IZ.

Exclusion

Barriers: Barriers, such as fencing, netting, etc, may be useful in separating infected animals from uninfected animals, and may also be useful in preventing movement or dispersal of wildlife between infected and uninfected zones. Factors affecting the efficacy of barriers during a FAD/EDI include the target species, the size and topography of the geographic area, availability of financial and material resources, length of time available for construction, availability of personnel for monitoring and maintenance of the barrier, length of time the barrier must be in place, animal welfare, and movement patterns of susceptible and non-susceptible wildlife.

Habitat Modification

Habitat modification: Habitat modification may under some circumstances be used to eliminate the attractiveness of certain areas for wildlife, to create buffer zones between infected and uninfected wildlife, or to attract wildlife to areas away from geographic areas where a FAD/ED occurs. Habitat modification may include either destruction or creation of food, water, cover or other resources. Any program involving habitat modification should be subject to an environmental assessment and be in compliance with the National Environmental Policy Act. Such methods would need to be evaluated relative to their potential effectiveness, timeliness, and environmental impact.

Harassment

Harassment: Harassing wildlife may be useful in specific circumstances, e.g., keeping wildlife away from a carcass disposal site. Hazing should not be used to disperse wildlife from an infected area if such dispersal may result in further spread of the FAD/ED. In a larger area, hazing may serve as a means to create a barrier between infected and uninfected animals.

Repellants: Chemical and non-chemical repellants may be effective for reducing wildlife contact with infected premises or other wildlife. Only experienced personnel should use repellants to ensure wildlife within the IZ are not being displaced.

Samples

Samples may be collected during wildlife control efforts to confirm presence of the disease agent or to develop additional information. Samples will be collected and processed as described above in Wildlife Surveillance.

IX. Carcass Disposal

Carcass disposal will be conducted as per guidelines provided by the Carcass Disposal Section. The Wildlife Section will work with the Carcass Disposal Section to develop specific protocols for carcass disposal. Wildlife Section personnel will be trained and comply with all carcass disposal policies and procedures. Special consideration must be given to the circumstances, locations, and environment in which wildlife surveillance and/or control will take place.

When surveillance/control is conducted in an IZ or SZ with an established disposal site and where movement of carcasses will not require additional cleaning and disinfection relative to established biosecurity, euthanized wildlife will be moved to the onsite disposal location.

When surveillance/control is conducted in areas without access to an established disposal site, carcasses will either be transported to an offsite disposal site, or disposed of on site according to guidelines set forth by the Carcass Disposal Section.

When carcasses must be transported to an offsite disposal location, all biosecurity procedures designated for such movements must be followed. Transport may be conducted by Wildlife Section personnel or other AERO personnel. Transport will require external disinfection of carcasses, sealing of carcasses in approved containers, disinfection of containers, and disinfection of personnel and all equipment, including vehicles.

Carcasses may only be disposed of onsite when approved through the Carcass Disposal Section as per guidelines provided by the Carcass Disposal Section. Disposal may be conducted by Wildlife Section personnel, e.g. burial of small birds or rodents. Where disposal cannot be conducted by Wildlife Section personnel, e.g. incineration or burial of large mammals, or within the SZ, the Carcass Disposal Section will arrange for alternative disposal sites.

X. Cleaning and Disinfection

Cleaning and disinfection (C&D) of Wildlife Section vehicles, equipment, clothing, and personnel will be conducted in accordance with AERO Cleaning and Disinfection Guidelines. The AERO Cleaning and Disinfection Section will develop specific policies and procedures for C&D relative to Wildlife Section activities in cooperation with the Wildlife Section. Wildlife Section personnel will be trained in and comply with all policies and procedures regarding C&D.

Cleaning and disinfection policies and procedures will apply to all personnel, vehicles, equipment, and supplies entering and leaving an IP, IZ, or SZ including firearms, computers, cell phones, ATVs, vehicles, boats, trailers, animals, and clothing.

Where Wildlife Section activities are conducted on an IP with ongoing C&D, Wildlife Section personnel, vehicles, equipment, and supplies may undergo C&D as provided at the site by the AERO. However, where Wildlife Section activities are not conducted within an IP or IZ with accessible C&D, C&D sites will be established and operated by either C&D Section personnel or by Wildlife Section personnel.

When Wildlife Section personnel must conduct C&D, training will be provided along with protocols and equipment to conduct C&D. This will include all necessary equipment and supplies for C&D of all personnel, equipment, and supplies including firearms, computers, cell phones, clothing, ATVs, vehicles, boats, and trailers. These protocols will prescribe specific methods for C&D under field conditions as well as disposal of disinfectants and other materials.

Protective Clothing: Personnel may conduct operations at day and/or night, under all potential weather conditions, and will require appropriate clothing. In addition, wildlife activities often will require specialized equipment. Cleaning and Disinfection requirements as designated for the IZ and SZ will apply to specialized equipment. Easily disinfected clothing including disposable coveralls, cloth coveralls, rubber boots, and rubber gloves should be used when possible. Required C&D should be considered when making clothing choices.

Personnel: The number of persons per field team will be based on the activities being conducted, and safety issues. Nonessential personnel should not accompany field teams. Wildlife personnel will complete all personal cleaning and disinfection requirements between premises and when leaving an IZ or SZ.

Equipment: Equipment used within an IZ/SZ to collect or capture animals is assumed to be contaminated. This may include traps, cages, nets, vehicles, firearms, etc.. Equipment for use in fieldwork should be disposable where possible, packaged in pre-planned supply kits, and easy to clean and disinfect. All unessential equipment should be removed from vehicles prior to proceeding to an IZ or SZ.

XI. Biosecurity

Biosecurity requirements for the Wildlife Section are as described in the AERO Biosecurity Manual. The AERO Biosecurity Section will develop additional specific policies and procedures for Wildlife Section activities in cooperation with the Wildlife Section. Wildlife Section personnel will be trained in and comply with all policies and procedures regarding biosecurity. FAD/EDI policies will apply to all Wildlife Section team activities and movement between an IP, IZ, SZ or other area.

Special consideration will be given to biosecurity and movement of Wildlife Section personnel during surveillance and/or control operations. When Wildlife Section personnel are operating on an IP, all Biosecurity policies regarding movement onsite or offsite will apply. When Wildlife Section personnel are operating in an IZ or SZ, a decision will be made as to whether personnel can move from property to property within an IZ or SZ without C&D, or if C&D must occur between all properties.

XII. Quarantine Issues

Hunting seasons

Transport of wild animal carcasses from an IZ or SZ presents a risk for spread of a FAD/ED. All quarantines established by the AERO apply to hunting activities. Movement of animal products is prohibited within an IZ. Animal products may be moved within the SZ, but movement of animal products out of the SZ is by permit only. These regulations apply to wild animal carcasses, parts, and products obtained through hunting.

The Wildlife Section will recommend that hunting activities be postponed in each IZ when appropriate. It may be necessary to temporarily close hunting seasons over a larger geographic area to include multiple IZs in a given region of a state. The Wildlife Section will recommend that hunting of susceptible wildlife species in the SZ also be postponed where appropriate. Hunting of non-susceptible species may be allowed within the SZ, but only under permit and biosecurity arranged through the AERO.

Restoration and wildlife management programs

Transport of live animals within or into an IZ is prohibited. Non-susceptible animals can be moved non-stop through an IZ. Susceptible animals can be moved within a SZ under special conditions and a permit. Non-susceptible animals can be moved within a SZ under permit, and out of a SZ under permit.

The Wildlife Section will determine if wildlife restoration or management programs that involve movement of animals are underway or planned by public and private organizations, and provide this information to the Quarantine Section.

Hunting preserves and exotic animal facilities

Hunting season postponements as described above (see **Hunting seasons**) will also apply to hunting preserves. The Wildlife Section will assist the Quarantine Section in determining the presence of hunting preserves and exotic animal facilities.

When a captive wildlife facility is located within an IZ, depopulation of susceptible species may be required by the AERO. In these cases, the Wildlife Section will assist in the physical depopulation in coordination with other AERO Sections as requested.

Other wildlife-associated activities

Field trials, pigeon races and other wildlife-associated activities involving direct or indirect contact with wildlife occur throughout the United States. The Wildlife Section will identify all such activities within the IZ/SZ, and determine whether they involve susceptible or non-susceptible species. Information regarding these activities will be provided to the Quarantine and Disease Control Sections, and the Wildlife Section will assist in communicating with the affected groups.

Wildlife Rehabilitators

Transport of live animals within or into an IZ is prohibited. Non-susceptible animals can be moved non-stop through an IZ. Susceptible animals can be moved within a SZ under special conditions and a permit which was pre-approved and obtained from the Quarantine Section. Non-susceptible animals can be moved within a SZ under permit, and out of a SZ under permit.

The Wildlife Section will assist in determining the locations of wildlife rehabilitators, and provide this information to the Quarantine and Disease Control Sections. Wildlife rehabilitators will be required to comply with all regulations.

Wildlife rehabilitators may not accept susceptible species or other wildlife from the IZ or SZ except under certain conditions outlined above and with written permission from the Quarantine Section. If individuals of a susceptible species are brought to a rehabilitator from within an IZ or SZ, the AERO should be contacted immediately so that specimens can be collected for diagnostic evaluation. If a rehabilitator receives reports of sick or dead wildlife from within the IZ or SZ, these should be reported to the AERO.

XIII. Public Relations

Public support for AERO activities is essential for success. The general public, including constituency groups such as consumptive and non-consumptive wildlife users, sport-hunting interests, farmers, and animal welfare activists, will be affected by an FAD/EDI. The Information Officer of the Command Staff is responsible for providing information to the general public and the media, and makes all public statements. The Wildlife Section will assist the Information Officer in understanding wildlife issues and Wildlife Section activities.

Wildlife activities may receive media attention and the level of support by the media for activities may vary. Specific information to justify Wildlife Section activities will be developed by the Wildlife Section as requested by the Information Officer.

The Wildlife Section will communicate with wildlife resource agencies and organizations after clearing such communication through the Information Officer.

If a wildlife agency disagrees with an AERO policy or procedure, state or federal wildlife agency representatives should directly work with the Information Officer and Liaison Officer of the Command Staff. AERO personnel, including all personnel in the Wildlife Section, must comply with AERO policies and procedures.

XIV. Appraisal

Wildlife surveillance and control may result in significant loss of wildlife resources and wildlife habitat in the affected areas. The Wildlife Section will assist the AERO in appraisal of such losses. Appraisals will be based on estimates of the cost for a state wildlife agency to develop and conduct management programs to re-establish lost wildlife and/or wildlife habitat in the affected areas.

XV. Acronyms

AERO	Animal Emergency Response Organization
APHIS	Animal and Plant Health Inspection Service
ATV	All Terrain Vehicle
C&D	Cleaning and Disinfection
ED	Emerging Disease
EDI	Emerging Disease Incident
EMOC	Emergency Management Operations Center
EP	Emergency Programs
FAD	Foreign Animal Disease
GPS	Global Positioning System
IP	Infected Premises
IZ	Infected Zone
PMDM	Predicted Maximum Distance Moved
SZ	Surveillance Zone
SWLO	State Wildlife Liaison Officer
USDA	United States Department of Agriculture
VS	Veterinary Services
WC	Wildlife Coordinator
WO	Wildlife Officer

The World Organization for Animal Health (OIE)

The need to fight animal diseases at global level led to the creation of the Office International des Epizooties through the international Agreement signed on January 25th 1924. In May 2003 the Office became the World Organization for Animal Health but kept its historical acronym OIE.

The OIE is the intergovernmental organization responsible for improving animal health worldwide.

It is recognized as a reference organization by the World Trade Organization (WTO) and as of January 2008, had a total of 172 Member Countries and Territories. The OIE maintains permanent relations with 36 other [international and regional organizations]() and has Regional and sub-regional Offices on every continent.

Web Site: www.oie.int