PROGRESS REPORT on the PLAN FOR ASSISTING STATES, FEDERAL AGENCIES AND TRIBES IN MANANGING CHRONIC WASTING DISEASE IN WILD AND CAPTIVE CERVIDS (OCTOBER 2002-SEPTEMBER 2003)

Introduction

In June of 2002, a task force of Federal agencies and state wildlife management agencies completed the *Plan for Assisting States, Federal Agencies, and Tribes in Managing Chronic Wasting Disease in Wild and Captive Cervids* and presented it to Congress. As a follow-up to the plan State wildlife agencies, universities, and Federal agencies developed a set of action items to help guide their response and direct funds to the ongoing battle against CWD. This report is meant to identify progress made on those actions consistent with the *National Plan*. The report also highlights areas for "next steps." Federal activities for next steps are assumed to be within existing budgets and annually must compete with national and agency priorities. Federal and state agencies, Tribes, and other partners have met and coordinated implementation activities through the International Association of Fish and Wildlife Agencies (IAFWA) Wildlife Health Committee, US Animal Health Association, and multi-states CWD Working Group. The past 12 months have seen progress in research, management, and information dissemination concerning CWD, but additional work is needed.

Funding

There has been considerable interagency collaboration and accomplishment regarding CWD surveillance, management, and research. Both U.S. Department of Interior and U.S. Department of Agriculture FY 2003 budgets contained appropriations for CWD work (Tables 1 and 2) and the agencies administering these funds worked with the IAFWA, states, and Tribes to insure the funding was utilized in a sensible fashion. The Department of Interior Agencies, (National Park Service, U.S. Geological Survey, and U.S. Fish and Wildlife Service) expended approximately $3.3M in FY 2003 (Table 1). The Department of Agriculture Agencies (Animal and Plant Health Inspection Service, Agriculture Research Service, and Cooperative State Research, Education, and Extension Service) expended approximately $18.15M in FY 2003 (Table 2). According to a survey conducted by IAFWA, the 50 state fish and wildlife management agencies collectively expended approximately $15.2M of state funding in FY 2003, and at the discretion of the States, $2.7M of Federal Aid and Wildlife Restoration Act funding (Table 3).

When all 50 state livestock health agencies were queried through the U.S. Animal Health Association (USAHA) regarding their expenditures on CWD-related activities from October 2002 to September 2003, 22 states responded and indicated their expenditures totaled approximately $1.98M and their estimated expenditures for 2004 are $1.0M. Continued funding of the *National Plan* is a priority of the states as they continue to coordinate with IAFWA and federal agencies.

The Federal and State Task Force identified six categories to focus CWD activities. These included communications, scientific and technical information dissemination, diagnostics, disease management, research, and surveillance.

Communications

The communications section contained three goals: 1) Increase awareness of and educate target audiences about CWD; 2) Provide accepted and updated scientific information on current knowledge and advances in CWD management and control; and 3) Provide scientific and technical training information on CWD management and surveillance alternatives to state, Federal, and Tribal employees. Two action items with three activities were identified to address these goals.

Action Item 1: Production of Materials

A. This action item called for development of templates for use by Federal, state, and Tribal entities to produce their own fact sheets on CWD and actions taken to combat the disease. The majority of states have produced fact sheets as have a number of private non-profit organizations. Fact sheets developed by agencies with CWD present in their jurisdictions were utilized as templates for other fact sheets. Additionally, several sportsmen-based wildlife conservation organizations and corporations have formed the CWD Alliance, a collaborative project whose mission is to promote responsible and accurate communication regarding CWD. The CWD Alliance has developed an informative website (www.cwd-info.org) to serve as a clearinghouse for the public and media to obtain accurate information. The website is accessed hundreds of times daily, provides links to nearly 70 state, Federal, and university CWD information web pages, and in turn, is linked to dozens of state and Federal agency websites. Presentations by CWD experts and regulatory officials have been made to numerous scientific, veterinary, conservation, industry, and sportsmen's organizations, as well as at various public meetings and Congressional hearings and briefings. The effort to ensure that the public is kept abreast of the most current information is continual.

   NEXT STEPS: New information needs to be quickly disseminated to all entities for incorporation into public outreach material. Additional distribution mechanisms need to be developed to ensure all concerned entities and individuals are receiving the most up-to-date information. Efforts to develop programs for specific target audiences, for instance landowners in CWD affected areas, have been initiated by partners, but need to be expanded.

Action Item 2: Events, Training, and Distribution of Information

A. There were two activities identified under this action item.
   The first was development of professional training for biologists and others involved with CWD work. The National Conservation Training Center (NCTC) and U. S. Geological Survey (USGS) National Wildlife Health Center (NWHC) are developing

a CWD training module that should be available during calendar year 2004 for use by appropriate entities working on CWD. Additionally, the U. S. Fish and Wildlife Service (USFWS) has planned training sessions for refuge workers and others during calendar year 2004. The National Park Service (NPS) has conducted training for staff in areas at high risk of CWD. USDA initiated CWD training for its Animal and Plant Health Inspection Service (APHIS) personnel working on CWD as well as for state agricultural personnel during its Designated Transmissible Spongiform Encephalopathy Epidemiology course in Ames, Iowa in August 2003. This training is scheduled to be repeated in April 2004 and annually. The APHIS/Wildlife Services (WS) program also has conducted training in CWD sample collection for its employees in Illinois, Maine, Maryland, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, Pennsylvania, Vermont, and Wisconsin. The NWHC conducted training for Tribal entities in 2003. Training for regional Tribal CWD biologists, hired by the Native American Fish and Wildlife Society through cooperative agreement funding from APHIS, will be provided in spring 2004 by both APHIS and the NWHC through collaborative efforts of these agencies. State wildlife management agencies have provided training for their personnel involved in CWD surveillance and for professionals (e.g. taxidermists, meat processors, guides, etc.) who assist with surveillance or are likely to encounter carcasses of animals that test positive for the CWD agent.

B. The second activity for this action item was establishment of a schedule for regular CWD symposia. The Wisconsin Department of Natural Resources is planning the next symposium, which will be in the summer 2005.

NEXT STEPS: Training must be ongoing and expanded to continue to reach professionals in wildlife management and related fields (e.g. public health, livestock health, etc.), sportsmen and women, and other wildlife enthusiasts. A mechanism is needed to distribute CWD information to Universities; County Extension Agents; the Cooperative State Research, Education, and Extension Service; and others working with the natural resources community. Inclusion of all workers that interact with the agriculture community and the public is needed to ensure that accurate information is disseminated to all interested parties. Additionally, state and national veterinary associations, state and Federal veterinarians, and private practitioners need to be provided with current information on CWD and management actions to control the disease.

<u>Scientific and Technical Information Dissemination</u>

This section contained four goals: 1) Providing access to common scientific and technical information in a partner-based data system; 2) Integrating CWD data from state, Tribal, and Federal agencies and others into the National Biological Information Infrastructure (NBII) Wildlife Disease Information Node (WDIN); 3) Working with states and Tribes to create data standards that will allow interoperability with existing CWD data sets; and 4) Providing wildlife managers and veterinarians with near real-time access to CWD data and critical information. One action item with eight closely related activities was identified.

Action Item 1: Integrated Information Systems

A. The USGS has the NBII available for public access on the web (www.nbii.gov). The NWHC is responsible for the scientific content and data the NBII provides through WDIN. Currently on the WDIN, with regard to CWD information, developed with the help of many collaborators, including states and Tribes, are:
--- CWD Data Integration Fact Sheet;
--- CWD Latest News;
--- CWD sampling information (including digital photos of CWD sampling) for specimen collection in CWD surveillance and research;
--- CWD information relative to human and domestic animal health;
--- Frequently Asked Questions about CWD;
--- Links to Federal, state, and regional CWD information websites; and
--- A CWD data layer is also under construction for The National Map (nationalmap.usgs.gov).
In addition, nationwide data on CWD surveillance of free-ranging cervids is assembled annually by the CWD Working Group of the IAFWA Fish and Wildlife Health Committee (Table 5). This information will be available through the CWD Alliance website.

In order to address demands for information about CWD, at least 42 state agencies, have also developed websites that provide similar information. Most of these CWD sites are part of existing agency sites and nearly all link to each other, providing the user greater access to information. The CWD Alliance website has compiled a great deal of information for public use on its website, and the CWD Alliance is committed to enhancing communication among scientists, wildlife managers, citizens, and policymakers with regard to CWD at a single site.

The Conservation Management Institute (CMI) at Virginia Polytechnic Institute held a CWD workshop in June, 2003. Representatives from 32 states, several Federal agencies, and some Canadian provinces attended. The purpose of the workshop was to address information dissemination items identified in the draft *Implementation Document*. Willingness of states to participate in a national database was mixed. Attempts were made to develop data standards, data collection standards, address data format compatibility, and the human resources required to do this work. The CMI also has a CWD Data Management site (fwie.fw.vt.edu/dsimsik/cwd/) with links to other CWD information pages.

As APHIS/Veterinary Services implements its CWD captive cervid herd certification program in 2004, data will be collected on farmed/captive cervids and entered into Veterinary Services' Generic Database. The APHIS will work with USGS to incorporate summaries of this information into the unified national CWD database under development by USGS.

All partners, state, Federal, non-profit, and academic, continue to work on aspects of how best, most effectively, and most efficiently to provide information and data to a universal database that includes data standards for wildlife disease and, in this particular case, CWD.

NEXT STEPS: Continued work by NWHC on the WDIN as well as establishment of an easy to access data import system that will provide easy, informative, credible, web-based science content for CWD.

Diagnostics

Five goals were identified for this section: 1) Develop an adequate laboratory system and capacity for testing and a timely turnaround time for distribution of results; 2) Evaluate existing diagnostic tests for CWD, both postmortem and live-animal, understanding that tests must be accurate, reasonably fast and inexpensive; 3) Establish a consensus standard on how to accredit laboratories to conduct CWD testing; 4) Describe time requirements for obtaining results from various tests so that CWD programs can incorporate accurate assumptions about the "turnaround time" needed; and 5) Facilitate evaluation and validation of high throughput screening tests. This section contained four action items and four activities.

Action Item 1: Establish sufficient testing capacity

A. As of April 2003, APHIS's National Veterinary Services Laboratory (NVSL) had contracted with and approved 26 State/university veterinary diagnostic laboratories to perform CWD testing. This is an increase of 11 laboratories beyond the original proposal. Four antigen-based test kits have been approved by APHIS's Center for Veterinary Biologics (CVB), allowing greater and faster throughput for laboratories choosing to utilize this technology. Thus, current laboratory capacity is more than adequate for total current demand.

   NEXT STEPS: Variations in seasonal and regional testing needs may require consideration of adding additional laboratories to the contract group if future demand so dictates.

Action Item 2: Continue using Immunohistochemistry (IHC)

A. Although IHC is still the "gold standard" for CWD testing, development of additional testing protocols using ELISA techniques has provided quicker turnaround times. The IHC is still used for confirmation of positives from ELISA.

   NEXT STEPS: Continue using IHC as the confirmatory test for positive CWD samples. If scientific data indicates the need to change the "gold standard", that action will be evaluated by National Veterinary Services Laboratory (NVSL).

Action Item 3: Assure sample quality

A. Training of sample collectors and laboratory workers in sample collection and handling has decreased the number of "not testable" samples.

NEXT STEPS: Continued training to ensure that sample quality remains high.

Action Item 4: Assist in validation and application of high throughput screening tests

A. Four antigen-based tests have been approved by the CVB, and an additional IHC system has been validated by NVSL for CWD testing. These tests have reduced turnaround time and reduced total costs.

NEXT STEPS: Continued validation of both post- and antemortem tests developed to detect CWD.

Disease Management

The four goals of this section were: 1) Prevention: To maintain a population or areas free from CWD; 2) Elimination: To remove CWD and prevent its reintroduction from a specific area; 3) Maintenance: To keep CWD below a specified level of prevalence; and 4) Containment: to keep CWD from spreading outside of an area where it occurs. The seven action items contained nine activities.

Action Item 1: Disease prevention

A. Existing regulations regarding movement of carcasses of free-ranging cervids and farmed cervids have been tabulated by the Michigan Department of Natural Resources and posted on the web site of the CWD Alliance. States currently are exchanging information regarding residents who harvested positive animals in other states. Twenty-four state wildlife management agencies have signed on to *Multi-state Guidelines for Chronic Wasting Disease Management in Free-ranging White-tailed Deer, Mule Deer, and Elk*. The APHIS proposed rule, *Chronic Wasting Disease (CWD) Herd Certification Program and Interstate Movement of Captive Deer and Elk*, was published in the Federal Register on December 24, 2003 with comments due February 23, 2004.

NEXT STEPS: Continued tabulation of rules and regulations promulgated by states and Federal agencies should be a priority to ensure that all entities are familiar with all rules and regulations. Prevention of CWD dispersion via future human assisted inter- and intra-state movement of free-ranging cervids for restocking purposes should be addressed. Following close evaluation of comments, APHIS will finalize and implement the rule.

B. Some states have instituted restrictions on baiting and feeding of free-ranging cervids in order to reduce opportunities for disease transmission. The Canadian Cooperative Wildlife Health Center has published *A Comprehensive Review of the Ecological and Human Social Effects of Artificial Feeding and Baiting of Wildlife*.

NEXT STEPS: Basic scientific information on ecological and human social impacts of baiting and feeding is available in the above referenced publication. This information should be utilized in developing rules and regulations by state and Federal wildlife agencies for control of artificial concentrations of free-ranging cervids associated with baiting and feeding.

C. Some state and Tribal authorities have conducted rudimentary risk assessments for the potential of CWD to infect free-ranging cervid populations. There is need for development of tools for decision makers to assess risk factors, which may affect likelihood of spread of CWD to new geographic areas. Using conventional risk analysis processes, NWHC working collaboratively with Federal, state, and Tribal agencies, will examine CWD risk factors in free-ranging cervid populations in order to develop a model for a set of risk analysis tools, as well as a format for collaboration on and management of such risk. These tools will be based upon source of infection, spread of the disease, population dynamics, and complexity of administrative authorities with regard to CWD in free-ranging animals. This project will focus primarily on states that have not yet reported CWD, with collaborative efforts among NWHC, USGS Fort Collins Science Center, and Colorado State University Animal Health Population Institute. A Risk Assessment/Users Workshop is planned for May 2004 to gather information and network with CWD experts on development of two risk-based models for CWD management for national use.

NEXT STEPS: Methodology for conducting scientifically based risk assessments still needs to be developed, and risk assessments need to be conducted on specific issues (e.g. farmed/captive cervids, sewage, carcass movement and disposal, environmental contamination, etc.).

Action Item 2: Management techniques to eliminate, contain and/or control CWD

A. In the FY 2003 cooperative agreement process APHIS conducted with the 50 State wildlife agencies, 19 States submitted what could be considered management or contingency plans for CWD. That does not mean the remaining 33 do not have plans, just that they did not submit a management plan as it was not required. In addition, Federal agencies and at least four Tribal agencies have developed contingency and/or management plans for CWD. They have utilized the *Multi-State Guidelines for Chronic Wasting Disease Management in Free-Ranging White-tailed Deer, Mule Deer, and Elk* and plans from other states as templates.

NEXT STEPS: Some state, Federal, and Tribal agencies still need contingency and management plans. These plans should be developed soon with assistance from those with experience with CWD and with encouragement from IAFWA and APHIS.

Action Item 3: Management of farmed/captive deer and elk

A. APHIS is providing indemnity as well as disposal and testing costs for voluntary depopulation of positive and exposed captive herds and trace animals. APHIS has added CWD personnel at the national and regional levels, as well as in key states with large farmed cervid populations. APHIS published for comment in the December 24, 2003 Federal Register a proposed rule for a CWD herd certification program and control of interstate movement. The proposed program includes identification, inventory, fencing, and surveillance requirements and provides certification for herds with 5 years of CWD-free surveillance. The comment period for the proposed rule closed February 23, 2004.

NEXT STEPS: Following close evaluation of comments, APHIS will finalize and implement the rule.

Action Item 4: Carcass disposal

A. Carcass disposal remains a problem. Current pressures and trends are decreasing landfill options while incineration and alkaline digestion options are limited and extremely expensive. Each state has its own views and rules on carcass disposal. The American Association of Veterinary Laboratory Diagnosticians and Region 8 of the Environmental Protection Agency have developed draft guidelines for disposal of potentially CWD prion contaminated materials and decontamination of laboratory work surfaces. Several partners, such as the state of Wisconsin, have summarized risk assessment evaluations on specific disposal strategies; this information is available through the CWD Alliance website. Food and Drug Administration guidance for industry on *Use of Material From Deer and Elk in Animal Feed* has made carcass disposal by rendering nearly impossible in states where CWD occurs, which presents major disposal problems for some states. Furthermore, the guidance has hindered the ability of some state wildlife agencies to reach surveillance goals among free-ranging cervids. APHIS is installing an alkaline hydrolysis tissue digester at NVSL and has assisted state diagnostic laboratories in Colorado, Wisconsin, and Minnesota in purchasing alkaline hydrolysis digesters. A tour of various laboratories conducting research and testing on Bovine Spongiform Encephalopathy and other TSE's in the United Kingdom (U.K.) is planned for 2004 with the purpose of reviewing their carcass disposal methods.

NEXT STEPS: Cost-effective and acceptable methods for disposing of large quantities of potentially infected tissue are needed; and further regional and national expert risk assessment and recommendations on prion disposal should be organized and funded, with results communicated expeditiously to state and Federal agencies and Tribes. Findings of the review of disposal practices for material contaminated with BSE in the U. K. and Europe should be provided to appropriate state and Federal agencies.

Action Item 5: Monitoring, measurement, and adaptive management

A. All 50 states, as well as several Federal and Tribal entities, conducted monitoring and management activities, which were partially funded by APHIS through cooperative agreements with the states for approved CWD activities. These activities will continue for the foreseeable future. The IAFWA CWD Working Group helped coordinate this monitoring and management and has assisted APHIS in developing its formula for providing assistance to the States. In FY 2003 APHIS reviewed surveillance plans from all 50 State wildlife agencies as well as management plans from the 8 States with CWD in free-ranging cervids and awarded $4 million in cooperative agreement funds to address these needs. Additionally, several states and Federal agencies are conducting research and/or assessments to determine impacts of their management actions on cervid populations and disease occurrence.

NEXT STEPS: Continued research is needed into impacts of management actions on cervid populations and disease ecology, and application of formal adaptive management science in control of CWD should be studied.

Action Item 6: Environmental decontamination

A. Preliminary research into the potential for environmental decontamination of infected areas and premises is underway in a few places.

NEXT STEPS: Research should be accelerated (is there research which is lower priority and can be delayed to shift resources to this activity) into detection of environmental contamination and development of effective methods for decontamination.

Action Item 7: Restoration

A. Restoration of depleted free-roaming cervid populations is still years away. However, a few management plans developed by state, Tribal, and/or Federal authorities have contained preliminary plans for population restoration. APHIS guidelines for the restocking of CWD-contaminated captive cervid properties are in place.

NEXT STEPS: A comprehensive plan for funding and conducting population restoration needs to be developed.

Research

Four goals were identified for Research: 1) Rapid diagnostics; 2) Biology and pathogenesis; 3) Management and ecology of the disease and the host; and 4) Human dimensions. Four action items contained five activities. Research activities in reference to CWD have accelerated during the past 18 months. Funding from USFWS, USGS, APHIS, and the Department of Defense have supplemented limited research budgets of some state and Federal agencies (Table 4). Additionally, research being conducted on BSE and other spongiform encephalopathies in

Europe and other areas may have applications to CWD in the future. However, additional CWD research funding remains an urgent need.

Action Item 1: Improve existing diagnostic tests and develop a validated live animal test.

A. Four antigen-based postmortem tests for detecting CWD in the brain stem and/or the retropharyngeal lymph nodes have been approved by the CVB. An additional IHC based system also has been validated by NVSL. However, these are postmortem tests requiring extensive laboratory work. A postmortem test that can be conducted quickly in the field would be an asset to large scale monitoring programs and an antemortem test is still needed. Research is underway on other testing methodologies.

   NEXT STEPS: Postmortem field tests and antemortem tests are needed.

B. Environmental contamination is one of the pressing issues in CWD management. Research is underway to determine the potential for environmental contamination, mechanisms of such contamination, and its contribution to disease transmission.

   NEXT STEPS: Continued research is essential regarding the ability to test for environmental contamination, the role of environmental contamination in CWD epidemiology, and environmental decontamination methods.

Action Item 2: Conduct research into the biology and pathology of CWD

A. Several research projects are underway to further understand the biology and pathology of CWD. Results of these projects should provide information about CWD biology that can be used to prevent and/or manage the disease.

   NEXT STEPS: Continued research and dissemination of results on the biology and pathology of CWD is needed.

Action Item 3: Conduct research into disease management and host ecology

A. Research projects, some partially funded by USGS, in Colorado, Illinois, Nebraska, New Mexico, South Dakota, Utah, Wisconsin, and Wyoming and National Park Service funded research are designed to determine the social behavior and movements of affected free-ranging cervid populations and the impact of the disease on these populations. Additional research is investigating the dynamics of social behavior as related to disease transmission and spread. Computer models exploring the epidemiology, spatial aspects, and impacts of CWD management have been developed in several states.

   NEXT STEPS: Research is needed regarding management of free-ranging cervid populations and methodologies to eliminate and prevent the spread of CWD. Continued refinement and validation of computer models of CWD management

should be supported. Research into using the tools of formal adaptive management science to improve CWD management should be considered.

Action Item 4: Conduct research into human dimensions of CWD

A. The Western Association of Fish and Wildlife Agencies (WAFWA) has initiated a limited study of human dimensions of hunters' responses to issues surrounding CWD. The Human Dimensions unit of Colorado State University is conducting this survey. Seven state wildlife agencies are participating in this survey that should provide guidance on all aspects of CWD management as perceived by the public. The final report for this project is due in July of 2004. Several states have or are conducting their own human dimensions studies, surveying hunters and landowners.

   NEXT STEPS: An evaluation of the WAFWA survey should be conducted to determine if a nation-wide human dimensions survey, patterned after the WAFWA survey, should be undertaken. This evaluation should also include review of state human dimension research results and dissemination of information that is similar across jurisdictions. Survey of attitudes of certain targeted affected groups (e.g. landowners, meat processors, etc.) should be considered.

Surveillance

This section contained four goals: 1) Sampling plans; 2) Early detection; 3) Determination of distribution and prevalence rates; and 4) Epidemiological investigations. Three activities were contained in two action items.

Action Item 1: Determine the best alternatives for sample collection and management and collection of samples

A. The USGS convened a workshop in Madison, Wisconsin in December 2002 to discuss surveillance strategies. Results of this workshop were published as *Surveillance Strategies for Detecting Chronic Wasting Disease in Free-Ranging Deer and Elk*. This handbook has been utilized by numerous entities in developing surveillance strategies for their CWD programs.

   NEXT STEPS: The handbook should be reviewed and updated periodically as new information becomes available. Discussion on goals, strategies, and statistical approaches for monitoring surveillance of CWD-affected populations should be considered for inclusion in a handbook update.

B. CWD surveillance programs have been implemented in all 50 states and by several Federal agencies. APHIS-Veterinary Services funded the laboratory testing costs for more than 90,000 hunter-killed surveillance samples from the 2002 hunting season in 38 States and paid for laboratory testing of more than 100,000 hunter-killed and 12,000 farmed cervid samples in FY 2003. Captive cervid sampling is expected to increase as APHIS implements its CWD herd certification program. APHIS

Wildlife Services (WS) has provided assistance to some states in CWD sample collection as part of the states' CWD surveillance efforts. In addition, WS hired 23 additional wildlife disease biologists that will be available to assist states in surveillance efforts once their training has been completed. With cooperative agreement funding from APHIS, the Native American Fish and Wildlife Society is in the process of developing a program to assist Native American agencies in implementing CWD surveillance programs, and four Tribes have completed plans. The NWHC has provided training to many Tribes for sample collection and development of surveillance plans.

Questionnaires were sent to all 50 states requesting CWD surveillance data for the period from October 1, 2002 - September 30, 2003. All 50 states responded and indicated that a total of 117,715 mule deer, white-tailed deer, and elk were tested for CWD with 592 animals testing positive. The states also indicated that an estimated 114,000 animals will be tested during the 2003-04 sampling and testing season. Details are available in Table 5.

NEXT STEPS: The Native American program needs to be implemented to allow surveillance on lands administered by the various Tribal authorities. States should continually review and update their surveillance programs as new information becomes available. A mechanism should be identified for states and Tribes to have consistent access to CWD testing data for free-ranging cervid samples submitted from the private sector to the national system of CWD testing laboratories.

Action Item 2: Actions involving epidemiological investigations will include identification of high risk and exposed animals.

A. APHIS epidemiologists and field staff, together with the states, perform ongoing epidemiologic investigations, tracing positive captive cervids back to herds in which they previously resided, and tracing animals from positive herds forward to other herds they may have exposed. APHIS offers indemnity and provides disposal and testing costs for depopulation of exposed and trace animals.

NEXT STEPS: Methodologies must be developed to identify high risk wildlife populations and animals.

Table 1A NPS Spending on CWD

AGENCY: NPS

CATEGORY	ACTION ITEM	FY 2003 BA	FY 2004 enacted	FY 2005 request
Communications				
	Develop fact sheets			
	Professional training			
	CWD symposium			
	TOTAL COMMUNICATION	$0	$0	$0
Information Dissemination	Develop database			
	Data import system			
	Digitization of data			
	Maintain info system			
	TOTAL INFO DISSEMINATION	$0	$0	$0
Diagnostics	Establish lab capacity			
	Assure sample quality			
	Validation of tests			
	TOTAL DIAGNOSTICS	$0	$0	$0
Disease Management	Evaluate regs, model polices			
	Regs on baiting and feeding			
	Risk assessments			
	Develop and implement plans	$564,000	$1,241,000	$1,241,000
	Management of farmed cervids			
	Carcass disposal			
	TOTAL DISEASE MANAGEMENT	$564,000	$1,241,000	$1,241,000
Research	Develop early tests, tissue bank			
	Tests for environmental contamination			
	Biology and pathogenesis			
	Epidemiologic studies			
	Methods to inactivate CWD agent			
	Human dimensions, surveys			
	TOTAL RESEARCH	$0	$0	$0
Surveillance	Design CWD surveillance programs			
	Implementation of CWD surveillance			
	Epidemiology			
	TOTAL SURVEILLANCE	$0	$0	$0
GRAND TOTALS		$564,000	$1,241,000	$1,241,000

Table 1B USGS Spending on CWD

AGENCY: USGS

CATEGORY	ACTION ITEM	FY 2003 BA	FY 2004 enacted	FY 2005 request
Communications				
	Develop fact sheets			
	Professional training			
	CWD symposium			
	TOTAL COMMUNICATION	$0	$0	$0
Information Dissemination	Develop database	$135,000	$135,000	$135,000
	Data import system/certif & QA	$65,000	$65,000	$65,000
	Digitization of data/CWD website	$50,000	$50,000	$40,000
	Maintain info system	$0	$0	$10,000
	TOTAL INFO DISSEMINATION	$250,000	$250,000	$250,000
Diagnostics	Establish lab capacity			
	Assure sample quality			
	Validation of tests			
	TOTAL DIAGNOSTICS	$0	$0	$0
Disease Management	Evaluate regs, model polices			
	Regs on baiting and feeding			
	Risk assessments			
	Develop and implement plans			
	Management of farmed cervids			
	Carcass disposal			
	TOTAL DISEASE MANAGEMENT	$0	$0	$0
Research	Develop early tests, tissue bank	$270,000	$270,000	$270,000
	Tests for environmental contamination		$0	$0
	Biology and pathogenesis	$1,430,000	$1,430,000	$1,430,000
	Epidemiologic studies	$700,000	$700,000	$700,000
	Methods to inactivate CWD agent		$0	$0
	Human dimensions, surveys			
	TOTAL RESEARCH	$2,400,000	$2,400,000	$2,400,000
Surveillance	Design CWD surveillance programs	$50,000		
	Implementation of CWD surveillance			
	Epidemiology			
	TOTAL SURVEILLANCE	$50,000	$0	$0
GRAND TOTALS		$2,700,000	$2,650,000	$2,650,000

Table 1C FWS Spending on CWD

AGENCY: FWS

CATEGORY	ACTION ITEM	FY 2003 BA	FY 2004 enacted	FY 2005 request
Communications				
	Develop fact sheets			
	Professional training			
	CWD symposium			
	TOTAL COMMUNICATION	$0	$0	$0
Information Dissemination	Develop database			
	Data import system			
	Digitization of data			
	Maintain info system			
	TOTAL INFO DISSEMINATION	$0	$0	$0
Diagnostics	Establish lab capacity			
	Assure sample quality			
	Validation of tests			
	TOTAL DIAGNOSTICS	$0	$0	$0
Disease Management	Evaluate regs, model polices			
	Regs on baiting and feeding			
	Risk assessments			
	Develop and implement plans		250,000	
	Management of farmed cervids			
	Carcass disposal			
	TOTAL DISEASE MANAGEMENT	$0	$250,000	$0
Research	Develop early tests, tissue bank			
	Tests for environmental contamination			
	Biology and pathogenesis			
	Epidemiologic studies			
	Methods to inactivate CWD agent			
	Human dimensions, surveys			
	TOTAL RESEARCH	$0	$0	$0
Surveillance	Design CWD surveillance programs			
	Implementation of CWD surveillance		250,000	
	Epidemiology			
	TOTAL SURVEILLANCE	$0	$250,000	$0
GRAND TOTALS		$0	$500,000	$0

Table 2

DEPARTMENT: USDA

CATEGORY	ACTION ITEM	FY 2003 BA	FY2004 enacted***	FY2005 request***
Communications				
(APHIS-captive)	Develop fact sheets		$34,000	$34,000
(APHIS)	Professional training		$45,000	$45,000
	CWD symposium			
	TOTAL COMMUNICATION	$0	$79,000	$79,000
Information Dissemination (APHIS-captive)	Develop database	$115,000	$114,000	$114,000
	Data import system			
	Digitization of data			
	Maintain info system			
	TOTAL INFO DISSEMINATION	$115,000	$114,000	$114,000
Diagnostics (APHIS)	Establish lab capacity	$642,000	$318,000	$318,000
	Assure sample quality			
(APHIS)	Validation of tests	$471,000	$448,000	$448,000
	TOTAL DIAGNOSTICS	$1,113,000	$766,000	$766,000
Disease Management	Evaluate regs, model polices			
	Regs on baiting and feeding			
	Risk assessments			
(APHIS-wild)	Develop and implement plans	$1,147,000	$1,421,000	$1,566,000
(APHIS)	Management of farmed cervids *	$7,293,000	$5,211,000	$5,950,000
(APHIS-captive)	Carcass disposal **		$796,000	$796,000
	TOTAL DISEASE MANAGEMENT	$8,440,000	$7,428,000	$8,312,000
Research	Develop early tests, tissue bank			
(APHIS)	Tests for environmental contamination	$125,000	$250,000	$250,000
(APHIS & ARS)	Biology and pathogenesis	$600,000	$1,810,000	$1,810,000
(APHIS)	Epidemiologic studies	$125,000	$250,000	$250,000
(APHIS & ARS)	Methods to inactivate CWD agent	$204,000	$510,000	$510,000
	Human dimensions, surveys			
(ARS & CSREES)	Other: diagnostic discovery/undistributed	$961,000	$1,396,000	$1,186,000
	TOTAL RESEARCH	$2,015,000	$4,216,000	$4,006,000

CATEGORY	ACTION ITEM	FY 2003 BA	FY2004 enacted***	FY2005 request***
Surveillance	Design CWD surveillance programs			
(APHIS-captive & wild)	Implementation of CWD surveillance	$6,366,000	$6,478,000	$7,072,000
(APHIS-captive & wild)	Epidemiology	$105,000	$442,000	$442,000
	TOTAL SURVEILLANCE	$6,471,000	$6,920,000	$7,514,000
	TOTAL APHIS	$16,639,000	$16,307,000	$17,785,000
	TOTAL ARS	$791,000	$2,600,000	$2,600,000
	TOTAL CSREES	$724,000	$616,000	$406,000
GRAND TOTALS		$18,154,000	$19,523,000	$20,791,000

Note:

*FY 2003 spending includes approximately $1.8 million in carryover FY 2002 Commodity Credit Corporation funds

**Carcass disposal not tracked separately in FY 2003; included in management of farmed cervids

***FY 2004 and 2005 estimates do not include approximately $2.25 million earmarked by Congress for specific States or projects

Table 3. International Association of Fish and Wildlife Agencies Chronic Wasting Disease Expenditures

Based on a questionnaire sent to all 50 state wildlife management agencies. Responses were received from 45 of the 50 states. Information is from State Wildlife agencies only, does not reflect funds expended by State Departments of Agriculture, Health and Human Services agencies or other state governmental entities.

1. Agencies that have expended state or Federal Aid funds on Chronic Wasting Disease in the past five years. Yes 44 NO 1

2. Amounts spent per year in each of the following categories:

Communications (Public Information Efforts)

	State Funds	Federal Aid Funds	Total
1999	3,350	500	3,850
2000	4,500	250	4,750
2001	21,079	11,530	32,609
2002	373,528	70,840	444,368
2003	1,375,686	64,831	1,440,517
Total	$1,778,143	$147,951	$1,926,094

Scientific and Technical Information Dissemination

	State Funds	Federal Aid Funds	Total
1999	4,050	1,700	5,750
2000	19,550	200	19,750
2001	22,899	15,000	37,899
2002	109,624	61,541	171,165
2003	541,522	76,278	617,800
Total	$697,645	$154,719	$852,364

Diagnostics

	State Funds	Federal Aid Funds	Total
1999	6,328	-0-	6,328
2000	2,560	-0-	2,560
2001	71,165	-0-	71,165
2002	558,794	152,649	711,443
2003	3,909,419	282,131	4,191,550
Total	$4,548,266	$434,780	$4,983,046

Research

	State Funds	Federal Aid Funds	Total
1999	8,333	25,000	33,333
2000	8,333	25,000	33,333
2001	8,333	25,000	33,333
2002	44,000	6,000	50,000
2003	445,000	155,000	600,000
Total	$513,999	$236,000	$749,999

Surveillance and Monitoring

	State Funds	Federal Aid Funds	Total
1999	40,401	25,115	65,516
2000	37,276	31,988	69,264
2001	183,520	123,370	306,890
2002	1,924,631	811,891	2,736,522
2003	8,956,034	2,133,186	11,089,220
Total	$11,141,862	$3,125,550	$14,267,412

Cumulative Total all Categories

	State Funds	Federal Aid Funds	Total
1999	62,462	52,315	114,777
2000	72,219	57,438	129,657
2001	306,996	174,900	481,896
2002	3,010,577	1,102,921	4,113,498

2003	15,227,661	2,711,426	17,939,087
Total	$18,679,915	$4,099,000	$22,778,915

3. Number of agencies that have state or Federal Aid funds budgeted for CWD efforts in 2004. Yes_39_ No_6_

4. Amounts budgeted for CWD work in 2004

	State Funds	Federal Aid Funds	Total
Communications	918,084	57,375	975,459
Information Dissemination	788,305	6,920	795,225
Diagnostics	2,353,772	295,475	2,649,247
Research	1,389,000	215,000	1,604,000
Surveillance and Monitoring	8,951,083	1,686,774	10,637,857
Total	$14,400,244	$2,261,544	$16,661,788

5. Comments: Additional funding from a State Wildlife Grant through IAFWA and grants from USDA-APHIS and DOI-USGS-BRD was expended by the states. Additionally, some states have received grants from local authorities and NGOs (Rocky Mountain Elk Foundation, Whitetails Unlimited, Boone and Crockett Club, Pope and Young Club, etc.) for CWD work. All amounts are estimates and should not be considered to be all that was spent on CWD by the state wildlife agencies.

Table 4. Ongoing and completed chronic wasting disease research conducted and funded by federal and state agencies and institutions since 1978. Although efforts were made to be complete, some areas of CWD research activity may have been inadvertently overlooked.

Subject of Research	**Objectives of Research**
DIAGNOSTICS	
Morphologic pathology of chronic wasting disease in cervids	Describe and compare the lesions of natural chronic wasting disease in mule deer, white-tailed deer, and elk
Field validation of commercially available immunohistochemistry kits for CWD in cervids (studies are currently also being conducted in Canada and Europe)	Validation of several commercially available IHC for diagnosis of CWD in mule deer, white-tailed deer, and elk.
Field validation of commercially available rapid diagnostic kits for CWD in cervids. (studies are currently also being conducted in Canada and Europe)	Validation of commercially available rapid diagnostic kits for CWD
Use of lymphoid tissues for diagnosis of CWD	Determine the usefulness of lymphoid tissues in comparison to brain for diagnosis of CWD
Ante-mortem diagnostic tests (tonsil biopsy)	Evaluate tonsil biopsy for ante-mortem diagnosis of CWD in deer and elk
Ante-mortem diagnostic tests (novel approaches)	Investigate possible novel diagnostic approaches that can be used in live animals
Development of transgenic mice expressing cervid prion protein	Develop genetically modified mice expressing cervid prion proteins for use in a variety of research and bioassay studies
Comparison of CWD to human TSE	Molecular characterization of CWD with comparison to cases of CJD (sCJD, FFI, GSSS)
Identification of biomarkers of prion disease	Identification of biomarkers for TSEs using a variety of approaches (genomics, CSF, blood, hormonal assays, etc)
Determine the utility of alternative diagnostic techniques	Investigate a variety of non-antibody based diagnostic tests (Fourier transformation infrared spectrometry, ES-MS, MALDI-TOFF, etc)
DISEASE MANAGEMENT	
Surveillance for CWD in free-ranging cervids	Survey populations of free-ranging cervids for evidence of CWD
Surveillance for CWD in captive cervids	Survey populations of captive cervids for evidence of CWD
Test and removal for control of CWD in free-ranging mule deer	Evaluate the efficacy and cost of using test and removal techniques to manage CWD
Control of CWD in white-tailed deer and mule deer by depopulation	Evaluate the effectiveness of population reduction for control of CWD

Subject of Research	Objectives of Research
Evaluating sharpshooting as a method for killing white-tailed deer	Evaluate factors affecting efficacy of sharpshooting to kill white-tailed deer
Separation of farmed and free-ranging cervids	Evaluate better methods to separate farmed and free-ranging cervids to prevent potential CWD transmission
RESEARCH	
DIAGNOSTICS	
DIAGNOSTIC TESTS (SEE ABOVE)	
TESTS FOR ENVIRONMENTAL CONTAMINATION	
Soil as an environmental reservoir for CWD agent	Determination of prion persistence in soil and influence of soil type on persistence
Prion protein in laboratory effluents	Determine if prion protein can be detected in effluents from laboratories working with CWD
BIOLOGY AND PATHOGENESIS	
PATHOGENESIS	
Pathogenesis of CWD in experimentally infected mule deer, white-tailed deer, and elk	To determine the pathogenesis of CWD in three species of cervids following oral exposure from early in infection and throughout the incubation period
Distribution of CWD agent in organs	To determine the distribution of prion protein in tissue of cervids with natural and experimentally induced CWD
STRAIN TYPES	
Strain typing CWD agent(s)	Develop and use a variety of diagnostic techniques to determine if strains of CWD exist (histopathology, lesion profiles, peptide mapping, immunoblotting, bioassay, CDI, etc)
HOST RANGE	
Susceptibility of cattle to CWD	Determine if CWD can be transmitted to cattle by intracerebral inoculation, oral exposure, contact exposure, transgenic mouse inoculation, or assess in vitro conversion.
Susceptibility of sheep to CWD	Determine if CWD can be transmitted to sheep by intracerebral and oral inoculation, and to assess in vitro conversion
Susceptibility of goats to CWD	Determine if CWD can be transmitted to goats by intracerebral inoculation (as a CWD model)

Subject of Research	**Objectives of Research**
Susceptibility of laboratory rodents to CWD	Determine if CWD can be transmitted to various laboratory rodents (excluding transgenics) for use as models, and to assess in vitro conversion
Susceptibility of mustelids to CWD	Determine if CWD can be transmitted to laboratory mustelids for use as models
Susceptibility of non-human primates to CWD	To determine if multiple species of non-human primates are susceptible to CWD by intracerebral and oral routs of exposure.
Susceptibility of humans to CWD	To determine if there is any epidemiologic evidence of human susceptibility to CWD, to assess in vitro conversion
Susceptibility of pronghorn to CWD	To determine if pronghorn are susceptible to CWD by oral exposure
Susceptibility of fallow deer to CWD	To determine if fallow deer are susceptible to CWD by contact
Susceptibility of moose to CWD	To determine if moose are susceptible to oral exposure to CWD
Susceptibility of bighorn sheep to CWD	To determine if bighorn sheep are susceptible to CWD by contact with CWD infected cervids and endemic environments
Susceptibility of raccoons to CWD	To determine if raccoons are susceptible to intracerebral inoculation to CWD and use for strain typing
Susceptibility of felids (domestic cats and mountain lions) to CWD	To determine if domestic cats and mountain lions are susceptible to CWD
Susceptibility of species found in CWD endemic areas	To determine the likelihood of transmission of CWD to wild species found in CWD endemic areas
TRANSMISSION	
Susceptibility of cervids to scrapie	To determine if cervids are susceptible to scrapie by intracerebral and oral inoculation
Contribution of scavenging on carcasses to epidemiology of CWD	Evaluate decomposition of cervid carcasses to determine patterns of scavenging to assess potential involvement of scavengers in the epidemiology of CWD
Contribution of carcasses to transmission of CWD	Evaluate the potential of carcasses to serve as a source of CWD agent for susceptible deer
Effects of behavior and movement of white-tailed and mule deer on transmission of CWD	Determine the movement and dispersal patterns of white-tailed and mule deer with and without CWD
Transmission of CWD among free-ranging white-tailed and mule deer	Infer pathways of CWD transmission among white-tailed deer by evaluating pedigrees

Subject of Research	**Objectives of Research**
Potential for maternal transmission of CWD in deer	Determine if CWD is transmissible from does to fawns and if this potential route is epidemiologically important
Role of contaminated environments to the transmission of CWD in deer and elk	Determine if environmental contamination plays a significant role in the transmission of CWD in deer and elk
Role of excreta in the transmission of CWD	Determine if feces, urine, saliva, semen, etc contain CWD infectivity
Infective dose	Titrate oral exposure of CWD in elk
Risk of CWD transmission associated with baiting and feeding	Evaluate factors associates with baiting and feeding that might effect transmission of CWD among white-tailed deer
Routes of CWD transmission	Investigation of routes of transmission of CWD including intracerebral, oral, parenteral, transfusion, maternal, and aerosol exposure and transmission
GENETICS	
Influence of genetics on CWD in elk	Characterized PrP genotypes in elk and influence (if any) on development of CWD
Influence of genetics on CWD in white-tailed deer	Characterization of PrP genotypes in white-tailed deer and influence (if any) on development of CWD
Influence of genetics on CWD in mule deer	Characterization of PrP genotypes in mule deer and influence (if any) on development of CWD
PrP genotypes in species other than susceptible cervids	Determining PrP genotypes of cervids and other species to learn about the evolution of the PrP gene and possible influence on susceptibility
Population genetics	Evaluation of PrP genotypes in populations of free-ranging and captive cervids and influence (if any) on distribution and prevalence of CWD
PROPHYLAXIS OR TREATMENT	
Effect of metals on development of CWD in deer and elk	To evaluate the influence of metals on occurrence of CWD
Vaccination against CWD	To evaluate the potential for use of vaccines for CWD prophylaxis
Usefulness of therapeutic compounds	Evaluation of therapeutic compounds for prevention or treatment of CWD in deer
MANAGEMENT AND ECOLOGY	
CWD MODELS	

Subject of Research	**Objectives of Research**
Epidemiologic models of CWD in mule deer	To develop, test, and refine models to assist in management of CWD
Epidemiologic models of CWD in white-tailed deer	To develop, test, and refine models to assist in management of CWD
POPULATION DYNAMICS	
Effect of CWD on population dynamics in free-ranging mule and white-tailed deer	To determine if CWD is having an effect on free-ranging mule and white-tailed deer populations
Occurrence of CWD in different age and sex classifications of cervids	Investigate the epidemiology of CWD by evaluating sex and age specific prevalence
Effect of CWD on susceptibility to harvest	Determine if CWD affected cervids are more likely to be harvested in comparison to healthy deer and elk
Effect of CWD on susceptibility to vehicular accidents	Determine if CWD affected cervids are more likely to be involved in vehicular accidents as compared to health deer and elk
SPACIAL EPIDEMIOLOGY (GIS)	
Interactions of white-tailed deer and cattle on range	Determine spatial and temporal overlap of free-ranging white-tailed deer and cattle on range to evaluate possible risk factors
Spacial patterns of CWD in mule and white-tailed deer and elk	Determine spacial patterns of CWD occurrence across the landscape
Anthropogenic influence on distribution and density of deer	Evaluate anthropogenic influences on CWD though effects on deer distribution and density
ECOLOGIC EFFECTS OF MANAGEMENT STRATEGIES	
Effect of deer management activities on plant and animal species other than cervids	Evaluate effect of deer population reduction or elimination on non-target animal and plant species in CWD management areas
PERSISTENCE OF CWD AGENT IN THE ENVIRONMENT (ALSO SEE ABOVE)	
Role of invertebrates in persistence of CWD agent in the environment	Investigate the potential for free-living and parasitic invertebrates to influence persistence and dynamics of CWD agent in the environment
INACTIVATION AND DECONTAMINATION	
Methods of CWD agent inactivation and decontamination	Investigated methods to partially or completely inactivate CWD agent
EFFECTS OF DENSITY	

Subject of Research	**Objectives of Research**
Effect of baiting and feeding on CWD transmission in white-tailed deer	Quantify the risks associated with baiting and feeding
Influence of deer density on distribution and prevalence of CWD	Evaluate the influence of density on the distribution and prevalence of CWD in free-ranging deer
METHODS OF CARCASS DISPOSAL	
Methods for disposal of carcasses and waste materials potentially contaminated with CWD agent	Evaluate efficacy, efficiency, and cost-benefit analyses and risk assessments for available methods of carcass and waste materials potentially contaminated with CWD agent.
HUMAN DIMENSIONS	
Survey of hunter perceptions of CWD	Assess hunter and public understanding of CWD, perception of risk, level of concern, and behavioral changes associated with the presence of CWD in deer and elk populations
Hunter and landowner concerns and participation in CWD control	Determine hunter and landowner attitudes toward CWD management
Economic and social impact of CWD	Evaluate the economic and social impact of the presence of CWD in free-ranging and captive cervids
Develop effective communication and education strategies	Develop and monitor effectiveness of strategies for communicating information about CWD to various consumers

Table 5. State chronic wasting disease surveillance results

2002-2003

CWD SAMPLING SEASON

TOTALS

SPECIES	ACTIVE SURVEILLANCE		TARGET PROFILE		TOTALS	
	TESTED	POSITIVE	TESTED	POSITIVE	TESTED	POSITIVE
White-tailed Deer	87970	249	965	16	88935	265
Mule Deer	15831	277	106	11	15937	288
Black-tailed Deer	462	0	0	0	462	0
Axis Deer	13	0	0	0	13	0
Fallow Deer	0	0	0	0	0	0
Reindeer	6	0	0	0	6	0
Elk/Red Deer Hybrid	0	0	0	0	0	0
Elk	12779	36	64	3	12843	39
Moose	98	0	0	0	98	0
Antelope	0	0	0	0	0	0
Caribou	0	0	0	0	0	0
Desert Bighorn Sheep	2	0	0	0	2	0
Oryx	27	0	0	0	27	0
Pronghorn	0	0	0	0	0	0
Other	264	0	2	0	266	0

2002-2003
SAMPLING SEASON

STATE	SPECIES	ACTIVE SURVEILLANCE		TARGET PROFILE	
		TESTED	POSITIVE	TESTED	POSITIVE
Alabama	White-tailed Deer	441	0	0	0
	Mule Deer	0	0	0	0
	Falow Deer	0	0	0	0
	Elk	0	0	0	0
	Elk/Red Deer Hyb	0	0	0	0
	Reindeer	5	0	0	0
Alaska	White-tailed Deer	0	0	0	0
	Mule Deer	0	0	0	0
	Black-tailed Deer	0	0	0	0
	Elk	0	0	0	0
	Moose	65	0	0	0
	Caribou	0	0	0	0
Arizona	White-tailed Deer	67	0	2	0
	Mule Deer	392	0	6	0
	Elk	143	0	1	0
	Other	0	0	0	0
Arkansas	White-tailed Deer	252	0	1	0
	Mule Deer	0	0	0	0
	Elk	10	0	0	0
	Other	0	0	0	0
California	White-tailed Deer	0	0	0	0
	Mule Deer	459	0	10	0
	Elk	1	0	1	0
	Other	0	0	0	0
Florida	White-tailed Deer	676	0	18	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Georgia	White-tailed Deer	336	0	0	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Hawaii	White-tailed Deer	0	0	0	0
	Mule Deer	0	0	0	0
	Black-tailed Deer	0	0	0	0
	Axis Deer	0	0	0	0
	Elk	0	0	0	0
Idaho	White-tailed Deer	164	0	0	0
	Mule Deer	420	0	0	0
	Elk	70	0	0	0
	Other	35	0	0	0
Illinois	White-tailed Deer	4562	11	50	3
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Indiana	White-tailed Deer	1176	0	11	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0

Colorado (does not include animals younger than 2 years old)	White-tailed Deer	339	11	2	1
	Mule Deer	6989	163	10	1
	Elk	9489	31	5	2
	Moose	33	0	0	0
	Pronghorn	0	0	0	0
Connecticut	White-tailed Deer	0	0	0	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Delaware	White-tailed Deer	0	0	0	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Louisiana	White-tailed Deer	1038	0	29	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Maine	White-tailed Deer	848	0	0	0
	Mule Deer	0	0	0	0
	Elk	28	0	0	0
	Other	186	0	0	0
Maryland	White-tailed Deer	305	0	12	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	
Massachusetts	White-tailed Deer	87	0	0	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Michigan	White-tailed Deer	4298	0	51	0
	Mule Deer	0	0	0	0
	Other	0	0	0	0
Iowa	White-tailed Deer	3418	0	11	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Kansas	White-tailed Deer	928	0	14	0
	Mule Deer	197	0	5	0
	Elk	13	0	0	0
	Other	0	0	0	0
Kentucky	White-tailed Deer	2495	0	15	0
	Mule Deer	0	0	0	0
	Elk	0	0	40	0
	Other	0	0	2	0
Nebraska	White-tailed Deer	2864	10	16	0
	Mule Deer	1618	14	5	0
	Elk	23	0	0	0
	Other	0	0	0	0
Nevada	White-tailed Deer	0	0	0	0
	Mule Deer	249	0	0	0
	Elk	71	0	0	0
	Other	0	0	0	0
New Hampshire	White-tailed Deer	259	0	0	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
New Jersey	White-tailed Deer	900	0	0	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
New Mexico	Mule Deer	397	5	0	0
	Dst Bighorn	2	0	0	0

	Elk	116	0	1	0
	Other	0	0	0	0
Minnesota	White-tailed Deer	4426	0	39	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Mississippi	White-tailed Deer	1214	0	30	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Missouri	White-tailed Deer	5934	0	69	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Montana	White-tailed Deer	426	0	8	0
	Mule Deer	825	0	9	0
	Elk	274	0	5	0
	Other	0	0	0	0
Oklahoma	White-tailed Deer	974	0	5	0
	Mule Deer	0	0	0	0
	Elk	26	0	0	0
	Other	0	0	0	0
Oregon	White-tailed Deer	17	0	0	0
	Mule Deer	244	0	0	0
	Black-tailed Deer	169	0	0	0
	Fallow Deer	0	0	0	0
	Elk	461	0	0	0
	Sheep				
	Elk	344	0	0	0
	Antelope	0	0	0	0
	Oryx	27	0	0	0
New York	White-tailed Deer	1271	0	17	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
North Carolina	White-tailed Deer	116	0	29	0
	Mule Deer	0	0	0	0
	Elk	3	0	3	0
	Other	0	0	0	0
North Dakota	White-tailed Deer	441	0	2	0
	Mule Deer	31	0	36	0
	Elk	26	0	4	0
	Other	0	0	0	0
Ohio	White-tailed Deer	545	0	10	0
	Mule Deer	0	0	0	0
	Elk	1	0	0	0
	Other	0	0	0	0
Utah	White-tailed Deer	0	0	0	0
	Mule Deer	1527	2	0	0
	Elk	73	0	0	0
	Moose	0	0	0	0
	Antelope	0	0	0	0
Vermont	White-tailed Deer	251	0	0	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0

Pennsylvania	White-tailed Deer	571	0	88	0
	Mule Deer	0	0	0	0
	Elk	57	0	0	0
	Other	0	0	0	0
Rhode Island	White-tailed Deer	0	0	0	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
South Carolina	White-tailed Deer	102	0	1	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
South Dakota	White-tailed Deer	892	5	20	1
	Mule Deer	616	6	16	1
	Elk	605	0	4	1
	Other	0	0	0	0
Tennessee	White-tailed Deer	1817	0	12	0
	Mule Deer	16	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Texas	White-tailed Deer	1911	0	0	0
	Mule Deer	47	0	0	0
	Axis Deer	13	0	0	0
	Elk	23	0	0	0
	Reindeer	1	0	0	0
	Other	32	0	0	0
Virginia	White-tailed Deer	1018	0	67	0
	Mule Deer	0	0	0	0
	Elk	9	0	0	0
	Other	0	0	0	0
Washington	White-tailed Deer	189	0	0	0
	Mule Deer	296	0	0	0
	Black-tailed Deer	293	0	0	0
	Elk	118	0	0	0
	Moose	0	0	0	0
	Other	11	0	0	0
West Virginia	White-tailed Deer	457	0	36	0
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Wisconsin	White-tailed Deer	39698	194	300	11
	Mule Deer	0	0	0	0
	Elk	0	0	0	0
	Other	0	0	0	0
Wyoming	White-tailed Deer	247	18	0	0
	Mule Deer	1508	87		9
	Elk	795	5	0	0
	Other	0	0	0	0