USDA/APHIS/WILDLIFE SERVICES
RESEARCH NEEDS ASSESSMENT
2006

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RESEARCH NEEDS ASSESSMENT

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICES
WILDLIFE SERVICES

Larry Clark, Kirk Gustad, David Nelson

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BACKGROUND

Beginning in 1989 the Wildlife Services (WS) Management Team determined that a national research needs assessment would be conducted every five years. For the first assessment, a survey of all WS State Directors resulted in a list of research needs and priorities based on species and affected resource groups (Packham and Connolly, 1992, "Control methods research priorities for Animal Damage Control", *Proc 15th Vertebrate Pest Conference*, J.E. Borrecco and R. E. Marsh eds., Pp 12-15). In 1991, the WS Program convened an "Expert Panel" of stakeholders in science, industry, agriculture, and the environment in Denver, Colorado, to identify research approaches to address the wildlife damage problems and needs identified in the 1989 survey. In 1996 and 2001 two additional WS program-wide Research Needs Assessment were completed (Bruggers, et al. 2002. Wildlife damage management research needs: perceptions of scientists, wildlife managers, and stakeholders of the USDA/Wildlife Services program. *International Biodeterioration & Biodegradation* 49:213-223). These Research Needs Assessments (RNA) guide the WS Methods Development research planning and have been used by the National Wildlife Research Center (NWRC) Director for guidance, along with Congressional Directives, Deputy Administrator input, input from external sources, and input from stakeholder groups, in allocating NWRC resources to specific research projects that address the WS Program's priority research needs.

As part of the process to improve and strengthen its research, and better align the research with WS Program and customer needs, the NWRC reorganized its research efforts in 1996 into individual multiyear, multidisciplinary projects. Research projects currently are aligned under four Research Program Managers for bird, mammal, product development, and wildlife disease research. These research projects address specific areas related to research priorities identified by the RNA process. Projects are of 3-5 years duration, have clearly stated goals and objectives, projected milestones, expected outputs, periodic reviews, and annual progress updates (e.g., NWRC Annual Highlights Report and Annual Report of the NWRC for Government Performance and Reporting Act).

Five years have passed since the 2001 survey. This report summarizes the input for the 2006 survey from WS State Directors, NWRC scientists, members of the National Wildlife Services Advisory Committee (NWSAC) to the US Secretary of Agriculture, state natural resources Directors through the Association of Fish and Wildlife Agencies, and the Wildlife Management Institute. This report lists the submitted research needs of those needs considered most important to the eastern and western regions, the NWRC, and the Program as a whole.

METHODS

The Animal and Plant Health Inspection Service's Wildlife Services Program has established a means of identifying and prioritizing wildlife conflicts and risks needing research attention through the use of a WS Research Needs Assessment (RNA) process conducted every five years. In this process, WS operational personnel from the state offices of the Eastern and Western Regions, as well as researchers from the National Wildlife Research Center (NWRC) are surveyed to identify the most important research needs. Previous assessments were conducted in 1989,1996, and 2001. Members of the National Wildlife Services Advisory Committee (NWSAC), Wildlife Management Institute, and state natural resources Directors through the Association of Fish and Wildlife Agencies (AFWA) requested the opportunity to be involved in the WS program's 2006 RNA process. Representatives from each of these groups were invited by the NWRC Director to provide input to the RNA survey. In early February 2006, the NWRC Director initiated the 2006 RNA. In late February 2006 the WS Deputy Administrator and NWRC Director , respectively, solicited from WS State Directors, NWRC scientists, and NWSAC members, their three (in most cases) most important research needs. By May of the same year, the NWRC Director had received submissions from all WS State Directors representing 50 states, 32 NWRC scientists, 3 NWSAC members, a summary list from the Wildlife Management Institute, and a compiled list from state natural resources Directors sent through the Association of Fish and Wildlife Agencies..

Individual respondents' input was reviewed and categorized into a data matrix. Data were categorized as to the animal group (e.g., mammal, bird, reptile), species (e.g., beaver, starling), broad problem area (e.g., property protection, livestock protection, human safety), the type of damage (e.g., predation, disease), research needed (e.g., toxicant, repellent, information), and a summary of specific requests for research. From these syntheses several summary statistics are reported.

NWRC does not have the resources to address all the listed needs of the WS program. Therefore, identified research needs are used by the WS/NWRC Director as principal guidance for prioritization, along with Congressional Directives and Deputy Administrator guidance, in allocating NWRC resources to specific research projects that address the WS Program's priority research needs.

Bird Species Commonly Reported as Causing Problems: Of the number and diversity of bird species within the United States, only a few are identified as negatively impacting human activity or interests. The species of birds most frequently identified as causing damage by WS State Directors are blackbirds, starlings, cormorants, and Canada geese (Figs. 1-4).

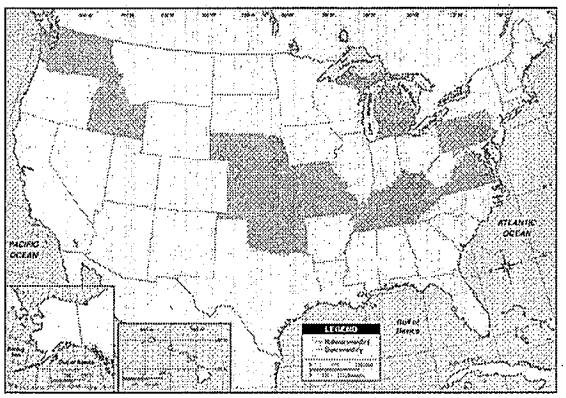


Fig. 1. Wildlife Services State Directors reporting high priority research needs to resolve conflicts with European starlings).

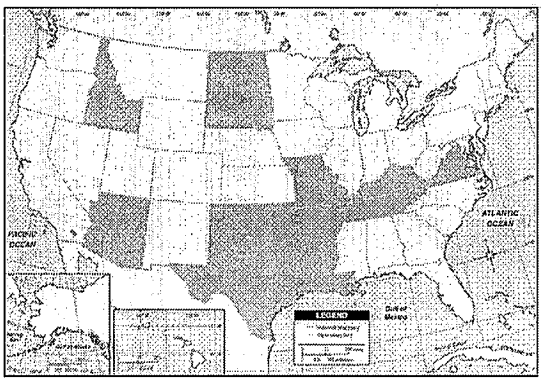


Fig. 2. Wildlife Services State Directors reporting high priority research needs to resolve conflicts with blackbirds.

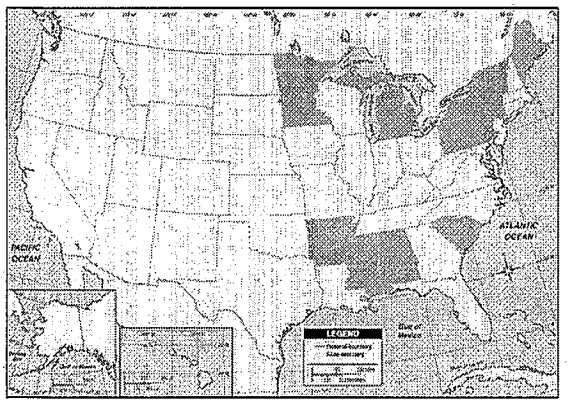


Fig. 3. Wildlife Services State Directors reporting high priority research needs to resolve conflicts with cormorants.

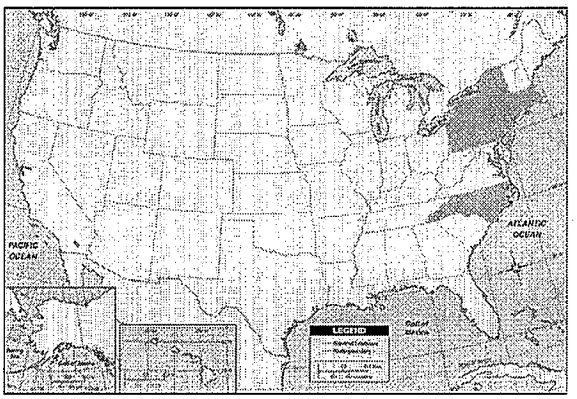


Fig. 4. Wildlife Services State Directors reporting high priority research needs to resolve conflicts with Canada geese.

Starlings (Fig. 1): States reporting problems caused by starlings tend to be within the winter range for this species. Problems frequently reported range from feed loss at dairy operations and beef feedlots; impact of selective feeding by starlings on the protein ration of cattle feed and its negative effect on meat or milk conversion; feed contamination at those operations by bird feces, and; the risk of disease transmission to cattle herds. Other damage areas mentioned included damage to fruit crops, nuisance issues at large urban roosts, property damage through fecal contamination and acid erosion of structures, and possible dissemination of zoonotic diseases.

Blackbirds (Fig. 2): States reporting problems with blackbirds are within the winter and breeding ranges for these species. During the winter, many of the same issues occur as reported for starlings at feedlots and dairies. In addition, blackbirds have significant negative impact on

sunflower seed production during their fall migration. During the early spring, blackbirds have significant impact on rice seeds and seedlings, and in the fall on the headed rice crop. Large blackbird roosts also can have impact on human health (e.g., fecal accumulation and contamination of sites with *Histoplasma* and other pathogens).

Cormorants (Fig. 3): This species is largely a problem in the central and eastern United States. In the southern United States cormorants have significant impact during the fall and winter on catfish production. During the spring and summer the impact of cormorants is on sports fisheries and habitat destruction at breeding colonies. This species has been implicated in transmission of fish diseases and parasites.

Canada geese (Fig. 4): While overabundant non-migratory populations of Canada geese are reported as being a nuisance throughout the United States, this species is primarily at the top of the list of nuisance species on the eastern seaboard. Geese have been implicated in aggressive contacts with humans during the breeding season, habitat destruction, general nuisance, fecal contamination of lawns and ponds, and a possible concern for human health.

Other species of birds were listed by the respondents surveyed, but these species tended to have more local (i.e., individual state) focus (Table 1). Nonetheless, they cause sufficient conflict with human activity to be listed within the top three problem areas by individual WS State Directors.

Table 1. List of bird species or group specifically mentioned by biologists as being involved with human-wildlife conflicts.

	WS State Directors East	WS State Directors West	NWRC Scientists
Blackbirds	✓	✓	✓
Canada geese	✓		✓
Cormorants	✓		✓
Cranes	✓		
Crows	✓	✓	✓
Gulls	✓	✓	✓
Horned larks	✓		✓
House finches			✓
Monk parakeets			✓
Parrots			✓
Pelicans	✓		✓
Pigeons	✓	✓	✓
Robins			✓
Snow buntings	✓		
Starlings	✓	✓	✓
Turkeys	✓		
Vultures	✓		
Wading birds (herons/egrets)	✓		✓

The areas of conflict focus primarily on commodity damage, property damage, nuisance, disease transmission, and human safety. For example, pelicans and wading birds eating bait fish or other aquaculture stock; vultures as depredating livestock or causing property damage; monk parakeets as causing property damage; cranes, parrots, horned larks, robins as eating seedlings or fruits; pigeons, gulls and crows as nuisance species or involved in disease transmission, and various birds involved in risk to aviation safety.

Mammal Species Commonly Reported as Causing Problems: The most frequently cited category of nuisance mammals is predators, including bears, coyotes, mountain lion, and wolves (Fig. 5). Unlike birds, many of these species have different protective status depending upon the specific state. However, the type of conflict is relatively uniform (i.e., depredation of livestock). Interestingly, several eastern states are beginning to report livestock depredation by coyotes and the need to address control methods in a very different environment than found in the western states. The next most frequently cited mammal causing damage is the feral swine. This species is implicated in habitat destruction and disease transmission to domestic swine (e.g., pseudo rabies).

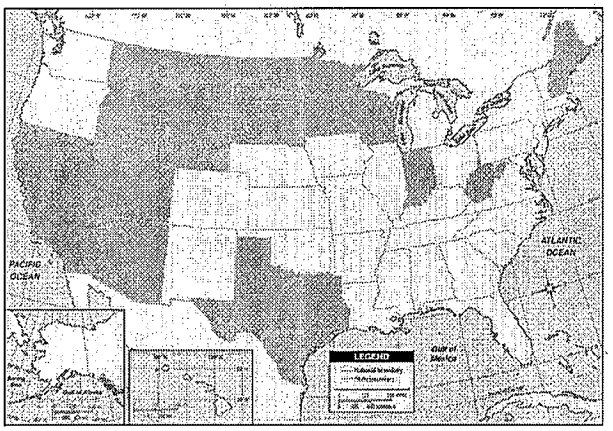


Fig. 5. Wildlife Services State Directors reporting high priority research needs to resolve conflicts with predators: coyotes, wolves, bears, mountain lions.

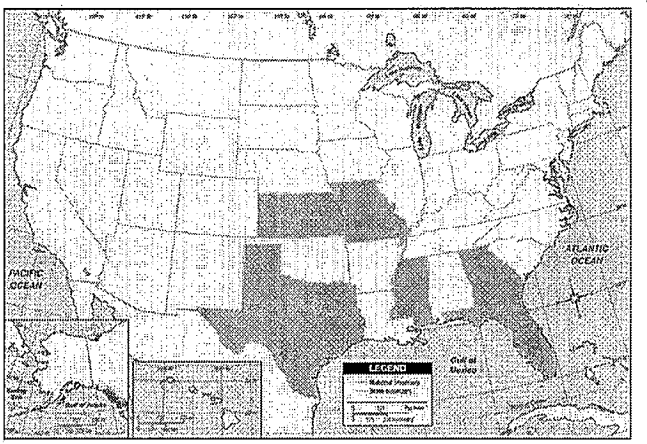


Fig. 6. Wildlife Services State Directors reporting high priority research needs to resolve conflicts with feral swine.

Other species of mammals were cited by State Directors and represent more regional conflicts with wildlife. Armadillos are expanding their geographic range and have been implicated in property damage. Bats are a concern as vectors for zoonotic disease. Bison are a concern as a reservoir and vector for Brucellosis which impacts cattle herd health. Deer cause property damage by browsing horticultural plants, cause natural resource damage by destroying forest structure, are a reservoir for chronic wasting disease and bovine tuberculosis in some states, and are involved in highway collisions. Feral cats have significant impact on native bird populations. Feral dogs can be livestock predators and be a reservoir for canine rabies. Mongoose negatively impact insular bird populations. Nutria are involved in habitat destruction in wetlands. Beaver are implicated in habitat and property destruction. Prairie dogs are a source of cattle injury because of their burrow systems. Raccoons are a reservoir for zoonotic diseases and impact threatened and endangered species. Rodents are reservoirs for zoonotic and animal health diseases, cause property damage, and prey on native bird populations. Skunks are reservoirs for

zoonotic diseases. Others species (e.g. kit foxes and jaguars) are of concern because of management issues complicated by their protected population status.

Table 2. List of mammal species or group specifically mentioned as being involved with human-wildlife conflicts.

	WS State Directors East	WS State Directors West	NWRC Scientists
Armadillo	✓		
Bats		✓	
Bears	✓	✓	✓
Beaver	✓	✓	✓
Bison			✓
Coyotes	✓	✓	✓
Deer	✓		✓
Feral Cats			✓
Feral Dogs			✓
Feral Swine	✓	✓	✓
Jaguars			✓
Kit foxes			✓
Mongoose			✓
Mountain Lion		✓	✓
Nutria		✓	✓
Prairies dogs		✓	
Raccoons	✓		
Rodents	✓		✓
Skunks		✓	
Wild horses			✓
Wolves	✓	✓	✓

Types of Conflict between Humans and Wildlife: The most common areas of wildlife-human conflicts identified by WS personnel are included in Table 3. These are major categories identified by biological professionals, however, it should be noted that the category headings are not mutually exclusive. Rather they reflect different emphasis on frequently overlapping problem areas. There was general agreement between WS operations and research on the rank order of the wildlife conflict areas that needed to be addressed (Fig. 7). The types of commodities affected (not ranked) are reported in Tables 4 and 5.

Table 3. Most frequently reported areas in need of research for human-wildlife conflicts. Ranks were determined by the frequency that a broad research need was cited. The lower the number the more frequently that conflict was cited as needing to be addressed. Similar numbers indicate tied ranks.

	WS Operations	NWRC
Property Protection	1.5	7
Livestock (disease)	1.5	2
Crop Protection	3	1
Livestock (predation)	4	5
Human Health	5.5	8
Safety (transportation)	5.5	9
Natural Resource (habitat)	7	5
Nuisance	8.5	2
Aquaculture	8.5	10.5
Natural Resource (T&E)	10	5
Invasive Species	11	10.5

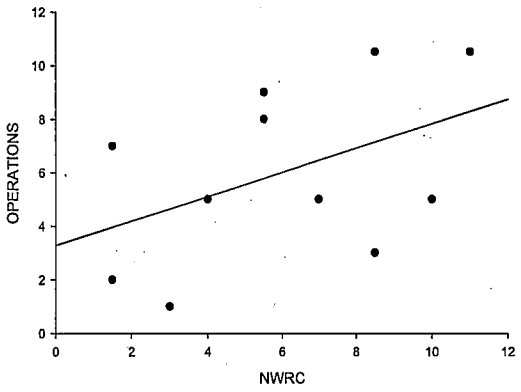


Figure 7. There was a positive rank correlation between WS operations and WS research personnel on the perceived importance of areas of human-wildlife conflict by stakeholders.

Table 4. Types of damage to commodities caused by birds.

	WS State Directors East	WS State Directors West	NWRC Scientists
Ag Commodity (damage/depredation)			
Bait fish			✓
Beef cattle feed loss		✓	
Corn			✓
Cow production loss (weight gain/milk)		✓	
Crawfish	✓		✓
Crops-general	✓		✓
Dairy feed loss		✓	
Fish-aquaculture stock (catfish, etc)	✓		✓

Fish-sports	✓		✓
Fish-salmon	✓		
Fruit crops		✓	
Grain crops			✓
Lettuce			✓
Livestock			✓
Pecans		✓	
Rice-headed	✓		✓
Rice-sprouting	✓		✓
Seedlings			✓
Sunflowers		✓	✓
Animal Health Impacts			
Aquaculture stock disease	✓		
Beef cattle disease		✓	✓
Dairy cow disease	✓	✓	✓
Dairy food contamination	✓	✓	✓
Herd mortality		✓	✓
Human Health Impacts			
Feces-dairy product contamination	✓		
Feces-human pathogen exposure	✓	✓	✓
Natural Resource Damage			
Habitat destruction	✓		✓
Impact on other species	✓		✓
Impact on threatened & endangered species			✓
Nuisance			
Feces-esthetics	✓		✓
Landfills		✓	
Roosts-noise	✓		✓
Property Damage			
Aircraft	✓		
Feces-corrosion (structures/vehicles)	✓		
Structures	✓	✓	✓
Safety			
Aviation	✓		✓
Transportation		✓	

Table 5. List of damage-related issues caused by mammals.

	WS State Directors East	WS State Directors West	NWRC Scientists
Ag Commodity (damage/depredation)			
Beef cattle predation	✓	✓	✓
Crop destruction	✓		
Dairy cattle predation	✓		
Forestry damage/herbivory			✓
Goat predation	✓		
Livestock-predation	✓	✓	✓
Livestock-injury		✓	
Salmon predation	✓		
Sheep predation		✓	
Animal Health Impacts			
Beef cattle disease	✓		✓
Bovine tuberculosis	✓		✓
Herd mortality	✓		
Dairy cow disease	✓		✓
Swine disease		✓	✓
Human Health Impacts			
Zoonoses	✓	✓	✓
Natural Resource Damage			
Antelope (predation)			✓
Big horn sheep (predation)			✓
Deer populations (predation)		✓	
Elk (predation)			✓
Game bird nests (predation)	✓	✓	
Gopher tortoise (predation)	✓		
Habitat destruction	✓		✓
Mule deer (predation)			✓
Sea turtle nests (predation)	✓		✓
Shorebird (predation)	✓		
T&E (predation)		✓	✓
Water quality (fecal contamination)		✓	
Property Damage			
Transportation (roads-flooding by beavers)	✓	✓	
Residential	✓	✓	
Commercial	✓	✓	
Safety			
Aviation	✓	✓	✓
Human attacks (mountain lions, bears)		✓	

Several geographic patterns emerged for research areas identified by WS operational program. The importance of developing research tools to alleviate property damage by wildlife is primarily focused in the eastern United States or other states with higher population densities (Fig. 8).

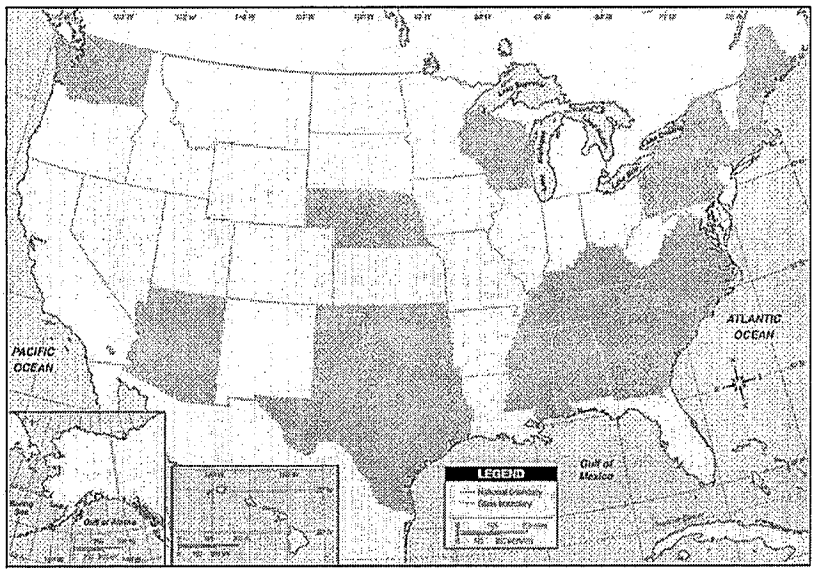


Figure 8. WS State Directors reporting research needs to alleviate property damage caused by wildlife. Note the concentration of reporting in the eastern United States.

Research requests to alleviate disease impacts on domestic animals (Fig. 9) were largely concentrated in states with high production in dairy and beef cattle and concentrated along the migratory and wintering range of starlings and blackbirds.

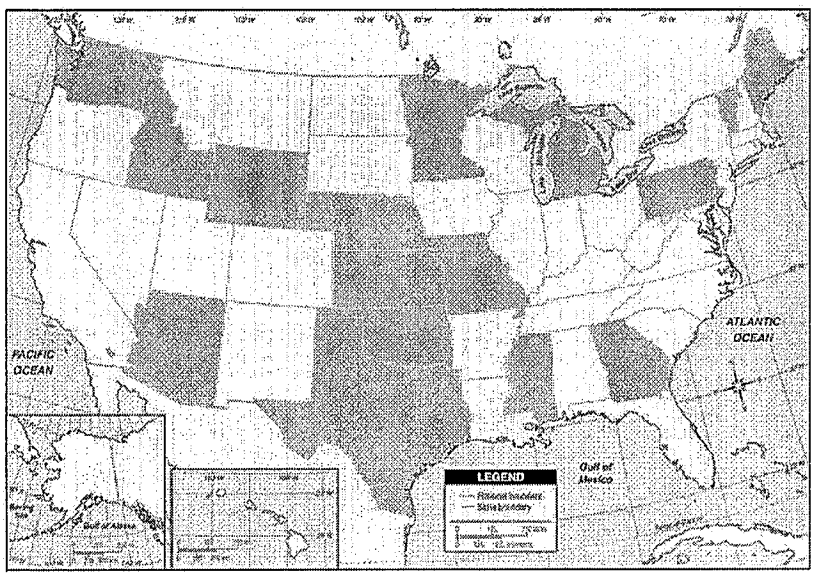


Fig. 9. WS State Directors reporting methods development needs to alleviate livestock losses attributable to disease caused by various wildlife species.

Research requests to alleviate crop damage (Fig. 10) were largely concentrated along the Mississippi flyway, most likely associated with blackbird migration and damage to rice and sunflowers). However, fruit and nut crops were also damaged by other birds.

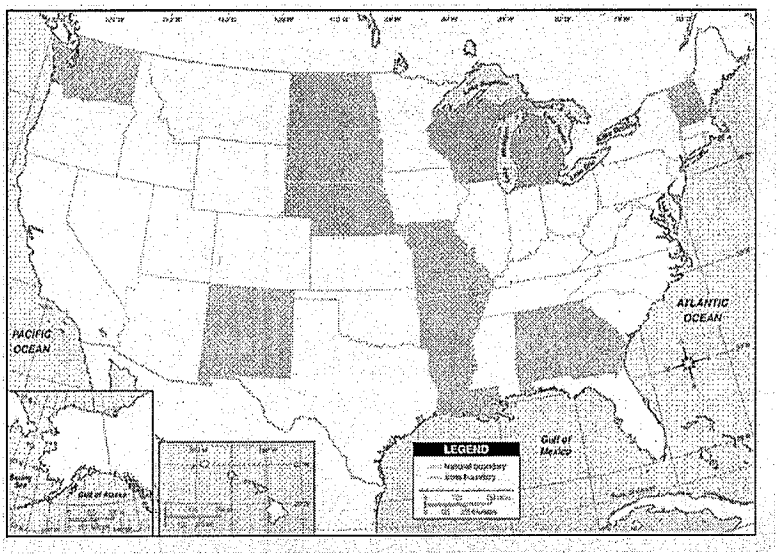


Fig.10. WS State Directors reporting methods development needs to alleviate crop damage caused by various wildlife species.

The top ten sheep producing states are all in the Western Region (TX, CA, WY, CO, MT, SD, UT, ID, OR, and NM). Six of those states listed development of methods to protect livestock from predation as being an important research issue. The top ten beef cattle states occur throughout the country (TX, MO, OK, NE, SD, MT, KS, KY, TN, and FL). Four of those states listed livestock predation as being an important wildlife conflict. The top ten dairy producing states are likewise distributed throughout the country (WI, CA, NY, PA, MN, TX, MI, ID, OH, and WA). Six of those states listed livestock predation as being an important wildlife conflict (Fig. 11).

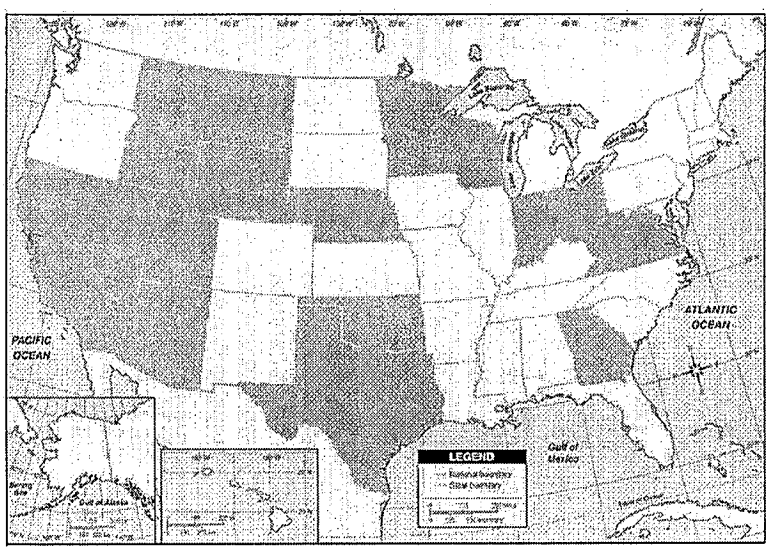


Figure 11. WS State Directors reporting methods development needs to alleviate livestock losses caused by predation.

Detailed summary of areas of wildlife conflict and research needs (alphabetically listed):

- *Aquaculture protection.* Research needs areas include:
  - damage assessments,
  - population estimates of depredating birds,
  - population modeling,
  - development of predation management plans,
  - spatial movement of depredating birds,
  - the role of birds in spreading diseases,
  - estimation of economic impacts of predation on various aquaculture endeavors,
  - impacts of cormorants on vegetation,
  - impacts of cormorants on sports fisheries,
  - development of management tools at the pond side, and
  - strategies for minimizing damage on larger spatial scales (e.g., regional and flyway).

- *Crop protection.* Research areas include:
  - physical and economic damage assessments and impact,
  - evaluation of the efficacy of methods to protect crops,
  - development of repellents,
  - development of hazing devices,
  - development of management plans,
  - registration support, and
  - assessments of the impacts of DRC-1339 on populations of birds.

- *Invasive species.* This category was somewhat intertwined with natural resource protection. Research areas include:
  - estimating damage (ecological and economic) caused by these species,
  - early detection methods,
  - risk assessment,
  - development of control plans, and
  - development of control methods.

- *Human health protection.* The primary research areas identified include:
  - identifying host range in wildlife species of zoonoses,
  - economic impact of zoonoses,
  - development of methods to minimize transmission zoonoses,
  - development of wildlife monitoring and surveillance methods,
  - development of wildlife vaccines,
  - development of baits and lures,
  - understanding wildlife epidemiology and disease ecology, and
  - risk assessment for transmission of zoonotic diseases.

- *Human safety protection.* This area is predominately focused on aviation issues, but surface transportation (vehicle collisions) are also included. Issues focus on:
  - predicting risks (spatial and temporal) wildlife pose for aviation and other modes of transportation,

- habitat and management plans to reduce attractive nuisance hazards, and
- developing new methods to exclude wildlife from protected areas.

- *Livestock protection (wildlife disease).* The primary research areas identified include:
  - identifying host range in wildlife species of pathogens impacting domestic animal health and production,
  - economic impact of diseases transmitted by wildlife to domestic production,
  - development of methods to minimize transmission of pathogens from wildlife to domestic animals,
  - development of wildlife monitoring and surveillance methods,
  - development of new diagnostic methods,
  - development of wildlife vaccines,
  - development of baits and lures, and
  - understanding wildlife epidemiology and disease ecology.

- *Livestock protection (predation management*): Research is needed to better minimize the impact of predators on livestock production. This includes:
  - gaining information on extent of impact,
  - evaluating control methods,
  - developing new control methods (lethal and nonlethal), and
  - developing management plans.

- *Natural resource protection (habitat):* Research is needed to evaluate the impact feral, overabundant native species, or invasive species have on natural resources. Methods are needed to control the populations to minimize their negative impacts on habitats and other wildlife species. Damage assessment (biological and economic) measures were identified as a need. Management plans were identified as a need.

- *Natural resource protection (T&E)*: Similar to habitat protection, information on feral, native and invasive species' impacts on threatened and endangered wildlife is needed. Methods to control these target species was identified. Evaluation of the risk these target species have on disease transmission to T&E species was requested.

- *Nuisance abatement:* Documenting the extent of feces, noise, aggressive behavior of problem species were identified as a source of information needed to develop control rationale. Abatement methods (lethal, nonlethal) were identified as research priorities. Most areas identified under this category were located in urban/suburban environments.

- *Property Protection:* These requests focused on physical damage to property.
  - develop methods to prevent damage to aircraft
  - developing control methods to protect cars and other vehicles
  - develop methods to prevent damage to farm and other equipment
  - develop methods to prevent damage to residential and commercial buildings
  - develop methods to prevent damage to communication and other industrial structures

Methods Development Needs

The WS operational programs were specific in identifying the types of research categories needed to resolve human wildlife conflicts (Fig. 12). Many of the historic methods needs still remain (e.g., toxicants, repellents, lures, baits). However, there was also a need for basic behavioral and ecological information for wildlife that come in contact with humans (e.g., movement patterns, surveillance methods, population modeling as they relate to population management issues or control activities carried out by the operational programs). These requests can be viewed as supporting NEPA documentation requirements and culminate in the high number of requests from operations to research in assistance in developing wildlife management plans as they relate to wildlife damage management scenarios. Other areas of research needs include increasing demand for methods and techniques for wildlife disease sampling and surveillance. There were also requests for economic valuations of state programs and the effectiveness of management tools.

The interpretation of Fig. 12 must be put in context. Some of the methods categories are very broad by their nature, while others focus on technologies. Moreover, the method categories are not mutually exclusive. For example, some respondents may have cited the need for a specific type of toxicant for a specific species. However, program delivery for a toxicant would involve not only development of the toxicant (chemical), but it would also involve other categories not specifically mentioned (e.g., lures to attract the target, baits to deliver the toxicant to the target, development of a delivery system, ecological information for NEPA considerations, and possibly an economic evaluation of need, efficiency, and benefit:cost analysis). Thus, effective methods development and complete operational Program delivery would involve 6 of the 11 methods categories, even though the respondent only listed one method category. Additional research category items such as registration support, prototyping, and technology transfer are also needed for effective and complete program delivery. In summary, although a specific research need is cited, other research and nonresearch investments are needed for complete program delivery to be achieved.

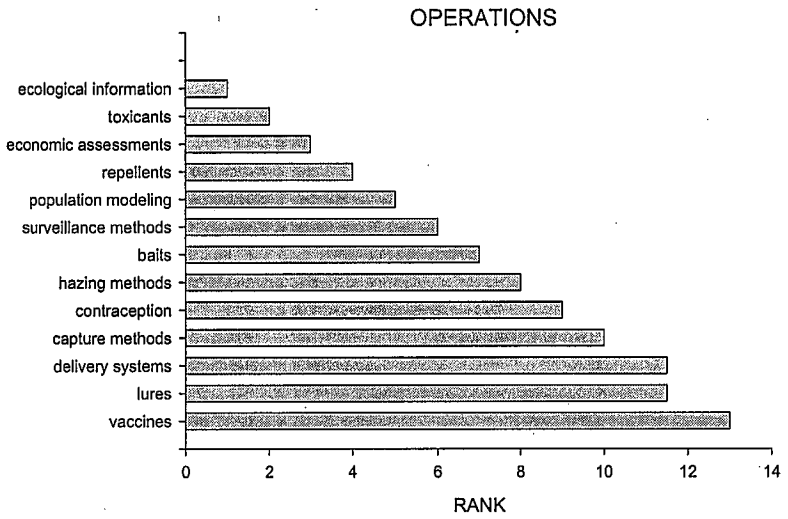


Fig. 12. Most frequently requested types of methods or data cited by WS operational state programs. **Low numbers are ranked higher.**

The types of research methods and information are listed (alphabetically) below:

- *Baits*: Research into what is palatable to various target species for the efficient and effective delivery of vaccines, contraceptives, and toxicants.

- *Capture methods*: Research in this area includes design and testing of mechanical devices, monitors for traps, drugs/stupefactants/tranquilizers/immobilizing agents, and behavioral assessments for success and efficacy.

- *Contraception*: Research includes discovery and development of chemical and immunocontraceptive methods for overabundant target birds and mammals, with emphasis on feral pigs and rodents. This area of research would also include development of strategies and management plans for the successful implementation of these control technologies.

- *Delivery systems:* This area is somewhat overlapping with capture methods and baits. Requests focus on methods to deliver various compounds (vaccines, toxicant, and repellents) to target wildlife. This area of research would include implementation strategies, formulations, devices, and evaluations of efficacy.

- *Economic assessments:* This area of research focuses on documenting and assessing damage caused by wildlife, cost/benefit analysis of methods and management strategies, and operational program evaluation.

- *Ecological information*: The research needs identified under this heading includes gathering basic ecological information on population status and spatial information of species being impacted by control programs. This heading also includes gathering basic behavioral information about target wildlife species that might be useful in developing control and damage abatement methods, as well as devising successful management

plans. One area of focus would be the impact that control technologies and methods might have on the local, regional and larger scale populations of wildlife. This information is needed for NEPA compliance and development of wildlife management plans.

- *Hazing methods*: This area of research focuses on ways to manipulate animal behavior so as to minimize damage caused by wildlife, and disperse concentrations of animals from strategically valuable areas. Requests also included research on the efficacy of these hazing methods in reducing damage, and the impacts the methods have on resource damage in areas nearby the site of hazing. Finally, studies were requested that evaluate the effectiveness and economics of translocation of nuisance wildlife.

- *Lures*: Methods are needed to attract target wildlife to traps or baits (for the delivery of vaccines, contraceptives, and toxicants).

- *Population modeling*: Estimates are needed for target wildlife species to better assess the impact of management and control strategies and plans. This information is increasingly needed for science-based NEPA documentation. This information would also be valuable for determining disease transmission dynamics over spatial and temporal scales.

- *Repellents*: Effective nonlethal methods for crop protection are needed. This area of research includes product discovery, formulation, and registration, as well as development of effective field deployment strategies.

- *Surveillance methods*: Cost effective population disease sampling strategies are needed to assess host range, epidemiology, and disease transmission dynamics in wildlife populations and transmission risks at the wildlife-agricultural-human interface. Also needed are sampling and diagnostic methodologies that are cost effective (minimizing field collection costs and lab analysis costs). Definition of host ranges for a suite of zoonotic and domestic animal diseases is needed.

- *Toxicants*: Effective, registerable toxicants are needed that are target-specific and have low environmental impact. Delivery and formulation are covered under separate headings.

- *Vaccines*: Effective product discovery and efficacy studies are needed for high profile wildlife diseases of high zoonotic and domestic animal health impact potential. Delivery and formulation are covered under separate headings.

Other Stakeholder Input

Several stakeholders responded to the call for research prioritization put out by the Deputy Administrator's office, among them were the Wildlife Management Institute, Association of Fish and Wildlife Agencies, California Fish & Game, and the Animal Welfare Institute.

Among the broader topics listed were research needs on nuisance wildlife issues, predation management, ungulate management, urban predator management, wildlife disease research, human safety, commodity protection, overabundant wildlife population control, nonlethal control strategies and methods, damage assessments, aquaculture, natural resource protection (habitat), human safety (airports, marine safety).

Specific methods research or information mentioned included: evaluation of efficacy of predator control (e.g., DRC 1339) as a predation management tool (ravens), lethal and nonlethal predator control, hazing methods, repellents, impact of nuisance wildlife on economics, and other human activity, population management plans, deer control methods, contraception methods for wildlife, efficacy of relocation programs (effectiveness, impact on survivorship of moved individuals), impact of wildlife diseases on domestic animal production, capture devices, monitoring devices, methods (lethal and nonlethal) to alleviate depredations on aquaculture, rice, and other commodities, measures of impact of invasive species on habitats and other wildlife species, and methods to resolve conflicts between sea lions and boats. In general, the overall requests for assistance parallel requests received from WS operations state directors, and the perception of needs of research scientists.

Specific species and problem associations were identified and research into methods to resolve those conflicts were reported as follows:

- Develop methods to deal with nuisance bears in urban environments
- Sage grouse protection (identify causes of population declines, e.g., disease, predation; and develop management plans to protect populations)
- Develop predation management plans for protection of waterfowl and turkeys
- Develop methods for urban predation management (lions, bears, coyotes)
- Develop methods and strategies to minimize impact of wildlife and zoonotic diseases
- Evaluate efficacy of anti-deer collision devices
- Methods to reduce big game impacts on crops
- Efficacy of fertility control in managing ungulates
- Methods to reduce urban/suburban damage caused by deer
- Develop cheap effective deterrents for deer (repellents, hazing devices)
- Evaluate coyote management strategies is eastern states
- Develop urban deer management plans
- Evaluate damage estimates against producer self reporting estimates
- Evaluate efficacy of bounty systems as a means of damage abatement
- Develop capture devices
- Develop control methods to alleviate aquaculture damage by wildlife
- Evaluate economic impacts of wildlife on aquaculture
- Develop nutria control methods and evaluate impact on natural resource recovery
- Develop blackbird control methods to alleviate impact on rice crops
- Develop nuisance control methods for Canada geese

Summary

The RNA is used as one source of information to guide the WS Methods Development research planning. The RNA, along with Congressional Directives, Deputy Administrator input, input from external sources, and input from stakeholder is used by the National Wildlife Research Center (NWRC) Director to allocate NWRC resources to specific research projects that address the WS Program's research needs through the NWRC's project management system. The systematic summary of the research needs also presents an opportunity for the WS Program to assess spatial and temporal patterns for various types of damages, for the identification of species in conflict with humans, and for identifying methods development needs to address and resolve the human-wildlife conflicts. Finally, with limited resources, the RNA, along with other inputs, allows the WS Program to make critical research management decisions for resource investment that have the broadest economical or strategic impact in finding solutions to human wildlife conflicts.

Acknowledgements

We wish to thank the operational and research WS program personnel for their input into the 2006 RNA. The State Directors and researchers have valuable connections to the spectrum of agricultural and wildlife stakeholders who have direct dealings with wildlife-human conflicts. It is through this interaction of Program personnel with stakeholders that critical research needs are identified. We also thank the Association of Fish and Wildlife Agencies, Wildlife Management Institute, and the National Wildlife Services Advisory Council for providing input from their various stakeholders on the nature and research needs in the area of wildlife-human conflicts.

NWRC Organization

Director's Office

- Legislative & Public Affairs
- Facility Development

Information Services

Administrative Unit

Animal Care

Quality Assurance

Invasive Species & Technology Development Research Program

Fort Collins
- Invasive Species (rodents)
- Wildlife Contraception
- Chemical Methods Development
- Wildlife Economics

Support Functions
- Analytical Chemistry
- Pesticide Registration
- Wildlife Forensics
- Electronics & GIS

Gainesville, FL
- Avian Population Mgmt

Hilo, HI
- Insular Invasive Species

Agriculture & Resource Protection Research Program

Fort Collins
- Rice/Blackbirds

Sandusky, OH
- Aviation/Wildlife

Starkville, MS
- Aquaculture/Fish eating birds

Bismarck, ND
- Sunflowers/Blackbirds

Logan, UT
- Predator Ecology
- Improved Capture Technology

Olympia, WA
- Forest Mammal Damage

Wildlife Disease Research Program

Fort Collins
- Bovine TB
- Raccoon Rabies
- Chronic Wasting Disease
- Surveillance, Monitoring & Research [avian bacteria, West Nile Virus, Avian Influenza]

Kingsville, TX
- Pseudo rabies/Feral hogs

USDA

United States Department of Agriculture

Animal and Plant Health Inspection Service

Wildlife Services

National Wildlife Research Center

4101 LaPorte Ave.
Ft. Collins, CO
80521
Ph: 970 266-6000
Fax: 970 266-6032

Subject: Reassessment of WS Research Needs

December 20, 2005

To: Larry Clark
Assistant Director

The Wildlife Services (WS) Program conducts a nationwide assessment of its research needs every five years. The results are used by the National Wildlife Research Center (NWRC) as important guidance, in addition to Congressional budget language, for the Center's research project planning and resource allocations. Fiscal year 2006 begins a new five-year cycle of research needs. I would like you to provide WS and Center leadership and coordination for this task.

The WS Management Team agreed, on October 27, 2005, to the recommendation of using a process similar to that used for the 2001 assessment, with NWRC providing the leadership, and each Region assigning a representative to work with you. Charles Brown, Eastern Regional Director, and Jeff Green, Western Regional Director, have designated Dave Nelson and Kirk Gustad, of their respective offices, to work with you. In addition, Bob Myers of the WS/OSS staff will assist you by analyzing WS data relative to possible research needs. The goal is to conduct an assessment of WS research needs and their relative priorities, not to prioritize current research which is based largely on priorities of the 2001 assessment. It is important to finish with a product that represents the broad spectrum and relative priorities of wildlife damage problems faced by the Program, its cooperators, and stakeholders. The NWRC will provide the staff support, as needed, to carry out the administrative aspects of the process – letters, memos, data compilation and analysis, and report writing. The target for completing the reassessment document is June 31, 2006.

Richard Bruggers
Director

cc: William H. Clay, Deputy Administrator, Wildlife Services
Joanne Garret, Director, Wildlife Services Operational Support Staff
Charles Brown, Director, Wildlife Services Eastern Regional Office
Jeff Green, Director, Wildlife Services Western Regional Office

USDA

United States
Department of
Agriculture

Animal and
Plant Health
Inspection
Service

Wildlife Services

Washington, DC

December 22, 2005

Subject: WS Research Needs Assessment – 2006

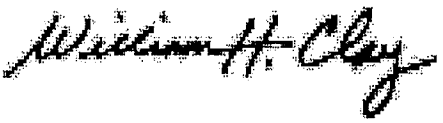
To: See Distribution

Research and methods development priorities of Wildlife Services (WS) are established largely through the WS Research Needs Assessment (RNA) process conducted every five years. The present WS National Wildlife Research Center (NWRC) research program is based on prior needs assessments, Congressional Directives, and NWRC Director, WS Deputy Administrator and WS Management Team decisions. The WS Management Team, in its October 2005 Management Team meeting, reaffirmed the value of updating the RNA during FY 2006 and identified individuals from both research and operations to lead and implement this process and to analyze and summarize responses.

By this memorandum, I am soliciting your input for research that you would like to see conducted by NWRC to better resolve existing and emerging issues faced by the WS Program. Please take this opportunity to identify the three most important research needs in priority order in your state and region. For each, provide (1) a brief statement of the problems or situations and include species/species groups and resources affected; (2) background on the magnitude and/or location of the problem (state, regional, national) and other pertinent information; and (3) the importance of research in this area. I also have asked the Operational Support Staff to analyze relevant data generated by the MIS to further assist this effort. **Your input via letter or email should be provided to the Director, National Wildlife Research Center, 4101 LaPorte Avenue, Fort Collins, CO 80521 or Richard.L.Bruggers@APHIS.USDA.GOV, by February 17, 2006.**

The NWRC has a very effective research project management system in place to address WS program and stakeholder research needs. The Center's research is organized into multi-year projects of 3-5 years duration. These projects have a precise goal, clearly defined objectives, periodic reviews, and expected outputs by which research can be initiated and progress measured. This 2006 RNA will be another important step to ensure that the WS program directs its research efforts to provide information and solutions to present and future problems. Every effort will be made to include the high priority, newly identified needs into the NWRC's research projects over the next five years.

Please share this request with your State Directors, Research Program Managers and scientists, and ask that they solicit input from others under their supervision. I encourage strong participation in this assessment.



William H. Clay
Deputy Administrator

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USDA

United States Department of Agriculture

Animal and Plant Health Inspection Service

Wildlife Services

National Wildlife Research Center

4101 LaPorte Ave.
Ft. Collins, CO 80521
Ph: 970 266-6000
Fax: 970 266-6032

Subject: WS Research Needs Assessment – 2006

April 24, 2006

To: 2006 National Wildlife Services Advisory Committee (NWSAC) Members

The USDA/Wildlife Services (WS) program is conducting a national assessment of the most important wildlife damage and human-wildlife conflict issues faced by its State Directors and research scientists to better understand the current and future research needs faced by the WS Program and its stakeholders. This 2006 assessment is the fourth such Research Needs Assessment (RNA) that has been conducted since the WS program's move from the Department of Interior into the Department of Agriculture. The results of these assessments provide guidance around which the WS program's National Wildlife Research Center (NWRC) develops its research agenda.

During the June 2000 NWSAC meeting, committee members expressed an interest in being given an opportunity for input in this RNA process, and as a result, NWSAC members participated in the 2001 RNA. WS is again requesting NWSAC participation in this 2006 RNA. Attached is the WS Deputy Administrator's solicitation letter to the WS program which includes guidance for submitting input. Please use the guidance in Mr. Clay's letter and provide any input you may have directly to me, either by letter or email (Richard.L.Bruggers@aphis.usda.gov), by May 31, 2006. WS will attempt to include your priority needs into the Center's research project management process as opportunities and funding permit. A summary report will be provided to you at the end of this process. Thank you in advance for your input.

Richard Bruggers
Director

cc: William H. Clay, Deputy Administrator, Wildlife Services
Dr. Larry Clark, Assistant Director, APHIS/WS/NWRC

Attachment

United States
Department of
Agriculture

Animal and
Plant Health
Inspection
Service

Wildlife Services

Washington, DC

December 22, 2005

Subject: WS Research Needs Assessment – 2006

To: See Distribution

Research and methods development priorities of Wildlife Services (WS) are established largely through the WS Research Needs Assessment (RNA) process conducted every five years. The present WS National Wildlife Research Center (NWRC) research program is based on prior needs assessments, Congressional Directives, and NWRC Director, WS Deputy Administrator and WS Management Team decisions. The WS Management Team, in its October 2005 Management Team meeting, reaffirmed the value of updating the RNA during FY 2006 and identified individuals from both research and operations to lead and implement this process and to analyze and summarize responses.

By this memorandum, I am soliciting your input for research that you would like to see conducted by NWRC to better resolve existing and emerging issues faced by the WS Program. Please take this opportunity to identify the three most important research needs in priority order in your state and region. For each, provide (1) a brief statement of the problems or situations and include species/species groups and resources affected; (2) background on the magnitude and/or location of the problem (state, regional, national) and other pertinent information; and (3) the importance of research in this area. I also have asked the Operational Support Staff to analyze relevant data generated by the MIS to further assist this effort. **Your input via letter or email should be provided to the Director, National Wildlife Research Center, 4101 LaPorte Avenue, Fort Collins, CO 80521 or Richard.L.Bruggers@APHIS.USDA.GOV, by February 17, 2006.**

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Please share this request with your State Directors, Research Program Managers and scientists, and ask that they solicit input from others under their supervision. I encourage strong participation in this assessment.

William H. Clay

William H. Clay
Deputy Administrator

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Mr. Scott W. Steckel
Varment Guard Environmental Svcs.
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Columbus, OH 43231

Ms. Patti L. Strand
National Animal Interest Alliance
4141 S.E. 141st Avenue
P.O. Box 66579
Portland, OR 97290

Mr. Hugh A. Warren
Executive Vice-President
Catfish Farmers of America
1100 Hwy 82 E Suite 202
Indianola, MS 38751

Current NWRC Research Projects with Goals and Objectives

Project Title *Project Leader*	*Project Start and Completion Dates*	*Goal*	*Objectives*

Agriculture and Resource Protection Research Program

New Technologies to Deter Wildlife from Airports and Aircraft

Robert Beason

10/1/2004
9/30/2009

To develop and evaluate methods and technologies for reducing the risks of wildlife strikes to civil aviation and to provide scientifically valid methods and techniques to be used on airfields to manage hazardous wildlife.

- Analyze wildlife food, water, and cover attractants on and near airfields to determine which characteristics of vegetation, trash disposal facilities, water management facilities, and other habitats attract or repel hazardous wildlife.
- Develop and evaluate wildlife control methods such as electric mats, razorwire, and avian effigies that might be effective in repelling and dispersing wildlife from airfields and locations near airfields.
- Investigate features of avian sensory perception that can be used to develop new wildlife deterrents and enhance existing systems.

Evaluation of Wildlife Food Plots, Repellents, and DRC-1339 "Take Models" for the Management of Blackbirds and Starlings in Sunflower Fields, Feedlots, and Dairies.

George M. Linz

10/1/2004
9/30/2009

Develop new and scientifically valid methods to reduce blackbird and starling damage to ripening sunflower crops, feedlots, and dairies.

- Evaluate the efficacy of using sunflower plots (Wildlife Conservation Sunflower Plots, WCSP) to reduce damage to nearby ripening commercial sunflower.
- Identify, develop, and improve the use of chemical repellents and tactile repellents, such as nearly invisible fire-line fishing line for reducing blackbird and starling damage to ripening sunflower crops, feedlots, and dairies. Place special emphasis on products with an EPA registration for other crop uses.
- Determine the effect of population density on reproduction and population status of red-winged blackbirds.
- Provide operational personnel with a methodology for selecting wetlands for cattail management.
- Develop and validate a DRC-1339 "take" model for blackbirds and starlings at feedlots and dairies.
- Develop specialized DRC-1339 baits for blackbirds and starlings for unique situations, such as industrial sites.

Appendix IV

Project Title *Project Leader*	*Project Start and Completion Dates*	*Goal*	*Objectives*
Defining Economic Impacts and Developing Strategies for Reducing Avian Predation in Aquaculture Systems *Mark Tobin (acting)*	*10/1/2005* *9/30/2009*	**Develop an understanding of the economic impacts of damage inflicted on aquaculture production systems by cormorants, pelicans, wading birds and waterfowl and to develop tools and techniques for reducing that damage.**	• Determine the economic impacts of cormorants, pelicans and wading birds in different production systems used in the catfish, baitfish and crawfish industries. • Develop and evaluate tools and strategies (e.g., roost shooting, automated devices, habitat management) for dispersing fish-eating birds from off-site roosts, loafing areas, and aquaculture facilities. • Determine the role of American white pelicans in the epidemiology of Bolbophorus trematodes at catfish facilities. • Develop methods for monitoring double-crested cormorant distribution and population growth. • Develop methods for managing breeding colonies of double-crested cormorants (e.g., nest destruction, colony dispersal, population modeling) and determine their response to management activities.
Development of Repellents and other Techniques for Managing Blackbird Depredations to Rice *John Cummings*	*10/1/2005* *9/30/2009*	**Develop a blackbird repellent for rice, improve the effectiveness of DRC-1339 for managing blackbird populations, determine local and regional movement patterns of blackbirds, and develop new or improved management strategies for reducing blackbird damage to rice.**	• Evaluate GWN-4770, caffeine and other chemical compounds as potential repellents for reducing bird damage to newly planted and ripening rice. • Improve DRC-1339 bait formulations to reduce the degradation of treated baits and enhance the acceptance of baits by blackbirds, and improve site specific baiting techniques by testing the efficacy of alternate baits, evaluating bait mixing and application procedures and evaluate site specific DRC-1339 baiting in Louisiana, Texas and Missouri when rice is ripening. • Develop supportive data to fill EPA data requirements for maintaining the registration(s) of DRC-1339 used for managing blackbird populations causing damage to rice. • Determine blackbird breeding population status, movements and distribution patterns in specific rice growing regions of Louisiana, Arkansas, Missouri and Texas. • Explore the effectiveness of sodium lauryl sulfate as a potential blackbird wetting agent. • Validate a model(s) to estimate the take of target blackbirds from DRC-1339 staging area baiting operations.

Project Title *Project Leader*	*Project Start and Completion Dates*	*Goal*	*Objectives*
Documenting Impacts, Developing Control Strategies, and Applying Knowledge of Predator Behaviour and Demographics to Protect Livestock and Natural Resources *Eric Gese*	*10/1/2005* *9/30/2009*	**Improve current knowledge of predator ecology, physiology, and behavior relative to depredations on species of human concern, and assess predator responses to management practices, and develop control approaches that effectively target alpha coyotes.**	• Evaluate the operational efficacy and feasibility of sterilizing coyotes as a strategy to reduce predation on livestock. • Document the impacts of predators (canids, felids, ursids) on livestock and natural resources. • Document the effects of nutrition on coyote reproduction, social dominance, and space use as it relates to predation and population demographics. • Improve selectivity of existing control methods for targeting depredating alpha coyotes. • Develop a non-lethal deterrent by exploiting the wariness of alpha coyotes to threats associated with humans, and develop new, more ecologically relevant procedures for testing the behavioral responses of alpha coyotes to control methods. • Develop methodology for determining composition of predator diet composition based on trans-fatty acids.
Improved Technologies and Non-lethal Techniques for Managing Predation *John Shivik*	*10/1/2005* *9/30/2009*	**Identify, develop, and evaluate improved technologies and tools, especially non-lethal methods for managing predation.**	• Investigate and evaluate new non-lethal methods and techniques, including new designs and applications for frightening devices (i.e., motions activated visual and audio stimulus) and approaches for conditioning avoidance (i.e., chemical and physical). • Develop and evaluate predator (coyotes, mountain lions, wolves) capture and restraint systems to increase capture efficiency and selectivity while decreasing injury. • Develop and evaluate auto-attaching radio-collars for selective management of predators. • Develop and evaluate remote trap monitor systems. • Document conflicts between humans and predators (bears, coyotes, mountain lions, wolves) in rural and urban-rural interfaces and examine techniques for minimizing conflicts.

Project Title *Project Leader*	*Project Start and Completion Dates*	*Goal*	*Objectives*
Defining Impacts & Developing Strategies to Reduce Mammalian Damage in Forested & Riparian Ecosystems *Jimmy Taylor*	*10/1/2006* *9/30/2010*	**Develop an understanding of the economic and ecological impacts of damage inflicted on forested and riparian systems by herivorous and omnivorous mammals, and to develop tools and techniques for reducing that damage.**	• Develop and evaluate tools and strategies to reduce impacts of rodents, ungulates, and bears on silvicultural systems. • Determine the economic impacts of herbivory (rodents, ungulates, and bears) on silvicultural systems. • Determine impacts of aquatic mammals on roads, forests, and streams and evaluate tools and strategies to reduce damage.

Project Title *Project Leader*	*Project Start and Completion Dates*	*Goal*	*Objectives*

Invasive Species and Technology Development Research Program

Methods and Strategies to Manage Invasive Species Impacts to Agriculture in Hawaii

William Pitt

10/1/2005
9/30/2009

Devleop safe and effective methods and strategies to manage the effects of invasive species to agriculture, natural resources, and human health and safety in Hawaii and other island ecosystems.

- Develop and evaluate rodenticides (diphacinone and brodifacoum) for use in native conservation areas and tropical fruit crops (banana, rambutan, logan, lychee, and starfruit).
- Develop and evaluate methods to address bird problems in agriculture and at airports.
- Evaluate effects and develop methods to control and detect invasive mongoose.
- Identify, develop and evaluate chemical methods to control invasive tree frogs. Evaluate the effect of frogs on native flora and fauna. Evaluate the effectiveness of current operational frog control programs.
- Evaluate effects and develop methods to control invasive mammals.
- Evaluate effects and develop methods to control invasive snakes.

Development of Chemistry, Biochemistry and Computational Based Tools for Wildlife Damage Management

John J. Johnston

10/1/2005
9/30/2009

Develop and apply chemistry, biochemistry and computer modeling based techniques and tools for improved management of pest wildlife by Wildlife Services and the wildlife damage management community.

- Development of improved toxicants for control of pest wildlife.
- Development of improved non-lethal chemical products (repellents, attractants, contraceptives and immobilizing agents) for control of pest wildlife.
- Development of improved wildlife tracking, monitoring and censusing techniques for use by WS program.

Project Title *Project Leader*	*Project Start and Completion Dates*	*Goal*	*Objectives*
Economic Research of Wildlife-Caused Agricultural, Public Health, and Natural Resource Impacts *Ray Sterner*	*10/1/2003* *9/30/2007*	**Quantify the benefits and costs of NWRC products and WS activities that aim to mitigate the impacts of wildlife diseases, wildlife damage to agriculture and natural resources, and wildlife risks to public health/safety.**	• Quantify the direct and indirect costs associated with wildlife-transmitted diseases. • Identify, assess, and quantify the benefits and costs of WS operational activities in California. • Determine the benefits and costs of predator management activities associated with the protection of wildlife. • Conduct economic surveys and analyses to quantify wildlife-caused damage. • Develop inexpensive, labor-saving methods of indexing wildlife populations, assessing wildlife damage, and quantifying the cost effectiveness of wildlife damage research and operational activities.
Development of Reproductive Control Methods for Overabundant Birds and Mammals *Lowell Miller*	*10/1/2003* *9/30/2008*	**Obtain FDA approval for use of PZP and GnRH immunocontraceptive vaccines for white-tailed deer and to develop new oral contraceptive agents for use in controlling reproduction in overabundant avian species such as monk parakeets and crows and in mammalian species such as California ground squirrels and prairie dogs.**	• Register GnRH/Adju Vac and SpayVac/AdjuVac with the FDA for use in White-Tailed deer and develop off-label use plans for other species. • Develop an oral or non-injectable GnRH vaccine, as an alternative to the injectable vaccine, for rodents and feral pigs. Develop yeast as a vector to deliver either the GnRH or rodent PZP contraceptive vaccines orally. • Develop and begin the FDA approval process for one or more effective oral contraceptive compounds for potential use in avian species such as monk parakeets and crows and rodent species such as ground squirrels and prairie dogs. • Determine feasibility of developing a species specific anti-conceptus vaccine.

Project Title *Project Leader*	*Project Start and Completion Dates*	*Goal*	*Objectives*
Development and Assessment of Methods and Strategies to Monitor and Manage Invasive Mammalian Species with an Emphasis on Rodents *Gary Witmer*	*3/31/2004* *9/30/2008*	**Review the current biological status of established and potential invasive mammalian species, with an emphasis on rodents in the United States and its territories, and investigate promising methods and strategies for surveillance, management, and eradication.**	• Assess the current status of selected rodent and meso-predator invasive mammalian species. Examine threats/risk, status, management options, priority needs, and other issues associated with the eradication or control of these species. • Identify or develop an effective lethal method for the management and eradication of Norway and black rats, nutria, and mongoose. • Identify or develop effective monitoring and physical capture methods for rats, mongoose, and nutria. Conduct pen studies and field assessments of the best candidate methods. • Investigate relevant sensory and perceptual behaviors exhibited by Norway and black rats, mongoose, and nutria. Identify or develop an effective attractant for each species of interest.
Resource Protection Through Avian Population Management *Michael Avery*	*10/1/2005* *9/30/2010*	**Develop methods for estimation of avian populations for species of WS management concern (objectives 1,3,6), (B) Develop and evaluate anti-fertility methods to reduce nuisance avian populations (objective 2), and (C) Evaluate impact of management methods ontargeted avaian populations in suport of efforts to reduce negative impact of nuisance avian species on agriculture and property, human health and safety, and endangered species (objectives 4,5)**	• Develop and validate biochemical markers as indices of age of birds species-specific pentosidine profiles to quantify age distribution within avian populations. • Evaluation of avian reproductive inhibitors, diazacon and nicarbazin, for utility as an avian population reduction methodology. • Evaluate existing methodology for estimating populations of birds. • Document patterns of roost occupancy and determine movements and activities of crows and vultures following dispersal of roosts. • Bait acceptance and estimates of take with DRC-1339 corvid baits. • Develop age-structured population models for predicting simulated response of populations to management actions.

Project Title *Project Leader*	*Project Start and Completion Dates*	*Goal*	*Objectives*

Wildlife Disease Research Program

Controlling Wildlife Vectors of Bovine Tuberculosis

Michael Dunbar

10/1/2006
9/30/2008

To study the ecology of wildlife diseases, assess the risk of disease transmission among wildlife, domestic animals, and humans, and develop methods that reduce or eliminate such transmission

- Evaluate the role of select wildlife species as reservoirs and/or vectors of bovine tuberculosis.
- Develop methods that decrease transmission of bovine tuberculosis from infected wildlife to l8ivestock through use of barriers and vaccines.
- Produce risk assessments for transmission of bovine tuberculosis from wildlife to cattle.

Evaluation and Management of Chronic Wasting Disease Transmission

Kurt VerCauteren

3/31/2004
9/30/2008

To assess the potential for CWD transmission at the interface between wild and domestic cervids, and to develop methods to reduce transmission and spread.

- Determine extent of interactions between domestic and wild cervids and develop cost-effective means of reducing interactions.
- Explore a CWD vaccine.
- Develop methods to detect CWD prions and decontaminate infected sites.
- Assess the role of predators and scavengers in CWD epidemiology.
- Develop improved cervid census and removal techniques.
- Evaluate white-tailed deer and mule deer ecology along riparian areas relative to the transmission and spread of CWD.

Project Title *Project Leader*	*Project Start and Completion Dates*	*Goal*	*Objectives*
Development of Surveillance Strategies and Management Tools to Control Pseudorabies and other Wildlife Diseases that Affect Humans and Livestock *Tyler Campbell*	*10/1/2005* *9/30/2008*	**To provide basic ecological information as related to developing management tools to control pseudorabies in feral hogs, and management of other wildlife diseases (in particular, Texas cattle fever, Heartwater) that affect livestock.**	• Develop surveillance strategies that evaluate the potential or actual risk that pseudorabies and other diseases in feral hogs (and other wildlife species) poses to Texas livestock. • Develop baiting strategies for pharmaceuticals delivery to control wildlife diseases including pseudorabies. • Develop physical methods to minimize the transmission of pseudorabies and other diseases between livestock and wildlife. • Develop surveillance strategies to evaluate the risks of other wildlife diseases of importance to Texas livestock.
Surveillance, Monitoring Research, and Response for Wildlife Diseases *Alan Franklin*	*10/1/2004* *9/30/2007*	**Understand the role wildlife play as hosts and reservoirs for zoonotic diseases (e.g., avian influenza, plague, West Nile virus), and diseases of agricultural importance (e.g., avian influenza, salmonellosis).**	• Establish biosafety level 2 (BSL-2, i.e., for standard pathogens) research diagnostic laboratory to support wildlife disease surveillance and research. • Establish biosafety level 3 (BSL-3, i.e., for high risk pathogens) laboratory and animal research test facilities and infrastructure to support wildlife disease surveillance and research. • Develop risk assessments for disease agents of zoonotic, animal health, or agricultural biosecurity concern (e.g., avian influenza, plague, West Nile virus). • Establish and develop a wildlife tissue archival system. • Conduct methods development, research, and surveillance studies.

Project Title *Project Leader*	*Project Start and Completion Dates*	*Goal*	*Objectives*
Investigating the Ecology, Control, and Prevention of Terrestrial Rabies in Free-ranging Wildlife *Michael Dunbar*	*10/1/2006* *9/30/2010*	**To study the ecology of wildlife and evaluate risk factors that may be involved with the transmission of rabies among wildlife and rabies virus trafficking across landscapes and to develop methods and strategies that reduce or eliminate such transmission**	• Determine the significance of demography, behavior, movements, and dispersal of raccoons and striped skunks as they may relate to the transmission and rabies virus trafficking across ecosystems. • Develop and/or evaluate methods and technologies for use by the oral rabies vaccination program to increase effectiveness in vaccinating free-ranging wildlife against rabies which may reduce or eliminate the transmission of rabies from wildlife to humans, livestock, and other wildlife. • Obtain information on the ecology of gray fox for possible development of improved baiting strategies for the oral rabies vaccination program in Texas. • Evaluate long-term efficacy of the V-RG vaccine and factors that may interfere with or reduce rabies vaccination rates in free-ranging raccoons.