# Agency Capacities to Detect and Respond to Fish and Wildlife Disease Events: 2011 National Survey Results

(Photos: USFWS-Midwest Region)

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Prepared by:

William F. Siemer, T. B. Lauber, and D. J. Decker
Human Dimensions Research Unit
Department of Natural Resources
Cornell University

Shawn J Riley
Partnership for Ecosystem Research and Management
Department of Fisheries & Wildlife
Michigan State University

## HUMAN DIMENSIONS RESEARCH UNIT PUBLICATION SERIES

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## EXECUTIVE SUMMARY

In recognition of a growing need to address disease issues effectively, a National Fish and Wildlife Health Initiative (NFWHI) was developed under the leadership of the Association of Fish and Wildlife Agencies (AFWA). Proposals were sought by the U.S. Fish and Wildlife Service for research that identified areas of capacity in need of strengthening and key issues for the development and implementation of a National Fish and Wildlife Health Plan. In January 2011, Cornell University was awarded funding to conduct this research. We identified four research objectives: (1) identify state agencies' primary fish and wildlife health management concerns; (2) identify factors that can facilitate and inhibit the ability of agencies to address these concerns; (3) determine which factors are currently most limiting the effectiveness of agencies at addressing fish and wildlife health concerns; and (4) recommend strategies by which agencies can increase their capacity to address fish and wildlife health.

We are addressing these objectives in three phases of research over two years (2011-2012). In this document we report findings from phase I research, which involved interviews and a survey of key informants designed to assess current capacities of state fish and wildlife agencies (SFWAs) to detect and respond to disease outbreaks in terrestrial and aquatic wildlife.

We questioned key informants about nine specific aspects of capacity, as follows.

- Institutional capacity:
  - interagency agreements related to staff sharing

- Enabling processes
  - Interagency coordination
  - funding sources
  - regulatory authority

- Essential resources
  - funding level
  - staffing
  - diagnostic facilities
  - funding
  - response plans (program management)

We began our study with a series of 11 telephone interviews with diverse array of fish and wildlife professionals working in state or federal agencies. Using open-ended interview questions, we explored areas of capacity described in the literature. We analyzed interview data to develop and refine a conceptual model of the system of factors that create capacity for early detection of and coordinated response to disease events.

We then developed two survey instruments to explore key components of our conceptual framework. One instrument focused on terrestrial wildlife (i.e., birds, mammals, terrestrial reptiles) and the other focused on aquatic wildlife (i.e., marine and freshwater fish and invertebrates, amphibians, sea turtles). Most of the content was the same across instruments; both explored perceptions of factors that contribute to capacity.

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The surveys were implemented in September-October, 2011 by the Survey Research Institute (SRI) of Cornell University, via their secure website. One terrestrial and one aquatic wildlife health representative was contacted in each state. Response to the terrestrial wildlife survey was 94% (n=47 states). The only states not represented in the terrestrial wildlife survey were: Hawaii, Kentucky, and Delaware. Response to the aquatic wildlife survey was 84% (n=42 states). The states not represented in the aquatic wildlife survey were: Connecticut, Hawaii, Oklahoma, Massachusetts, Nevada, Texas, Vermont, and Virginia.

We tabulated frequencies and group means. No statistical tests were used; the findings represent parameters of the population of states that completed a questionnaire. To facilitate regional comparisons we placed states into one of 5 groups created based on the regional classification used by the U.S. Fish and Wildlife Service. We labeled the regional groups as follows: Pacific (USFWS regions 1, 7, and 8), West (USFWS regions 2 and 6), Midwest (USFWS region 3), Southeast (USFWS region 4), and Northeast (USFWS region 5).

## FINDINGS HIGHLIGHTS

Agencies placed medium to high priority on detecting and responding to game and nongame terrestrial wildlife disease, but often reported low capacity to address those objectives. They had higher capacity to detect terrestrial disease than to respond to it. They placed high priority on preventing disease transmission between wild and hatchery fish. Agencies tended to place lower priority on detecting or preventing disease in amphibian or aquatic invertebrate populations.

Key findings about SFWA capacity include:

### Institutional Foundation

- Interagency agreements. We explored how interagency agreements contributed to the ability of agencies to respond immediately to disease events. Few agencies had formal agreements to access staff in other organizations for immediate response to a terrestrial or aquatic disease event. Formal agreements for immediate staff assistance from the State Director of USDA APHIS-WS were most common for terrestrial disease events. Formal agreements for immediate staff assistance from a university were most common for aquatic disease events.

### Enabling processes

- Interagency coordination. The most common level of interaction between terrestrial wildlife staff and their peers in other agencies was “a few times a year.” In a substantial minority of agencies terrestrial wildlife staff reportedly interacted at least once a month with peers in three agencies: state agriculture department/state veterinarian, USDA-APHIS WS, and state public health department. Comparatively less interaction was reported between aquatic wildlife staff and their peers in other agencies. Nevertheless, the majority of both terrestrial and aquatic representatives believed that the current level of interagency communication was sufficient to achieve their agency’s disease management objectives.

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- Funding mechanisms. The majority of state representatives reported a narrow range of funding mechanisms. Terrestrial disease management was typically funded by federal grant programs for response to specific disease threats (e.g., chronic wasting disease [CWD]), federal formula funds (i.e., Pittman-Robertson), and hunting license sales revenues. Aquatic disease management was typically funded through just two sources: federal formula funds (i.e., Dingle-Johnson) and fishing license sales revenues. Federal grants for response to specific diseases had been used to respond to aquatic disease issues in 37% of states. (In comparison, 98% of states used such grants to fund response to terrestrial disease issues.)

- Authority. Though many agency representatives reported that general management authority was clear, they also reported that clarifying authority to address specific disease events was important. Nearly 75% of terrestrial and 60% of aquatic representatives reported that clarifying authority to address disease events that affect free-ranging wildlife was "very important" to their agency.

**Necessary resources**

- Funding level. About 40% of representatives reported that funding for detection and response to disease threats had declined over the past five years (20% reported that funding had increased). Representatives in the majority of states reported that funding levels were "adequate" or "partially adequate" to conduct disease monitoring, surveillance, and response activities; about 25% said current funding levels were "not at all adequate" for response to disease outbreaks in terrestrial and aquatic wildlife.

- Staffing. We evaluated whether agencies had access to specialized staff such as veterinarians and pathologists. A majority of agencies did not have veterinarians or pathologists on staff, but nearly all had access to such staff. Access to veterinarians or pathologists was perceived as an impediment to disease detection and response in about 15% of states.

- Staff capacity. About 75% of agencies reported that they had adequate field staff sizes to provide short-term response to terrestrial disease outbreaks, but only 25% had adequate staff to provide long-term response to terrestrial disease outbreaks. About 80% of agencies reportedly had staff adequate for short-term response to an aquatic disease outbreak, but only 46% had the staff capacity to provide a long-term response.

- Diagnostic capabilities. Most state agencies had access to diagnostic laboratories in other states and an in-state diagnostic laboratory operated by another agency or a university. But fewer than half of agencies operated their own laboratories to conduct diagnostic tests on pathogens in aquatic wildlife and fewer than one-third operated their own laboratories to conduct diagnostic testing on pathogens affecting terrestrial wildlife.

- Program management. Survey results demonstrate that the majority of agencies have developed few strategic plans for response to specific disease threats, and only a minority have strategic plans for emergency communication and response during a disease outbreak. The absence of such plans suggests that fish and wildlife agencies remain reactive rather than proactive about disease response.

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## ACKNOWLEDGMENTS

We express our gratitude to the many fish and wildlife professionals who contributed their time and expertise when asked to participate in or assist with this research. For their assistance with study design and panelist recruitment, we thank the members of our project advisory team: Collin Gillin (Oregon Department of Fish and Wildlife), Margaret Wild (Biological Resource Management Division, National Park Service), Gary Whelan (Michigan Department of Natural Resources, Fisheries Division), and David Whitehurst (Virginia Department of Game and Inland Fisheries). We are grateful to the Association of Fish and Wildlife Agencies for their endorsement of and assistance with implementation of the national survey reported herein. In particular, we wish to thank AFWA Legislative Director Gary Taylor and Bob Duncan (Virginia Department of Game and Inland Fisheries), Chair of the AFWA National Fish and Wildlife Health Steering Committee. We thank Jonathan Sleeman (National Wildlife Health Center) for helping us to obtain permission to contact key informants for the terrestrial portion of this research.

Web survey layout and implementation was conducted by Cornell University's Survey Research Institute. Carol B. Cook provided interview transcription. Meghan Baumer (HDRU) provided administrative assistance throughout this project.

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## INTRODUCTION

In recognition of a growing need to address disease issues effectively, a National Fish and Wildlife Health Initiative (NFWHI) was developed under the leadership of the Association of Fish and Wildlife Agencies. The goals of the NFWHI are to: (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; and (2) minimize the negative impacts of health issues affecting free-ranging fish and wildlife through management, surveillance, and research (AFWA 2008:8). Proposals were sought by the U.S. Fish and Wildlife Service for research that identified areas of capacity in need of strengthening and key issues for the development and implementation of a National Fish and Wildlife Health Plan. In January 2011, we were awarded funding to conduct this research. We identified four research objectives:

(1) Identify state agencies' primary fish and wildlife health management concerns.

(2) Identify factors that can facilitate and inhibit the ability of agencies to address these concerns.

(3) Determine which factors are currently most limiting the effectiveness of agencies at addressing fish and wildlife health concerns.

(4) Recommend strategies by which agencies can increase their capacity to address fish and wildlife health.

We are addressing these objectives in three phases of research over two years (2011-2012). Our assessment of capacity is wide-ranging and focuses on both tangible factors (such as personnel, funding, and facilities) and intangible factors (such as leadership and the quality of collaborative relationships).

The purpose of this document is to report findings from phase I research, which involved interviews and a survey of key informants designed to assess current capacities of state fish and wildlife agencies (SFWAs) to detect and respond to disease outbreaks in terrestrial and aquatic wildlife.

## CONCEPTUAL FOUNDATION

Because fish and wildlife agencies are government organizations, we examined literature on capacity development in state institutions to create a theoretical foundation for our research. Institutional capacity is a concept with multiple dimensions and multiple definitions of capacity development have been advanced (Lusthaus et al. 1999). For purposes of our research the term *capacity* refers to an agency's capabilities for early detection and coordinated response to disease events. *Capacity development* refers to any system, effort or process designed to enhance those capabilities.

Capacity development literature identifies at least five internal features of agencies that play a role in institutional capacity: strategic leadership; human resources; other core resources;

program and process management; and inter-institutional linkages (Lusthaus et al.1995, 1999; Riley et al. 2003).

L*eadership* includes a broad range of formal and informal activities that establish the direction of an organization and keep it on course. Through strategic planning and direct interactions, leadership sets goals and directs staff and stakeholders toward actions that address the organization's objectives. Strategic leadership includes efforts to secure resources, motivate staff and stakeholders to perform in ways that address objectives, and help the organization adapt to external stressors in the management environment. Adaptive leadership (Heiftz and Linsky 2002) is a practice that some wildlife agencies are beginning to use to address challenges for which they have no readily available solutions.

*Human resources* include all available agency staff who might contribute to disease detection and response capabilities. Veterinarians, pathologists, disease specialists, biologists and field technicians come to mind immediately when one thinks of disease detection capabilities. Many other types of staff may play supporting roles in detection and response programs (e.g., public affairs and communication specialists, administrators, law enforcement personnel, etc.). The number, type, and competence of staff play a crucial role in capacity of an agency.

*Other core resources* essential to agency capacity include finances (e.g., level and types of program funding), technological resources (e.g., access to diagnostic facilities or equipment), and infrastructure (e.g., buildings, vehicles, communication systems). Demand for core resources during emergence of a disease event may exceed the core resource capacity that an agency maintains for normal operations.

*Program/process management* refers to all the processes and management activities that guide staff activities and interactions with partner agencies and organizations. These processes include: planning, problem solving, decision making, internal communications, monitoring, and evaluation. Examples of disease program management include: efforts to establish a wildlife health unit, clearly define goals for the program, or establish communication networks.

*Inter-institutional linkages* are essential to coordinated, interagency response to disease events. Capacity depends in part on the strength of linkages between fish and wildlife agencies and sources of technical services, funding sources, agencies who share response authority, and other potential collaborators. Linkages between state fish and wildlife and agriculture agencies, and between state and federal fish and wildlife agencies are recognized as an important dimension of fish and wildlife disease management.

Although capacity development literature identifies some of the tangible factors that determine capacity, that literature does not offer a framework for understanding how those factors interact as a system. To address that need, we looked to policy learning literature for a theoretical foundation (Fiorino 2001; Glasbergen 1996; Lauber and Brown 2006; Lauber et al. 2009, 2011).

One idea that we adopted from the policy learning literature is the assertion that factors affecting capacity, including those discussed above, fall into three inter-related groups that provide the institutional foundation (e.g., interagency agreements), enabling processes (e.g., funding

mechanisms), and necessary resources (e.g., funds, staff, information) for capacity development. Lauber et al. (2011) provided empirical support for this relationship of variables in a study of successful collaborative conservation initiatives. We used their findings to inform our research.

## METHODS

### Project Advisory Team

At the outset of this project, we identified a 4-member project advisory team to offer feedback on our research plan, help us identify agency contacts, and provide input on our draft instruments and written products. We assembled a geographically diverse team with a wealth of experience on a range of fish and wildlife health topics. Three advisory team members worked in state fish and wildlife agencies, and one member worked in a federal natural resource agency. Two members of the team serve on the AFWA Fish and Wildlife Health Committee. We consulted with the team regularly during the project to ensure that both our research questions and written results would address practical information needs of fish and wildlife agencies.

### Exploratory Interviews

We completed a set of 11 telephone interviews with a diverse array of fish and wildlife professionals working in state or federal agencies. Subjects were identified with assistance from our project advisory team. Interviews were completed between March 8 and June 1, 2011 and ranged in duration from 39 to 68 minutes. Interviews were open-ended, but followed an interview guide designed to explore areas of capacity identified in the capacity-development and policy-learning literature. Each interview was recorded and later transcribed. Transcription quotes were coded and analyzed using Atlas.ti (a software program for qualitative data analysis). Responses were used to develop and refine a conceptual model of the system of factors that create capacity for early detection of and coordinated response to disease events.

### Survey Samples

We used our interview results to inform the design of two surveys of SFWAs – one focused on capacity to detect and respond to disease in *terrestrial* wildlife (i.e., birds, mammals, terrestrial reptiles) and the other focused on aquatic wildlife (i.e., marine and freshwater fish and invertebrates, amphibians, sea turtles).

The U.S. Geological Survey (USGS) National Wildlife Health Center maintains a list of points of contact in each state agency that it uses to disseminate information on terrestrial wildlife disease issues. In the summer of 2011, the Director of the National Health Center (NHC) circulated a request to release contact information to Cornell University for the purpose of conducting our survey. NHC received permission to release email addresses for key informants in 47 states, and provided that information to us as the contact list for our terrestrial survey. We contacted the remaining three agencies directly to identify a contact person to receive an invitation to participate in the study.

To identify our aquatic wildlife survey sample, we contacted individuals within agencies by email or telephone to identify a point of contact in each state agency who would be invited to complete the questionnaire. Many of those individuals were their agency's representatives to the

National Association of State Aquaculture Coordinators (NASAC). In a few states, the same person completed both the terrestrial and aquatic forms of the questionnaire.

**Survey Instruments**

We developed two survey instruments to explore key factors that could influence capacity to detect and respond to disease outbreaks – one focused on terrestrial wildlife (Appendix A) and the other focused on aquatic wildlife (Appendix B). Most of the content was the same across instruments (items about concerns related to aquatic or terrestrial disease issues differed by instrument). Both instruments contained items that explored perceptions of factors that create an institutional foundation, enabling processes, or essential resources to develop capacity. We questioned key informants about nine specific aspects of capacity, as follows.

- Institutional capacity:
  - interagency agreements related to staff sharing

- Enabling processes
  - Interagency coordination
  - funding sources
  - regulatory authority

- Essential resources
  - funding level
  - staffing
  - diagnostic facilities
  - funding
  - response plans (program management)

Nearly all questions were formatted as standardized items with yes-no or Likert-type response options. Some questions were repeated from an AFWA survey of state agencies conducted by members of the AFWA health committee in 2010 (AFWA 2010, unpublished report). We developed additional questions to gather information on factors affecting capacity that were not considered in the AFWA study but were suggested as important by the literature.

**Survey Implementation**

The Survey Research Institute (SRI) of Cornell University implemented both the terrestrial and aquatic versions of the survey. SRI implemented the survey via their secure website. Each member of the sample population had a unique identification number and could only submit one completed questionnaire. Nonrespondents received up to three reminders to complete the questionnaire. The original contact email came with an attached memo from Bob Duncan (Director, Virginia Department of Game and Inland Fisheries), acting Chair of the AFWA Fish and Wildlife Health Committee (Appendix C). The cover memo indicated that the project was endorsed by AFWA (Appendix D).

*Terrestrial survey*. Invitation e-mails were sent out to one contact per state on September 7th, 2011. Reminder e-mails were sent to all non-respondents on September 14th, September 21st and September 28th, 2011. Data collection ended on October 21st, 2011.

*Aquatic survey*. Invitation e-mails were sent out on September 9th, 2011. Reminder e-mails were sent to all non-respondents on September 16th, September 23rd and September 30th, 2011. Data collection ended on October 17th, 2011.

Data collection protocols and instruments were reviewed and granted approval by the Cornell University Office of Research Integrity and Assurance (Institutional Review Board for Human Participants, Protocol ID# 100401374).

**Analysis**

We used the Statistical Package for Social Science (SPSS) to tabulate frequencies and group means. No statistical tests are used; the findings represent parameters of the population of states that completed a questionnaire. To facilitate regional comparisons we placed states into one of 5 groups created based on the regional classification used by the U.S. Fish and Wildlife Service (Figure 1). We created 5 regional groupings, described below.

- **Pacific** (USFWS regions 1, 7, and 8): Alaska, California, Hawaii, Idaho, Nevada, Oregon, Washington.

- **West** (USFWS regions 2 and 6): Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, Wyoming.

- **Midwest** (USFWS region 3): Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin.

- **Southeast** (USFWS region 4): Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee.

- **Northeast** (USFWS regions 5): Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia.

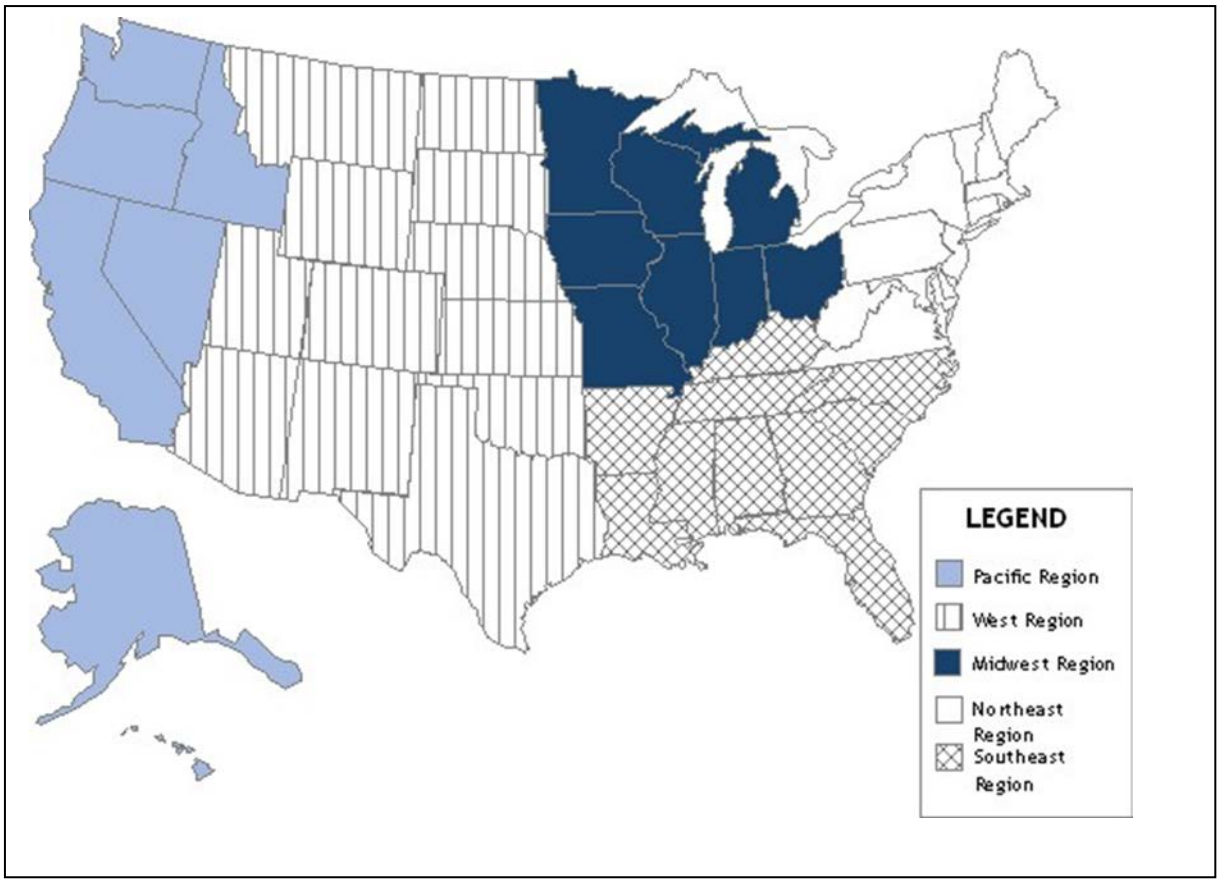


**Figure 1.** Geographic regions created for analysis of 2011 agency capacity surveys.

## RESULTS

Contacts in 47 states completed a terrestrial wildlife questionnaire (94% response rate). The only states not represented were Hawaii (Pacific Region), Kentucky (Southeast Region) and Delaware (Northeast Region).

Contacts in 42 states returned a completed aquatic wildlife questionnaire (84% response rate). The only states not represented were Oklahoma and Texas (West Region), Hawaii and Nevada (Pacific Region), and Connecticut, Massachusetts, Vermont and Virginia (Northeast Region).

In this section, we highlight key findings and differences across regional groupings of states. A comprehensive set of results tables appears at the end of the report (Appendix A-B). We prepared parallel sets of tables for the two surveys. Labels for all results tables from the survey focused on terrestrial wildlife include the letter A; labels for tables from the survey on aquatic wildlife include the letter B.

We organized findings on capacity into a conceptual framework based on existing literature and the results of our exploratory interviews (Figure 1). The figure, adapted from Lauber et al.

(2011), represents our mental model of how agencies gradually develop institutional capacity to detect and respond to disease events. Survey findings are presented below as they relate to and help to clarify the elements of capacity in Figure 2.

**Disease Management Priorities and Concerns**

Addressing disease in terrestrial game and nongame wildlife was important to most agencies. A majority of agencies placed medium to high priority on detecting and reducing spread of diseases in both game and nongame terrestrial wildlife. Slightly more agencies prioritized detecting and reducing the spread of diseases in game populations than prioritized detecting and reducing the spread of diseases in nongame populations (Table A1).

Few contacts reported that their agencies had high capacity to address any of the four possible objectives for managing disease in terrestrial wildlife. Ten representatives reported that their agency had high capacity to detect disease in game populations. Fewer reported high capacity to reduce spread of disease in game populations (n=6), detect disease in nongame populations (n=6), or reduce spread of disease in nongame populations (n=3). Seven agency representatives reported high capacity in two or more of those areas (only two representatives reported high capacity in all four areas). Overall, the responses indicated that agencies tended to have more capacity to detect than to reduce the spread of disease, and they tended to have more capacity to address game than nongame disease issues (Table A2).

A comparison of capacity to priorities suggests gaps between existing and desired conditions in agencies. The proportion of states that place high priority on the four terrestrial disease management objectives exceeded the proportion of states that reported high capacity to address those objectives. For example, about 62% of agencies placed high priority on detecting the presence of diseases in game populations, but only 21% reported a high capacity to address that objective. About 55% of agencies labeled reducing the spread of disease in game populations a high priority, but only 13% reported a high capacity to address that objective (Tables A2). In several instances, the disparity between high priority and high capacity was widest in the Southeast. For example, 67% of agencies in the Southeast Region placed a high priority on reducing spread of disease in game populations, but no agencies reported high capacity to address that objective.

We asked agency contacts what level of priority their agencies placed on eight objectives for managing disease in aquatic wildlife. About 90% of agencies placed high priority on preventing the spread of disease from hatchery to wild aquatic systems; 80% placed high priority on preventing introduction of diseases from wild to hatchery systems. The majority of agencies placed medium to high priority on detecting and preventing disease outbreaks in wild fish populations. A majority of agencies placed low to medium priority on detecting or preventing disease in amphibian or aquatic invertebrate populations (Table B1).

Contacts in a majority of states reported medium or higher agency capacity to prevent spread of diseases between hatchery and wild populations of fish. The majority of contacts reported that their agencies had low or medium capacity to detect and prevent disease outbreaks

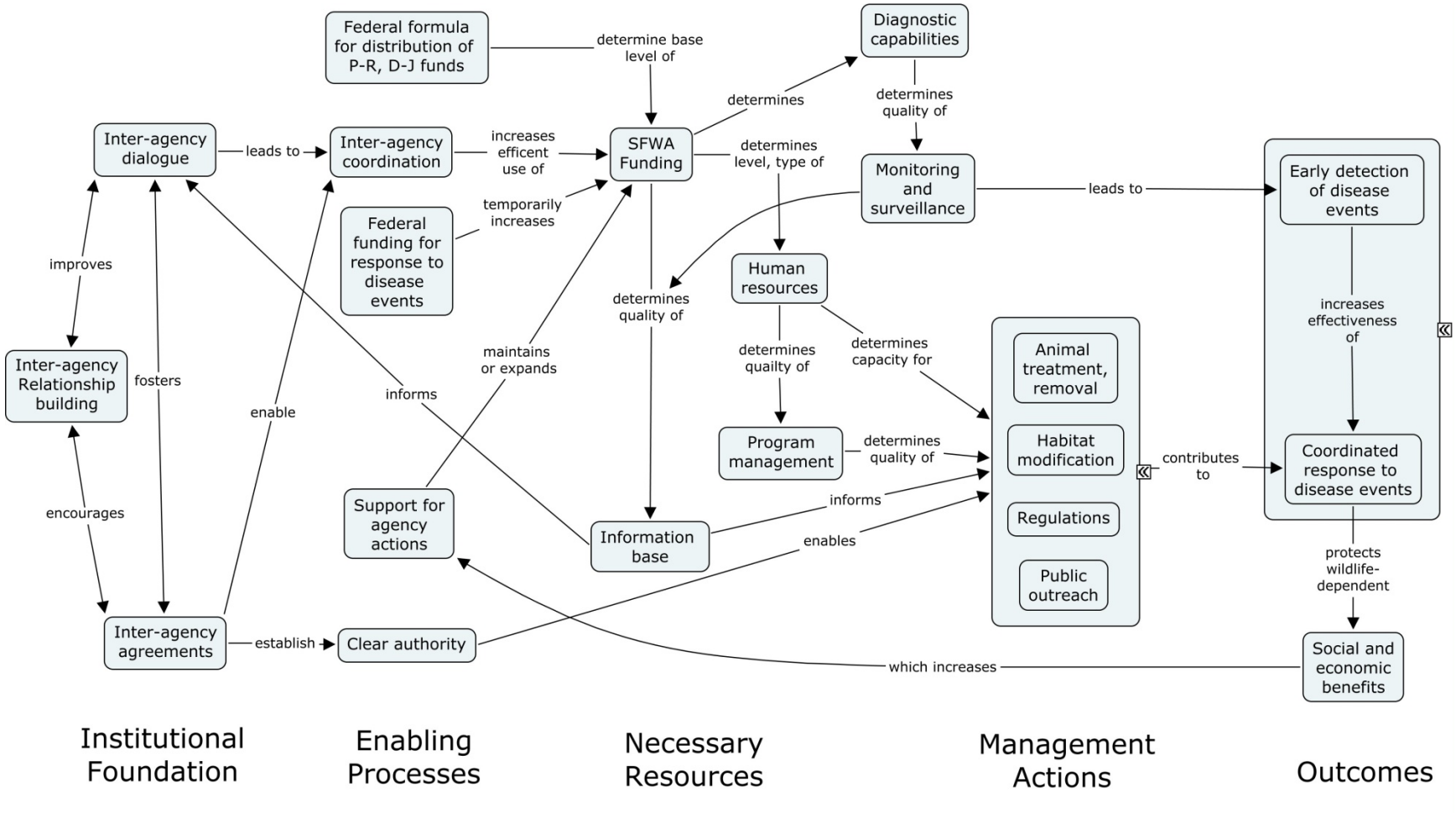


**Figure 2.** A conceptual model of institutional capacity building by state fish and wildlife management agencies as those agencies respond to wildlife or aquatic disease issues over multiple years.

in wild fish populations. Contacts reported much lower capacity to detect or prevent diseases in amphibian and aquatic invertebrate populations. A substantial minority of state contacts (12% – 20%) were not sure of their agencies capacity in those areas (Table B2).

### Top disease threats

We asked agency contacts how concerned their agencies were about a range of 10 terrestrial and 10 aquatic disease threats. A majority of agencies expressed high concern about just two terrestrial disease issues: chronic wasting disease and white nose syndrome. A majority were at least moderately concerned about: bovine tuberculosis, rabies, and "other avian diseases" (diseases other than avian influenza). Overall concern about CWD was lower in the Pacific Region. Overall concern about white-nose syndrome was lower in the West Region (Table A3).

A majority of agencies expressed high concern about seven aquatic disease threats, including: viral diseases of all types in hatcheries, viral hemorrahagic septicemia virus, bacterial diseases of all types in hatcheries, whirling disease, infectious hematopoietic virus, and infectious pancreatic necrosis virus. A majority were at least moderately concerned about diseases that impact warm water fish populations, and diseases that impact mollusk or amphibian populations (Table B3).

## Institutional Foundation

Literature and personal interviews suggest that inter-agency dialogue and relationship building contribute to the institutional foundation for disease detection and response by fish and wildlife agencies (Figure 2). Through a process of dialogue, new ideas are generated, shared objectives are established, and inter-agency relationships are built. All of these things provide a foundation upon which to form interagency agreements. Interagency agreements enable greater interagency coordination and provide force multipliers, which in turn increases efficient use of funding available to a SFWA for disease detection and response.

### Interagency agreements

We assessed the prevalence of one particular type of interagency agreement: informal and formal agreements that allowed state fish and wildlife agencies access to staff in other agencies or organizations for immediate response to a disease event.

Few agencies had formal agreements to access staff in other organizations for this purpose (Table A4, B4). Formal agreements for immediate staff assistance from the State Director of USDA APHIS-WS were most common for terrestrial disease events (Table A4). About half of agencies in the Midwest Region had a formal staff sharing agreement with APHIS WS (Table A4). Formal agreements for immediate staff assistance from a university were most common for aquatic disease events (Table B4). Formal agreements with universities were most common in the Southeast and Midwest regions.

Informal agreements to access staff in an emergency were more common, but the organizations involved differed for terrestrial and aquatic contexts. For response to terrestrial disease events, the majority of agencies had informal staff sharing agreements with: their state department of

agriculture/state veterinarian's office, a USDA-APHIS WS veterinarian or state director, and the U.S. Fish and Wildlife Service (USFWS) (Table A4). For response to aquatic disease events informal agreements were most commonly formed with: USFWS, other state fish and wildlife agencies, and the state department of agriculture/state veterinarian's office (Table B4).

## Enabling Processes

Processes that enable development of capacity include interagency coordination, funding mechanisms, and establishing or clarifying management authority (Figure 2).

### Interagency coordination

Achieving disease management objectives depends in part on inter-agency communication and coordination. We asked agency representatives to report the level of interactions that occur between professionals in their agency who deal with fish and wildlife disease outbreaks and the professional staff of several other agencies (Tables A5-A6, B5-B6). The most common level of interaction between terrestrial wildlife staff and their peers in other agencies was "a few times a year." In a substantial minority of agencies terrestrial wildlife staff reportedly interacted at least once a month with peers in three agencies: state agriculture department/state veterinarian, USDA-APHIS WS, and state public health department (Table A5). A majority of representatives reported that the current level of interagency communication was sufficient to achieve their agency's terrestrial disease management objectives (Table A6). Representatives in the West region were more likely than representatives in other regions to report that the level of communication was sufficient with all of the other agencies (Table A6). A majority of representatives in the Midwest region reported that interactions with USGS and USFWS were not sufficient (Table A6).

With the exception of interactions with USFWS, comparatively less interaction was reported between aquatic wildlife staff and their peers in other agencies (Table B5). Nevertheless, the majority of representatives reported that the current level of interagency communication was sufficient to achieve the agency's aquatic disease management objectives (Table B6). The Pacific and Midwest region states reported the highest levels of interagency communication. The Pacific region states also were most likely to report that levels of communication were adequate to attain their agency's disease management objectives (Tables B5, B6).

### Funding mechanisms

Funding mechanisms represent enabling processes to develop capacity. In this case, base funding from federal formula funds (i.e., Pittman-Robertson) or hunting and fishing license sales may be supplemented by temporary (one- to three-year) increases in funding provided by grants awarded for response to particular disease outbreaks (e.g., CWD, whirling disease).

Representatives in a majority of states reported that, during the previous three years, detection of and response to terrestrial disease in their state was funded by federal grant programs for response to specific disease threats (e.g., CWD); federal formula funds (i.e., Pittman-Robertson); and hunting license sales revenues (Table A7). About 30% of agencies used general revenue funds and state wildlife grants to address terrestrial disease threats. States in the Northeast region

were less likely than states in other regions to fund disease management with state general revenue funds or hunting license sale funds (and thus were more dependent on P-R federal formula funds and federal grants). About 15% of agencies funded disease management activities through other mechanisms, including a dedicated sales tax, revenue from fines, National Fish and Wildlife Foundation grants, other nongovernmental or state grants, USFWS Section 6 funds, or a state-specific trust fund dedicated to conservation of native threatened or endangered species. Mechanisms for funding detection of or response to terrestrial disease events were most diverse in the Southeast and Pacific regions (Table A7).

In a majority of states, funding mechanisms for disease detection and response in aquatic wildlife came from just two sources: federal formula funds (i.e., Dingle-Johnson); and fishing license sales revenues. Federal grants for response to specific diseases had been used to respond to aquatic disease issues in 37% of states (by comparison, 98% of states used such grants to fund response to terrestrial disease issues). Use of specific federal grants was highest in the Pacific and West regions.

Few agencies (about 12%) reported using other mechanisms to fund aquatic disease management. Other mechanisms included: a dedicated sales tax, revenue from fines, National Fish and Wildlife Foundation grants, other nongovernmental or state grants, species Conservation Trust Fund, and USFWS Section 6 funds. Mechanisms for funding detection of or response to aquatic disease events was most diverse in the Pacific region, where 50% or more of states used five different types of funding (Table B7).

### Authority

Clear management authority, established through laws, statutes, and interagency agreements, legitimizes particular roles for a SFWA, creating a foundation around which to develop core capacities. In most states, the state fish and wildlife agency had lead authority to respond to disease events that affect free-ranging terrestrial wildlife, the state agriculture department was the lead agency for events that affect domestic animals, and the state health department was the lead agency for terrestrial disease events with human health implications (Tables A8). In most states the state fish and wildlife agency had lead authority to address events that affected wild fish health (Table B8). There was more variation in lead authority for response to aquatic disease events that affect commercial aquaculture and human health. About 39% of fish and wildlife agencies had lead authority in cases involving commercially-raised fish or other aquaculture (Table B8).

By region, 83-100% of agency representatives reported that authority of agencies to respond to disease outbreaks that affect free-ranging wildlife were clearly defined (Table A9). The majority of agency representatives also reported that management authority is clearly defined for response to events that affect farmed domestic animals or human health. Representatives in the Pacific and Southeast regions were more likely to report that management authority was not clear for response to disease outbreaks with human health implications (Table A9).

Slightly fewer state representatives believed that management authority was clearly defined for response to aquatic disease events. Representatives in the Pacific and Midwest regions were most

likely to report that management authority was clearly defined; representatives in the Northeast region were most likely to report that clarity of authority was lacking (Table B9).

Though many agency representatives reported that general management authority was clear, they also reported that clarifying authority to address specific disease events was important. Nearly 75% of agency representatives reported that clarifying authority to address disease events that affect free-ranging wildlife was "very important" to their agency (Table A10). Clarifying authority to respond to disease outbreaks affecting farmed domestic animals or human health was particularly important to agencies in the Midwest region (Table A10). Sixty percent reported that clarifying authority to address disease events that affect wild fish was "very important" to their agency (Table B10).

One variable that may constrain agencies is authority to enter private land to respond to a disease emergency. About 52% of agencies reportedly had authority to enter private land to respond to a terrestrial disease emergency (66.7% Southeast region, 63.6% Northeast region; 50.0% West region; 50.0% Midwest region; 16.7% Pacific region). About 56% had authority to enter private land to respond to an aquatic disease emergency (75.0% Pacific region; 71.4% Midwest region; 70.0% Southeast region, 44.4% Northeast region; 33.3% West region).

**Necessary Resources**

Necessary resources for capacity within SFWAs include: funding, diagnostic capabilities, human resources, and information (Figure 2). Funding level and sources determine the quality of the information base, diagnostic capabilities, and level of human resources. Funding and staff characteristics (number, composition, skill sets) then determine the quality of the agency's disease management program (i.e., program management).

The information base created by a SFWA plays a pivotal role in enhancing or impeding capacity. The state agency's information base informs interagency dialogue and has the potential to catalyze learning that leads to the development of new management objectives and the identification of actins that can help to achieve those objectives.

**Funding level**

Funding plays multiple roles in agency capacity. Funding level (which is a function of funding sources) influences the quality of the information base that managers use during interagency dialogue and in decisions about which suite of management actions to take to respond to disease threats. Funding level is critical to decisions about the number and types of personnel that will be hired or dedicated to disease detection and response. Funding also influences monitoring and surveillance, because it determines the level and type of diagnostic work the agency can contract through outside facilities or through its own facilities and staff.

Trend in funding. We asked representatives about the trend in funding for detection and response to disease threats over the past five years. Over 40% of agency representatives reported that funding had declined; only 20% reported that funding had increased (Table A11). Thirty-seven percent of representatives reported that funding for detection of or response to aquatic disease

threats had decreased (and 20% reported that funding had increased) (Table B11). States in the Southeast and Northeast regions were most likely to report decreased funding for both terrestrial and aquatic disease management.

Adequacy of funding level. Agency representatives in the majority of states responded that funding levels were "adequate" or "partially adequate" to conduct disease monitoring, surveillance, and response activities (Table A12, B12). But about 25% of state representatives responded that current funding levels were "not at all adequate" for response to disease outbreaks in terrestrial and aquatic wildlife (Table A12, B12).

### Staffing

Key components of the human resources component of capacity include staff size, composition, and skill sets. We asked a series of questions related to staff capacity in fish and wildlife agencies. We began by asking about presence of wildlife veterinarians and pathologists, because those areas of expertise were identified as an important to agency capacity in our 11 exploratory interviews (described on page 2).

Veterinarians and pathologists. Nearly all agencies had access to wildlife veterinarians and pathologists who could assist with response to terrestrial disease outbreaks, but fewer than 40% of agencies had one or more wildlife veterinarians, and only 2% of agencies had a wildlife pathologist, on staff (Table A13). Fewer than 10% of state representatives reported that access to wildlife veterinarians was impeding early detection of diseases by the agency. Access to wildlife pathologists was described as an impediment by 15% of state representatives (Table A13).

Most agencies had access to veterinarians and pathologists with aquatic disease expertise. About 33% had such a veterinarian on staff and 41% had an aquatic pathologist on staff. About 15% of agency representatives reported that access to veterinarians or pathologists with expertise in aquatic organisms was an impediment to disease detection by their agency (Table B13). In combination the terrestrial and aquatic survey findings suggest that agencies highly value veterinary or pathology expertise, but some believe they can meet their disease detection and response needs without having those specialties on staff.

Staff capacity. Agency response to disease threats can include short-term, emergency response or sustained, long-term response to disease threats. About 75% of agencies reported that they had adequate field staff sizes to provide short-term response to terrestrial disease outbreaks. In contrast, about 75% reported that they did not have adequate staff to provide long-term response to disease outbreaks (Table A14). In combination with findings on funding, these findings on staff capacity suggest that agencies are typically better suited to address routine tasks, such as disease monitoring, than to respond to disease outbreaks that require intensive response and long-term commitment of resources.

Similar staff limitations were reported by aquatic representatives. About 80% of agencies reportedly had staff adequate for short-term response to an aquatic disease outbreak, but only 46% had the staff capacity to provide a long-term response (Table B14).

Representatives in 22% of agencies reported that their agency lacked access to some types of professional staff needed for early detection of and coordinated response to terrestrial disease events in their state (Southeast 11%, West 17%, Midwest 25%, Northeast 27%, Pacific 33%). Representatives in 25% of agencies reported that their agency lacked access to some types of professional staff needed for early detection of and coordinated response to aquatic disease events in their state (Pacific 0%, Southeast 20%, West 22%, Midwest 29%, Northeast 44%). Inadequate access to terrestrial expertise was highest in the Pacific region; lack of access to necessary aquatic expertise was most pronounced in the Northeast.

When asked about additional types of staff expertise they might need, representatives from eight different states identified one or more of the following types as important:

- One or more staff veterinarians or a veterinarian with wildlife experience.
- A wildlife pathologist on staff or on contract.
- An epidemiologist with wildlife experience.
- Field personnel for collecting samples.
- A wildlife disease specialist.
- Staff to assist with response to a disease event.

Representatives from nine different states identified the following types of additional expertise they needed to increase aquatic disease detection and response capacity. A need for veterinarians, pathologists, and biologists was identified by multiple respondents.

- Veterinarian with aquatic veterinary expertise on staff; permanent fulltime veterinarian with aquatic expertise.
- Staff aquatic pathologist.
- Aquatic invertebrate disease specialist.
- Amphibian disease specialist.
- Aquatic biologist
- Permanent fulltime microbiologist
- Additional field biologists

We asked representatives four questions about the adequacy of staff skill sets. The questions we asked were specific examples of skills related to interagency relationship building (i.e., skills in communicating with staff in other agencies), program management (i.e., communicating with others within the agency and implementing emergence response plans), and monitoring and surveillance (i.e., skills related to submitting useable tissue samples for testing). Most agencies reportedly had staff with medium to high skills in communicating with other internal staff, communicating with staff in other agencies, and in submitting tissue samples for diagnostic testing. Fewer state representatives reported high staff skills related to implementing emergency response plans (Table A15, BA15). The findings suggest a perception that skills in these four areas were lower overall for terrestrial than for aquatic staff.

**Diagnostic capabilities**

Necessary resources include facilities and technology necessary to build the agency's information base and implement programs. We focused on one aspect of capacity in this area: access to disease diagnostic laboratories. Most representatives reported that their agency had access to diagnostic laboratories in other states for diagnostic testing related to terrestrial and aquatic disease detection (Table A16, B16). Most agencies had access to National Animal Health Laboratory (NAHLN)-accredited facilities to test for chronic wasting disease and avian influenza (Table A16). Most agencies also had access to an in-state diagnostic laboratory operated by another agency or a university (Table 16, A16). But fewer than half of agencies operated their own laboratory to conduct diagnostic tests on pathogens in aquatic wildlife and fewer than one-third operated their own laboratory to conduct diagnostic testing on pathogens affecting terrestrial wildlife (Table B16, A16). Agencies in the Southeast region were least likely, and agencies in the Pacific region were most likely to operate their own facility for aquatic diagnostic testing (Table B16).

**Program management**

This dimension of capacity includes all the mechanisms that guide interactions between people within and outside the agency so that objectives and ongoing work are facilitated rather than hindered or blocked. The two elements of program management that we investigated were response planning and staff training.

Emergency response planning. We asked agency representatives about presence/absence of eight types of plans for response to terrestrial diseases. Most agencies had developed a formal written plan for response to chronic wasting disease (CWD). About 50% of agencies had a written plan for emergency response to avian influenza (AI). About one-third of agencies had a strategic plan for response to terrestrial disease outbreaks, plans for internal communication during a terrestrial disease outbreak or disposal of animal carcasses. Written plans for response to foot-and-mouth, West Nile virus and waterfowl diseases were less common (Table A17). Seven agencies noted that they had written response plans for other diseases, including: white nose syndrome (4 states), rabies (2 states), and bovine tuberculosis (1 state).

We asked agency representatives about presence/absence of seven types of plans for response to aquatic diseases. About one-third of agencies had plans for internal communication during an aquatic disease outbreak or disposal of animal carcasses. About one-quarter of agencies had a strategic plan for response to aquatic disease outbreaks, or a written plan for response to viral hemorrhagic disease (VHS) or whirling disease. Few agencies had written plans for response to infectious hematopietic necrosis (IHN) or infectious pancreatic necrosis (IPN) (Table A17). Seven agencies noted that they had written response plans for other aquatic diseases, including: bacterial kidney disease/ERM/furunculosis; infectious salmon anemia virus; ISA and OMV; Mycobacterium/Kudoa/harmful algael blooms; SVC/BKD/ERM; whitespot syndrome virus; and emergency response to disease outbreaks within hatcheries.

Staff training. We asked agency representatives about the level of training available to staff in six areas related to disease program management. Representatives reported that most agencies had at least some training on proper tissue sample collection and submission, sampling methods and approaches to valid and reliable data collection for disease surveillance, and use of protective

equipment when handling animals or animal tissues. But more than one-third of agency representatives reported that no training was available in their agency on emergency communication plans or implementing emergency response plans (Tables A18, B18).

## DISCUSSION

We completed the 2011 surveys of fish and wildlife agency representatives as phase I of our research project. In phase II of the research, we convened a 26-member expert panel to offer additional information about capacity factors. We asked the panel to identify factors contributing to capacity in the same general categories covered in the national surveys (i.e., interagency coordination, authority, leadership, funding, staffing, facilities and technology, and information acquisition). The expert panel provided input during several rounds of inquiry, eventually reaching general agreement on 34 key traits that would exist in fish and wildlife agencies that are exemplary with regard to capacity for early detection of and coordinated response to disease events (Siemer et al. 2012). In combination these studies provide a snapshot of current conditions in agencies with regard to the most tangible factors influencing agency capacity and desired future conditions with regard to capacity to detect and respond to disease threats.

Below we highlight insights that these data provide about factors that limit or add to agency capacity. Additional analyses of these data, as well as the final phase of the project, will provide additional insights on these topics.

- Disease management concerns and priorities: Reported disease management concerns reflect the major disease outbreaks that fish and wildlife agencies have responded to in recent years (e.g., CWD, avian influenza, white-nose syndrome, whirling disease). Findings confirm that agencies have more fish and wildlife disease management priorities than they have the capacity to address. Findings also indicate that addressing fish health, especially transmission of disease between hatchery and wild fish populations, remains a higher priority to state agencies than addressing disease issues in amphibian and aquatic invertebrate populations. This is likely attributable to the economic value of fish populations.

- Interagency coordination: In our companion study (Siemer et al. 2012) a panel of 26 fish and wildlife health experts recognized that interagency collaboration is an important dimension of capacity. Those experts agreed that exemplary agencies would: participate in collaborative projects and programs (e.g., cooperative monitoring and management plans), coordinate their disease management program with other agencies spatially, temporally, and logistically, have leaders of a health unit who maintain strong professional networks that facilitate information sharing and collaboration, and follow response plans designed to coordinate multi-agency response to disease outbreaks. Those traits are developed over time through interagency communication, so survey results on interagency communication are encouraging. Representatives in a majority of agencies believed current levels of communication with other agencies were sufficient to achieve disease management objectives within fish and wildlife agencies. The survey data document current interagency networks and levels of interagency communication. Additional analysis is needed to clarify which networks and types of interactions contribute most to agency capacity for disease detection and response.

- Funding mechanisms: Our expert panel agreed that an exemplary agency would have funding mechanisms that provided timely and stable funding for planned disease surveillance and response, but mechanisms also would be flexible enough to respond to emerging disease detection and response needs (Siemer et al. 2012). The survey findings document that most agencies have few mechanisms for funding disease detection and response, and those mechanisms are not well-suited to provide funding flexibility or response to disease outbreaks in nongame wildlife, nongame fish, amphibians, and invertebrates. Most agencies received funding through three broad mechanisms. A few agencies received funding via five funding mechanisms. Additional research should be conducted to compare capacity in states with different suites of funding mechanisms.

- Funding levels: Findings reported here document that most agencies have capacity to address short-term and routine disease management activities, but few have capacity to sustain a long-term response. Funding levels represent constraints on agency capacity to respond to disease outbreaks, which may require immediate response and periods of intensive agency activity. Our expert panel suggested that funding is critical for agency capacity and agreed that exemplary agencies would have leadership that advocated for adequate funding to support disease management (Siemer et al. 2012).

- Authority: We found that many agencies perceive a need to clarify their authority to respond to specific terrestrial and aquatic disease threats. Findings from our expert panel shed some light on the areas where agencies are seeking clear authority. Those experts agreed that an exemplary agency would have authority to: control fish and wildlife populations as necessary to address disease risks, promulgate regulations that reduce spread of pathogens in fish and wildlife populations, investigate fish and wildlife disease events, and respond to the threat of diseases before the disease is present in the state (Siemer et al. 2012). More investigation is needed to determine the degree to which agencies already have the kinds of management authority identified by our expert panel.

- Staffing: Most agencies have access to veterinary or pathology expertise, but a substantial number of agencies do not have veterinary or pathology expertise on staff. Though some agencies are satisfied with obtaining such expertise from outside, other agencies perceive a need to add veterinarians or pathologists to their staff. Regardless of how that expertise is obtained, this study confirmed the assumption that access to veterinary and pathology professionals plays a key role in capacity for disease detection and response. Our expert review panel agreed that access to other types of staff capacity are also critical to agency capacity. The expert panel agreed that an exemplary agency would have a unit specifically dedicated to fish/wildlife health that coordinates disease surveillance and agency response, and staff necessary for communication with and outreach to stakeholders (i.e., publics such as hunters, anglers, farmers and ranchers, bait producers) (Siemer et al. 2012).

- Diagnostic capabilities: Our findings document that most agencies do not own or operate diagnostic laboratories, opting to instead contract for those services with facilities outside their agency and often outside of their state. A continually-changing regulatory environment and the costs of maintaining current technology create disincentives for state agencies to develop their own diagnostic facilities.

- In our companion study (Siemer et al. 2012) fish and wildlife health experts agreed that an agency with exemplary capacity to manage disease would have access to state of the art diagnostic facilities necessary for sophisticated and cutting-edge diagnostic testing. But those experts also emphasized that agencies do not need to own or operate sophisticated diagnostic facilities. Survey findings suggest that access to multiple types of diagnostic facilities may play an important role in increasing agency capacity; more detailed information about access to diagnostic facilities should be collected in the next phase of this project.

- Strategic planning (program management): Members of our expert panel agreed that exemplary agencies would have leaders who demonstrate a commitment to developing plans for response to emerging high-risk disease threats (Siemer et al. 2012). Survey results demonstrate that many agencies have a strategic plan for response to CWD, but plans for response to many other disease threats, and for emergency communication and response during a disease outbreak, remain less common. The absence of such plans suggests that many fish and wildlife agencies remain reactive rather than proactive about disease response.

- Staff training (program management): There are four general approaches to build institutional capacity (Crisp and Duckett, 2000). One of those is a bottom-up approach, in which leaders commit to continuous learning and improvement within their organizations and increasing internal capabilities by acquiring and training staff. This study documents a number of areas where agency representatives in a majority of agencies perceive a need for additional staff training. Particularly apparent was a need for additional staff training on use of emergency communication plans and implementation of emergency response plans.

**Next Steps**

In 2012, we will complete the third and final phase of this research. The specifics of disease management vary across agencies, and agency capacity may be influenced by intangible factors that are difficult to detect through standardized survey questions. To address this challenge, we begin phase III with a set of telephone interviews with at least one knowledgeable fish and wildlife agency staff member in all 50 states. We will use open-ended questions to: (a) gain detail about the range of agency characteristics that influence agency capacity to manage fish and wildlife health in each state; and (b) obtain deeper insight about *how* those factors influence capacity. Findings from interview analysis will inform development of questions for a web-based survey which will target the wide range of individuals playing key roles in managing fish and wildlife health throughout the U.S. This survey will focus on gaining more detailed information about a set of key influences on agency capacity to detect and respond to disease outbreaks.

Data from all phases of the project will provide a comprehensive list of factors that facilitate or inhibit agency capacity, professional judgments about which of these factors are most critical, and data on each state agency's characteristics with respect to these factors. These data will allow us to produce a set of recommendations about how agencies may best enhance their capacities to manage fish and wildlife health.

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**Appendix A:**
Survey Instrument: terrestrial version

**CAPACITY OF STATE AGENCIES TO DETECT AND RESPOND TO DISEASE OUTBREAKS IN TERRESTRIAL ANIMAL POPULATIONS**

A Survey of Fish and Wildlife Agency Representatives

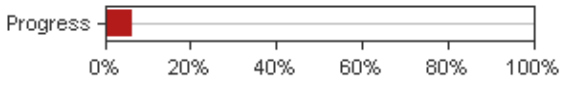
**Project Background**

The purpose of this survey is to identify state agencies' concerns about management of wildlife disease outbreaks and clarify current capacity in state agencies to detect and respond to disease outbreaks. This research is being conducted by the Human Dimensions Research Unit at Cornell University and was funded by the U. S. Fish and Wildlife Service (50% Wildlife Restoration; 50% Sport Fish Restoration).

This survey is endorsed by and was designed to support information needs identified by the Association of Fish and Wildlife Agencies (AFWA) in AFWA's National Fish and Wildlife Health Initiative. The survey is one part of a multi-faceted study that will involve four data collection steps completed in 2011 and 2012 ( for more information about this study, contact: Bill Siemer, 202 Bruckner Hall, Department of Natural Resources, Cornell University; email:wfs1@cornell.edu).

How you were selected to participate in this survey: We are contacting one professional in each state to complete this questionnaire. In the summer of 2011, the National Health Center circulated a request to release contact information to Cornell University for the purpose of conducting this survey. Contacts in most states agreed to allow release of their email address for this purpose. Contact information will not be used for any purpose other than correspondence about this survey and release of survey results reports.

**Continue to Survey**




**Instructions about Completing the Questionnaire**

The referent for all questions in this survey is **disease in terrestrial wildlife** (i.e., birds, mammals, and reptiles).

Please answer all questions on behalf of the state agency in which you work. Feel free to contact any colleagues in your agency as needed to provide responses that accurately represent your agency. At any time you can contact Bill Siemer at Cornell University (607.255.2828; email wfs1@cornell.edu) if you need clarification about a specific question.

**Thank You!**

**[Q1] Please identify the state for which you will be providing information:** -- Select --

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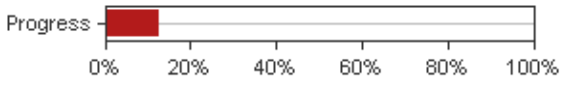


## Section 1: Management Concerns

Items in this section are intended to clarify similarities and differences in state agency's concerns about management of disease outbreaks in terrestrial wildlife.

State fish and wildlife agencies may have a variety of objectives related to disease management. Please read the following potential objectives for disease management in terrestrial wildlife.

Check the response that indicates the priority your agency places on addressing that objective (low, medium or high priority). Check the response that indicates your assessment of your agency's current capacity to achieve the objective (low, medium, or high capacity). Check "unsure" if you do not have enough information to make a judgment about priorities or capacity of your agency.

| Potential objectives for managing disease in wildlife | Agency priority placed on achieving this objective | | | | Current agency capacity to achieve objective | | | |
|---|---|---|---|---|---|---|---|---|
| | Low | Med | High | Unsure | Low | Med | High | Unsure |
| [T2A] Detecting the presence of diseases in game populations | | | | | | | | |
| [T2B] Reducing the spread of disease in game populations | | | | | | | | |
| [T2C] Detecting the presence of diseases in nongame populations | | | | | | | | |
| [T2D] Reducing the spread of disease in nongame populations | | | | | | | | |

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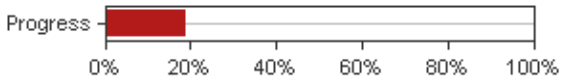


## Section 1: Management Concerns (continued)

Disease management priorities differ by state and region. Please check the boxes that represent the level of concern your agency has about managing the following disease issues.

*If the list of diseases below does not capture the issues of greatest concern in your state, please use the lines marked "other" to identify up to three other wildlife diseases that are of high concern to your agency.*

| Diseases in terrestrial ecosystems | Level of concern to your agency | | | |
|---|---|---|---|---|
| | None | Low | Med | High |
| [T3A] Rabies | | | | |
| [T3B] Chronic wasting disease (CWD) | | | | |
| [T3C] Avian influenza (AI or HPAI) | | | | |
| [T3D] Other avian diseases (avian cholera, avian botulism, salmonellosis) | | | | |
| [T3E] White-nose syndrome | | | | |
| [T3F] Tularemia | | | | |
| [T3G] Brucellosis | | | | |
| [T3H] Bovine Tuberculosis | | | | |
| [T3I] West Nile virus | | | | |
| [T3J] Other foreign animal diseases (e.g., foot-and-mouth disease, Rinderpest, Denge fever) | | | | |
| [T3K] Other diseases of high concern to our agency [T3K_spec] specify: | | | | |
| [T3L] Other diseases of high concern to our agency [T3L_spec] specify: | | | | |
| [T3M] Other diseases of high concern to our agency [T3M_spec] specify: | | | | |

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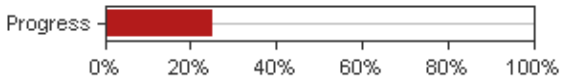


## Section 2: Human Resources

Items in this section focus on staff capacity available to agencies for detection of and response to wildlife disease outbreaks.

**[Q45] Does your agency have access to wildlife veterinarians (within or outside the agency) who can assist with detection of and inform response to disease outbreaks in terrestrial wildlife?**

○ Yes ○ No

**[SRI Note: If Q45 answered 'Yes', show Q56]**

**[Q56] Does your agency have one or more wildlife veterinarians on staff?**

○ Yes ○ No

**[Q67] Does your agency have access to wildlife pathologists (within or outside the agency) who can assist with detection of and inform response to disease outbreaks in terrestrial wildlife?**

○ Yes ○ No

**[SRI Note: If Q67 answered 'Yes', show Q78]**

**[Q78] Does your agency have one or more wildlife pathologists on staff?**

○ Yes ○ No

**Please indicate whether lack of access to wildlife veterinarians or wildlife pathologists is impeding early detection of wildlife diseases by your agency.**

| | Yes | No |
|---|---|---|
| [Q89A] Is access to wildlife veterinarians impeding early detection of diseases by your agency? | ○ | ○ |
| [Q89B] Is access to wildlife pathologists impeding early detection of diseases by your agency? | ○ | ○ |

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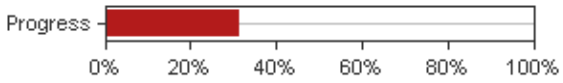


## Section 2: Human Resources (continued)

**Please indicate whether your agency has an agreement (either a formal written agreement, such as an MOU, or an informal agreement) to allow for additional personnel (of any type) from the following state or federal agencies, universities, or other groups to be immediately available (within 48 hr) to respond to a wildlife disease event.**

| | Type of agreement | | |
|---|---|---|---|
| | Formal | Informal | No agreement |
| [Q910A] Other states' fish and wildlife agencies | ○ | ○ | ○ |
| [Q910B] State Department of Agriculture / state veterinarian's office | ○ | ○ | ○ |
| [Q910C] University personnel | ○ | ○ | ○ |
| [Q910D] Federal Veterinarian USDA-APHIS-Veterinary Services | ○ | ○ | ○ |
| [Q910E] State Director USDA-APHIS-Wildlife Services | ○ | ○ | ○ |
| [Q910F] USFWS | ○ | ○ | ○ |
| [Q910G] USGS | ○ | ○ | ○ |
| [Q910H] Non-government organizations or associations | ○ | ○ | ○ |

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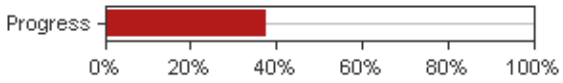


## Section 2: Human Resources (continued)

**Please indicate whether the number of field staff available to your agency is adequate for response to wildlife disease outbreaks. *If response to disease outbreaks is a low priority for your agency, check N/A (not applicable)***

| Is the number of field staff available : | Yes | No | N/A |
|---|---|---|---|
| [Q1011A] Adequate for short-term response to disease outbreaks? | ○ | ○ | ○ |
| [Q1011B] Adequate for long-term response to disease outbreaks? | ○ | ○ | ○ |

**[Q1112] The types of professional expertise available to an agency may affect capacity to detect and respond to disease events. Agencies may have access to these types of expertise through the staff they employ or through agreements with other agencies to gain access to their staff. Which of the following best describes the types of professional expertise available to your agency?**

○ Agency has access to all the types of professional staff needed for early detection of and coordinated response to terrestrial wildlife disease events in our state.

○ Agency lacks access to some types of professional staff needed for early detection of and coordinated response to terrestrial wildlife disease events in our state.

**[SRI Note: If 1112 answered 'Agency lacks access...', show Q1213]**

[Q1213A] **Below, please indicate up to three types of additional expertise needed by your agency to increase its capacity to detect and respond to wildlife disease events.**

**Type of additional expertise needed:**

1. _____
2. _____
3. _____

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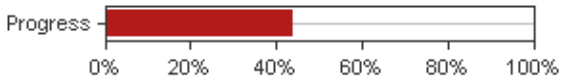


## Section 2: Human Resources (continued)

**Detection of and response to disease outbreaks calls for staff with a variety of skill sets. How adequate are the skills of staff in your agency for carrying out each of the following tasks?**

| Tasks associated with disease detection and response | Aggregate skill level | | |
|---|---|---|---|
| | Low | Med | High |
| [Q1314A] Submitting tissue samples usable for diagnostic testing | | | |
| [Q1314B] Implementing emergency response plans | | | |
| [Q1314C] Communicating with other staff within your agency | | | |
| [Q1314D] Communicating with staff in other state and federal agencies | | | |

**Please check the box that best describes the adequacy of training programs available to staff in your agency with responsibilities for detection of or response to disease events.**

***1 = no training on this topic is available to staff***
***2 = limited training is available to staff, but more is needed***
***3 = adequate training on this topic is available to staff***

| Current status of training programs on: | 1 | 2 | 3 |
|---|---|---|---|
| [Q1415A] Sampling methods/approaches to collect valid and reliable data on pathogens in wildlife populations | | | |
| [Q1415B] Proper sample collection and submission | | | |
| [Q1415C] Emergency response plans/protocols (e.g., field response, understanding of incident command system) | | | |
| [Q1415D] Emergency communication plans | | | |
| [Q1415E] Safe work practices | | | |
| [Q1415F] Use of protective equipment | | | |

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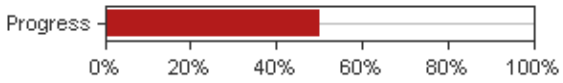


## Section 3: Diagnostic Facilities

Items in this section focus on your agency's access to facilities that conduct diagnostic testing associated with disease monitoring and surveillance.

**Does your agency have the capability to conduct wildlife disease diagnostics through:**

| | Yes | No |
|---|---|---|
| [Q1516A] Laboratory(s) operated by your agency | ○ | ○ |
| [Q1516B] Laboratory(s) operated by other agency, organization or university in your state | ○ | ○ |
| [Q1516C] Laboratory(s) in other states | ○ | ○ |

**Does your agency utilize diagnostic facilities with NAHLN-accreditation to test for the following diseases?**

| | Yes | No | Unsure |
|---|---|---|---|
| [T16A] Access to NAHLN-accredited facilities to test for Chronic wasting disease (CWD) | ○ | ○ | ○ |
| [T16B] Access to NAHLN-accredited facilities to test for avian influenza | ○ | ○ | ○ |

**[Q17] Capacity of facilities to process diagnostic tests may limit an agency's ability to detect disease events. How adequate is the disease diagnostic capacity of the facilities on which you rely to meet your expected needs during disease events?**

○ Not at all adequate ○ Partially adequate ○ Adequate ○ More than adequate

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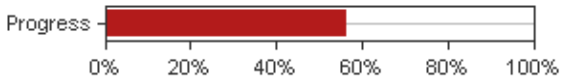


## Section 4: Financial Capacity

Items in this section focus on funding available to your agency for management of disease outbreaks in terrestrial wildlife.

**[Q18] Availability of funding may limit an agency's ability to conduct monitoring and surveillance. How adequate is the level of funding available for monitoring and surveillance of wildlife disease by your agency?**

Not at all adequate | Partially adequate | Adequate | More than adequate

**[Q19] How adequate is the level of funding available for response to wildlife-disease outbreaks by your agency?**

Not at all adequate | Partially adequate | Adequate | More than adequate

**Please check all boxes next to sources of funding that your agency has used to fund terrestrial wildlife disease management sometime in the last 3 years.**

- [T20A] Pittman-Robertson (federal formula) funds
- [T20B] Hunting license sale funds
- [T20C] State general revenue funds
- [T20D] State wildlife grants
- [T20E] Federal grants for response to a specific disease (CWD, Avian Influenza, white nose syndrome)
- [T20F] Other [T20F_spec] **, please specify:**

**[Q21] Which of the following best describes the trend in amount of funding available for disease management by your agency over the past 5 years?**

**Over the past 5 years, funding available to our agency for detection of and response to wildlife disease events has:**

| Decreased greatly | Decreased moderately | Remained about the same | Increased moderately | Increased greatly | Unsure/don't know |
|---|---|---|---|---|---|

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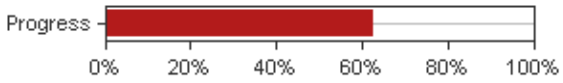


## Section 5: Emergency Response Plans

Questions in this section focus on strategic planning and planning for response to specific wildlife disease events

**[Q22] Does your agency have a strategic plan (i.e., written goals and objectives) that provides overall guidance for response to wildlife disease outbreaks?**

○ Yes ○ No

**Does your agency have a formal written emergency response plan for the following diseases in wildlife?**

| | Yes | No |
|---|---|---|
| [T23A] Chronic wasting disease (CWD) | ○ | ○ |
| [T23B] Avian influenza (AI) | ○ | ○ |
| [T23C] Foot-and-mouth disease (FMD) | ○ | ○ |
| [T23D] Waterfowl diseases | ○ | ○ |
| [T23E] West Nile virus | ○ | ○ |
| [T23F] Other [T23F_spec] , specify: | ○ | ○ |

**[Q24] Does your agency have a formal written plan for disposing of animal carcasses associated with management of a wildlife-disease outbreak?**

○ Yes ○ No

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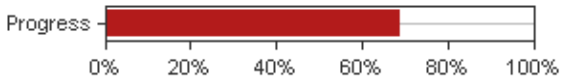


## Section 6: Internal Communication Plans

Questions in this section focus on capacity for communication about wildlife disease outbreaks among staff within your agency

**[Q25] Does your agency have a formal written plan for emergency internal communications in the event of a wildlife-disease outbreak?**

○ Yes ○ No

**[Q26] How adequate is communication between levels of your agency (e.g., central office and regional staff) with regard to response to a wildlife disease emergency?**

○ Not at all adequate ○ Partially adequate ○ Adequate ○ More than adequate

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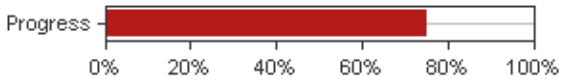


## Section 7: Inter-Agency Communication

Questions in this section focus on communication with other state and federal agencies. Achieving disease management objectives depends in part on inter-agency communication and coordination.

**Please check the statement which best describes interaction between professionals in your agency who deal with wildlife disease outbreaks and the professional staff of the following agencies.**

| | Never interact | No more than once a year | A few times a year | At least once a month | At least weekly |
|---|---|---|---|---|---|
| [Q27A] State Agriculture Department/State Veterinarian | ○ | ○ | ○ | ○ | ○ |
| [Q27B] State Public Health | ○ | ○ | ○ | ○ | ○ |
| [Q27C] USDA:APHIS Veterinary Services | ○ | ○ | ○ | ○ | ○ |
| [Q27D] USDA:APHIS Wildlife Services | ○ | ○ | ○ | ○ | ○ |
| [Q27E] U.S. Geological Survey | ○ | ○ | ○ | ○ | ○ |
| [Q27F] U.S. Fish and Wildlife Service | ○ | ○ | ○ | ○ | ○ |

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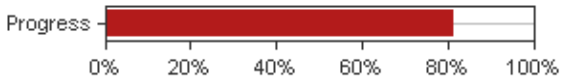


## Section 7: Inter-Agency Communication (continued)

**Achieving disease management objectives depends in part on communication and coordination with other agencies. Would you describe communication between staff working on wildlife disease in your agency with professional staff in the following agencies as sufficient to achieve your agency's objectives regarding disease management?**

| | Yes | No |
|---|---|---|
| [Q28A] State Agriculture Department/State Veterinarian | ○ | ○ |
| [Q28B] State Public Health | ○ | ○ |
| [Q28C] USDA:APHIS Veterinary Services (Area Veterinarian in Charge) | ○ | ○ |
| [Q28D] USDA:APHIS Wildlife Services | ○ | ○ |
| [Q28E] U.S. Geological Survey | ○ | ○ |
| [Q28F] U.S. Fish and Wildlife Service | ○ | ○ |
| [Q28G] Other, [Q28G_spec] specify: | ○ | ○ |

*Please use "Other, specify" above to note any other agency with which your agency coordinates on detection of or response to disease events, and whether current communication with that agency is sufficient.*

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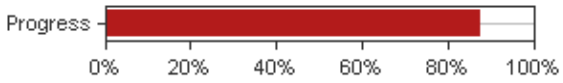


## Section 8: Regulatory Authority

Items in this section focus on clarifying the level of authority that state wildlife agencies have to take action in the context of disease outbreaks that affect wildlife only, domestic animals, or human health.

**Are the types of authority that your agency and other state agencies have to respond to the following disease events clearly defined through inter-agency agreements, legislation or other means?**

| Are the types of authority that your agency and other state agencies have to respond clearly defined for disease outbreaks: | Yes | No |
|---|---|---|
| [Q29A] That affect free-ranging wildlife? | ○ | ○ |
| [Q29B] That affect farmed domestic animals? | ○ | ○ |
| [Q29C] That have human health implications? | ○ | ○ |

**Please check the response category which best reflects how important it is to your agency to clarify its authority to address disease events in the following categories.**

| A disease outbreak that: | Priority your agency places on clarifying its authority in this area | | |
|---|---|---|---|
| | Not at all important | Somewhat important | Very important |
| [Q30A] Affects free-ranging wildlife | ○ | ○ | ○ |
| [Q30B] Affects farmed domestic terrestrial/aquatic animals? | ○ | ○ | ○ |
| [Q30C] Has human health implications | ○ | ○ | ○ |

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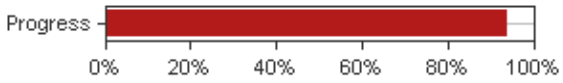


## Section 8: Regulatory Authority (continued)

**[Q31] Notwithstanding federal authority, which agency in your state has authority to lead response to disease events that affect free-ranging wildlife?**

- State Fish and Wildlife Agency
- State Agriculture Department/State Veterinarian
- State Public Health Department
- Combination
- Unclear who has lead authority
- Other [Q31_spec] **- please specify:**

**[Q32] Notwithstanding federal authority, which agency in your state has authority to lead response to disease events that affect farmed domestic animals?**

- State Fish and Wildlife Agency
- State Agriculture Department/State Veterinarian
- State Public Health Department
- Combination
- Unclear who has lead authority
- Other [Q32_spec] **- please specify:**

**[Q33] Notwithstanding federal authority, which agency in your state has authority to lead response to disease events that has human health implications?**

- State Fish and Wildlife Agency
- State Agriculture Department/State Veterinarian
- State Public Health Department
- Combination
- Unclear who has lead authority
- Other [Q33_spec] **- please specify:**

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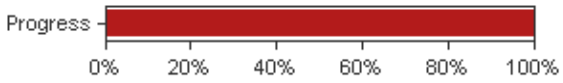


## Section 8: Regulatory Authority (continued)

**[Q34] Does your agency have authority to enter private land to respond to wildlife disease emergency?**

○ Yes ○ No

**[Q35] Please use the following space for any questions or comments you wish to make on the topic of capacity of state fish and wildlife agencies to manage wildlife disease outbreaks.**

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## Thank you for taking the time to complete this survey.

Your survey has been submitted, please close your browser.

**Appendix B:**
Survey instrument: aquatic version

# CAPACITY OF STATE AGENCIES TO DETECT AND RESPOND TO DISEASE OUTBREAKS IN AQUATIC ANIMAL POPULATIONS

A Survey of Fish and Wildlife Agency Representatives

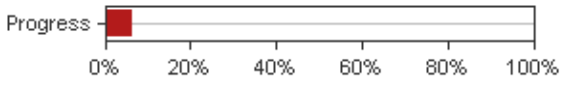
**Project Background**

The purpose of this survey is to identify state agencies' concerns about management of disease outbreaks in aquatic wildlife and clarify current capacity in state agencies to detect and respond to disease outbreaks. This research is being conducted by the Human Dimensions Research Unit at Cornell University and was funded by the U. S. Fish and Wildlife Service (50% Wildlife Restoration; 50% Sport Fish Restoration).

This survey is endorsed by and was designed to support information needs identified by the Association of Fish and Wildlife Agencies (AFWA) in AFWA's National Fish and Wildlife Health Initiative. The survey is one part of a multi-faceted study that will involve four data collection steps completed in 2011 and 2012 ( for more information about this study, contact: Bill Siemer, 202 Bruckner Hall, Department of Natural Resources, Cornell University; email:wfs1@cornell.edu).

How you were selected to participate in this survey: We are contacting one professional in each state to complete this questionnaire. We identified you as the most appropriate person in your agency to complete this questionnaire because you are listed in the NASAC-APHIS list of State Agency Contacts as the contact person for questions about aquatic wildlife health in your state. Contact information will not be used for any purpose other than correspondence about this survey and release of survey results reports.

**Continue to Survey**




**Instructions about Completing the Questionnaire**

All the questions in this survey instrument refer to management of **disease outbreaks in aquatic animals.** As you complete the questions, please consider your agencies' response to disease in freshwater fish, amphibians, and aquatic invertebrates. *If you are providing information for a coastal state, please also consider your agencies' response to marine fish, marine invertebrates, and sea turtles.*

Please answer all questions on behalf of the state agency in which you work. Feel free to contact any colleagues in your agency as needed to provide responses that accurately represent your agency. At any time you can contact Bill Siemer at Cornell University (607.255.2828; email wfs1@cornell.edu) if you need clarification about a specific question.

**Thank You!**

**[Q1] Please identify the state for which you will be providing information:** -- Select --

**[A2] Will your responses to questions refer to disease in freshwater systems only, or both freshwater and marine ecosystems?**

- ○ Freshwater ecosystems only
- ○ Freshwater and marine ecosystems

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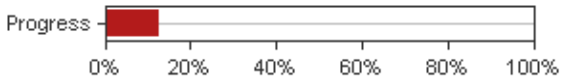


## Section 1: Management Concerns

Items in this section are intended to clarify similarities and differences in state agencys' concerns about management of disease outbreaks in aquatic organisms.

State fish and wildlife agencies may have a variety of objectives related to disease management. Please read the following potential objectives for disease management in aquatic organisms.

Check the response that indicates the priority your agency places on addressing that objective (low, medium or high priority). Check the response that indicates your assessment of your agency's current capacity to achieve the objective (low, medium, or high capacity). Check "unsure" if you do not have enough information to make a judgment about priorities or capacity of your agency.

| Potential objectives for managing disease in aquatic organisms | Agency priority placed on achieving this objective | | | | Current agency capacity to achieve objective | | | |
|---|---|---|---|---|---|---|---|---|
| | Low | Med | High | Unsure | Low | Med | High | Unsure |
| [A3A] Detecting the presence of diseases in wild fish populations | | | | | | | | |
| [A3B] Detecting the presence of diseases in amphibian populations | | | | | | | | |
| [A3C] Detecting the presence of diseases in invertebrate populations | | | | | | | | |
| [A3D] Preventing introduction of disease from wild to hatchery systems | | | | | | | | |
| [A3E] Preventing spread of disease from hatchery to wild systems | | | | | | | | |
| [A3F] Preventing disease outbreaks in wild fish populations | | | | | | | | |
| [A3G] Preventing disease outbreaks in wild amphibian populations | | | | | | | | |
| [A3H] Preventing disease outbreaks in wild invertebrate populations | | | | | | | | |

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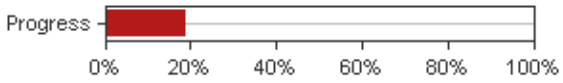
If you have questions or require technical assistance with this survey, please email the Survey Research Institute or call 1-888-367-8404.




## Section 1: Management Concerns (continued)

Disease management priorities differ by state and region. Please check the boxes that represent the level of concern your agency has about managing the following disease issues.

*If the list of diseases below does not capture the issues of greatest concern in your state, please use the lines marked "other" to identify up to three other diseases in aquatic ecosystems that are of high concern to your agency.*

| Diseases in aquatic ecosystems | None | Low | Med | High |
|---|---|---|---|---|
| [A4A] Infectious Pancreatic Necrosis Virus (IPNV) | | | | |
| [A4B] Infectious Hematopoietic Necrosis Virus (IHNV) | | | | |
| [A4C] Viral Hemorrhagic Septicemia Virus (VHS) | | | | |
| [A4D] Whirling Disease (WD) | | | | |
| [A4E] Viral diseases of all types (in hatcheries) | | | | |
| [A4F] Bacterial disease of all types (in hatcheries) | | | | |
| [A4G] Infectious Salmon Anaemia (ISA) | | | | |
| [A4H] Diseases that impact warmwater fish populations | | | | |
| [A4I] Diseases that impact mollusk populations | | | | |
| [A4J] Diseases that impact amphibian populations *(e.g., Batrachochytrium dendrobatidis)* | | | | |
| [A4K] Other, [A4K_spec] specify: | | | | |
| [A4L] Other, [A4L_spec] specify: | | | | |
| [A4M] Other, [A4M_spec] specify: | | | | |

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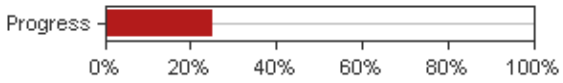


## Section 2: Human Resources

Items in this section focus on staff capacity available to agencies for detection of and response to disease outbreaks in aquatic systems.

**[Q45] Does your agency have access to veterinarians with aquatic organism expertise (within or outside the agency) who can assist with detection of and inform response to disease outbreaks in aquatic wildlife?**

○ Yes ○ No

**[SRI Note: If Q45 answered 'Yes', show Q56]**

**[Q56] Does your agency have one or more veterinarians with aquatic organism expertise on staff?**

○ Yes ○ No

**[Q67] Does your agency have access to aquatic pathologists (within or outside the agency) who can assist with detection of and inform response to disease outbreaks in aquatic wildlife?**

○ Yes ○ No

**[SRI Note: If Q67 answered 'Yes', show Q78]**

**[Q78] Does your agency have one or more aquatic pathologists on staff?**

○ Yes ○ No

**Please indicate whether lack of access to veterinarians or aquatic pathologists is impeding early detection of aquatic animal diseases by your agency.**

| | Yes | No |
|---|---|---|
| [Q89A] Is access to veterinarians with aquatic organism expertise impeding early detection of diseases by your agency? | ○ | ○ |
| [Q89B] Is access to aquatic pathologists impeding early detection of diseases by your agency? | ○ | ○ |

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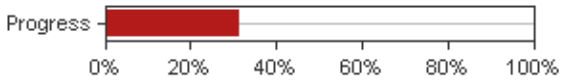


## Section 2: Human Resources (continued)

**Please indicate whether your agency has an agreement (either a formal written agreement, such as an MOU, or an informal agreement) to allow for additional personnel (of any type) from the following state or federal agencies, universities, or other groups to be immediately available (within 48 hr) to respond to a disease event in a freshwater aquatic system.**

| | Type of agreement | | |
|---|---|---|---|
| | Formal | Informal | No agreement |
| [Q910A] Other states' fish and wildlife agencies | ○ | ○ | ○ |
| [Q910B] State Department of Agriculture / state veterinarian's office | ○ | ○ | ○ |
| [Q910C] University personnel | ○ | ○ | ○ |
| [Q910D] Federal Veterinarian USDA-APHIS-Veterinary Services | ○ | ○ | ○ |
| [Q910E] State Director USDA-APHIS-Wildlife Services | ○ | ○ | ○ |
| [Q910F] USFWS | ○ | ○ | ○ |
| [Q910G] USGS | ○ | ○ | ○ |
| [Q910H] Non-government organizations or associations | ○ | ○ | ○ |

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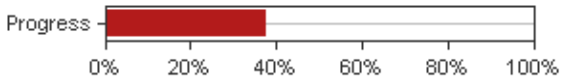


## Section 2: Human Resources (continued)

**Please indicate whether the number of field staff available to your agency is adequate for response to disease outbreaks in aquatic systems.** ***If response to disease outbreaks is a low priority for your agency, check 'N/A' (not applicable)***

| Is the number of field staff available : | Yes | No | N/A |
|---|---|---|---|
| [Q1011A] Adequate for short-term response to disease outbreaks? | ○ | ○ | ○ |
| [Q1011B] Adequate for long-term response to disease outbreaks? | ○ | ○ | ○ |

**[Q1112] The types of professional expertise available to an agency may affect capacity to detect and respond to disease events. Agencies may have access to these types of expertise through the staff they employ or through agreements with other agencies to gain access to their staff. Which of the following best describes the types of professional expertise available to your agency?**

○ Agency has access to all the types of professional staff needed for early detection of and coordinated response to disease events in aquatic systems in our state.

○ Agency lacks access to some types of professional staff needed for early detection of and coordinated response to disease events in systems in our state.

**[SRI Note: If Q1112 answered 'Agency lacks access..', show Q1213A]**

[Q1213A] **Below, please indicate up to three types of additional expertise needed by your agency to increase its capacity to detect and respond to disease events in aquatic systems.**

**Type of additional expertise needed:**

1.

2.

3.

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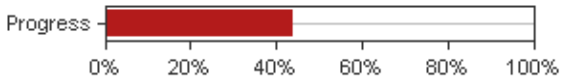


## Section 2: Human Resources (continued)

**Detection of and response to disease outbreaks calls for staff with a variety of skill sets. How adequate are the skills of staff in your agency for carrying out each of the following tasks?**

| Tasks associated with disease detection and response | Aggregate skill level | | |
|---|---|---|---|
| | Low | Med | High |
| [Q1314A] Submitting tissue samples usable for diagnostic testing | | | |
| [Q1314B] Implementing emergency response plans | | | |
| [Q1314C] Communicating with other staff within your agency | | | |
| [Q1314D] Communicating with staff in other state and federal agencies | | | |

**Please check the box that best describes the adequacy of training programs available to staff in your agency with responsibilities for detection of or response to disease events.**

***1 = no training on this topic is available to staff***
***2 = limited training is available to staff, but more is needed***
***3 = adequate training on this topic is available to staff***

| Current status of training programs on: | 1 | 2 | 3 |
|---|---|---|---|
| [Q1415A] Sampling methods/approaches to collect valid and reliable data on pathogens in populations of aquatic organisms | | | |
| [Q1415B] Proper sample collection and submission | | | |
| [Q1415C] Emergency response plans/protocols (e.g., field response, understanding of incident command system) | | | |
| [Q1415D] Emergency communication plans | | | |
| [Q1415E] Safe work practices | | | |
| [Q1415F] Use of protective equipment | | | |

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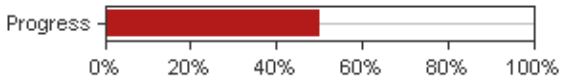


## Section 3: Diagnostic Facilities

Items in this section focus on your agency's access to facilities that conduct diagnostic testing associated with disease monitoring and surveillance.

**Does your agency have the capability to conduct aquatic disease diagnostics through:**

| | Yes | No |
|---|---|---|
| [Q1516A] Laboratory(s) operated by your agency | ○ | ○ |
| [Q1516B] Laboratory(s) operated by other agency, organization or university in your state | ○ | ○ |
| [Q1516C] Laboratory(s) in other states | ○ | ○ |

**[Q17] Capacity of facilities to process diagnostic tests may limit an agency's ability to detect disease events. How adequate is the disease diagnostic capacity of the facilities on which you rely to meet your expected needs during disease events?**

○ Not at all adequate ○ Partially adequate ○ Adequate ○ More than adequate

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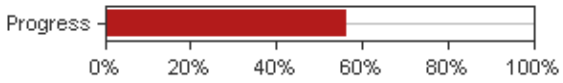


## Section 4: Financial Capacity

Items in this section focus on funding available to your agency for management of disease outbreaks in aquatic systems.

**[Q18] Availability of funding may limit an agency's ability to conduct monitoring and surveillance. How adequate is the level of funding available for monitoring and surveillance of aquatic diseases by your agency?**

○ Not at all adequate ○ Partially adequate ○ Adequate ○ More than adequate

**[Q19] How adequate is the level of funding available for response to aquatic disease outbreaks by your agency?**

○ Not at all adequate ○ Partially adequate ○ Adequate ○ More than adequate

**Please check all boxes next to sources of funding that your agency has used to fund aquatic wildlife disease management sometime in the last 3 years.**

- ☐ [A20A] Dingle-Johnson (federal formula) funds
- ☐ [A20B] Fishing license sales funds
- ☐ [A20C] State general revenue funds
- ☐ [A20D] State wildlife grants
- ☐ [A20E] Federal grants for response to a specific disease (e.g., whirling disease)
- ☐ [A20F] Other [A20F_spec] **, please specify:**

**[Q21] Which of the following best describes the trend in amount of funding available for disease management by your agency over the past 5 years?**

**Over the past 5 years, funding available to our agency for detection of and response to aquatic disease events has:**

| ○ | ○ | ○ | ○ | ○ | ○ |
|---|---|---|---|---|---|
| **Decreased greatly** | **Decreased moderately** | **Remained about the same** | **Increased moderately** | **Increased greatly** | **Unsure/don't know** |

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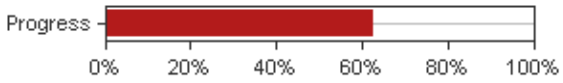


## Section 5: Emergency Response Plans

Questions in this section focus on strategic planning and planning for response to specific wildlife disease events

**[Q22] Does your agency have a strategic plan (i.e., written goals and objectives) that provides overall guidance for response to disease outbreaks in aquatic ecosystems?**

Yes No

**Does your agency have a formal written emergency response plan for the following diseases in aquatic systems?**

| | Yes | No |
|---|---|---|
| [A23A] Viral Hemorrhagic Septicemia (VHS) | | |
| [A23B] Infectious Pancreatic Necrosis (IPN) | | |
| [A23C] Infectious Hematopoietic Necrosis (IHN) | | |
| [A23D] Whirling Disease (WD) | | |
| [A23E] Other, [A23E_spec] specify: | | |

**[Q24] Does your agency have a formal written plan for disposing of fish or other animal remains associated with management of a disease outbreak in aquatic systems?**

Yes No

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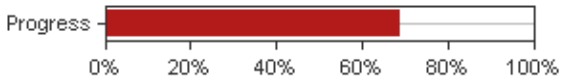


## Section 6: Internal Communication Plans

Questions in this section focus on capacity for communication about wildlife disease outbreaks among staff within your agency

**[Q25] Does your agency have a formal written plan for emergency internal communications in the event of a disease outbreak in aquatic systems?**

○ Yes ○ No

**[Q26] How adequate is communication between levels of your agency (e.g., central office and regional staff) with regard to response to a disease emergency in aquatic systems?**

○ Not at all adequate ○ Partially adequate ○ Adequate ○ More than adequate

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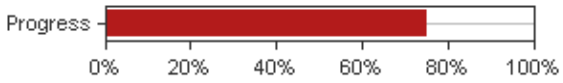


## Section 7: Inter-Agency Communication

Questions in this section focus on communication with other state and federal agencies. Achieving disease management objectives depends in part on inter-agency communication and coordination.

**Please check the statement which best describes interaction between professionals in your agency who deal with aquatic disease outbreaks and the professional staff of the following agencies.**

| | Never interact | No more than once a year | A few times a year | At least once a month | At least weekly |
|---|---|---|---|---|---|
| [Q27A] State Agriculture Department/State Veterinarian | ○ | ○ | ○ | ○ | ○ |
| [Q27B] State Public Health | ○ | ○ | ○ | ○ | ○ |
| [Q27C] USDA:APHIS Veterinary Services | ○ | ○ | ○ | ○ | ○ |
| [Q27D] USDA:APHIS Wildlife Services | ○ | ○ | ○ | ○ | ○ |
| [Q27E] U.S. Geological Survey | ○ | ○ | ○ | ○ | ○ |
| [Q27F] U.S. Fish and Wildlife Service | ○ | ○ | ○ | ○ | ● |

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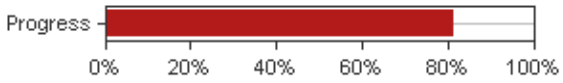


## Section 7: Inter-Agency Communication (continued)

**Would you describe communication between staff working on aquatic disease in your agency with professional staff in the following agencies as sufficient to achieve your agency's objectives regarding disease management?**

| | Yes | No |
|---|---|---|
| [Q28A] State Agriculture Department/State Veterinarian | ○ | ○ |
| [Q28B] State Public Health | ○ | ○ |
| [Q28C] USDA:APHIS Veterinary Services (Area Veterinarian in Charge) | ○ | ○ |
| [Q28D] USDA:APHIS Wildlife Services | ○ | ○ |
| [Q28E] U.S. Geological Survey | ○ | ○ |
| [Q28F] U.S. Fish and Wildlife Service | ○ | ○ |
| [Q28G] Other, [Q28G_spec] specify: | ○ | ○ |

*Please use "Other, specify" above to note any other agency with which your agency coordinates on detection of or response to disease events, and whether current communication with that agency is sufficient.*

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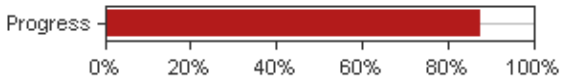
Finish Later




## Section 8: Regulatory Authority

Items in this section focus on clarifying the level of authority that state fish and wildlife agencies have to take action in the context of disease outbreaks that affect wild fish only, commercially-raised aquatic animals, or human health.

**Are the types of authority that your agency and other state agencies have to respond to the following disease events clearly defined through inter-agency agreements, legislation or other means?**

| Are the types of authority that your agency and other state agencies have to respond clearly defined for disease outbreaks: | Yes | No |
|---|---|---|
| [Q29A] That affect wild fish? | ○ | ○ |
| [Q29B] That affect commercially-raised fish/aquaculture? | ○ | ○ |
| [Q29C] That have human health implications? | ○ | ○ |

**Please check the response category which best reflects how important it is to your agency to clarify its authority to address disease events in the following categories.**

| A disease outbreak that: | Priority your agency places on clarifying its authority in this area | | |
|---|---|---|---|
| | Not at all important | Somewhat important | Very important |
| [Q30A] Affects wild fish | ○ | ○ | ○ |
| [Q30B] Affects commercially-raised fish/aquaculture | ○ | ○ | ○ |
| [Q30C] Has human health implications | ○ | ○ | ○ |

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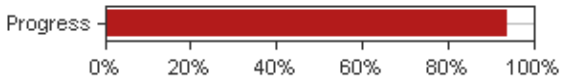


## Section 8: Regulatory Authority (continued)

**[Q31] Notwithstanding federal authority, which agency in your state has authority to lead response to disease events that affect wild fish?**

- State Fish and Wildlife Agency
- State Agriculture Department/State Veterinarian
- State Public Health Department
- Combination
- Unclear who has lead authority
- Other [Q31_spec] **- please specify:**

**[Q32] Notwithstanding federal authority, which agency in your state has authority to lead response to disease events that affect commercially-raised fish / aquaculture?**

- State Fish and Wildlife Agency
- State Agriculture Department/State Veterinarian
- State Public Health Department
- Combination
- Unclear who has lead authority
- Other [Q32_spec] **- please specify:**

**[Q33] Notwithstanding federal authority, which agency in your state has authority to lead response to aquatic disease events that has human health implications?**

- State Fish and Wildlife Agency
- State Agriculture Department/State Veterinarian
- State Public Health Department
- Combination
- Unclear who has lead authority
- Other [Q33_spec] **- please specify:**

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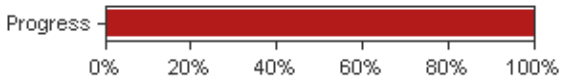


## Section 8: Regulatory Authority (continued)

**[Q34] Does your agency have authority to enter private land to respond to a disease emergency in aquatic systems?**

○ Yes ○ No

**[Q35] Please use the following space for any questions or comments you wish to make on the topic of capacity of state fish and wildlife agencies to manage aquatic disease outbreaks.**

Previous Submit Survey
Finish Later

## Thank you for taking the time to complete this survey.

Your survey has been submitted, please close your browser.

**Appendix C:**
AFWA endorsement letter

ASSOCIATION of FISH & WILDLIFE AGENCIES

The voice of fish and wildlife agencies

Hall of the States
444 North Capitol Street, NW
Suite 725 • Washington, D.C. 20001
Phone: 202-624-7890
Fax: 202-624-7891
E-mail: info@fishwildlife.org
www.fishwildlife.org

Disease outbreaks in fish and wildlife populations can produce significant ecological, economic and human health consequences. A new study, sponsored by the U.S. Fish and Wildlife Service and conducted by the Human Dimensions Research Unit (HDRU) at Cornell University, will assess the capacity of state fish and wildlife agencies to detect and respond to disease outbreaks. Study results can be used to inform efforts to build agency capacity in ways that agencies believe are most effective for addressing disease outbreaks. This project directly addresses a high priority national conservation need identified by AFWA's Fish and Wildlife Health Committee in support of the National Fish and Wildlife Health Initiative.

This is a two-year research project that will include four phases of data collection. The first phase of the project will be a set of two web-based surveys that will be implemented by Cornell University in September 2011. One survey will focus on disease outbreaks in terrestrial wildlife, while a companion survey focuses on disease outbreaks in aquatic organisms and systems. Two professionals in each state (one terrestrial and one aquatic specialist) will be asked to provide information about multiple facets of agency capacity to detect and respond to disease outbreaks (e.g., presence / absence of dedicated staff, funding, facilities, and interagency communication). In combination with findings from other phases of the study, this project will help agencies identify gaps in capacity to manage disease outbreaks in the U.S. Study results will be reported directly to AFWA and related reports will be made available to all state agencies.

We encourage you to respond if you are contacted to participate in one of these surveys. The information you provide for these surveys can improve agency capacity in ways that are most effective for addressing disease issues.

Questions and comments about this study should be directed to Bill Siemer at Cornell University (wfs1@cornell.edu).

Sincerely,

Bob Duncan, Chair
AFWA Fish and Wildlife Health Committee

John Fischer, Vice Chair

**Appendix D:**
Cover memos for survey response urges

INVITATION – September 7, 2011

Sender: "William F. Siemer" <surveyresearch2@cornell.edu>
Subject: Survey on agency capacity to manage fish and wildlife disease

Dear [display name],

The Human Dimensions Research Unit at Cornell University is conducting a national survey to gather information about disease management by state fish and wildlife agencies. The purpose of this survey is to identify agencies' concerns about wildlife disease management and assess the capacity of state agencies to detect and respond to disease outbreaks. In each state we are contacting one professional with expertise in wildlife disease management to provide information on behalf of their agency. The data we gather will be used to formulate recommendations about how agencies can build their capacity to address the wildlife disease issues that are priorities to them.

This research is funded by the U. S. Fish and Wildlife Service. It is endorsed by and was designed to support information needs identified by the Association of Fish and Wildlife Agencies (AFWA) (a copy of the AFWA endorsement statement may be found at the following link: http://sri.cornell.edu/AFWA/resources/Association of Fish and Wildlife Agencies letter.pdf). The survey is one part of a multi-faceted study that will be completed in 2011 and 2012. Electronic copies of summary reports from this and other phases of the study will be available to state agencies at no cost.

I am writing to ask that you participate in this study by completing an online questionnaire about detection of and response to disease outbreaks by your agency.

To access the questionnaire, please use the following URL:
https://sri.cornell.edu/AFWA/Terrestrial/?survid=[[survid]]
(This is a unique URL only for you, please do not forward this link to anyone else.)

Your participation in this survey is voluntary. Please be assured that all the information you provide will be kept confidential and the information you give us will never be associated with your name.

If you have any questions about using the web-based form or submitting your completed questionnaire, please do not hesitate to contact staff at the Survey Research Institute at 607-255-3786 or surveyresearch2@cornell.edu. If you have questions about the content of the survey, please feel free to contact me.

Thank you very much.

William F. Siemer, Ph.D.
REMINDER – September 14, 2011

Sender: "William F. Siemer" <surveyresearch2@cornell.edu>
Subject: Reminder about survey on agency capacity to detect and respond to disease outbreaks

Dear [display name],

We recently contacted you about participating in a national survey focused on state agency capacity to manage disease outbreaks. Our records show that you have not yet completed the survey. We encourage you to take your earliest opportunity to complete the online questionnaire to provide information about disease management concerns and capacity in your agency.

Your response is important. You are the single representative we contacted to provide information about your agency's concerns related to disease outbreaks in terrestrial wildlife (birds, mammals and reptiles). The information you provide will help us develop recommendations that will address your agency's needs.

Please be assured that your identity will be kept confidential and the information you give us will never be associated with your name. All the information you provide will be used in aggregate form only.

To access the questionnaire, use the following link:
https://sri.cornell.edu/AFWA/Terrestrial/?survid=[[survid]]
(This is a unique URL only for you, please do not forward this link to anyone else.)

Please make sure you press the "Submit Survey" button once you have completed the survey.

If you have any questions about the survey, please do not hesitate to contact us at 607-255-3786 or surveyresearch2@cornell.edu.

Thank you very much.

William F. Siemer, Ph.D.
Research Associate, Human Dimensions Research Unit
Department of Natural Resources, Cornell University
telephone: 607.255-2828
email: wfs1@cornell.edu

REMINDER – September 21, 2011

Sender: "William F. Siemer" <surveyresearch2@cornell.edu>
Subject: Second reminder about survey on agency capacity to detect and respond to disease outbreaks

Dear [display name],

A few weeks ago we contacted you about participating in a national survey focused on state agency capacity to manage disease outbreaks. We still have not received your completed questionnaire. We understand the challenge of carving out time to participate in professional activities like this survey, but we encourage you to do so because we believe that the data from this study will directly benefit state fish and wildlife agencies. This survey is endorsed by and was designed to support information needs identified by the Association of Fish and Wildlife Agencies (AFWA) http://sri.cornell.edu/AFWA/resources/Association of Fish and Wildlife Agencies letter.pdf. Results of the survey will be provided to agencies and the Association of Fish and Wildlife Agencies (AFWA) and will inform individual and collective efforts to improve agency response to emerging disease risks.

We hope you understand the importance of your contribution to this study. You are the single representative we contacted to provide information about your agency's capacity to address disease outbreaks in terrestrial wildlife (birds, mammals and reptiles).

If you have any reservations about participating in the study, please contact me (telephone: 607-255-2828; email wfs1@cornell.edu). I would be happy to address and resolve any concerns that may be keeping you from participating in the project.

At your earliest convenience, please take some time to complete a questionnaire for your state. To access the questionnaire, use the following link:
https://sri.cornell.edu/AFWA/Terrestrial/?survid=[[survid]]
(This is a unique URL only for you, please do not forward this link to anyone else.)

Please make sure you press the "Submit Survey" button once you have completed the survey. If you have any difficulties in submitting your completed questionnaire, please contact the Survey Research Institute at Cornell (at 607-255-3786 or surveyresearch2@cornell.edu).

Thank you very much.

William F. Siemer, Ph.D.
Research Associate, Human Dimensions Research Unit
Department of Natural Resources, Cornell University
telephone: 607.255-2828
email: wfs1@cornell.edu

REMINDER – September 28, 2011

Sender: "William F. Siemer" <surveyresearch2@cornell.edu>
Subject: Second reminder about survey on agency capacity to detect and respond to disease outbreaks

Dear [display name],

Our survey of state fish and wildlife agencies to characterize concerns about and capacity to respond to disease outbreaks will conclude in a few weeks. I am writing one final time to encourage you to take advantage of this opportunity to tell us about the concerns and capacities of your agency.

We would greatly appreciate your participation in this study. You are the single representative we contacted to provide information about your agency's capacity to respond to wildlife disease outbreaks.

Your input on this study is important to us. Even a partially-completed questionnaire would be a valuable contribution. If you still have any concerns about the study that are preventing you from participating, please contact me (telephone: 607- 255-2828; email wfs1@cornell.edu). I would be happy to address and resolve any concerns that may be keeping you from participating in the project.

To access the survey, use the following link:
https://sri.cornell.edu/AFWA/Terrestrial/?survid=[[survid]]
(This is a unique URL only for you, please do not forward this link to anyone else.)

Please make sure you press the "Submit Survey" button once you have completed the survey. If you have any difficulties in submitting your completed questionnaire, please contact the Survey Research Institute at Cornell (at 607-255-3786 or surveyresearch2@cornell.edu).

Thank you very much.

William F. Siemer, Ph.D.
Research Associate, Human Dimensions Research Unit
Department of Natural Resources, Cornell University
telephone: 607.255-2828
email: wfs1@cornell.edu

**Appendix E:**
Results tables, terrestrial and aquatic wildlife surveys

**Table A 1.** Level of priority agencies place on achieving four objectives for managing diseases in terrestrial wildlife, by USFWS region, in 2011.

| Potential objectives for managing disease in wildlife | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| Detecting the presence of diseases in game populations | (n) | (6) | (12) | (8) | (9) | (12) | (47) |
| | mean[1] | 2.33 | 2.58 | 2.75 | 2.56 | 2.58 | 2.57 |
| Reducing the spread of disease in game populations | (n) | (6) | (12) | (8) | (9) | (12) | (47) |
| | mean | 2.17 | 2.58 | 2.63 | 2.67 | 2.17 | 2.45 |
| Detecting the presence of diseases in nongame populations | (n) | (6) | (12) | (8) | (9) | (12) | (47) |
| | mean | 2.00 | 2.25 | 2.38 | 2.33 | 2.17 | 2.23 |
| Reducing the spread of disease in nongame populations | (n) | (6) | (11) | (8) | (9) | (12) | (46) |
| | mean | 2.00 | 2.17 | 2.13 | 2.00 | 2.18 | 2.11 |

[1]1=low priority, 2=medium priority, 3=high priority

**Table B 1.** Level of priority agencies place on achieving eight objectives for managing diseases in aquatic wildlife, by USFWS region, in 2011.

| | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| Potential management objectives | | Pacific | West | Midwest | Southeast | Northeast | National |
| Preventing spread of disease from hatchery to wild systems | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| | mean | 3.00 | 3.00 | 2.86 | 2.70 | 3.00 | 2.90 |
| Preventing introduction of diseases from wild to hatchery systems | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| | mean | 2.80 | 3.00 | 2.86 | 2.60 | 2.78 | 2.80 |
| Detecting the presence of diseases in wild fish populations | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| | mean[1] | 2.40 | 2.10 | 2.29 | 2.00 | 2.11 | 2.15 |
| Preventing disease outbreaks in wild fish populations | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| | mean | 3.00 | 1.90 | 2.00 | 1.80 | 2.00 | 2.05 |
| Preventing disease outbreaks in amphibian populations | (n) | (4) | (10) | (5) | (9) | (7) | (35) |
| | mean | 2.25 | 1.30 | 1.40 | 1.78 | 1.43 | 1.57 |
| Detecting the presence of diseases in amphibian populations | (n) | (4) | (10) | (5) | (8) | (6) | (33) |
| | mean | 2.00 | 1.50 | 1.60 | 1.50 | 1.77 | 1.52 |
| Preventing disease outbreaks in invertebrate populations | (n) | (3) | (9) | (5) | (9) | (7) | (33) |
| | mean | 2.00 | 1.11 | 1.40 | 1.67 | 1.57 | 1.48 |
| Detecting the presence of diseases in invertebrate populations | (n) | (3) | (9) | (5) | (8) | (7) | (32) |
| | mean | 1.67 | 1.11 | 1.40 | 1.75 | 1.14 | 1.38 |

[1]1=low priority, 2=medium priority, 3=high priority

**Table A 2.** Capacity agencies had to achieve four objectives for managing diseases in terrestrial wildlife, by USFWS region, in 2011.

| Potential objectives for managing disease in wildlife | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| Detecting the presence of diseases in game populations | (n) | (6) | (12) | (8) | (9) | (12) | (47) |
| | Mean[1] | 2.17 | 2.17 | 2.38 | 2.00 | 1.92 | 2.11 |
| Reducing the spread of disease in game populations | (n) | (6) | (12) | (8) | (8) | (12) | (46) |
| | mean | 1.67 | 1.58 | 2.00 | 1.75 | 1.83 | 1.76 |
| Detecting the presence of diseases in nongame populations | (n) | (6) | (12) | 8) | (9) | (12) | (47) |
| | Mean | 1.67 | 1.67 | 2.00 | 1.44 | 1.75 | 1.70 |
| Reducing the spread of disease in nongame populations | (n) | (6) | (12) | (8) | (8) | (12) | (45) |
| | mean | 1.50 | 1.45 | 1.50 | 1.25 | 1.42 | 1.42 |

[1]1=low capacity, 2=medium capacity, 3=high capacity

**Table B 2.** Capacity agencies had to achieve eight objectives for managing diseases in aquatic wildlife, by USFWS region, in 2011.

| Potential management objectives | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| Preventing spread of disease from hatchery to wild systems | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| | Mean | 2.60 | 2.50 | 2.71 | 2.00 | 2.22 | 2.37 |
| Preventing introduction of diseases from wild to hatchery systems | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| | Mean | 2.60 | 2.50 | 2.71 | 2.00 | 2.22 | 2.37 |
| Detecting the presence of diseases in wild fish populations | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| | Mean[1] | 2.20 | 1.80 | 1.86 | 2.10 | 1.67 | 1.90 |
| Preventing disease outbreaks in wild fish populations | (n) | (4) | (10) | (7) | (10) | (9) | (40) |
| | Mean | 1.75 | 2.50 | 1.71 | 1.20 | 1.22 | 1.48 |
| Detecting the presence of diseases in amphibian populations | (n) | (4) | (10) | (5) | (7) | (7) | (33) |
| | Mean | 2.00 | 1.30 | 1.80 | 1.43 | 1.29 | 1.48 |
| Detecting the presence of diseases in invertebrate populations | (n) | (3) | (8) | (5) | (8) | (7) | (31) |
| | Mean | 1.67 | 1.13 | 1.60 | 1.50 | 1.14 | 1.35 |
| Preventing disease outbreaks in invertebrate populations | (n) | (3) | (9) | (5) | (7) | (7) | (31) |
| | Mean | 1.67 | 1.00 | 1.80 | 1.00 | 1.14 | 1.23 |
| Preventing disease outbreaks in amphibian populations | (n) | (3) | (10) | (5) | (7) | (7) | (32) |
| | Mean | 1.33 | 1.70 | 1.80 | 1.14 | 1.14 | 1.22 |

[1]1=low capacity, 2=medium capacity, 3=high capacity

**Table A 3.** Level of management concern about various terrestrial disease issues, by USFWS region, in 2011.

| Disease issues | Capacity of agencies to achieve objectives (mean rating[1]), by region | | | | | |
|---|---|---|---|---|---|---|
| | Pacific | West | Midwest | Southeast | Northeast | National |
| | (n=6) | (n=12) | (n=8) | (n=9) | (n=12) | (n=47) |
| Chronic wasting disease | 2.33 | 2.75 | 2.87 | 2.78 | 2.92 | 2.77 |
| White-nose syndrome | 2.00 | 1.33 | 2.75 | 2.33 | 2.83 | 2.23 |
| Bovine tuberculosis | 1.67 | 1.83 | 2.62 | 1.78 | 1.83 | 1.94 |
| Rabies | 1.83 | 1.83 | 1.50 | 1.88 | 2.25 | 1.89 |
| Other avian diseases | 1.83 | 2.67 | 1.88 | 2.11 | 1.33 | 1.72 |
| Avian influenza (AI or HPAI) | 1.33 | 1.33 | 1.75 | 2.22 | 1.67 | 1.66 |
| Brucellosis | 2.00 | 1.42 | 1.13 | 1.89 | 1.42 | 1.53 |
| Other foreign animal diseases | 1.67 | 1.33 | 1.50 | 1.78 | 1.17 | 1.45 |
| Tularemia | 1.83 | 1.42 | 1.13 | 1.33 | 1.25 | 1.36 |
| West Nile virus | 1.33 | 1.00 | 1.00 | 1.22 | 1.42 | 1.19 |

[1]1=low concern, 2=medium concern, 3=high concern

**Table B 3.** Level of management concern about various aquatic disease issues, by USFWS region, in 2011.

| Disease issues | Capacity of agencies to achieve objectives (mean rating[1]), by region | | | | | |
|---|---|---|---|---|---|---|
| | Pacific (n) | West (n) | Midwest (n) | Southeast (n) | Northeast (n) | National (n) |
| Viral diseases of all types (in hatcheries) | (5) 3.00 | (10) 2.90 | (7) 3.00 | (10) 2.60 | (9) 2.56 | (41) 2.78 |
| Viral Hemorrhagic Septicemia Virus (VHS) | (5) 2.80 | (10) 3.00 | (7) 3.00 | (10) 2.60 | (9) 2.33 | (41) 2.73 |
| Bacterial disease of all types (in hatcheries) | (5) 3.00 | (10) 2.70 | (7) 2.71 | (10) 2.70 | (9) 2.33 | (41) 2.66 |
| Diseases that impact warmwater fish populations | (5) 2.00 | (9) 2.22 | (7) 2.29 | (10) 2.60 | (9) 1.89 | (40) 2.23 |
| Whirling Disease (WD) | (5) 2.20 | (10) 2.70 | (7) 2.86 | (10) 1.40 | (9) 2.00 | (41) 2.20 |
| Infectious Hematopoietic Necrosis Virus (IHNV) | (5) 3.00 | (10) 2.40 | (7) 2.43 | (10) 1.30 | (8) 2.00 | (40) 2.13 |
| Infectious Pancreatic Necrosis Virus (IPNV) | (5) 2.20 | (10) 2.40 | (7) 2.71 | (10) 1.40 | (9) 2.00 | (41) 2.10 |
| Diseases that impact mollusk populations | (5) 2.20 | (9) 1.11 | (7) 1.43 | (8) 2.13 | (9) 1.56 | (38) 1.63 |
| Diseases that impact amphibian populations | (4) 2.50 | (9) 1.78 | (7) 1.57 | (9) 1.56 | (8) 1.13 | (37) 1.62 |
| Infectious Salmon Anaemia (ISA) | (5) 2.20 | (9) 1.44 | (7) 1.29 | (9) 1.00 | (9) 1.44 | (39) 1.41 |

[1]1=low concern, 2=medium concern, 3=high concern

**Table A 4.** Proportion of agencies which have formal or informal agreements with other agencies and organizations to make staff available for response to a terrestrial wildlife disease event within 48 hours, by region, in 2011.

| Organizations | Type of agreement with assisting agency | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | Southeast | Northeast | National |
| | | n | (6) | (12) | (8) | (9) | (11) | (46) |
| State Director USDA-APHIS WS | Formal | % | 16.7 | 33.3 | 50.0 | 11.1 | 45.5 | 32.6 |
| | Informal | % | 66.7 | 58.3 | 37.5 | 77.8 | 36.4 | 54.3 |
| State veterinarians office | Formal | % | 33.3 | 8.3 | 25.0 | 11.1 | 27.3 | 19.6 |
| | Informal | % | 50.0 | 83.3 | 62.5 | 77.8 | 45.5 | 65.2 |
| University personnel | Formal | % | 16.7 | 16.7 | 12.5 | 22.2 | 27.3 | 19.6 |
| | Informal | % | 16.7 | 41.7 | 62.5 | 55.6 | 45.5 | 45.7 |
| Federal veterinarian USDA Wildlife Services | Formal | % | 16.7 | 8.3 | 12.5 | 0.0 | 27.3 | 13.0 |
| | Informal | % | 16.7 | 75.0 | 50.0 | 44.4 | 54.5 | 52.2 |
| USFWS | Formal | % | 16.7 | 8.3 | 0.0 | 0.0 | 9.1 | 6.5 |
| | Informal | % | 50.0 | 66.7 | 37.5 | 22.2 | 63.6 | 54.3 |
| USGS | Formal | % | 0.0 | 8.3 | 0.0 | 0.0 | 0.0 | 2.2 |
| | Informal | % | 33.3 | 41.7 | 37.5 | 22.2 | 45.5 | 37.0 |
| Non-governmental organizations | Formal | % | 16.7 | 0.0 | 0.0 | 0.0 | 20.0 | 6.7 |
| | Informal | % | 16.7 | 33.3 | 25.0 | 22.2 | 30.0 | 26.7 |
| Other states' fish and wildlife agencies | Formal | % | 0.0 | 8.3 | 12.5 | 11.1 | .0 | 6.5 |
| | Informal | % | 16.7 | 16.7 | 25.0 | 11.1 | 36.4 | 21.7 |

**Table B 4.** Proportion of agencies which have agreements with other agencies and organizations to make staff available for response to an aquatic wildlife disease event within 48 hours, by region, in 2011.

| Organizations | Type of agreement to allow staff to assist agency during a disease event | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | Southeast | Northeast | National |
| University personnel | | n | (5) | (10) | (7) | (10) | (9) | (41) |
| | Formal | % | 20.0 | 0 | 57.1 | 60.0 | 22.2 | 31.7 |
| | Informal | % | 20.0 | 30.0 | 14.3 | 20.0 | 44.4 | 26.8 |
| State department of ag/ State veterinarians office | | n | (5) | (10) | (7) | (9) | (9) | (40) |
| | Formal | % | 0 | 20.0 | 14.3 | 22.2 | 11.1 | 15.0 |
| | Informal | % | 20.0 | 10.0 | 71.4 | 44.4 | 44.4 | 37.5 |
| USFWS | | n | (5) | (10) | (7) | (10) | (9) | (41) |
| | Formal | % | 0 | 10.0 | 28.6 | 30.0 | 0 | 14.6 |
| | Informal | % | 40.0 | 40.0 | 42.6 | 50.0 | 77.8 | 51.2 |
| Non-governmental organizations | | n | (5) | (10) | (7) | (8) | (9) | (39) |
| | Formal | % | 0 | 20.0 | 0 | 12.5 | 11.1 | 10.3 |
| | Informal | % | 20.0 | 10.0 | 14.3 | 37.5 | 11.1 | 17.9 |
| Federal veterinarian USDA Wildlife Services | | n | (5) | (10) | (7) | (9) | (8) | (39) |
| | Formal | % | 0 | 10.0 | 0 | 22.2 | 0 | 7.7 |
| | Informal | % | 20.0 | 20.0 | 14.3 | 44.4 | 50.0 | 30.8 |
| State Director USDA-APHIS WS | | n | (5) | (10) | (7) | (9) | (8) | (39) |
| | Formal | % | 0 | 0 | 0 | 22.2 | 0 | 5.1 |
| | Informal | % | 20.0 | 10.0 | 28.6 | 33.3 | 50.0 | 28.2 |
| USGS | | n | (5) | (10) | (7) | (9) | (9) | (40) |
| | Formal | % | 0 | 0 | 14.3 | 11.1 | 0 | 5.0 |
| | Informal | % | 20.0 | 10.0 | 0 | 44.4 | 55.6 | 27.5 |
| Other states' fish and wildlife agencies | | n | (5) | (10) | (7) | (9) | (9) | (40) |
| | Formal | % | 0 | 0 | 14.3 | 0 | 0 | 0 |
| | Informal | % | 20.0 | 10.0 | 57.1 | 33.3 | 33.3 | 44.4 |

**Table A 5.** Mean level of interaction that wildlife agency staff with terrestrial disease management responsibilities have with peers in other agencies, by USFWS region, in 2011.

| Agency | Region | | | | | |
|---|---|---|---|---|---|---|
| | Pacific | West | Midwest | Southeast | Northeast | National |
| (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| State Agriculture Dept/State Vet. | 4.17[1] | 3.83 | 3.75 | 3.56 | 3.45 | 3.72 |
| USDA-APHIS Wildlife Services | 3.17 | 3.17 | 3.50 | 3.78 | 3.55 | 3.43 |
| State Public Health | 3.50 | 3.25 | 3.00 | 2.89 | 3.36 | 3.20 |
| USDA-APHIS Veterinary Services | 2.67 | 3.17 | 3.13 | 2.89 | 2.64 | 2.91 |
| US Fish and Wildlife Service | 2.83 | 2.83 | 2.75 | 2.78 | 3.27 | 2.91 |
| US Geological Survey | 2.83 | 2.42 | 2.50 | 2.67 | 2.60 | 2.58 |

[1] Response categories: 1=Never interact; 2=No more than once/year; 3=A few times a year; 4=At least once a month; 5=at least weekly.

**Table B 5.** Level of interaction that aquatic wildlife agency staff with disease management responsibilities have with peers in other agencies, by USFWS region, in 2011.

| Agency | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| US Fish and Wildlife Service | (n) | (4) | (10) | (7) | (10) | (9) | (40) |
| | | 3.75[1] | 3.10 | 3.71 | 2.70 | 3.22 | 3.20 |
| State Agriculture Dept/State Vet. | (n) | (4) | (10) | (8) | (10) | (9) | (41) |
| | | 3.00 | 2.30 | 3.50 | 1.90 | 2.78 | 2.61 |
| USDA-APHIS Veterinary Services | (n) | (4) | (10) | (7) | (10) | (9) | (40) |
| | | 2.75 | 2.20 | 3.14 | 2.50 | 1.78 | 2.40 |
| State Public Health | (n) | (4) | (10) | (7) | (10) | (9) | (40) |
| | | 2.25 | 1.90 | 2.14 | 2.10 | 2.33 | 2.13 |
| USDA-APHIS Wildlife Services | (n) | (3) | (10) | (7) | (10) | (9) | (39) |
| | | 2.33 | 2.10 | 1.86 | 2.40 | 2.00 | 2.13 |
| US Geological Survey | (n) | (4) | (10) | (7) | (10) | (9) | (40) |
| | | 3.50 | 1.40 | 2.29 | 1.90 | 2.22 | 2.07 |

[1] Response categories: 1=Never interact; 2=No more than once/year; 3=A few times a year; 4=At least once a month; 5=at least weekly.

**Table A 6.** Proportion of agencies who reported that communication between their agency and other specific agencies was sufficient to achieve the wildlife agency's terrestrial disease management objectives, by USFWS region, in 2011.

| Agency | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| | (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| State Agriculture Dept/State Vet. | % | 100.0 | 100.0 | 87.5 | 88.9 | 72.7 | 89.1 |
| State Public Health | % | 66.7 | 91.7 | 87.5 | 55.6 | 81.8 | 78.3 |
| USDA-APHIS Veterinary Services | % | 66.7 | 91.7 | 100.0 | 88.9 | 72.7 | 84.8 |
| USDA-APHIS Wildlife Services | % | 83.3 | 91.7 | 100.0 | 88.9 | 90.9 | 91.3 |
| US Geological Survey | % | 66.7 | 83.3 | 37.5 | 77.8 | 60.0 | 66.7 |
| US Fish and Wildlife Service | % | 66.7 | 83.3 | 37.5 | 66.7 | 63.6 | 65.2 |

**Table B 6.** Proportion of agencies who reported that communication between their agency and other specific agencies was sufficient to achieve the fish and wildlife agency's aquatic disease management objectives, by USFWS region, in 2011.

| Agency | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| US Fish and Wildlife Service | (n) | (4) | (10) | (7) | (10) | (9) | (40) |
| | % | 100.0 | 100.0 | 100.0 | 80.0 | 77.8 | 90.0 |
| USDA-APHIS Veterinary Services | (n) | (4) | (10) | (7) | (9) | (9) | (39) |
| | % | 100.0 | 90.0 | 71.4 | 66.7 | 44.4 | 71.8 |
| US Geological Survey | (n) | (4) | (8) | (7) | (9) | (9) | (37) |
| | % | 100.0 | 62.5 | 85.7 | 55.6 | 66.7 | 70.3 |
| State Agriculture Dept/State Vet. | (n) | (4) | (10) | (8) | (9) | (9) | (40) |
| | % | 100.0 | 60.0 | 75.0 | 66.7 | 66.7 | 70.0 |
| State Public Health | (n) | (3) | (9) | (7) | (9) | (9) | (37) |
| | % | 100.0 | 77.8 | 42.9 | 66.7 | 66.7 | 67.6 |
| USDA-APHIS Wildlife Services | (n) | (3) | (9) | (7) | (9) | (9) | (37) |
| | % | 100.0 | 88.9 | 42.9 | 55.6 | 55.6 | 64.9 |

**Table A 7.** Proportion of states who used various sources (sometime during the preceding 3 years) to fund agency activities related to detection of and response to terrestrial disease issues, by USFWS region, in 2011.

| Possible sources of funding | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| | (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| Federal grants for response to specific diseases (CWD, AI, etc.) | % | 100.0 | 100.0 | 100.0 | 100.0 | 90.9 | 97.8 |
| Pittman-Robertson (federal formula Funds | % | 83.3 | 75.0 | 75.0 | 88.9 | 81.8 | 80.4 |
| Hunting license sale funds | % | 66.7 | 83.3 | 87.5 | 88.9 | 54.5 | 76.1 |
| State general revenue funds | % | 50.0 | 25.0 | 25.0 | 55.6 | 9.1 | 30.4 |
| State wildlife grants | % | 33.3 | 16.7 | 25.0 | 66.7 | 18.2 | 30.4 |
| Other[1] | % | 33.3 | 25.0 | 12.5 | 0.0 | 9.1 | 15.2 |

[1]Other sources of funding: dedicated sales tax; fines; National Fish and Wildlife Foundation grants; NGO or other state grants; species Conservation Trust Fund; USFWS Section 6 funds.

**Table B 7.** Proportion of states who used various sources in(sometime during the preceding 3 years) to fund agency activities related to detection of and response to aquatic disease issues, by USFWS region, in 2011.

| Possible sources of funding | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| | n | (5) | (10) | (7) | (10) | (9) | (41) |
| Dingle-Johnson (federal formula) Funds | % | 50.0 | 90.0 | 62.5 | 80.0 | 77.8 | 75.6 |
| Fishing license sale funds | % | 75.0 | 90.0 | 62.5 | 60.0 | 88.9 | 75.6 |
| Federal grants for response to a specific disease | % | 50.0 | 60.0 | 25.0 | 30.0 | 22.2 | 36.6 |
| State general revenue funds | % | 50.0 | 20.0 | 12.5 | 50.0 | 22.2 | 29.3 |
| State wildlife grants | % | 25.0 | 20.0 | 0 | 40.0 | 0 | 17.1 |
| Other[1] | % | 50.0 | 10.0 | 0 | 10.0 | 11.1 | 12.2 |

[1]Other sources of funding: dedicated sales tax; fines; National Fish and Wildlife Foundation grants; NGO or other state grants; species Conservation Trust Fund; USFWS Section 6 funds.

**Table A 8.** Agency which has lead authority to respond to terrestrial wildlife disease events that affect wildlife, domestic animals, or human health, by region, in 2011.

| | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | Southeast | Northeast | National |
| Authority to lead response to disease events that affect free-ranging wildlife | | (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| | State wildlife agency | % | 100.0 | 91.7 | 87.5 | 55.6 | 100.0 | 87.0 |
| | State Ag. Dept/State Vet. | % | -- | -- | 12.5 | 11.1 | -- | 4.3 |
| | State Public Health Dept | % | -- | -- | -- | -- | -- | -- |
| | Combination | % | -- | 8.3 | -- | 33.3 | -- | 8.7 |
| | Unclear | % | -- | -- | -- | -- | -- | -- |
| | Other | % | -- | -- | -- | -- | -- | -- |
| Authority to lead response to disease events that affect domestic animals | State wildlife agency | % | 16.7 | 0.0 | 0.0 | 0.0 | -- | 2.2 |
| | State Ag. Dept/State Vet. | % | 83.3 | 100.0 | 100.0 | 88.9 | 100.0 | 95.7 |
| | State Public Health Dept | % | -- | -- | -- | -- | -- | -- |
| | Combination | % | -- | -- | -- | 11.1 | -- | 2.2 |
| | Unclear | % | -- | -- | -- | -- | -- | -- |
| | Other | % | -- | -- | -- | -- | -- | -- |
| Authority to lead response to disease events that have human health implications | State wildlife agency | % | 16.7 | -- | -- | -- | -- | 2.2 |
| | State Ag. Dept/State Vet. | % | -- | -- | -- | -- | -- | -- |
| | State Public Health Dept | % | 50.0 | 91.7 | 100.0 | 77.8 | 100.0 | 87.0 |
| | Combination | % | 16.7 | 8.3 | -- | 22.2 | -- | 8.7 |
| | Unclear | % | 16.7 | -- | -- | -- | -- | 2.2 |
| | Other | % | -- | -- | -- | -- | -- | -- |

**Table B 8.** Agency which has lead authority to respond to aquatic wildlife disease events that affect wildlife, domestic animals, or human health, by region, in 2011.

| Type of Authority | Agency with lead authority | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | South east | North east | National |
| | | (n) | (4) | (10) | (8) | (10) | (9) | (41) |
| Authority to lead response to disease events that affect wild fish | State fish & wildlife agency | % | 75.0 | 100.0 | 87.5 | 80.0 | 100.0 | 90.2 |
| | State Ag. Dept/State Vet. | % | -- | -- | -- | -- | -- | -- |
| | State Public Health Dept | % | -- | -- | -- | -- | -- | -- |
| | Combination | % | -- | -- | 12.5 | 10.0 | -- | 4.9 |
| | Unclear | % | -- | -- | -- | 10.0 | -- | 2.4 |
| | Other | % | 25.0 | -- | -- | -- | -- | 2.4 |
| Authority to lead response to disease events that affect commercially-raised fish / aquaculture | State wildlife agency | % | 50.0 | 50.0 | 25.0 | 20.0 | 55.6 | 39.0 |
| | State Ag. Dept/State Vet. | % | 25.0 | 30.0 | 50.0 | 80.0 | 11.1 | 41.5 |
| | State Public Health Dept | % | -- | -- | -- | -- | -- | -- |
| | Combination | % | -- | -- | 25.0 | -- | 11.1 | 7.3 |
| | Unclear | % | -- | 20.0 | -- | -- | 22.2 | 9.8 |
| | Other | % | 25.0 | -- | -- | -- | -- | 2.4 |
| Authority to lead response to disease events that have human health implications | State wildlife agency | % | -- | 10.0 | 12.5 | -- | 11.1 | 7.3 |
| | State Ag. Dept/State Vet. | % | -- | -- | -- | -- | -- | -- |
| | State Public Health Dept | % | 50.0 | 30.0 | 50.0 | 60.0 | 77.8 | 53.7 |
| | Combination | % | 50.0 | 30.0 | 37.5 | 20.0 | 11.1 | 26.8 |
| | Unclear | % | -- | 30.0 | -- | 20.0 | -- | 12.2 |
| | Other | % | - | -- | -- | -- | -- | -- |

**Table A 9.** Proportion of agencies who reported that authority to respond to various types of terrestrial disease management issues is clearly defined in their state, by USFWS region, in 2011.

| | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| | (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| Authority of agencies to respond to disease outbreaks that affect free-ranging wildlife are clearly defined | % | 83.3 | 100.0 | 100.0 | 77.8 | 90.9 | 91.3 |
| Authority of agencies to respond to disease outbreaks that affect farmed domestic animals are clearly defined | % | 100.0 | 91.7 | 100.0 | 66.7 | 90.9 | 89.1 |
| Authority of agencies to respond to disease outbreaks that have human health implications are clearly defined | % | 50.0 | 100.0 | 87.5 | 66.7 | 81.8 | 80.4 |

**Table B 9.** Proportion of agencies who reported that authority to respond to various types of aquatic disease management issues is clearly defined in their state, by USFWS region, in 2011.

| Type of authority | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| Authority of agencies to respond to disease outbreaks that affect wild fish | (n) | (4) | (9) | (8) | (10) | (9) | (40) |
| | % | 75.0 | 66.7 | 100.0 | 70.0 | 66.7 | 75.0 |
| Authority of agencies to respond to disease outbreaks that affect commercially-raised fish / aquaculture | (n) | (4) | (10) | (8) | (10) | (9) | (41) |
| | % | 100.0 | 80.0 | 87.5 | 50.0 | 66.7 | 73.2 |
| Authority of agencies to respond to disease outbreaks that have human health implications are clearly defined | (n) | (3) | (10) | (7) | (10) | (9) | (39) |
| | % | 100.0 | 50.0 | 100.0 | 50.0 | 33.3 | 59.0 |

**Table A 10.** Importance that agencies place on clarifying their authority to respond to terrestrial wildlife disease events that affect wildlife, domestic animals, or human health, by region, in 2011.

| Type of disease outbreak | Importance agency places on clarifying its authority in this area | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | Southeast | Northeast | National |
| | | (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| Outbreak affects Free-ranging wildlife | Not at all important | % | -- | 16.7 | 12.5 | -- | 9.1 | 8.7 |
| | Somewhat important | % | -- | 16.7 | 12.5 | 33.3 | 18.2 | 17.4 |
| | Very important | % | 100.0 | 66.7 | 75.0 | 66.7 | 72.7 | 73.9 |
| Outbreak affects Farmed domestic animals | Not at all important | % | 33.3 | 16.7 | -- | 22.2 | 18.2 | 17.4 |
| | Somewhat important | % | 33.3 | 66.7 | 50.0 | 44.4 | 36.4 | 47.8 |
| | Very important | % | 33.3 | 16.7 | 50.0 | 33.3 | 45.5 | 34.8 |
| Outbreak has Implications for Human health | Not at all important | % | 16.7 | 8.3 | -- | 11.1 | 18.2 | 10.9 |
| | Somewhat important | % | 66.7 | 50.0 | 37.5 | 44.4 | 36.4 | 45.7 |
| | Very important | % | 16.7 | 41.7 | 62.5 | 44.4 | 45.5 | 43.5 |

**Table B 10.** Importance that agencies place on clarifying their authority to respond to aquatic wildlife disease events that affect wildlife, domestic animals, or human health, by region, in 2011.

| Type of disease outbreak | Importance agency places on clarifying its authority in this area | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | Southeast | Northeast | National |
| Outbreak affects wild fish | | (n) | (4) | (10) | (8) | (9) | (9) | (40) |
| | Not at all important | % | -- | -- | 12.5 | -- | 11.1 | 5 |
| | Somewhat important | % | 50.0 | 30.0 | 37.5 | 33.3 | 33.3 | 35.0 |
| | Very important | % | 50.0 | 70.0 | 50.0 | 66.7 | 55.6 | 60.0 |
| Outbreak affects commercially-raised Fish / aquaculture | | (n) | (4) | (10) | (7) | (9) | (9) | (39) |
| | Not at all important | % | -- | 10.0 | -- | 11.1 | 11.1 | 7.7 |
| | Somewhat important | % | 25.0 | 40.0 | 71.4 | 55.6 | 33.3 | 46.2 |
| | Very important | % | 75.0 | 50.0 | 28.6 | 33.3 | 55.6 | 46.2 |
| Outbreak has Implications for Human health | | (n) | (3) | (9) | (7) | (9) | (9) | (37) |
| | Not at all important | % | -- | 11.1 | 28.6 | 11.1 | -- | 10.8 |
| | Somewhat important | % | -- | 66.7 | 42.9 | 33.3 | 33.3 | 40.5 |
| | Very important | % | 100.0 | 22.2 | 28.6 | 55.6 | 66.7 | 48.6 |

**Table A 11.** Perceived trend in funding for terrestrial disease management over the past 5 years, by region, in 2011.

| Perceived trend in funding over 5 years | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| | (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| Decreased greatly | % | 16.7 | 16.7 | 12.5 | 22.2 | 18.2 | 17.4 |
| Decreased moderately | % | 16.7 | 33.3 | 12.5 | 33.3 | 27.3 | 26.1 |
| Remained about the same | % | 33.3 | 41.7 | 50.0 | 11.1 | 36.4 | 34.8 |
| Increased moderately | % | 33.3 | 8.3 | 12.5 | 33.3 | -- | 15.2 |
| Increased greatly | % | -- | -- | 12.5 | -- | 9.1 | 4.3 |
| Unsure/don't know | % | -- | -- | -- | -- | 9.1 | 2.2 |



**Table B 11.** Perceived trend in funding for aquatic disease management over the past 5 years, by region, in 2011.

| Perceived trend in funding over 5 years | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| | n | (5) | (10) | (7) | (10) | (9) | (41) |
| Decreased greatly | % | 25.0 | 10.0 | 14.3 | 0 | 22.2 | 12.5 |
| Decreased moderately | % | -- | 10.0 | 14.3 | 50.0 | 33.3 | 25.0 |
| Remained about the same | % | 25.0 | 40.0 | 42.9 | 40.0 | 33.3 | 37.5 |
| Increased moderately | % | 50.0 | 10.0 | 28.6 | -- | -- | 12.5 |
| Increased greatly | % | -- | 20.0 | -- | -- | 11.1 | 7.5 |
| Unsure/don't know | % | -- | 10.0 | -- | 10.0 | -- | 5.0 |

**Table A 12.** Agency assessment of adequacy of agency funding, diagnostic testing facilities, and internal communication to address terrestrial disease issues, by region, in 2011.

| | Adequacy rating | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | Southeast | Northeast | National |
| Current level of funding for monitoring and surveillance of wildlife diseases | | (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| | Not at all adequate | % | -- | -- | -- | 11.1 | 18.2 | 6.5 |
| | Partially adequate | % | 83.3 | 66.7 | 75.0 | 66.7 | 63.6 | 69.6 |
| | Adequate | % | 16.7 | 33.3 | 25.0 | 22.2 | 18.2 | 23.9 |
| | More than adequate | % | -- | -- | -- | -- | -- | -- |
| Current level of funding for response to wildlife-disease outbreaks | | | | | | | | |
| | Not at all adequate | % | 33.3 | 33.3 | 0.0 | 22.2 | 27.3 | 23.9 |
| | Partially adequate | % | 50.0 | 50.0 | 75.0 | 77.8 | 63.6 | 63.0 |
| | Adequate | % | 16.7 | 16.7 | 25.0 | 0.0 | 9.1 | 13.0 |
| | More than adequate | % | -- | -- | -- | -- | -- | -- |
| Current capacity of the facilities your state relies on for diagnostic testing during disease events | | | | | | | | |
| | Not at all adequate | % | -- | -- | -- | -- | -- | -- |
| | Partially adequate | % | 16.7 | 16.7 | 12.5 | 0.0 | 18.2 | 13.0 |
| | Adequate | % | 16.7 | 41.7 | 50.0 | 77.8 | 54.5 | 50.0 |
| | More than adequate | % | 66.7 | 41.7 | 37.5 | 22.2 | 27.3 | 37.0 |
| Communication between levels of your agency with regard to disease response | | | | | | | | |
| | Not at all adequate | % | 16.7 | -- | -- | 22.2 | 18.2 | 10.9 |
| | Partially adequate | % | -- | 25.0 | 25.0 | 11.1 | 27.3 | 19.6 |
| | Adequate | % | 66.7 | 75.0 | 75.0 | 55.6 | 45.5 | 63.0 |

**Table B 12.** Agency assessment of adequacy of diagnostic testing facilities, agency funding, and internal communication for aquatic disease issues, by region, in 2011.

| | | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Adequacy rating | | Pacific | West | Midwest | Southeast | Northeast | National |
| Current level of funding for monitoring and surveillance of wildlife diseases | | n | (4) | (10) | (7) | (10) | (9) | (40) |
| | Not at all adequate | % | -- | 10.0 | 28.6 | 30.0 | 11.1 | 17.5 |
| | Partially adequate | % | 25.0 | 40.0 | 42.9 | 60.0 | 55.6 | 47.5 |
| | Adequate | % | 25.0 | 50.0 | 28.6 | 10.0 | 33.3 | 30.0 |
| | More than adequate | % | 50.0 | -- | -- | -- | -- | 5.0 |
| Current level of funding for response to wildlife-disease outbreaks | | n | (4) | (10) | (7) | (10) | (9) | (40) |
| | Not at all adequate | % | -- | 10.0 | 42.9 | 30.0 | 33.3 | 25.0 |
| | Partially adequate | % | 25.0 | 40.0 | 14.3 | 50.0 | 33.3 | 35.0 |
| | Adequate | % | 25.0 | 50.0 | 42.9 | 20.0 | 33.3 | 35.0 |
| | More than adequate | % | 50.0 | -- | -- | -- | -- | 5.0 |
| Current capacity of the facilities your state relies on for diagnostic testing during disease events | | n | (5) | (10) | (7) | (10) | (9) | (41) |
| | Not at all adequate | % | -- | -- | -- | -- | 11.1 | 2.4 |
| | Partially adequate | % | -- | 20.0 | 14.3 | -- | 11.1 | 9.8 |
| | Adequate | % | 60.0 | 30.0 | 71.4 | 60.0 | 44.4 | 51.2 |
| | More than adequate | % | 40.0 | 50.0 | 14.3 | 40.0 | 33.3 | 36.6 |
| Communication between levels of your agency with regard to disease response | | n | (4) | (10) | (7) | (10) | (9) | (40) |
| | Not at all adequate | % | -- | 10.0 | 14.3 | 0 | 11.1 | 7.5 |
| | Partially adequate | % | 25.0 | 10.0 | 42.9 | 20.0 | 33.3 | 25.0 |
| | Adequate | % | 50.0 | 70.0 | 42.9 | 80.0 | 44.4 | 60.0 |
| | More than adequate | % | 25.0 | 10.0 | -- | -- | 11.1 | 7.5 |

**Table A 13.** Proportion of state representatives who agreed with statements about staff capacity to address terrestrial disease issues, by USFWS region, in 2011.

| Statements | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| | (n) | (6) | (12) | (8) | (9) | (12) | (47) |
| Agency has access to wildlife veterinarians who can assist with response to terrestrial disease outbreaks | % | 100.0 | 100.0 | 87.5 | 100.0 | 100.0 | 97.9 |
| Agency has one or more wildlife veterinarians on staff | % | 100.0 | 33.3 | 42.9 | 22.2 | 25.0 | 37.8 |
| Agency has access to wildlife pathologists who can assist with response to terrestrial disease outbreaks | % | 100.0 | 100.0 | 87.5 | 100.0 | 100.0 | 97.9 |
| Agency has one or more pathologists on staff | % | -- | -- | -- | -- | 8.3 | 2.2 |
| Access to wildlife veterinarians is impeding early detection of diseases in our agency | % | -- | 8.3 | -- | 11.1 | 8.3 | 6.4 |
| Access to wildlife pathologists is impeding early detection of diseases in our agency | % | 33.3 | 16.7 | -- | 11.1 | 16.7 | 14.9 |

**Table B 13.** Proportion of state representatives who agreed with statements about staff capacity to address aquatic disease issues, by USFWS region, in 2011.

| Statements | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| Agency has access to wildlife veterinarians with aquatic disease expertise. | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| | % | 60.0 | 80.0 | 100.0 | 80.0 | 77.8 | 80.5 |
| Agency has one or more wildlife veterinarians with aquatic experience on staff. | (n) | (3) | (8) | (7) | (8) | (7) | (33) |
| | % | 100.0 | 37.5 | 28.6 | 12.5 | 28.6 | 33.3 |
| Agency has access to wildlife pathologists who can assist with response to terrestrial disease outbreaks. | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| | % | 100.0 | 90.0 | 100.0 | 100.0 | 100.0 | 97.6 |
| Agency has one or more aquatic pathologists on staff. | (n) | (5) | (9) | (7) | (10) | (8) | (39) |
| | % | 100.0 | 33.3 | 28.6 | 20.0 | 50.0 | 41.0 |
| Access to wildlife veterinarians with aquatic expertise is impeding early detection of diseases in our agency. | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| | % | -- | 20.0 | 28.6 | -- | 22.2 | 14.6 |
| Access to wildlife pathologists with aquatic expertise is impeding early detection of diseases in our agency. | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| | % | -- | 20.0 | 28.6 | -- | 33.3 | 17.1 |

**Table A 14.** Proportion of agencies which have adequate staff available to respond to short-term and long-term terrestrial disease outbreaks, by region, in 2011.

| | Response | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | Southeast | Northeast | National |
| | | (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| Number of field staff available is adequate for short-term response to disease outbreaks | No | % | 16.7 | 8.3 | 25.0 | 11.1 | 27.3 | 17.4 |
| | Yes | % | 66.7 | 91.7 | 75.0 | 66.7 | 72.7 | 76.1 |
| | Not applicable[1] | % | 16.7 | -- | -- | 22.2 | -- | 6.5 |
| Number of field staff available is adequate for long-term Response to disease outbreaks | No | % | 66.7 | 91.7 | 62.5 | 66.7 | 72.7 | 73.9 |
| | Yes | % | 16.7 | 8.3 | 37.5 | 11.1 | 27.3 | 19.6 |
| | Not applicable | % | 16.7 | -- | -- | 22.2 | -- | 6.5 |

[1]Agency representatives were instructed to check the "Not Applicable" response if response to disease outbreaks was a low priority to their agency.

**Table B 14.** Proportion of agencies which have adequate staff available to respond to short-term and long-term aquatic disease outbreaks, by region, in 2011.

| | Response | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | Southeast | Northeast | National |
| Number of field staff available | | n | (5) | (10) | (7) | (10) | (9) | (41) |
| is adequate for short-term | No | % | 20.0 | 20.0 | 14.3 | -- | 33.3 | 17.1 |
| response to disease outbreaks | Yes | % | 80.0 | 80.0 | 85.7 | 100.0 | 55.6 | 80.5 |
| | Not applicable | % | -- | -- | -- | -- | 11.1 | 2.4 |
| Number of field staff available | | n | (5) | (10) | (7) | (10) | (9) | (41) |
| is adequate for long-term | No | % | 20.0 | 40.0 | 57.1 | 50.0 | 55.6 | 46.3 |
| Response to disease outbreaks | Yes | % | 80.0 | 60.0 | 42.9 | 50.0 | 33.3 | 51.2 |
| | Not applicable | % | -- | -- | -- | -- | 11.1 | 2.4 |

**Table A 15.** Perceived adequacy of staff skill sets in four areas related to detection of and response to terrestrial disease outbreaks, by USFWS region, in 2011.

| | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| | (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| Communicating with other staff within your agency | | | | | | | |
| Low | | -- | -- | -- | 11.1 | 9.1 | 4.3 |
| Medium | | 50.0 | 50.0 | 25.0 | 11.1 | 45.5 | 37.0 |
| High | | 50.0 | 50.0 | 75.0 | 77.8 | 45.5 | 58.7 |
| Submitting tissue samples | | | | | | | |
| Low | | -- | 8.3 | -- | -- | -- | 2.2 |
| Medium | | 50.0 | 41.7 | 12.5 | 44.4 | 63.6 | 43.5 |
| High | | 50.0 | 50.0 | 87.5 | 55.6 | 36.4 | 54.3 |
| Communicating with staff in other state and federal agencies | | | | | | | |
| Low | | 16.7 | -- | -- | 11.1 | -- | 4.3 |
| Medium | | 50.0 | 41.7 | 50.0 | 22.2 | 54.5 | 43.5 |
| High | | 33.3 | 58.3 | 50.0 | 66.7 | 45.5 | 52.2 |
| Implementing emergency response plans | | | | | | | |
| Low | | 50.0 | 25.0 | -- | 44.4 | 27.3 | 28.3 |
| Medium | | 33.3 | 58.3 | 75.0 | 44.4 | 54.5 | 54.3 |
| High | | 16.7 | 16.7 | 25.0 | 11.1 | 18.2 | 17.4 |

**Table B 15.** Perceived adequacy of staff skill sets in four areas related to detection of and response to disease aquatic outbreaks Priority agencies place on achieving four objectives for managing diseases in wildlife, by USFWS region, in 2011.

| | | Region | | | | | |
|---|---|---|---|---|---|---|---|
| Staff skill set descriptions | | Pacific | West | Midwest | Southeast | Northeast | National |
| Communicating with other staff within your agency | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| Low | | -- | -- | 14.3 | -- | -- | 2.4 |
| Medium | | 20.0 | 30.0 | 14.3 | 10.0 | 33.3 | 22.0 |
| High | | 80.0 | 70.0 | 71.4 | 90.0 | 66.7 | 75.6 |
| Submitting tissue samples usable for diagnostic testing | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| Low | | -- | 10.0 | 14.3 | -- | 22.2 | 9.8 |
| Medium | | 20.0 | 10.0 | -- | 30.0 | 33.3 | 19.5 |
| High | | 80.0 | 80.0 | 85.7 | 70.0 | 44.4 | 70.7 |
| Communicating with staff in other state and federal agencies | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| Low | | -- | -- | 14.3 | -- | -- | 2.4 |
| Medium | | 20.0 | 40.0 | 28.6 | 40.0 | 55.6 | 39.0 |
| High | | 80.0 | 60.0 | 57.1 | 60.0 | 44.4 | 58.5 |
| Implementing emergency response plans | (n) | (5) | (10) | (7) | (10) | (9) | (41) |
| Low | | -- | 30.0 | 28.6 | 10.0 | 33.3 | 22.0 |
| Medium | | 40.0 | 30.0 | 42.9 | 70.0 | 33.3 | 43.9 |
| High | | 60.0 | 40.0 | 286 | 20.0 | 33.3 | 34.1 |

**Table A 16.** State agency access to terrestrial wildlife disease diagnostic facilities, by region, in 2011.

| Facilities to which agency has access | Response | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | Southeast | Northeast | National |
| | | (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| Laboratory(s) in other states | | | | | | | | |
| | No | % | -- | -- | -- | 11.1 | -- | 2.2 |
| | Yes | % | 100.0 | 100.0 | 100.0 | 88.9 | 100.0 | 97.8 |
| Access to NAHLN-accredited facilities to test for Chronic Wasting Disease | | | | | | | | |
| | No | % | -- | -- | -- | -- | -- | -- |
| | Yes | % | 100.0 | 91.7 | 87.5 | 77.8 | 100.0 | 91.3 |
| | Unsure | % | 0.0 | 8.3 | 12.5 | 22.2 | 0.0 | 8.7 |
| Laboratory(s) operated by other agency, organization or university in your state | | | | | | | | |
| | No | % | 16.7 | 8.3 | -- | -- | 27.3 | 10.9 |
| | Yes | % | 83.3 | 91.7 | 100.0 | 100.0 | 72.7 | 89.1 |
| Access to NAHLN-accredited facilities to test for avian influenza | | | | | | | | |
| | No | % | -- | -- | -- | 11.1 | -- | 2.2 |
| | Yes | % | 83.3 | 83.3 | 62.5 | 66.7 | 72.7 | 73.9 |
| | Unsure | % | 16.7 | 16.7 | 37.5 | 22.2 | 27.3 | 23.9 |
| Laboratory(s) operated by your agency | | | | | | | | |
| | No | % | 33.3 | 75.0 | 75.0 | 77.8 | 81.8 | 71.7 |
| | Yes | % | 66.7 | 25.0 | 25.0 | 22.2 | 18.2 | 28.3 |

**Table B 16.** State agency access to aquatic wildlife disease diagnostic facilities, by region, in 2011.

| Facilities to which agency has access | Response | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | Southeast | Northeast | National |
| Laboratory(s) in other states | | n | (5) | (10) | (7) | (10) | (9) | (41) |
| | No | % | 40.0 | -- | -- | 30.0 | 11.1 | 14.6 |
| | Yes | % | 60.0 | 100.0 | 100.0 | 70.0 | 88.9 | 85.4 |
| Laboratory(s) operated by other agency, organization or university in your state | | n | (5) | (10) | (7) | (10) | (9) | (41) |
| | No | % | 20.0 | 30.0 | 14.3 | -- | 33.3 | 19.5 |
| | Yes | % | 80.0 | 70.0 | 85.7 | 100.0 | 66.7 | 80.5 |
| Laboratory(s) operated by your agency | | n | (5) | (10) | (7) | (10) | (9) | (41) |
| | No | % | -- | 50.0 | 57.1 | 70.0 | 55.6 | 51.2 |
| | Yes | % | 100.0 | 50.0 | 42.9 | 30.0 | 44.4 | 48.8 |

**Table A 17.** Proportion of states with who have developed specific plans for response to a range of terrestrial disease risks, by USFWS region, in 2011.

| | | Percent who agreed with statement, by region | | | | | |
|---|---|---|---|---|---|---|---|
| | | Pacific | West | Midwest | Southeast | Northeast | National |
| | (n) | (6) | (12) | (8) | (9) | (11) | (46) |
| Types of planning instruments | | | | | | | |
| Formal plan for emergency response to chronic wasting disease (CWD) | % | 50.0 | 83.3 | 87.5 | 88.9 | 81.8 | 80.4 |
| Formal plan for emergency response to avian Influenza (AI) | % | 66.7 | 25.0 | 62.5 | 66.7 | 54.5 | 52.2 |
| A strategic plan (i.e., written goals and objectives) for response to disease outbreaks | % | 33.3 | 25.0 | 37.5 | 44.4 | 45.5 | 37.0 |
| Formal plan for emergency internal communications during a disease outbreak | % | 33.3 | 25.0 | 37.5 | 22.2 | 63.6 | 37.0 |
| Formal plan for disposing of animal carcasses associated with disease management | % | 16.7 | 25.0 | 62.5 | 25.0 | 45.5 | 35.6 |
| Formal plan for emergency response to foot-and-mouth disease (FMD) | % | 33.3 | 0.0 | 25.0 | 22.2 | 45.5 | 23.9 |
| Formal plan for emergency response to West Nile virus | % | 16.7 | 8.3 | 37.5 | -- | 27.3 | 17.4 |
| Formal plan for emergency response to waterfowl diseases | % | 16.7 | 8.3 | 12.5 | 22.2 | 18.2 | 15.2 |

**Table B 17.** Proportion of states with who have developed specific plans for response to a range of aquatic disease risks, by USFWS region, in 2011.

| | | Percent who agreed with statement, by region | | | | | |
|---|---|---|---|---|---|---|---|
| Types of planning instruments | | Pacific | West | Midwest | Southeast | Northeast | National |
| Formal plan for emergency internal communications during a disease outbreak | (n) | (4) | (10) | (7) | (10) | (9) | (40) |
| | % | 50.0 | 20.0 | 57.1 | 40.0 | 22.2 | 35.0 |
| Formal plan for disposing of animal Carcasses associated with disease management | (n) | (4) | (9) | (7) | (9) | (8) | (37) |
| | % | 75.0 | 0.0 | 57.1 | 11.1 | 50.0 | 32.4 |
| Formal plan for emergency response to Viral Hemorrhagic Septicemia(VHS) | (n) | (4) | (10) | (7) | (10) | (9) | (40) |
| | % | 75.0 | 20.0 | 42.9 | 10.0 | 22.2 | 27.5 |
| A strategic plan (i.e., written goals and obj.) for response to aquatic disease outbreaks | (n) | (4) | (9) | (7) | (10) | (8) | (38) |
| | % | 50.0 | 11.1 | 57.1 | 10.0 | 12.5 | 23.7 |
| Formal plan for emergency response to Whirling disease (WD) | (n) | (4) | (10) | (7) | (10) | (8) | (39) |
| | % | 75.0 | 30.0 | 0.0 | 0.0 | 22.2 | 20.0 |
| Formal plan for emergency response to Infectious Hematopietic Necrosis (IHN) | (n) | (4) | (10) | (7) | (10) | (9) | (40) |
| | % | 75.0 | 10.0 | 0.0 | 0.0 | 25.0 | 15.4 |
| Formal plan for emergency response to Infectious Pancreatic Necrosis (IPN) | (n) | (4) | (10) | (7) | (10) | (9) | (40) |
| | % | 50.0 | 10.0 | 0.0 | 0.0 | 11.1 | 10.0 |

**Table A 18.** Level of staff training available on topics related to terrestrial disease detection and response, by region, in 2011.

| Staff skill set descriptions | Level of training available[1] | (n) | Region: Pacific (6) | West (12) | Midwest (8) | Southeast (9) | Northeast (11) | National (46) |
|---|---|---|---|---|---|---|---|---|
| Proper sample collection and submission | None | % | -- | -- | -- | -- | 18.2 | 4.3 |
| | Limited | % | 66.7 | 25.0 | 75.0 | 66.7 | 63.6 | 56.5 |
| | Adequate | % | 33.3 | 75.0 | 25.0 | 33.3 | 18.2 | 39.1 |
| Sampling methods/approaches to collect valid and reliable data on pathogens | None | % | -- | -- | -- | 11.1 | 27.3 | 8.7 |
| | Limited | % | 66.7 | 50.0 | 62.5 | 77.8 | 54.5 | 60.9 |
| | Adequate | % | 33.3 | 50.0 | 37.5 | 11.1 | 18.2 | 30.4 |
| Use of protective equipment | None | % | -- | -- | -- | 11.1 | 27.3 | 8.7 |
| | Limited | % | 83.3 | 58.3 | 75.0 | 44.4 | 54.5 | 60.9 |
| | Adequate | % | 16.7 | 41.7 | 25.0 | 44.4 | 18.2 | 30.4 |
| Safe work practices | None | % | 16.7 | 8.3 | -- | 11.1 | 27.3 | 13.0 |
| | Limited | % | 66.7 | 58.3 | 62.5 | 44.4 | 45.5 | 54.3 |
| | Adequate | % | 16.7 | 33.3 | 37.5 | 44.4 | 27.3 | 32.6 |
| Implementing emergency response plans/protocols | None | % | 66.7 | 25.0 | 25.0 | 11.1 | 54.5 | 34.8 |
| | Limited | % | 16.7 | 58.3 | 62.5 | 66.7 | 45.5 | 52.2 |
| | Adequate | % | 16.7 | 16.7 | 12.5 | 22.2 | -- | 13.0 |
| Emergency communication plans | None | % | 83.3 | 33.3 | 25.0 | 22.2 | 54.5 | 41.3 |
| | Limited | % | -- | 58.3 | 62.5 | 55.6 | 36.4 | 45.7 |
| | Adequate | % | 16.7 | 8.3 | 12.5 | 22.2 | 9.1 | 13.0 |

[1]Full response options were: “no training on this topic available to staff”; “limited training available, but more is needed”; “adequate training on this topic is available to staff.”

**Table B 18.** Level of staff training available on topics related to aquatic disease detection and response, by region, in 2011.

| Staff skill set descriptions | Level of training available[1] | | Region | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pacific | West | Midwest | Southeast | Northeast | National |
| | | n | (5) | (10) | (7) | (10) | (9) | (41) |
| Proper sample collection and submission | None | % | -- | -- | -- | -- | 22.2 | 4.9 |
| | Limited | % | 40.0 | 60.0 | 28.6 | 30.0 | 33.3 | 39.0 |
| | Adequate | % | 60.0 | 40.0 | 71.4 | 70.0 | 44.4 | 56.1 |
| Safe work practices | None | % | -- | 20.0 | -- | 10.0 | 22.2 | 12.2 |
| | Limited | % | -- | 30.0 | 42.9 | 40.0 | 44.4 | 34.1 |
| | Adequate | % | 100.0 | 50.0 | 57.1 | 50.0 | 33.3 | 53.7 |
| Use of protective equipment | None | % | -- | 30.0 | -- | 20.0 | 22.2 | 17.1 |
| | Limited | % | 40.0 | 10.0 | 28.6 | 50.0 | 55.6 | 36.6 |
| | Adequate | % | 60.0 | 60.0 | 71.4 | 30.0 | 22.2 | 46.3 |
| Sampling methods/approaches to collect valid and reliable data on pathogens | None | % | -- | 10.0 | 14.3 | 10.0 | 33.3 | 14.6 |
| | Limited | % | 40.0 | 60.0 | 28.6 | 40.0 | 33.3 | 41.5 |
| | Adequate | % | 60.0 | 30.0 | 57.1 | 50.0 | 33.3 | 43.9 |
| Implementing emergency response plans/protocols | None | % | 20.0 | 60.0 | 14.3 | 30.0 | 55.6 | 39.0 |
| | Limited | % | 40.0 | 30.0 | 28.6 | 30.0 | 22.2 | 29.3 |
| | Adequate | % | 40.0 | 10.0 | 57.1 | 40.0 | 22.2 | 31.7 |
| Emergency communication plans | None | % | 20.0 | 40.0 | 42.9 | 30.0 | 55.6 | 39.0 |
| | Limited | % | 60.0 | 50.0 | 14.3 | 30.0 | 22.2 | 34.1 |
| | Adequate | % | 20.0 | 10.0 | 42.9 | 40.0 | 22.2 | 26.8 |

[1]Full response options were: “no training on this topic available to staff”; “limited training available, but more is needed”; “adequate training on this topic is available to staff.”