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

ENVIRONMENTAL ASSESSMENT

ORAL VACCINATION TO CONTROL SPECIFIC RABIES VIRUS VARIANTS IN RACCOONS, GRAY FOXES, AND COYOTES IN THE UNITED STATES

In cooperation with:
United States Department of Agriculture
Forest Service
And
In consultation with:
United States Department of the Interior
Bureau of Land Management

December 2009

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Acronyms

AGFD	Arizona Game and Fish Department
AMDUCA	Animal Medical Drug Use Clarification Act
AMS	Agricultural Marketing Service
APHIS	Animal and Plant Health Inspection Service
AVEPA	Aubrey Valley Experimental Population
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BO	Biological Opinion
CA	Contingency Action
CAV2-RVG	Canine Adenovirus Rabies Virus Glycoprotein
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CS	Coated Sachet
CZMA	Coastal Zone Management Act
DFP	Dog Food Polymer
DOD	United States Department of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FBI	Federal Bureau of Investigation
FMP	Fishmeal Polymer
FONSI	Finding of No Significant Impact
FR	Federal Register
FY	Fiscal Year
GAT	Georgia-Alabama-Tennessee
LCNCA	Las Cienegas National Conservation Area
MOU	Memorandum of Understanding
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMGFD	New Mexico Game and Fish Department
NMNHP	New Mexico Natural Heritage Program
NOP	National Organic Program
NPS	National Park Service

NRMP	National Rabies Management Program
ORV	Oral Rabies Vaccination
PEP	Post Exposure Prophylaxis
SLR	Saint Lawerence Region
SOP	Standard Operating Procedures
TDSHS	Texas Department of State Health Services
T&E	Threatened and Endangered
TVA	Tennessee Valley Authority
TVR	Trap Vaccinate Release
USACE	United State Army Corps of Engineers
USC	United States Code
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VDH	Vermont Department of Health
V-RG	Vaccinia-Rabies Glycoprotein
VSTA	Virus Serum Toxin Act
WS	Wildlife Services

CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

This Environmental Assessment (EA) documents the analysis of the potential environmental effects of a proposal to continue and expand the involvement of the U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Wildlife Services (APHIS-WS) program in oral rabies vaccination (ORV) programs in 28 states and the District of Columbia including portions of the USDA Forest Service (USFS) National Forest System lands and Bureau of Land Management (BLM) lands, excluding Wilderness Areas (WA). The states where APHIS-WS involvement would be continued or expanded include: Alabama, Arizona, Connecticut, Delaware, Florida, Georgia, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, and West Virginia. The programs' primary goals are to stop the spread of specific rabies variants or "strains" of the rabies virus in raccoons (*Procyon lotor*) in eastern states, gray fox (*Urocyon cinereoargenteus*) in Arizona, New Mexico, and Texas, and coyotes (*Canis latrans*) in Texas. If not stopped, these strains could potentially spread over much broader areas of the United States and Canada and cause substantial increases in public and domestic animal health costs because of increased rabies exposures.

This EA serves as the new, comprehensive EA for the ORV program and supersedes all previous ORV EAs and supplemental EAs along with their Findings of No Significant Impact (FONSI) and Decisions to conduct ORV Programs in various areas of the country. This update was made in order to streamline the environmental documentation for the ORV program, as well as to facilitate an easier understanding and ability to monitor the program for both the public and interested agencies. This EA contains all relevant analyses from the previous EA, supplemental EAs, and FONSIs/Decisions that have previously been subject to the public review process. Additionally, this new EA analyzes the effects of expanding the ORV program into the states of Arizona and New Mexico.

The oral rabies vaccine used in these programs is the recombinant vaccinia-rabies glycoprotein (RABORAL V-RG®, Merial, Inc., Athens, GA) vaccine currently licensed for use in raccoons and coyotes in the U.S. and Canada (although it is only being used for raccoons in Canada, as canine rabies does not occur in coyotes in Canada) and approved for experimental use in gray fox in Texas. It has been used extensively and successfully in Europe to combat fox rabies. This vaccine is contained in baits which are distributed by aircraft or ground placement, and then are picked up and consumed by the target species. It has been found to be safe for use in a number of animal species with no known adverse effects.

The proposed action would involve use of federal funds by APHIS-WS to purchase ORV baits and cooperate with programs in the aforementioned states in the distribution of such baits to create zones of vaccinated target species that then serve as barriers to further advancement of the particular rabies virus variants. ORV baits could also be used in other areas where the particular rabies virus variants are known to occur with the goal of eliminating those variants from such areas. The proposed action would also include APHIS-WS assistance in monitoring and surveillance of rabies and successful vaccination involving the capture and release or lethal collection of the targeted animal species in the aforementioned states to take biological samples for testing to determine the effectiveness of the ORV programs. APHIS-WS could also assist the states in implementing contingency actions which will be further defined in this document. Contingency actions may include a single action or an integration of two or more of the following: 1) enhanced surveillance, 2) treatment with increased bait density, 3) increased baiting frequency more than once/year, 4) trap-vaccinate-release (TVR) of targets and specific nontargets, and 5) localized target species population reduction.

This EA analyzes a number of environmental issues or concerns with the oral rabies vaccine and with activities associated with ORV programs such as capturing and handling animals for monitoring and surveillance purposes, as well as the potential implementation of contingency actions to address rabies outbreaks such as more concentrated localized ORV use or localized suppression of target species populations. The EA also analyzes several alternatives to the proposed action, including no action (i.e., the current program), live-capture-vaccinate-release programs (i.e., trapping animals followed by

administration of injectable vaccines and then release), ORV bait distribution without animal specimen collections or localized lethal removal of target species under state contingency plans (i.e., no capturing or lethal removal of animals by APHIS-WS for monitoring or surveillance purposes or to address localized rabies outbreaks), and no federal program (i.e., no federal funding or participation by APHIS-WS).

1.1 BACKGROUND

Rabies is an acute, fatal viral disease of mammals most often transmitted through the bite of a rabid animal. The disease can be effectively prevented in humans and many domestic animal species, but abundant and widely distributed reservoirs among wild mammals complicate rabies control. Within most of the U.S., these reservoirs occur in geographically discrete regions where the virus transmission is primarily between members of the same species (Krebs et al. 2000). These species include but are not limited to raccoons, coyotes, skunks (primarily the striped skunk (*Mephitis mephitis*)), gray foxes, and red foxes (*Vulpes vulpes*). Species specific variants of the virus may be transmitted to other animal species. However, these encounters rarely result in sustained virus transmission within that animal species. Once established, virus transmission within a specific animal species can persist at epidemic levels for decades, even perhaps for centuries (Krebs et al. 2000).

The vast majority of rabies cases reported to the Centers for Disease Control and Prevention (CDC) for the United States, including Puerto Rico, each year occur in wildlife (>90% of all cases) as in most developed countries. For example in 2007, wildlife accounted for 93% of positive cases while domestic animals accounted for 7% (Blanton et al. 2008). A total of 7,259 cases were reported in 2007 broken down to 2,659 raccoons (37%), 1,973 bats (27%), 1,478 skunks (20%), 489 foxes (7%), 274 domestic cats (4%), 93 dogs (1%), 57 cattle (1%), 177 other wildlife[1] (2%), 58 domestic animals[2] (1%), and 1 human (Blanton et al. 2008). This is very typical of other years, but the number fluctuates from year to year and can be influenced greatly by epizootics (epidemics in animals). Epizootic outbreaks can occur increasing the number of reported cases as well as the postexposure rabies treatments given to people. Two canine rabies epizootics emerged in Texas in 1988, one involving coyotes and dogs in South Texas and the other in gray foxes in West/Central Texas. The South Texas epizootic alone has resulted in two human deaths and caused over 3,000 people to receive postexposure rabies treatment (TDSHS 2009).

1.1.1 Public Health Importance of Rabies.

Over the last 100 years, rabies in the United States has changed dramatically. About 90 percent or greater of all animal cases reported annually to CDC now occur in wildlife (Krebs et al. 2000, CDC 2009a). Before 1960 the majority of cases were reported in domestic animals. The principal rabies hosts today are wild carnivores and bats. The number of rabies-related human deaths in the U.S. has declined from more than 100 annually at the turn of the century to an average of one or two people/year in the 1990s. Modern day prophylaxis, which is the series of vaccine injections given to people who have been potentially or actually exposed, has proven nearly 100 percent successful in preventing mortality when administered promptly (CDC 2009a). In the U.S., human fatalities associated with rabies occur in people who fail to seek timely medical assistance, usually because they were unaware of their exposure to rabies.

Human rabies deaths are rare, but the estimated public health costs associated with disease detection, prevention, and control are high, estimated to exceed $300 to $450 million annually. These costs include the vaccination of companion animals, maintenance of rabies laboratories, medical costs, such as those incurred for exposure case investigations, rabies post-exposure prophylaxis (PEP) and animal control programs (CDC 2009a). Accurate estimates of these expenditures are not available. Although the number of PEPs given in the U.S. each year is unknown, it is estimated to be about 40,000. When rabies becomes epizootic or enzootic (i.e., present in an area over time but with a low case frequency) in a region, the number of PEPs in that area increases. Although the cost varies, a course of rabies immune globulin and five doses of vaccine given over a four-week period typically exceeds $1,000 (CDC 2009) and has been

[1] Includes 46 woodchucks, 39 bobcats, 33 coyotes, 32 mongoose (Puerto Rico included in report), 10 otter, 6 deer, 4 beaver, 3 opossums, and 1 each bear, fisher, wolf, and wolf hybrid.
[2] Includes 42 horses/mules, 13 sheep/goats, and 3 swine.

reported to be as high as $3,000 or more (Meltzer 1996). The cost per human life saved from rabies ranges from approximately $10,000 to $100 million, depending on the nature of the exposure and the probability of rabies in a region (CDC 2009a). In Massachusetts during 1991-95, the median cost for PEP was $2,376 per person (CDC 2009b). Also, as epizootics spread in wildlife populations, the risk of "mass" human exposures requiring treatment of large numbers of people that contact individual rabid domestic animals infected by wild rabid animals increases – one case in Massachusetts involving contact with, or drinking milk from, a single rabid cow required PEPs for a total of 71 persons (CDC 2009b). The total cost of this single incident exceeded $160,000 based on the median cost for PEPs in that state cited above. Perhaps the most expensive single mass exposure case on record in the U.S. occurred in 1994 when a kitten from a pet store in Concord, NH tested positive for rabies after a brief illness. As a result of potential exposure to this kitten or to other potentially rabid animals in the store, at least 665 persons received postexposure rabies vaccinations at a total cost of more than $1.1 million (Noah et al. 1995).

1.1.2 Raccoon Rabies in the Eastern U.S.

Based on surveillance data, raccoon rabies did not exist outside a focus in Florida before the 1940s and is, therefore, considered an exotic strain in the U.S. outside this area (C. Rupprecht, CDC, pers. comm. 2003 as cited in USDA 2004a). After raccoon rabies was described in Florida, it spread slowly during the next three decades into Georgia, Alabama, and South Carolina. It was unintentionally introduced into the mid-Atlantic states, probably by translocation of infected animals (Krebs et al. 1999). The first cases appeared in West Virginia and Virginia in 1977 and 1978. Since then, raccoon rabies in the area expanded to form the most intensive rabies outbreak in the U.S. Raccoon rabies is now enzootic in all eastern coastal states as well as in Alabama, Ohio, Pennsylvania, Tennessee, Vermont, and West Virginia (Blanton et al. 2008). In the past 21 years, all of the mid-Atlantic and New England states have experienced at least one outbreak. The raccoon rabies epizootic front reached Maine in 1994, reflecting a movement rate of about 30 miles per year (48.3 km/yr). It was also first confirmed in northeastern Ohio in 1996 (Krebs et al. 1998). In 1999, the first three cases of raccoon rabies were confirmed in southern Ontario (Rosatte et al. 2001). Subsequently raccoon rabies was also confirmed in New Brunswick and Quebec in 2000 and 2006 respectively.

Raccoon rabies presents a human health threat through potential direct exposure to rabid raccoons, or indirectly through the exposure of a pet that had an encounter with a rabid raccoon. To date, one case resulting in the death of a human is attributable to the raccoon strain of the rabies virus. A 25-year-old, previously healthy northern Virginia man died in June 2003. A diagnosis of rabies had not been considered and was only made 3 months after death when brain tissue was examined. Patient history did not reveal contact with animals and no specific exposure experience could be determined (S. Jenkins, Virginia Department of Health, pers. comm. 2003, L. Orciari, CDC, pers. comm. 2003 all as cited in USDA 2004a). Adding to the threat of the raccoon strain of the rabies virus are the number of pets and livestock examined and vaccinated for rabies, the number of diagnostic tests requested, and the number of post exposure treatments are all greater when raccoon rabies is present in an area. Human and financial resources allocated to rabies-related human and animal health needs also increase, often at the expense of other important activities and services.

The westward movement of the raccoon rabies front has slowed, probably in response to both natural geographic and man-made barriers. The Appalachian Mountains and perhaps river systems flowing eastward have helped confine the raccoon variant to the eastern U.S. However, a raccoon rabies positive case was confirmed outside of the previously established ORV zone in Ohio in 2004 (Krebs et al. 2005) prompting a closer look at the potential for westward spread of the virus. With no effective physical barrier across the middle of Ohio, rabies could move more rapidly through this zone then in any previously recorded epizootic (Russell et al. 2005). Live trapping results in Ohio (A. Montoney, APHIS-WS, pers. comm. cited in Kemere et al. 2001) as well as the status of raccoons in the Midwest (Sanderson and Hubert 1982, Glueck et al. 1988, Hasbrouck et al. 1992, Mosillo et al. 1999) suggest that raccoon populations are sufficient for rabies to spread westward along a front at a rate similar to or greater (Rupprecht and Smith 1994) than the rate at which this rabies strain has spread in the eastern U.S. When reinforced natural barriers are not an option for rabies control, as is the case in much of Ohio, the need for rapid remedial intervention by ORV and intensified, active surveillance is immediate (Russell et al. 2005). Figure 1-1

shows the potential for spread of this rabies variant across the central portion of the U.S. if it is not stopped.

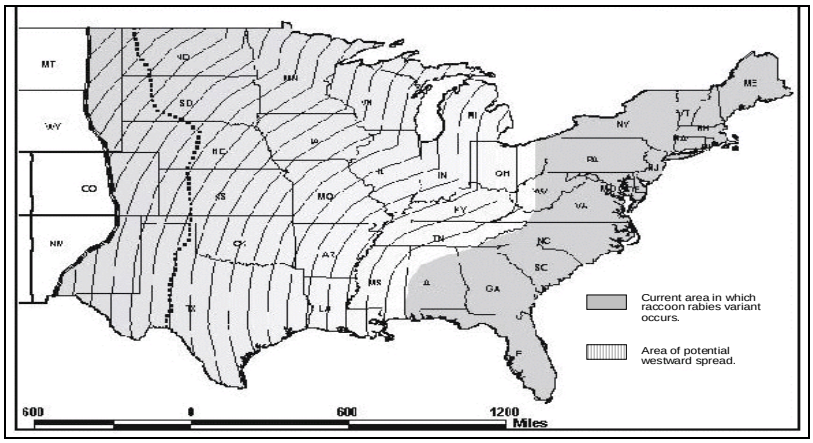


Figure 1-1. Potential areas of the U.S. into which raccoon rabies could spread if not stopped by rabies management programs (from Kemere et al. 2001).

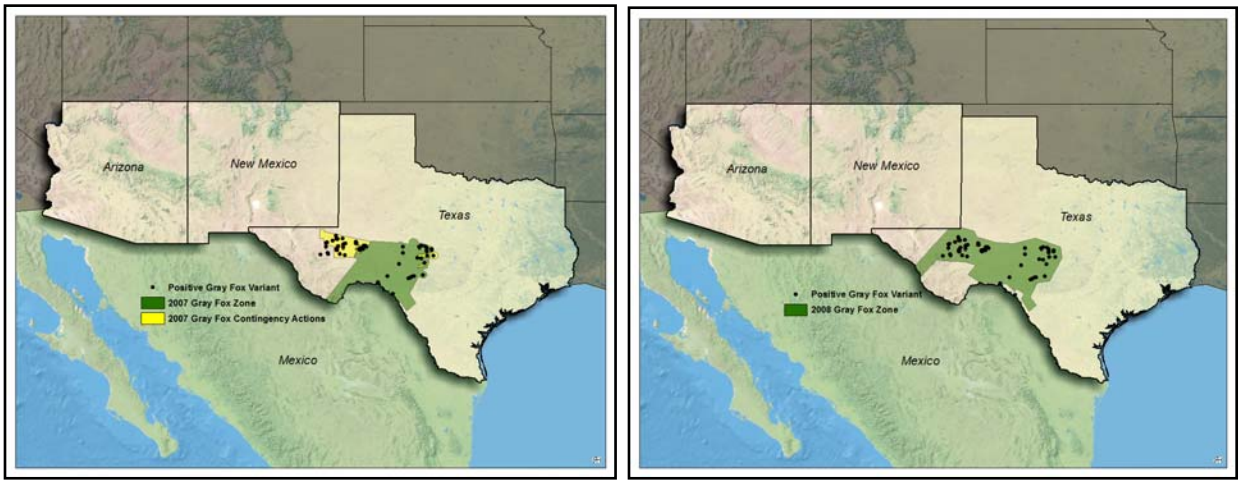
1.1.3 Gray Fox and Coyote Rabies in Arizona, New Mexico, and Texas.

In 1988, a strain of rabies that had previously been confined to urban domestic dogs became established in coyotes along the U.S.-Mexico border in south Texas (Clark and Wilson 1995). This canine strain of rabies is readily transmitted from coyotes to domestic dogs and, subsequently, between domestic dogs (Clark et al. 1994). Rabies outbreaks involving domestic animals greatly increase the risk of human exposure which heightened the seriousness of this particular epizootic from a public health standpoint (Clark and Wilson 1995). By 1994, this strain had advanced 158 miles (255 km) north of the U.S.-Mexico border. Two human deaths from this strain occurred during this time - one in 1991 and another in 1994 (Clark and Wilson 1995).

Prior to 1988, a gray fox strain of rabies was enzootic (prevalent) in West Texas. From a starting point near Sonora, Texas in Sutton County in 1988, an epizootic of gray fox rabies cases expanded 80.8 miles (130 km) northward and 158.45 miles (255 km) eastward. This particular strain was readily transmitted to raccoons and to livestock, especially cows and goats (Clark and Wilson 1995).

In addition to the two human deaths, the south Texas canine rabies epizootic alone has resulted in over 3,000 people receiving post-exposure rabies treatment (TDSHS 2009). In 1994, the public health threat created by these two expanding epizootics prompted the Governor of Texas to declare rabies a public health emergency in the state (Clark and Wilson 1995).

Most recently an outbreak of gray fox variant rabies in coyotes west of the original gray fox ORV zone in Texas toward the New Mexico border was confirmed in 2007 and as a result contingency actions were implemented to halt further spread of this variant (Figure 1-2 and 1-3). Additionally, an ongoing outbreak of gray fox variant rabies in western New Mexico and eastern Arizona continues to be a cause for concern. The State of Arizona recently released a management plan for invasive species. The rabies virus was included in this list of invasive species that should be controlled and managed (State of Arizona 2008).



Figures 1-2and 1-3: Expansion of ORV program to include New Mexico and Arizona as a result of a recent outbreak of gray fox variant rabies in coyotes. The outbreak occurred west, toward the New Mexico border, of the original gray fox ORV zone in 2007. Contingency actions were used to contain the spread. In 2008, a new gray fox ORV zone was created to incorporate and attempt to contain the spread.

1.1.4 Primary Need for Action.

If new rabies strains such as those transmitted by raccoons, gray foxes, and coyotes are not prevented from spreading to new areas of the U.S., the health threats and costs associated with rabies are expected to increase substantially as broader geographic areas of the U.S. are affected. In the area that stretches west from the leading edge of the current distribution of raccoon rabies (which stretches from Alabama northeast along the Appalachian Mountains through coastal Maine) to the Rocky Mountains, and north from the distribution of gray fox and coyote rabies in Texas, there are more than 111 million livestock animals, including cattle, horses, mules, swine, goats, and sheep, which are valued at $42 billion (65 FR 76606-76607, December 7, 2000). If raccoon, gray fox, or coyote rabies were to spread into the above described area, many of these livestock would be at risk to these specific rabies variants. More importantly, human health care concerns would be expected to increase substantially as well if raccoon, coyote and gray fox strains of rabies infect a much broader geographic area which would add to the current high costs of living with these strains.

1.1.5 Development of Oral Rabies Vaccine Programs.

Although the concept of ORV to control rabies in free-ranging wildlife populations originated in the U.S. (Baer 1988), it has a longer history of implementation in Europe and Canada. The emergence of raccoon rabies in the U.S. during the 1970s heightened interest in the application of ORV to raccoons. Due to biological and ecological differences among the types of animals that transmit rabies, development of specific vaccine and bait combinations was needed. One of the main difficulties was the development of a safe and effective vaccine for raccoons. In contrast to red foxes, which were the primary subjects of ORV programs in Europe and Canada, raccoons were not readily immunized by the oral route with the modified live rabies virus vaccines that worked well in foxes (Rupprecht et al. 1988). In addition, modified "live virus" vaccines pose a small risk of causing vaccine-induced rabies, and have resulted in some cases of vaccine-induced rabies in animals (but no cases in humans) during oral baiting programs in Europe and Canada (Wandeler 1991). However, vaccinia-rabies glycoprotein (V-RG) vaccine has proven to be orally effective in raccoons, coyotes and foxes. This vaccine was extensively evaluated in the laboratory for safety in more than 50 vertebrate species with no adverse effects regardless of route or dose. As a consequence of field safety testing in the early 1990s, V-RG was conditionally licensed in 1995 and fully licensed in 1997 in the U.S. for vaccination of free-ranging raccoons. It remains the only effective vaccine licensed for use in the U.S. and Canada for raccoons. V-RG was also recently fully licensed by the USDA in 2002 for vaccination of coyotes in the U.S. and Canada. It has been approved for experimental use to vaccinate wild

gray foxes in Texas.

The vaccinia-rabies glycoprotein vaccine is commercially available from MERIAL, 115 Transtech Drive, Athens, GA 30601 under the registered name RABORAL V-RG®. It is currently the only licensed oral vaccine available for rabies control in some wild carnivores in the U.S. (CDC 2000). Throughout the remainder of this document, RABORAL V-RG® is referred to as "V-RG". As a recombinant vaccine, the letter "V" is used to denote vaccinia, the self-replicating pox virus that serves as the vector (i.e., carrier) for the rabies virus gene that is responsible for the production of rabies glycoprotein. The letters "RG" stand for rabies glycoprotein which is the protective sheath around the bullet-shaped rabies virus core. The glycoprotein by itself is noninfective and cannot cause rabies, but it serves as an "antigen" which means it elicits an immune response to rabies when the vaccine is swallowed by raccoons, foxes, or coyotes. There is no possibility of vaccine-induced rabies with V-RG because the vaccine only contains the non-infective surface protein of the rabies virus; none of the viral nuclear material (i.e., RNA) which would be required for the rabies virus to replicate is present in the vaccine. Approximately 102.1 million doses[3] have been distributed in the U.S. since 1995 with only one case of vaccinia virus infection reported in humans (resulting in localized skin rashes) to date (Rupprecht et al. *unpublished* 2000, Rupprecht et al. 2001). This vaccine has been tested in more than 50 wild mammalian and avian species without adverse effects. In addition, a domestic animal's annual rabies vaccination can be safely administered even if it recently ingested a dose of oral rabies vaccine.

A number of studies have been conducted to determine the best bait formulations and strategies for delivery of ORV vaccines to raccoons (Hanlon et al. 1989a, Hable et al. 1992, Hadidian et al. 1989, Linhart et al. 1991, Linhart et al. 1994), gray fox (Steelman et al. 1998, 2000), and coyotes (Linhart et al. 1997; Farry et al. 1998a, 1998b). When raccoons, foxes or coyotes eat oral rabies baits and puncture a sachet[4] containing the vaccine, the vaccine is swallowed and bathes the lymphatic tissue in the throat area and initiates the immunization process. A positive rabies antibody titer in an animal from a baited area is most likely due to consumption of a bait and adequate contact with vaccine. However, the lack of a detectable antibody response may not be an accurate reflection of immune status. It is possible that the animal was successfully immunized, but that the blood sample was taken earlier or later than when antibodies could be detected (C. Hanlon, CDC, pers. comm. 2003 as cited in USDA 2004a). Antibodies induced by a one-time oral vaccination appear to be of relatively short duration. Among a group of animals in a baited area, the best time to collect blood samples for detection of antibodies is 4-8 weeks after baiting. A successfully immunized animal may have antibodies shortly after vaccination, but then the level may decline to undetectable levels. If the animal is then exposed to rabies, it is still likely that the animal's "memory" immunity will become activated by the rabies exposure and more antibodies will be made very quickly. The successfully immunized animal will most likely survive exposure, even though it did not have measurable antibodies at the time of the exposure (C. Hanlon, CDC, pers. comm. 2003 as cited in USDA 2004a).

The baits are small blocks of fishmeal (for coyotes and raccoons) or dog food (for gray foxes) that are held together with a polymer binding agent and are considered to be "food grade" materials (Figure 1-2). The dog food baits are now prepared from poultry-based dog food as concerns were raised regarding the possibility of beef-based dog food containing bovine spongiform encephalopathy (BSE, also known as mad cow disease). To address these concerns, the change to poultry-based products was made on a voluntary basis by MERIAL, Inc. (J. Maki, MERIAL, Inc., pers. comm. 2003 as cited in USDA 2004a). The baits are rectangular or square in shape with hollow centers. The sachet containing the liquid vaccine is contained in the hollow center of the bait. "Coated" sachets (Figure 1-2) with a simple fishmeal attractant coating have also been field tested with effectiveness that appears to be comparable to fishmeal polymer baits containing the sachet (Linhart et al. *unpublished* 2001). Using the "coated" sachet may be equal in effectiveness at lower cost per vaccinated target wild animal. All baits are marked with a warning label that includes a

[3] Number of baits distributed over time refers only to APHIS-WS involvement. State and local health departments and other programs have also distributed baits without APHIS-WS involvement.

[4] A thin plastic packet much like those in which condiments (e.g., catsup, mustard) are provided at fast food restaurants.

phone number to call for additional information.

Recently WS and cooperators have begun to shift from fishmeal polymer (FMP) baits to coated sachets (CS).CS's are less expensive than FMP baits, less likely to cause damage from aerial distribution, are more palatable to smaller carnivores like skunks, and, most importantly, perform generally at least as well as FMP based on field titer responses from Cornell University. The shift to CS's is currently viewed as an interim management step until improved baits can be developed, licensed, and produced (USDA 2008a). Additionally, captive studies being conducted by the APHIS-WS National Wildlife Research Center are critical to decisions regarding the best available bait for delivering oral rabies vaccine to raccoons.

Figure 1-4. Coated Sachet and Fishmeal Polymer baits utilized during the ORV program. (Photos used with permission from MERIAL Limited, Athens, Georgia, USA).

Fishmeal and dog food polymer baits (DFP) contain a tetracycline biomarker. These biomarkers bind to calcium, which can be found in the metabolically active portions of bones and teeth of animals. Tetracycline deposits can be viewed in the teeth or bones with fluorescent light under a microscope. When the tooth or bone sample of an animal is positive for tetracycline, it is likely that the animal has eaten at least one bait and possibly multiple baits (C. Hanlon, CDC, pers. comm. 2003 as cited in USDA 2004a). The presence of tetracycline, however, is not an indication of immunity since it is possible in some situations for an animal to eat the outer bait matrix without rupturing the vaccine sachet inside. Other potential sources of "background" tetracycline in a study area may include consumption of medicated feeds such as those sometimes used for production animals, intentional treatment by humans with tetracycline, and non-specific fluorescence from undescribed but similar chemical compounds that may be found naturally (C. Hanlon, CDC, pers. comm. 2003 as cited in USDA 2004a).

However, field studies have indicated through antibody analysis that 40% of raccoons in a particular bait zone were antibody positive, yet only 10% of the population was positive for tetracycline biomarker (Slate pers. comm. 2003 from Johnston et al. 2005) thus indicating the need for more effective biomarkers. Rhodamine B, when ingested, stains the oral cavity and extremities of an animal that contacts it and it is absorbed systemically through diffusion (Clark 1953) in growing keratinous tissues (i.e. nails, hair and whiskers). Exposure to rhodamine B is easily identified in hair and whiskers as a fluorescent orange band under UV light. Research (Fisher et al. 1999) has indicated rhodamine B in hair and whiskers of feral cats under ambient light in 45% of cases, 56% of cases under hand held UV lamps, and in 100% of cases under UV microscopes. Research is currently being conducted to determine if the same may be true for raccoons. If proven effective, rhodamine B could reduce the need for samples to be sent to diagnostic labs as these samples could be assessed in the field or office thereby reducing costs. (Fry and Dunbar 2007). Recent research on the effectiveness of rhodamine B as a potential biomarker for raccoons, as a part of the National ORV program, is being completed and analyzed by scientists at WS, National Wildlife Research Center. The potential for rhodamine B to satisfy many of the ideal characteristics of a biomarker,

affordability, persistence, and non-invasive sampling methods are met by this dye thus far (Fry and Dunbar 2007).

The growing need for bait-vaccine formulations that are both cost effective and have the ability to produce desirable antibody responses across a wide range of meso-carnivores has prompted field studies and research into the development of new bait delivery systems and new vaccines. Field studies are under way by APHIS-WS to determine the acceptability of a fishing lure-type enrobed sachet which, if proven effective, could provide a bait that is both cost effective and has the ability to carry a biomarker. Additionally, research is being conducted by Thomas Jefferson University to determine the efficacy and safety of a canine adenovirus rabies virus glycoprotein (CAV2-RVG).

In field tests conducted in the U.S., the majority of ORV baits have been consumed within the first 7 to 14 days after placement, with reports of up to 100 percent of the baits being consumed within a 7 day period (Farry et al. 1998b, Hable et al. 1992, Hadidian et al. 1989, Hanlon et al. 1989a, Linhart et al. 1994, Steelman et al. 2000, USDA 1995a). The likelihood of a bait being consumed is dependent upon several factors including animal population densities (target and non-target species), bait preference, and the availability of alternative food sources. Those baits that are not consumed may remain in the environment for several months after placement, dependent upon environmental conditions (precipitation, temperature, etc.) and the condition of the baits. The V-RG virus that is not consumed by the target species or other vertebrates will become inactivated over a relatively short time period. Persistence and stability of the V-RG virus outside of an organism is highly dependent on ambient temperature and local environmental conditions, the higher the temperature the quicker the virus will become inactive (USDA 1992, USDA 1995a). For example, at temperatures between 68 and 100 degrees Fahrenheit (20 and 37.8 Celsius) the liquid viral vaccine potency remains stable for approximately 14 to 7 days, respectively, in the un-punctured sachet or inside the bait. In situations where the bait and sachet are damaged, inactivation of the V-RG virus will occur more rapidly.

Oral wildlife vaccination for raccoon rabies control has been under field evaluation in the U.S. since 1990. A limited field release of the recombinant vaccine occurred on Parramore Island, VA, prior to wider spread use in the U.S. for control of raccoon rabies (Hanlon et al. 1998). A major objective of this field trial was to evaluate the free-ranging raccoon population for adverse effects after the distribution of V-RG vaccine-laden baits. With the development and field testing of the V-RG vaccine, a potential method of rabies control now exists for some rabies variants to complement methods of control which include public education, domestic animal vaccination, and human PEP. In 2004, APHIS-WS, in cooperation with the CDC, began conducting small mammal vaccinia monitoring at Parramore Island, VA. Because this is the site where vaccinia was first released into the wild in ORV baits and since these baits have not been released at this site since the early 1990s, viruses in hosts can be monitored. Microtine mammals, especially rodents, are typically the most likely hosts for orthopox viruses, which include vaccinia. Thus, these mammals are good sentinel species for indicators for the environmental presence of viruses, such as vaccinia. Samples were collected and tested at CDC laboratories to determine the presence of vaccinia virus in small mammals collected at this site. Results of this study found no evidence of V-RG circulation based upon the serological survey (C. Rupprecht, CDC, pers. comm. 2009).

Since the first field release of the V-RG vaccine in 1990, the number of vaccine-laden baits that were distributed annually in the U.S. has risen exponentially. For instance, APHIS-WS' involvement in the national rabies management program between 1995 and 2008 contributed to 102.1 million ORV baits disbursed in the U.S (USDA 2008b, ORV website). Numerous projects have been conducted or are in progress in the eastern U.S. and Texas (USDA 2009b, 2008b). Since ORV program inception, positive rabies cases have either decreased or the advance of the virus has been slowed or stopped in each state where an ORV program was initiated, or Contingency Actions have been successfully utilized to address emergencies:

- In Maryland, 19 rabies cases were reported per year on the Annapolis Peninsula alone before the ORV program began in 1998. Between 1998 and 2007, with the intervention of 412,441 FMP baits, only 21 raccoons have been reported from the Annapolis Peninsula, indicating success of the Anne Arundel

County ORV Program (USDA 2009a).

- In New York, an ORV program was implemented in 1998 to prevent the northward spread of the virus. Prior to the ORV program in New York, almost 150 positive rabies cases were recorded in 1998 and 1999 in the St. Lawrence Region (SLR) ORV zone alone. In 2007, New York reported a decline to 35 positive rabies cases in the SLR zone. Further, out of an additional 3089 animals tested for rabies from the three remaining NY ORV zones, only 95 were reported positive. The majority (75) of these came from the Long Island ORV zone which, as of 2007, is only in its fourth year of operation. (USDA 2009a).

- Vermont has been participating in the ORV program since 1996. However, in June 2006, the province of Quebec confirmed its first-ever case of raccoon rabies approximately 11 km (6.6mi) north of the Vermont border. Subsequently, a second positive case in Quebec was discovered in July 2007. In a continuing effort to stop the spread of raccoon rabies in northern Vermont, WS implemented several TVR campaigns throughout the standard and high bait density ORV zones. In 2008, WS will continue coordinated TVR efforts, but shift focus to the Lake Memphremagog basin in Orleans County to prevent rabies from entering Quebec from that area. WS will maintain communications and work closely with Quebec officials to coordinate field work and maximize efforts to contain (and explore strategies to eliminate) the raccoon variant of rabies from Vermont and Quebec (USDA 2009a).

- In Ohio, 62 positive rabies cases were recorded prior to program implementation in 1997. From 2001-2003, three cases were reported near the Pennsylvania border where raccoon rabies is still enzootic. In 2001, APHIS-WS, in coordination with state agencies, began an ORV program in Pennsylvania (USDA 2009a) to address this issue. The ability to create rabies-free zones, within raccoon rabies enzootic areas, is a requisite to achieve elimination of this variant of the rabies virus.

  In mid-July 2004, a raccoon infected with raccoon variant of the rabies virus was confirmed just west of the ORV zone near Lake Erie in Lake County in northeastern Ohio. APHIS-WS and state, county and municipal cooperators responded immediately to this high priority rabies issue. A contingency action plan that included enhanced rabies surveillance, trap-vaccinate-release, and continuance of the ORV program was implemented upon detection of the index case. High raccoon population densities and additional rabies cases based on enhanced surveillance suggest that additional action may be required. Enhanced rabies surveillance is being maintained on the south and west sides of this outbreak to determine the next course of action, if required. The creation of an ORV zone, a cooperative ORV program, began in 1997 and has expanded to include the states of Pennsylvania, West Virginia, Virginia, Tennessee, Maryland, Georgia and Alabama. Throughout its length from Ohio to northeastern Alabama, the ORV zone is at least 30-miles in width to attempt to prevent the westward spread of raccoon rabies.

  As a component of the greater Appalachian Ridge ORV zone, Ohio continued biannual baiting of the Contingency Action (CA) ORV zone (east of Cleveland) in the spring and fall of 2007. Wildlife Services integrated TVR into the rabies control campaign within the CA zone to prevent the spread of raccoon rabies that was first detected there in 2004. As a result of this effort, 1,285 animals were hand vaccinated and released in northeastern Ohio. The number of rabid animals with raccoon variant in this CA zone decreased to 19 cases in 2007 with enhanced surveillance in place (from a high of 46 cases in 2004) (USDA 2009a).

- In Massachusetts, the rabies virus had not spread to the Cape where intensive baiting programs at the peninsular neck (since 1995), combined with the natural barrier of Cape Cod Canal, seemed to act as effective barriers (Robbins et al. 1998). In early March 2004, however, raccoon variant of the rabies virus was confirmed east of the Cape Cod Canal for the first time and by 2006 it was confirmed on the outer Cape (USDA 2009a). The canal served as the eastern anchor point for the ORV zone which was designed to prevent raccoon rabies from spreading east onto the Cape. This cooperative project was initiated in the mid-1990s by Tufts University and the State of Massachusetts Health Department. APHIS-WS became a partner in this effort in 2001. APHIS-WS, Tufts University, and the State of Massachusetts Health Department immediately implemented enhanced rabies surveillance, followed

by trap-vaccinate-release and ORV as a contingency action plan to prevent further spread, with the long range goal of eliminating raccoon rabies from the area. It is not known if raccoon rabies spread to the Cape through the long range movement of an individual rabid raccoon or skunk infected with raccoon variant of the rabies virus or if the virus spread animal to animal approaching the canal, with rabies spreading to the Cape through a short range raccoon or skunk movement across the canal. Translocation, either intentional or unintentional (i.e., raccoon "hitch-hiking" in a garbage truck or tailored boat and escaping once on the Cape), represents another potential source of spread.

The Cape Cod ORV zone now includes all townships on Cape Cod. In 2007, only 5 cases of raccoon variant rabies were confirmed on the Cape, down from 50 cases in 2006. (USDA 2009a).

- In Maine, WS initiated rabies management efforts during 2003 in collaboration with New Brunswick, Canada to vaccinate raccoons and skunks. As rabies has progressed north and eastward, rabies vaccination efforts have been targeted along the Maine, USA and New Brunswick, Canada border creating a "barrier" to protect raccoon populations against rabies. Through vaccination efforts New Brunswick has maintained a terrestrial rabies-free status since 2002 and continued rabies surveillance and TVR rabies management efforts throughout 2007. Maine WS continues to support the international eradication of rabies through enhanced surveillance along the front line of documented cases and ORV bait distribution along the international border (USDA 2009a).

- In November 2003, WS established the Georgia-Alabama-Tennessee (GAT) ORV zone where the Georgia and Alabama borders meet southern Tennessee. At the time, raccoon rabies was in northwestern Georgia and moving westward. The Alabama-Coosa River system to the south and the Appalachian Mountains to the north were serving as potential natural barriers to the westward spread of raccoon rabies. The GAT zone was established to help fill a gap between these potential barriers and to prevent the spread of raccoon rabies into the Tennessee Valley and subsequently the interior of the United States. In January 2004, raccoon rabies entered southeastern Tennessee from Georgia and reached the GAT ORV zone. In response to the first positive case of raccoon rabies inside the GAT zone, WS began baiting the city of Chattanooga and surrounding areas of Hamilton County in the spring, while baiting these areas again in the fall as part of the larger GAT ORV effort. During 2004, 14 cases of raccoon rabies were documented in wildlife in Hamilton County. During 2005, only 1 animal (a raccoon) was confirmed with raccoon rabies in Hamilton County and the virus was not detected in any surrounding counties. Although no cases of raccoon rabies were documented in Hamilton County in 2006, 1 case was confirmed in adjacent Bradley County in a gray fox (*Urocyon cineroargenteus*). In 2007, 1 raccoon case was confirmed in Hamilton County, but no additional cases were detected in Bradley or other surrounding counties (USDA 2009a).

- Projects have also been conducted or are in progress in New Jersey (1992-1994, with additional projects reinitiated in the last few years), Florida (1995-present), Virginia (2000-present), West Virginia (2001-present), Pennsylvania (1995-present), NH (2002-present), AL (2003-present), GA (2003-present), and NC (2005-present).

1.2 DESCRIPTION OF THE PROPOSED ACTION

In accordance with the provisions of the Act of September 25, 1981, as amended (7 U.S.C. 147b), the Secretary of Agriculture declared rabies to be an emergency issue that threatens the agricultural production industry in the U.S. and authorized the transfer and use of funds from the Commodity Credit Corporation (CCC) of the USDA in FY 2001 for the continuation of ORV programs to address rabies problems in several eastern states and Texas (65 FR 76606-76607, December 7, 2000). Additional CCC funds continue to be provided to augment the funding obtained through the appropriations process and support the continuation and expansion of ORV programs to ensure that raccoon and gray fox rabies spread was contained.

The APHIS-WS program, in cooperation with the USDA-Forest Service (USFS) and the USDI-Bureau of Land Management (BLM), is proposing to continue or expand federal cooperation through funding and direct involvement in these programs. APHIS-WS proposes to expand the ORV program to include a total

of 28 states and the District of Columbia, including portions of National Forest System and BLM land, but excluding Wilderness Areas (see Appendices I and J for a list of National Forest and BLM lands and maps where APHIS-WS involvement would be continued or expanded). The states where APHIS-WS involvement would be continued or expanded include: Alabama, Arizona, Connecticut, Delaware, Florida, Georgia, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, and West Virginia. Figure 1-5 shows the states involved in the proposed action. Potential areas involved may cover several land types and land uses including: forests, meadows, wetlands, and rangelands, representing diverse wildlife habitats. Free water bodies, such as lakes, rivers, and oceans, would not be baited (see Section 2.2.7).

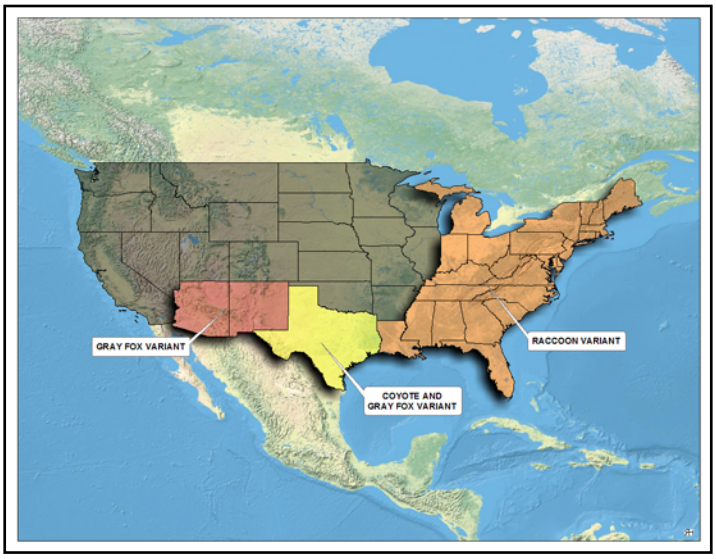


Figure 1-5. States where APHIS-WS would continue or expand assistance to and participation in ORV programs.

The primary goals of this program would involve the continuation and expansion of the national rabies management program, including the continuation and expansion to National Forest System and BLM lands, in attempt to: 1) stop the forward advance of specific rabies strains from areas where they now occur by immunizing portions of target species population along the leading edges of the rabies fronts; and 2) reduce the incidence of rabies cases involving wild and domestic animals and rabies exposures to humans in areas where the ORV programs are conducted. If the ORV program is successful in stopping the forward advance of specific strains of rabies, then the ultimate goal could include elimination of specific rabies variants. The inclusion of land areas managed by the federal government has become an increasingly important requirement for this program, given the extensive public lands within the ORV targeted zones. If baiting programs were conducted around these large land masses, reservoirs of the virus would likely still exists, creating holes in the program and potentially making the program less effective at stopping the forward advance or elimination of specific rabies virus strains.

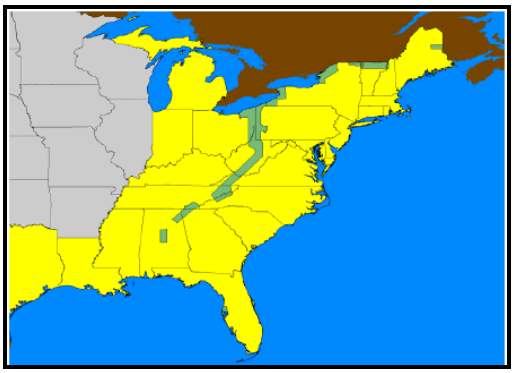
The program would involve the use of APHIS-WS federal funds to purchase and distribute ORV baits to create zones of vaccinated target species that would serve as barriers to cease the further advancement of specific rabies virus variants in raccoons, gray foxes, and coyotes. Vaccination zones would be determined in cooperation with the various state rabies task forces, state health or agriculture departments, and/or other agencies with jurisdiction over vaccine use and application in wildlife and domestic animals. ORV baits could also be used in other areas where raccoon, gray fox, and coyote rabies virus variants are known to occur with the goal of eliminating those variants from such areas. The proposed action would also include APHIS-WS assistance in monitoring and surveillance activities involving the capture and release or lethal collection of the targeted animal species in the above states to take biological samples for testing to determine the effectiveness of the ORV programs. APHIS-WS could also assist the states in implementing

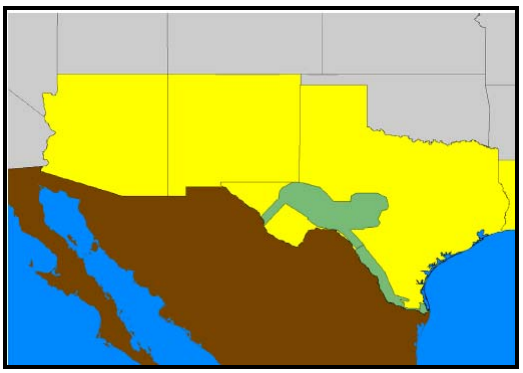
contingency plans that include localized population reduction of target species, trap-vaccinate-release (TVR) of target species, increased baiting frequency, or increased baiting density in areas where rabies outbreaks occur beyond ORV barriers. The role of the USFS and BLM would involve cooperation with APHIS-WS in permitting access to National Forest System and BLM lands for bait disbursal and rabies monitoring and surveillance activities.

The emergency federal funds authorized above, along with other federal funds would be used to: 1) purchase ORV baits and participate in the distribution of ORV baits by air and ground placement; 2) provide other forms of assistance in monitoring rabies and determining the effectiveness of the ORV programs through collection and testing of samples from wild animal specimens, including; and 3) if necessary, participate in implementing contingency plans that may involve a reduction of target species populations through lethal means or trap-vaccinate-release programs to cover an emergency in a local area. The aforementioned actions may also occur on National Forest System and BLM lands, however coordination with specific National Forest and BLM State Offices would occur prior to project implementation.

The ORV that would be used is the V-RG vaccine in any of several types of baits as described in Section 1.1.5. The intent of the bait distribution is to orally vaccinate wild raccoons in portions of the above states with the exception of Texas. Similar programs would be directed at gray foxes in west-central Texas, Arizona, and New Mexico and coyotes in southern Texas. The primary goals of the program are to: 1) stop the forward advance of these strains of rabies from areas where they now occur by immunizing portions of target species populations along the leading edges of the rabies fronts and 2) reduce the incidence of rabies cases involving wild and domestic animals and rabies exposures to humans in the areas where the ORV programs are conducted. If the ORV program is successful in stopping the forward advance of these strains, then the ultimate goal could include elimination of these rabies variants.

The areas over which the ORV baits would be distributed and from which animal specimens would be collected could be anywhere in the above listed 28 states and District of Columbia, including National Forest System and BLM lands, but excluding WAs. National Forest System and BLM lands proposed for inclusion in the ORV program are listed in Appendix I and J. Coordination with specific National Forests and BLM lands would occur prior to project implementation to ensure that the integrity of specially designated areas is maintained (i.e., Research Natural Areas, Wild and Scenic Rivers, etc.). The ORV zones would be delineated based on the most current distribution of rabies cases and the expected direction of disease spread. Vaccination zones would be determined in cooperation with state rabies task forces, state health departments, or other state agencies with jurisdiction over vaccine use and application in wildlife and domestic animals. Figures 1-6 and 1-7 show the current areas where APHIS-WS will continue treatment with ORV baits or expand. Figure 1-8 depicts the areas located within the current ORV zone where enhanced rabies surveillance was conducted in the eastern U.S. in 2007. Pending the verification of legal authorities to do so, ORV baits would be distributed by the states over a variety of classes of land ownership, including private, public, tribal, and other state and federal lands. Each bait will have a warning label advising persons not to handle or disturb the bait along with a toll-free telephone number to call for further information.





Figures 1-6 and 1-7. Current and anticipated ORV barrier zones where APHIS-WS would continue or expand participation in and assistance to ORV programs to stop the westward and northward spread of raccoon rabies in the eastern U.S. and ORV zones where APHIS-WS is proposing to continue or expand assistance to and participation in ORV programs in the southwest to stop the spread of gray fox and coyote rabies. ORV baits would be distributed in these and perhaps other zones under the proposed action to vaccinate wild raccoons and form barriers to prevent further spread of the disease or where outbreaks of coyote or gray fox rabies occur.

Wild animal collections for purposes of monitoring would be conducted using a variety of live capture or lethal methods. Information from raccoons would be predominantly collected from cage-trapped individuals that, if apparently healthy, would normally be released at or near their site of capture. The requisite sample from coyotes would be obtained primarily by aerial or ground-based shooting from sample areas within the ORV zones. Gray fox samples would be obtained by ground shooting and various capture methods including leghold traps, cage traps, and snares. Only legally approved methods would be used in all animal sample collection areas to provide critical data for the evaluation of project effectiveness. Project effectiveness would be based in large part on the percentage of ORV baits consumed in populations of target species, the presence of sufficient levels of serum neutralizing antibodies in a large enough percentage of the population to resist the spread of rabies, and the absence of the rabies strain targeted for control with ORV beyond the vaccination barrier established to prevent spread of the virus. In addition to the primary target species, several other species such as striped skunks and red foxes will be targeted during monitoring and surveillance, and for disease control in areas where a rabies outbreak has occurred. Several of these animals will be sampled to help determine efficacy of the treatment.

Biological data such as sex, age, and weight would also be collected to determine if baits are consumed differently by various age or sex groups. For example, juvenile male raccoons are the most likely age/sex group to disperse from the home range in which they were born and are, therefore, the cohort which would be most important to vaccinate. Enhanced surveillance (using sick and strange-acting target and nontarget wildlife, nuisance wildlife captured during other WS damage management activities, and road-killed wildlife) would be conducted to track the occurrence of rabies within the ORV bait zones and to determine the epizootic front of the virus, so that ORV and other measures (i.e., trap-vaccinate-release) may be implemented ahead of these cases to maintain the integrity of the barrier.

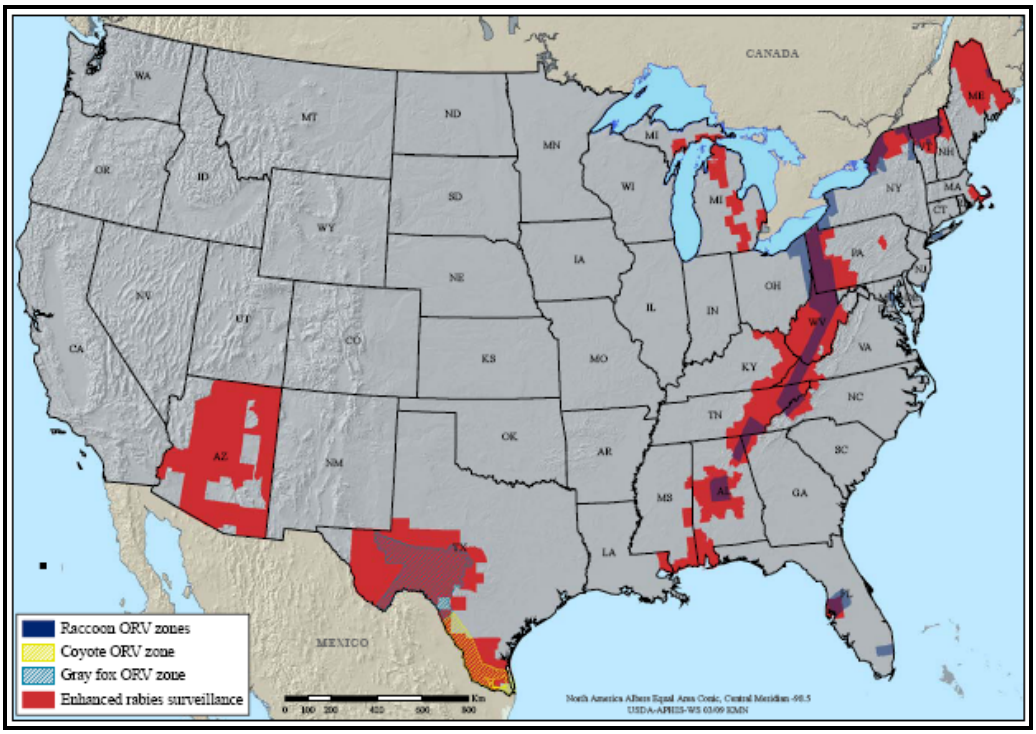


Figure 1-8. Areas of enhanced surveillance conducted by APHIS-WS in and around current or anticipated ORV zones in 2007.

1.2.1 Contingency Actions

In the event that the targeted rabies strains advance beyond the barriers created by the ORV zones, contingency plans may be implemented by the involved states. Rabies emergencies requiring contingency actions may be categorized as: Type 1) index rabies case(s) that occur well beyond (e.g., raccoon rabies is detected greater than 80 km [50 miles] west of its known current distribution) ORV barriers (likely due to translocation of a rabid animal); Type 2) rabies case(s) that occur just beyond established ORV zones; Type 3) rabies case(s) that occur where no ORV zone has been created; Type 4) persistence of rabies cases within ORV zones created as emergency treatments (e.g., northeast Ohio); Type 5) rabies hotspots found within the ORV zones that represent a high risk of spreading; and Type 6) aggressive epizootics (large numbers of infected animals in a relatively small area) approaching an established ORV zone that potentially could spread through the treatment area.

Depending on the type(s) of rabies emergency(ies), contingency actions may employ one or more of the following practices:

- Enhanced surveillance, which may include capture and release or euthanasia of target and specific nontarget animals for rabies testing.
- Treatment with increased bait density (e.g., 75 baits/km^2 is considered the standard bait density for raccoons) to ensure sufficient baits for high density of target species or to bolster antibody response under "normal" target species densities.
- Increase baiting frequency more than once/year.
- A trap-vaccinate-release (TVR) program could be conducted for specific targets, primarily canids with high populations such as skunks and feral cats that are known to harbor and transmit rabies.

A licensed parenteral (injectable) vaccine, such as IMRAB® 3 (Merial, Inc.), rather than the oral rabies vaccine, would be used during the TVR contingency action. This action would involve the live capture of species being targeted (e.g., raccoons) followed by administration of rabies vaccines by injection and release back into the wild. Currently, no vaccine is specifically licensed for this type of use (CDC 2000). However, certain injectable vaccines may be used "off-label" under the direction of veterinarians to vaccinate wild animal species in certain situations (J. Mitzel, APHIS-Veterinary Services, pers. comm. 2001 as cited in USDA 2001a). Injectable vaccines, such as IMRAB® 3, are killed-virus rabies vaccines recommended for the vaccination of healthy pets and other domestic animals (e.g., cats, dogs, horses, sheep, cattle, and ferrets). They contain the same virus strain that is used in the Pasteur Merieux Connaught human vaccine. TVR has been used successfully in various locals in Canada (i.e., New Brunswick, St. Lawrence River region, Ontario, etc.) as part of an integrated rabies management program to eliminate or stop the spread of specific variants of the rabies virus in raccoons and skunks (Rosatte et al. 1990, 1992, 2001).

- Localized target species population reduction.

The least intrusive contingency actions involve increasing levels of surveillance to determine if additional action is warranted.

The rabies management program has several examples of contingency actions currently being conducted. In July 2007, rabies was documented in Quebec Canada, 3 km from the border with Clinton County, New York, while at the same time rabies was continuing to advance westward from Vermont (Type 2 and 4 emergencies). In response to the threat of rabies continuing to spread south from Quebec and the continuing westward spread in Vermont, an emergency TVR effort was initiated in the northeast portion of Clinton County (USDA 2009).

During 2004, Ohio identified its first case of raccoon variant of the rabies virus in Lake County, located 6.6 miles (10.6 km) west of the existing ORV zone. Additional raccoon rabies cases were detected in the area from enhanced and public health surveillance (45 rabid raccoons and one skunk positive for raccoon rabies were confirmed within Geauga, Lake, and Cuyahoga Counties) in Ohio. This emergency (Types 2 and 4) triggered a contingency action response which encompassed a 954 mi^2 (2,471 km^2) area in 2004. In 2007, the contingency action zone in Cuyahoga, Geauga, Lake, Portage, and Summit Counties was baited for the fourth year. Following the contingency action ORV baiting, Ohio WS assisted Lake County General Health District with supplemental hand baiting efforts in response to a cluster of rabies positives in the northwest corner of Lake County.

Additionally, in a continuing effort to stop the spread of raccoon rabies in the CA ORV zone, WS conducted a Coordinated TVR effort in 2007. During this time, 1,013 unique raccoons and 3 striped skunks were immobilized, processed, and released; 1,007 of those raccoons and 3 striped skunks were hand vaccinated prior to release. Three feral cats were also trapped, vaccinated, and released. In addition, 445 raccoons and 3 striped skunks were trapped, euthanized, and tested to enhance rabies surveillance. One of those raccoons from Cuyahoga County tested positive for rabies (USDA 2009a).

In 2007, two cases of rabies that involved the Texas fox variant were confirmed west of the recently completed west-central Texas ORV zone. One case occurred at Rankin, 0.9mi (1.6 km) outside of the vaccination zone and the other near Grand falls, 26.0mi (42.0km) outside of the vaccination zone (Type 2 emergency). In response, the Texas Department of State Health Services (TDSHS) and WS established an enhanced surveillance area. To eliminate the further spread, TDSHS and WS implemented population reduction efforts within a 100 mi^2 (259 km^2) area surrounding Rankin. The Texas WS program provided a helicopter to distribute 8,687 FMP baits over the Rankin contingency area. However, 9 new cases of Texas fox variant were later confirmed in additional areas. To abate this problem, WS in cooperation with TDSHS distributed an additional 225,360 FMP and 112,476 dog food polymer (DFP) baits over 4,703 mi^2 (12,179 km^2). In addition, WS, TDSHS, and city employees hand distributed 2,160 DFP baits throughout communities within the contingency areas. FMP baits were distributed to contain the rabies outbreak in coyotes across the western two-thirds of this second contingency area, while DFP baits were distributed in the eastern third of this area to target gray foxes and to increase the barrier width at key points along the

eastern edge of the existing gray fox ORV zone. Upon completion of the second west-central Texas contingency action, WS and TDSHS increased the size of the enhanced surveillance area to include all counties surrounding the gray fox zone and contingency bait areas (USDA2009).

In a continuing effort to stop the spread of raccoon rabies in northern Vermont, WS implemented several TVR campaigns throughout the standard and high bait density ORV zones in 2007. The first and second were coordinated TVR efforts were conducted in May and June-July 2007 in Franklin County, as well as in and around the city of St. Albans. A total of 766 unique raccoons and 46 skunks were captured during this initial effort. All skunks were euthanized to better understand the role they may have played in the outbreak; 40 were submitted and tested negative for rabies. Seventy-five raccoons were euthanized after exhibiting disorientation or showing clinical signs of rabies, or having puncture wounds, bite marks, or other lesions. Of these, 69 were submitted to the Vermont Department of Health (VDH) and 8 were positive for rabies. The remaining 689 raccoons were hand vaccinated and released. Additionally, 45 feral cats, 8 red foxes, and 2 fishers, were hand vaccinated and released. Most of the raccoons and skunks, and the 2 fishers were immobilized and processed as normal collecting blood and tooth samples to evaluate ORV efficacy from the previous year's baiting.

In July 2007, raccoon rabies was documented in Quebec, just north of Grand Isle County. This prompted a shift in TVR priorities from Franklin to Grand Isle County and to vaccinating and releasing animals without processing. A total of 318 raccoons unique to this sampling period were captured. Of these, 108 raccoons were euthanized with all but one submitted to VDH for testing. Four tested positive for rabies. The other 210 raccoons, all but 5 recaptures, were hand vaccinated and released. Nine of these 205 raccoons were recaptured during the same sampling period. All 9 were euthanized upon recapture due to abnormal behavior, but all tested negative for rabies. Seventeen skunks were also trapped and euthanized; 16 were submitted to the VDH and all were negative for rabies. Additionally, 9 feral/free-ranging cats, 2 red foxes, 1 coyote, and 1 fisher were hand vaccinated and released. One more red fox was euthanized due to abnormal behavior, but it tested negative for rabies. Approximately 10% of the animals were immobilized and processed as normal collecting blood and tooth samples to evaluate ORV efficacy from the previous year's baiting (USDA 2009).

In 2007, WS continued to enhance rabies surveillance in most of the states conducting ORV for raccoons, as well as emphasizing surveillance in adjacent states west of the raccoon ORV zone including Michigan, Kentucky, Mississippi and Louisiana.

1.3 AUTHORITIES

Wildlife disease and damage management are based on interagency relationships, which require close coordination and cooperation because of related or overlapping authorities or legal mandates. The APHIS-WS National Rabies Management Program (NRMP) cooperates and coordinates closely with the United States Forest Service (USFS) and the Bureau of Land Management (BLM). Additionally, the APHIS-WS NRMP consults with the United States Fish and Wildlife Service (USFWS), the Tennessee Valley Authority (TVA), the United States Army Corps of Engineers (USACE), the United States Coast Guard (USCG), the Department of Defense (DoD), the National Aeronautics and Space Administration (NASA), the Federal Bureau of Investigation (FBI), the Bureau of Indian Affairs (BIA), and other agencies when necessary and as appropriate. Finally, NRMP cooperates closely with state agencies where APHIS-WS works with agencies such as the State Health and Wildlife Departments.

1.3.1 Federal Authorities.

APHIS – Wildlife Services. USDA is authorized and directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authorities for the APHIS-WS program are the Act of March 2, 1931 (46 Stat. 1468; 7 United States Code (USC) 426-426c) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 USC 426c). The Act of March 2, 1931, as amended in the Fiscal Year 2001 Agriculture Appropriations Bill, provides that:

"*The Secretary of Agriculture may conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services authorities in effect on the day before the date of the enactment of the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriation Act, 2001.*"

In 1988, Congress strengthened the legislative directive and authority of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

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

WS recognizes that wildlife is an important public resource greatly valued by the American people. By its very nature, however, wildlife is a highly dynamic and mobile resource that can damage agricultural resources, pose risks to human health and safety, and affect other natural resources. The WS program provides Federal leadership in helping to solve problems that occur when human activity and wildlife are in conflict with one another.

The Act of September 25, 1981, as amended (7 U.S.C. Sec. 147b). This law authorizes the Secretary of Agriculture, in connection with emergencies which threaten any segment of the agricultural production industry of the U.S., to transfer from other appropriations or funds available to the agencies or corporations of USDA such sums as the Secretary may deem necessary, to be available only in such emergencies for the arrest and eradication of contagious or infectious diseases of animals. It is under this authority that funds from the federal Commodity Credit Corporation have been transferred to APHIS-WS to expend for the continuation and expansion of ORV programs in the states identified herein (65 FR 76606-76607, December 7, 2000).

Virus-Serum-Toxin Act (21 U.S.C. 151 et seq.). The oral rabies vaccine (RABORAL V-RG®) is licensed for treatment of raccoons and coyotes by the USDA under the Virus-Serum-Toxin Act (VSTA). Animal vaccines shipped in or from the U.S. must be prepared under and cannot be imported without a USDA license. Federal regulations implementing the VSTA (9 CFR 103.3) require authorization by APHIS before an experimental biological product can be shipped for the purpose of treating limited numbers of animals as part of an evaluation process. The license for RABORAL V-RG® requires that it be restricted for use in state or federal rabies management programs.

Public Health Service Act. CDC, located in Atlanta, Georgia, is an agency of the U.S. Department of Health & Human Services. CDC's mission is to promote health and quality of life by preventing and controlling disease, injury, and disability. CDC is authorized under 42 U.S.C. 241 to render assistance to other appropriate public authorities in the conduct of research, investigations, demonstrations, and studies relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and impairments of man. In addition, under 42 U.S.C. 243(a), the Secretary of Health & Human Services may assist states and their political subdivisions in the prevention and suppression of communicable diseases.

National Forest Management Act of 1976 (16 U.S.C. section 2101 [note]). This law amended the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for the management of renewable resources on national Forest lands. The national Forest Management Act requires the Secretary of agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the national Forest Systems. This Act is the primary statue governing the administration of national Forests.

Cooperative Forestry Assistance Act of 1978 (16 U.S.C. section 2101 [note]). This laws authorizes the Secretary of agriculture to assist in controlling forest insects and diseases directly on National Forest

System lands and in cooperation on other federal and non-federal lands of all ownerships.

U.S. Forest Service (USFS). Under the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C 426c), the USFS and the APHIS-WS, along with the states cooperate to manage wildlife damage on the USFS lands, the National Forest System. Under the framework of an MOU, signed June 4, 2004, between the USFS and APHIS-WS, APHIS-WS is designated as the lead agency concerning animal damage and disease management activities on USFS lands. This includes a responsibility to maintain technical expertise in the science of wildlife damage management, control tools and techniques, conducting management programs, and complying with NEPA for APHIS-WS activities. The MOU directs the USFS to coordinate with APHIS-WS in the development and review of work plans governing APHIS-WS' activities on USFS lands and to cooperate in APHIS-WS' NEPA processes.

Bureau of Land Management. Under the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C 426c), BLM and APHIS-WS, along with the states, cooperate to manage wildlife damage on BLM lands. Similar to the USFS, BLM and APHIS-WS have entered into a MOU, signed March 21, 1995, which identifies the roles and responsibilities of each agency in wildlife damage management operations and coordination, and NEPA compliance. The MOU directs BLM to coordinate with APHIS-WS in the development and review of wildlife damage work plans governing APHIS-WS' activities on BLM lands and to cooperate in APHIS-WS' NEPA processes.

1.3.2 State and Local Authorities.

Each of the states involved in this proposed action has a state agency or agencies with authority under state law to approve, conduct or coordinate rabies control programs. APHIS-WS involvement in rabies control in each state has previously occurred and, under the proposed action, would only occur in complete cooperation with the appropriate state agency(ies) and in accordance with state authorities as identified by those agencies.

With regard to ORV programs, it is the various cooperating states that exercise their authorities under state law to propose or approve the distribution of ORV baits onto lands owned or managed by a variety of entities including private persons, federal land management agencies [e.g., USDA Forest Service, National Park Service (NPS), and others], state, county, and city governments, and American Indian Tribes. It is critical to the success of establishing and maintaining ORV barriers and, potentially, to the eventual elimination of targeted rabies strains in many areas, that all lands containing substantial amounts of habitat for the targeted carnivore species are included. APHIS-WS would not be making the decision to distribute baits on the various land ownerships. Those decisions would be made by the states. The proposed action assumes that ORV baits would be distributed under state authorities, consistent with pertinent property rights laws and regulations and would include acquiring permission from public land managers and American Indian Tribes when appropriate.

1.4 OTHER RELEVANT FEDERAL LAWS AND REGULATIONS

National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq.). The purpose of NEPA is to declare a national policy that encourages productive and enjoyable harmony between man and the environment, promotes efforts that prevent or eliminate damage to the environment and biosphere, and stimulate the health and welfare for man, enriches the understanding of ecological systems and natural resources important to the Nation, and, lastly, establishes a Council on Environmental Quality.

APHIS-WS prepares analyses of the environmental impacts of program activities to meet procedural requirements of this law. APHIS has previously prepared a number of environmental assessments (EAs) to address the environmental effects of experimental programs using V-RG ORV baits and covering the approval of licensing of the vaccine for use in raccoons (see Section 1.5). APHIS-WS also completed an EA and Finding of No Significant Impact (FONSI) (USDA 2001a), dated July 30, 2001; a supplemental FONSI (USDA 2002), dated August 5, 2002; a supplemental EA and FONSI (USDA 2003a), dated June

12, 2003; a supplemental EA and FONSI (USDA 2004a), dated September 9, 2004; and a FONSI (USDA 2007c), dated April 10, 2007. These documents analyzed the environmental effects of APHIS-WS involvement in the funding of and participation in ORV programs to eliminate or stop the spread of raccoon rabies in a number of eastern states (Alabama, Connecticut, Delaware, Florida, Georgia, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, and West Virginia) and gray fox and coyote rabies in Texas. APHIS-WS determined these actions would not have a significant impact on the quality of the human environment (see Section 1.5). Furthermore, APHIS-WS, in cooperation with the USFS, prepared an EA and FONSI (USDA 2004b), dated February 12, 2004; and a supplemental EA and FONSI (USDA 2006a), dated December 8, 2005. These documents analyzed the environmental effects of APHIS-WS involvement in the funding of and participation in ORV programs on several USFS lands (excluding Wilderness Areas) in the eastern U.S. to eliminate or stop the spread of raccoon rabies. APHIS-WS with USFS determined the action would not have a significant impact on the quality of the human environment (see Section 1.5).

APHIS-WS determined that, because of increased federal involvement in ORV programs in recent years, because of the current proposal to continue or expand federal involvement in such programs in additional states, and because of the need for expanded monitoring and surveillance in the event contingency actions must be implemented, further NEPA documentation is appropriate. Therefore, this EA is intended to meet the NEPA requirement for the proposed action by clearly communicating the scope of federal involvement by APHIS-WS and by determining if there are any substantive new issues or alternatives that should be analyzed.

Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.). It is federal policy, under the ESA, that all federal agencies shall seek to conserve threatened and endangered (T&E) species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). For actions that "may affect" listed species, APHIS-WS conducts Section 7 consultations with the U.S. Fish & Wildlife Service (USFWS) to ensure that "*any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency shall use the best scientific and commercial data available*" (Sec.7(a)(2)). APHIS-WS has analyzed the potential for effects on listed species in this EA and has concluded that the proposed action will have minimal potential to affect or no effect on any listed species (see Section 4.1.3.2).

National Historic Preservation Act (NHPA) of 1966 as amended (16 U.S.C. 470). NHPA and its implementing regulations (36 CFR 800) require federal agencies to: 1) determine whether activities they propose constitute "undertakings" that can result in changes in the character or use of historic properties and, 2) if so, evaluate the effects of such undertakings on such historic resources and consult with the State Historic Preservation Office regarding the value and management of specific cultural, archaeological, and historic resources, and 3) consult with appropriate American Indian Tribes to determine whether they have concerns for traditional cultural properties in areas of these federal undertakings.

ORV activities described under the proposed action (Section 1.2) do not cause major ground disturbance, do not cause any physical destruction or damage to property, do not cause any alterations of property, wildlife habitat, or landscapes, and do not involve the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Therefore, the methods that would be used under the proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, then site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

Executive Order on Environmental Justice. Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations requires federal agencies to analyze disproportionately high and adverse environmental effects of proposed actions on minority and

low-income populations. APHIS-WS has analyzed the effects of the proposed action and determined that implementation would not have adverse human health or environmental impacts on low-income or minority populations.

Executive Order on Protection of Children from Environmental Health and Safety Risks. Executive Order 13045 was passed to help protect children who may suffer disproportionately from environmental health and safety risks for many reasons. ORV activities as proposed in this EA would only involve legally available and approved methods that have been subjected to safety evaluations and testing. The vaccinia virus used as a carrier of the rabies glycoprotein is the same type of virus that was used in smallpox eradication, although more attenuated or weakened (USDA 1991, p. 39). The analysis in Section 4.1.1 of this EA supports a conclusion of very low to no risk of adverse effects on children from the ORV baiting strategy. Implementation of the proposed action would not increase environmental health or safety risks to children, but would in fact reduce such risks by minimizing the potential for children to contract rabies. Children are particularly at risk from rabies because they are more prone to experiencing "undetected" or "unappreciated" exposures (Huntley et al. *unpublished* 1996) that do not lead to post-exposure vaccine treatments. Therefore, federal involvement in ORV programs is consistent with and helps to achieve the goals of EO 13045.

Native American Graves and Repatriation Act of 1990. The Native American Graves Protection and Repatriation Act requires federal agencies to notify the Secretary of the Department that manages the federal lands upon the discovery of native American cultural items on federal or tribal lands. Federal projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360). This law places administration of pharmaceutical drugs, including those used in wildlife capture and handling, under the Food and Drug Administration.

Controlled Substances Act of 1970 (21 U.S.C. 821 et seq.). This law requires an individual or agency to have a special registration number from the federal Drug Enforcement Administration (DEA) to possess controlled substances, including those that are used in wildlife capture and handling.

Animal Medicinal Drug Use Clarification Act of 1994 (AMDUCA). The AMDUCA and its implementing regulations (21 CFR Part 530) establish several requirements for the use of animal drugs, including those used to capture and handle wildlife in rabies management programs. Those requirements are: (1) a valid "veterinarian-client-patient" relationship; (2) well defined record keeping; (3) a withdrawal period for animals that have been administered drugs; and (4) identification of animals. A veterinarian, either on staff or on an advisory basis, would be involved in the oversight of the use of animal capture and handling drugs under the proposed action. Veterinary authorities in each state have the discretion under this law to establish withdrawal times (i.e., a period of time after a drug is administered that must lapse before an animal may be used for food) for specific drugs. Animals that might be consumed by a human within the withdrawal period must be identified; the Western Wildlife Health Committee of the Western Association of Fish and Wildlife Agencies has recommended that suitable identification markers include durable ear tags, neck collars, or other external markers that provide unique identification (WWHC *undated*). APHIS-WS establishes procedures in each state for administering drugs used in wildlife capture and handling that must be approved by state veterinary authorities in order to comply with this law.

Clean Air Act of 1970 as amended (42 U.S.C. 7401). The Clean Air Act is a comprehensive federal law that regulates air emissions from area, stationary, and mobile sources.

Coastal Zone Management Act of 1972, as amended (CZMA) (16 USC 1451-1464, Chapter 33; P.L. 92-583, October 27, 1972; 86 Stat. 1280). The CZMA established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans. Funds were authorized for cost-sharing grants to states to develop their programs. Subsequent to federal approval of their plans, grants would be awarded for implementation purposes. In

order to be eligible for federal approval, each state's plan was required to define boundaries of the coastal zone, identify uses of the area to be regulated by the state, determine the mechanism (criteria, standards or regulations) for controlling such uses, and develop broad guidelines for priorities of uses within the coastal zone. In addition, this law established a system of criteria and standards for requiring that federal actions be conducted in a manner consistent with the federally approved plan. The standard for determining consistency varied depending on whether the federal action involved a permit, license, financial assistance, or a federally authorized activity.

APHIS-WS submitted a National Consistency Determination concerning the potential effects of the national rabies management program on coastal zone resources to all potentially affected states with approved coastal management programs (AL, CT, DE, FL, GA, IN, LA, ME, MD, MA, MI, MS, NH, NJ, NY, NC, OH, PA, RI, SC, and VA). APHIS-WS received concurrence that the national rabies management program would have *de minimus* (15CFR930.33) cumulative or secondary effects on coastal resources. Thus, APHIS-WS has determined the national rabies management program to be consistent with the CZMA and associated coastal zone management programs within the potentially affected coastal zone states and the program is excluded from further state agency consistency review.

Wilderness Act of 1964 – An Act (Public Law 88-577; 88th Congress, S.4; September 3, 1964). The Wilderness Act allows federally owned lands meeting specific criteria to be designated as "wilderness areas." The act prohibits and restricts certain uses of these designated lands. The act provides special provisions to allow certain activities to take place within designated wilderness areas such as the use of aircraft to control fire, insects, and diseases (Sec. 4 (d)). APHIS-WS obtains USFS Forest Supervisor or BLM State Director approval to conduct control activities in Wilderness areas where necessary.

1.5 RELATIONSHIP TO OTHER ENVIRONMENTAL DOCUMENTS

Work Plan for Oral Vaccination by Ground or Aerial Baiting to Control Specific Rabies Virus Variant in Raccoons on National Forest System Lands in USFS Regions 8 and 9. This Work Plan has been prepared by APHIS-WS in coordination with the USFS to implement ORV program activities on National Forest System lands in USFS Regions 8 and 9.

The USFS has reviewed the proposed action and alternatives described in this EA and has determined the proposed action to be consistent with Land and Resource Management Plans for the National Forests listed in Appendix I and excluding Wilderness Areas.

A number of other NEPA documents have been prepared that analyzed the potential environmental effects of ORV programs and the methods used in rabies monitoring and surveillance. Pertinent information from those analyses has been incorporated by reference into this EA.

Wildlife Services Programmatic EIS. APHIS-WS has issued a final Environmental Impact Statement (EIS) (USDA 1997j) and Record of Decision on the National APHIS-WS program. Relevant information from the EIS will be incorporated by reference in this document.

EA, FONSI, and Decision – Oral Vaccination to Control Specific Rabies Virus Variants in Raccoons, Gray Foxes, and Coyotes in the United States. This EA and FONSI/Decision and Supplements (USDA 2001a, 2002, 2003a, 2004a, 2007c) analyzed the environmental effects of APHIS-WS involvement in the funding of and participation in ORV programs to eliminate or stop the spread of raccoon rabies in a number of eastern states (Alabama, Connecticut, Delaware, Florida, Georgia, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, and West Virginia) and gray fox and coyote rabies in Texas. APHIS-WS determined the action would not have any significant adverse impact on the quality of the human environment.

EA, FONSI, and Decision - Oral Vaccination to Control Specific Rabies Virus Variant in Raccoons on National Forest System Lands in the United States. This EA and FONSI and Supplement (USDA 2004b, 2006a,) analyzed the potential environmental effects of a proposal to expand the involvement of the APHIS-WS program in ORV programs to portions of National Forest System lands, excluding Wilderness Areas, in a number of eastern states. The National Forest System lands where APHIS-WS involvement would be expanded may be located within the states of Alabama, Connecticut, Delaware, Florida, Georgia, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, and West Virginia. Numerous National Forest System lands are located within current and potential ORV barrier zones. To effectively combat this strain of the rabies virus, it has become increasingly important to bait these large land masses.

EA, FONSI, and Decision – Oral Rabies Vaccination Program. APHIS-WS was a cooperating agency in the preparation of this EA and FONSI/Decision (USDI 2004) which analyzed the environmental effects of NPS participation in ORV programs on fifteen NPS units in the states of Alabama, Florida, Georgia, North Carolina, and Tennessee in the effort of stopping the spread of a specific raccoon rabies variant or "strain" of the rabies virus and reducing or eliminating this strain of the virus from the eastern United States. The NPS determined the action would have a negligible impact on the quality of the human environment.

EA, FONSI, and Decision – Oral Rabies Vaccination Program for Big Bend National Park, Guadalupe Mountains National Park, and Amistad National Recreation Area in Texas. APHIS-WS was a cooperating agency in the preparation of this EA and FONSI/Decision (USDI 2003) which analyzed the environmental effects of NPS participation in ORV programs to eliminate or stop the spread of gray fox rabies on three NPS units in Texas. The NPS determined the action would have a negligible impact on the quality of the human environment.

EA, FONSI, and Decision – Proposed Issuance of a Conditional United States Veterinary Biological Product License to Rhone Merieux, Inc. for Rabies Vaccine, Live Vaccinia Vector. This EA and its FONSI/Decision, dated April 7, 1995, were prepared by APHIS and concluded that there would be no significant impact on the quality of the human environment from the decision to issue the conditional license mentioned above (USDA 1995a). The conditional license approved the use of V-RG in raccoon rabies control programs administered under the direction of state or federal government agencies. Mitigation measures required under the decision included public education and notification efforts prior to distributing the baits, and the placement of warning labels on each vaccine-laden bait.

EA, FONSI, and Decision – Proposed Field Application of an Experimental Rabies Vaccine, Live Vaccinia Vector, in South Texas. This EA and its FONSI/ Decision, completed in 1995, analyzed the environmental effects of experimental distribution of ORV baits containing V-RG to eliminate and stop the spread of coyote rabies in South Texas (USDA 1995b). APHIS determined the action would not have any significant adverse impact on the quality of the human environment.

EAs and Findings of No Significant Impact on Proposed Field Trials/Tests of Live Experimental Vaccinia-Vector Recombinant Rabies Vaccine for Raccoons. APHIS analyzed the potential environmental impacts of six separate field trials or tests of the recombinant V-RG vaccine in several northeastern states. In EAs and FONSIs/Decisions covering those actions, (USDA 1991, 1992, 1993, 1994a, 1994b, 1994c), APHIS determined that none of the actions would have any significant adverse impact on the quality of the human environment.

Risk Analyses for ORV Using the V-RG Recombinant Virus. Two formal risk analyses on the rabies vaccine -- live vaccinia vector (i.e., the recombinant V-RG vaccine) have been prepared previously by APHIS (USDA undated *a*, USDA undated *b*). Both analyses concluded the risk of adverse animal safety, human safety, or other environmental effects to be low.

(Nine) EAs, Findings of No Significant Impact, and Decisions - Predator Damage Management in (Brownwood, Canyon, College Station, Fort Stockton, Fort Worth, Kerrville, Kingsville, San Angelo, and Uvalde) District(s) of the Texas Animal Damage Control Program. These EAs and their FONSIs/Decisions evaluated the environmental impacts of implementing various methods of predator damage management in nine districts in Texas, including methods proposed herein for collection of gray foxes and coyotes as part of rabies ORV program monitoring and surveillance activities. APHIS-WS determined that none of the district programs would have any significant impact on the quality of the human environment (USDA 1997a, 1997b, 1997c, 1997d, 1997e, 1997f, 1997g, 1997h, and 1997i).

EA, Finding of No Significant Impact, and Decision – Predator Damage Management in New Mexico. This EA and its FONSI/Decision evaluated the environmental impacts of implementing predator damage management in New Mexico to protect all resources, including human health and safety from disease, and determined that the take of predators did not have a significant adverse impact on the quality of the human environment (USDA 2006b).

EAs, Findings of No Significant Impact, and Decisions – Predator Damage Management on Nonfederal and Tribal Lands and Federal Public Lands in Arizona. These 2 EA and their FONSIs/Decisions evaluated the environmental impacts of implementing predator damage management, on all land classes combined, in Arizona to protect all resources, including human health and safety from disease, and determined that the take of predators did not have a significant adverse impact on the quality of the human environment (USDA 1996, 1999).

1.6 DECISION TO BE MADE

Based on the scope of this EA, the decisions to be made are:

- Should APHIS-WS continue or expand its involvement in ORV programs in the eastern and southwestern United States, including National Forest System and BLM lands, to combat raccoon, gray fox, and coyote rabies?

- If not, should APHIS-WS attempt to implement one of the alternatives as described in this EA?

- Would implementing the proposed action or one of the other alternatives have significant adverse impacts on the quality of the human environment requiring preparation of an EIS?

1.7 GOALS

As stated in the description of the proposed action, the primary goals of the program are to:

- Stop the forward advance of raccoon, gray fox, and coyote strains of rabies from areas where they now occur by immunizing portions of target species populations along the leading edges of the rabies fronts; and

- reduce the incidence of rabies cases involving wild and domestic animals and rabies exposures to humans in the areas where the ORV programs are conducted.

A Work Plan between the USFS and APHIS-WS has been prepared regarding implementation of ORV programs on National Forest System lands. Additionally, the states that would be involved in the proposed action have established, or are in the process of establishing, plans for the implementation of ORV or contingency action programs. The proposed action would be consistent with such plans and any statements of goals and objectives as they are developed by the involved state and federal agencies.

1.8 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.8.1 Actions Analyzed.

This EA evaluates the environmental effects of the continued and expanded APHIS-WS funding of and participation in ORV programs to eliminate or stop the spread of raccoon, gray fox, and coyote strains of rabies in the eastern and southwestern United States, including National Forest System and BLM lands. Analyses specific to this EA include the incorporation of trap-vaccine-release (TVR) as a possible contingency action, as well as the clarification of the term "contingency actions" which were previously analyzed in a Supplemental EA with its FONSI/Decision (USDA 2007). Further, the additional effects of expanding the ORV program into Arizona and New Mexico are presented in this EA. Under the proposed action, ORV, monitoring, and surveillance activities, and contingency actions could be conducted on private, federal, state, tribal, county, and municipal lands in the eastern and southwestern United States (Figure 1-5).

1.8.2 Period for which this EA is Valid.

This EA would remain valid until APHIS-WS determines that new needs for action, new unforeseen significant issues, or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document would be supplemented or revised pursuant to NEPA. Review of the EA will be conducted annually by APHIS-WS to ensure that the EA and the analyses contained herein are still appropriate for the scope of the program.

1.8.3 Site Specificity.

This EA analyzes potential impacts of continued or expanded APHIS-WS participation in ORV programs in the states described in Section 1.2 (Figure 1-5), including National Forest System and BLM lands. Because the proposed action is to assist the affected states in accordance with plans, goals, and objectives developed by those states, the proposed action could involve APHIS-WS participation in ORV bait distribution, monitoring and surveillance, or local population reduction of target species anywhere in those states where the need has been identified by the appropriate state agencies. Therefore, all National Forest System and BLM lands within the aforementioned states could be affected.

This EA identifies as possible the typical habitat and specific areas that are currently known to be in need of ORV program action. However, the location of every wildlife rabies outbreak that would trigger use of ORV cannot be predicted. Implementation of emergency response and contingency action plans that involve localized population suppression of target species could similarly be needed anywhere in the involved states where outbreaks of the targeted rabies strains occur. In addition, changes in funding levels over time could create changes in ORV program activities, such as increasing or decreasing the size of the ORV barrier zone and other areas to be baited and varying the types of monitoring and surveillance and research conducted in an adaptive management mode. Planning for the management of rabies epizootics must be viewed as being conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, and insurance companies.

Although some of the sites where wildlife rabies outbreaks will occur can be predicted, specific locations or times where such outbreaks will occur in any given year cannot be accurately predicted. Thus, this EA addresses the substantive environmental issues that pertain to ORV use and monitoring/surveillance activities, and, if necessary, localized target species population reduction wherever these activities might occur in the states identified herein. The analyses in this EA are intended to apply to any action that may occur *in any locale, except Wilderness Areas,* and at *any time* within the analysis area. In this way, APHIS-WS believes it meets the intent of NEPA with regard to site-specific analysis and program planning and that this is the only practical way for WS to comply with NEPA and still be able to accomplish its mission.

1.8.4 Coordination.

WS is the lead agency and decision-maker for this EA. However, to assure that the concerns of other Federal land managers have been addressed, the USFS and BLM were asked to participate in the development and review of this EA. The agencies participated in the review of this EA as per 40 CFR 1501.6 and ensure compliance with their respective Land and Resource Management Plans.

APHIS-WS will coordinate with all applicable federal and state agencies, and tribal governments (Appendix F) who will be affected by APHIS-WS actions on their lands through compliance with the NEPA process or other agency specific coordination including, but not limited to, entrance into MOUs, establishment of work plans, or issuance of Special Use Permits. All affected agencies will be contacted early and prior to implementation of any APHIS-WS NRMP activity to ensure that the agencies are in accordance with APHIS-WS actions and gain their cooperation with any site specific issues the affected agency might have. However, APHIS-WS activities on NPS lands are not covered under the scope of this document. ORV implementation of NPS lands has been addressed through EAs maintained by the NPS.

1.9 SUMMARY OF PUBLIC INVOLVEMENT EFFORTS

Several EAs have been prepared previously to analyze the environmental effects of APHIS-WS' continued and expanded participation with an ORV program in the eastern and southwestern United States (Figure 1-5). Issues related to the proposed action were identified through involvement and planning/scoping meetings with numerous federal (i.e., Centers for Disease Control and Prevention), state (i.e., health, agriculture, and natural resource departments), and local government agencies, academic institutions, and Canadian provincial government agencies (i.e., Ontario Ministry of Natural Resources).

For the previous EA and supplemental EAs, additional efforts to determine further issues that the public might have with this action were made through Federal Register Notices (66 FR 13696-13700, March 7, 2001 and 66 FR 27489, May 17, 2001) and making the EA available to the public for review and comment prior to an agency decision. A letter was sent to potentially affected or interested American Indian Tribes to assure their opportunity to be involved in the EA process. Comments received were reviewed to identify any substantive new issues or alternatives not already identified for analysis. A third Federal Register Notice (66 FR 45835-45836, August 30, 2001) was published announcing the availability of the EA and Decision/ FONSI. In 2002, a Notice of Availability for a subsequent Decision/FONSI was published through a Federal Register Notice (67 FR 44797-44798, July 5, 2002). In 2003, a Notice of Availability for a supplemental EA and Decision/FONSI was published through a Federal Register Notice (68 FR 38669-38670, June 30, 2003). In 2004, a Notice of Availability for an EA and Decision/FONSI was published through a Federal Register Notice (69 FR 7904-7905, February 20, 2004) in cooperation with the USFS to expand ORV program assistance to National Forest System lands, excluding Wilderness Areas, in several eastern states. Also in 2004, a Notice of Availability for another supplemental EA and Decision/FONSI was published through a Federal Register Notice (69 FR 56992-56993, September 23, 2004) to document the expansion of the rabies management program to include 26 states and the District of Columbia. In response to the expanded program area, another Notice of Availability for a supplemental EA and Decision/FONSI was published through a Federal Register Notice (70 FR 72977-72978, December 8, 2005) in 2005 to document additional National Forest System lands within the expanding program. In 2007, a Notice of Availability for a subsequent Decision/FONSI was published through a Federal Register Notice (72 FR 20984-20986, April 27, 2007). These previous analyses and reviews indicated that the ORV program would have no significant effects.

This draft EA will be made available to the public by a notice in the Federal Register, by directly mailing notices of availability to all people who have expressed an interest in this or similar APHIS-WS activities, and by posting this document and notice of its availability on the APHIS-WS website http://www.aphis.usda.gov/wildlife_damage/nepa.shtml. The draft EA will be available for public comment for a period of 30 days, with a closing date specified in the Federal Register notice. Anyone who proveds comments or expresses an interest in the proposal during the public comment period of this EA will receive a notice of the decision.

CHAPTER 2: ISSUES AND AFFECTED ENVIRONMENT

2.1 ISSUES

In preparation of this EA, APHIS-WS compiled issues for the ORV EA from public input received in response to a Federal Register Notice (66 FR 13696-13700, March 7, 2001) and agency concerns discussed during scoping meetings held with state and local departments of health and the CDC. Many issues were discussed in previous EAs and FONSIs (USDA 2001a, 2002, 2003a, and 2004a), but the following issues were determined to be germane to the proposed action and were considered in detail:

- Potential for adverse effects on target wildlife species populations.
- Potential for adverse effects on nontarget wildlife species, including threatened or endangered species.
- Potential for adverse effects on people, pets, and livestock that are exposed to or consume the vaccine laden baits.
- Potential for the recombined V-RG virus to "revert to virulence" or recombine with other viruses and result in a virus that could cause disease in humans or animals.
- Potential for aerially dropped baits to strike and injure people or domestic animals.
- Cost of the program in comparison to perceived benefits.
- Humaneness of methods used to collect wild animal specimens critical for timely program evaluation or to reduce local populations of target species under state contingency plans.

2.2 OTHER ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

2.2.1 Potential for Drugs Used in Animal Capture and Handling to Cause Adverse Health Effects in Humans that Hunt and Eat the Species Involved

Among the species to be captured and handled under the proposed action, this issue is expected to be the most concern for raccoons which are hunted and sometimes consumed by people as food. Drugs used in capturing and handling raccoons for surveillance and monitoring purposes in rabies management programs include ketamine hydrochloride, xylazine (Rompun®, Bayer Health Care, Monheim, Germany), and a mixture of tiletamine and zolazepam (Telazol®, Wyeth Pharmaceuticals, Fort Dodge Animal Health, IA). Meeting the requirements of the AMDUCA (see Section 1.4) should prevent any significant adverse impacts on human health with regard to this issue. Standard operating procedures (SOPs) followed in each state include:

- All drugs used in capturing and handling raccoons, coyotes, gray foxes, skunks, and other animals would be under the direction of state or federal veterinary authorities, either directly or through procedures agreed upon between those authorities and APHIS-WS.
- As determined on a federal- or state-level basis by these veterinary authorities (as allowed by AMDUCA), ORV program participants may choose to avoid capture and handling activities that use immobilizing drugs within a specified number of days prior to the hunting or trapping season for the target species to avoid release of animals that may be consumed by hunters prior to the end of established withdrawal periods for the particular drugs used. However, capture and handling activities would likely extend into the hunting season during late summer/fall ORV baiting schedules. Therefore, target species would either be marked or euthanized if immobilizing drugs are used within 30 days of hunting or trapping seasons. These measures would be taken to avoid release of animals that could be consumed by hunters prior to the end of established withdrawal periods for the particular drugs used.

- Animals that have been immobilized and released are ear tagged or marked in some way to alert hunters and trappers that they should contact APHIS-WS personnel before consuming the animal.

By following these procedures in accordance with AMDUCA, rabies management programs would avoid any significant impacts on human health with regard to this issue.

2.2.2 Potential for Drugs Used in Animal Capture and Handling to Cause Adverse Health Effects in Scavengers or Other Nontarget Animals that May Consume the Species Involved

Drugs used in the capturing and handling of raccoons, gray foxes, or coyotes for surveillance and monitoring purposes in the rabies management program include ketamine hydrochloride, xylazine, and a mixture of tiletamine and zolazepam. These drugs are generally injected intravenously or intramuscularly and, less-often, subcutaneously. Oral delivery of immobilizing drugs may be used to calm animals caught in traps. For example, oral delivery of ketamine can calm the animal enough to allow injection of additional drug via syringe (USDA 2001b). However, oral delivery is not recommended for anesthetizing the animal due to the much higher dosage required to compensate for the slower uptake rate and correct dosages cannot be guaranteed (USDA 2001b).

APHIS-WS personnel would not release an animal until it has returned to full and normal function, thereby reducing its chances of succumbing to potential predators or other dangers. Most immobilizing drugs used, such as ketamine and xylazine, are metabolized and excreted within hours after the animal returns to full function (Dr. L. Bigler, New York State Animal Health Diagnostic Laboratory, pers. comm. 2004 as cited in USDA 2004a). In addition, reversal agents, such as yohimbine, may be used to rouse the animal more quickly. Therefore, if a previously immobilized animal dies in the field sometime later, even if a scavenging animal were to ingest an entire animal previously immobilized, they should suffer no adverse effects (Dr. G. Gathright, DVM, APHIS-WS, National Wildlife Research Center, pers. comm. 2004 as cited in USDA 2004a). Furthermore, the scavenger would be consuming the animal by oral route, thus requiring a much larger dosage of the drug. Immobilizing drugs would produce carcasses that are not considered toxic to scavengers (USDA 2001b). If an animal must be euthanized, APHIS-WS personnel would remove it from the field immediately, thereby eliminating the chance of scavengers finding the carcass. Due to these factors, immobilizing drugs will have no adverse effect on scavengers or predators that consume previously immobilized animals.

2.2.3 Potential for Adverse Impacts on Wildlife from Aircraft Overflights Conducted in ORV Programs.

An issue that has arisen is the potential for low-level flights associated with ORV bait distribution to disturb wildlife, including T&E species, to the point that they are impacted. APHIS-WS uses aircraft in ORV bait distribution, and these aircraft typically fly at about 500 feet above ground level (AGL) and in straight transects for many miles to distribute baits equally across the landscape. A number of studies have looked at responses of various wildlife species to aircraft overflights. The National Park Service (1995) reviewed studies on the effects of aircraft overflights on wildlife. The report revealed that a number of studies have documented responses by certain wildlife species that suggest adverse impacts could occur. Few, if any studies, have proven that aircraft overflights cause significant adverse impacts on wildlife populations, although the report stated it is possible to draw the conclusion that impacts to populations are occurring. The Air National Guard (ANG) concluded that military training flights which occur frequently and generate much more noise were not expected to cause adverse effects on wildlife after extensive review of numerous studies of this issue (ANG 1997a, 1997b). In general, it appears that the more serious potential impacts occur when overflights are frequent such as hourly and over long periods of time which represents a chronic exposure. Chronic exposure situations generally involve areas near commercial airports and military flight training facilities. WS ORV bait distribution operations occur over the landscape and occur in any given area only for a short time period.

Several examples of wildlife species that have been studied with regard to low-level flights are available in the literature. Colonial waterbirds were reported that low level overflights of 2-3 minutes in duration by a fixed-wing airplane and a helicopter produced no drastic disturbance of tree-nesting colonial waterbirds,

and, in 90% of the observations, the individual birds either showed no reaction or merely looked up (Kushlan 1979). Conomy et al. (1998) quantified behavioral responses of wintering American black ducks (*Anas rubripes*), American wigeon (*A. americana*), gadwall (*A. strepera*), and American green-winged teal (*A. crecca carolinensis*) exposed to low-level flying military aircraft in North Carolina and found that only a small percentage (2%) of the birds reacted to the disturbance. They concluded that such disturbance was not adversely affecting the time-activity budgets of the species. Mexican spotted owls (Delaney et al. 1999) did not flush when chain saws and helicopters were greater than 110 yards away; owls flushed to these disturbances at closer distances and were more prone to flush from chain saws. Owls returned to their predisturbance behavior 10-15 minutes following the event and researchers observed no differences in nest or nestling success (Delaney et al. 1999). USFS (2002) found that Mexican spotted owls showed only minor behavioral changes to F-16 fly-bys during training runs, but less behavioral changes than to natural occurrences. Andersen et al. (1989) conducted low-level helicopter overflights directly at 35 red-tailed hawk (*Buteo jamaicensis*) nests and concluded their observations supported the hypothesis that red-tailed hawks habituate to low level flights during the nesting period; results showed similar nesting success between hawks subjected to such overflights and those that were not. White and Thurow (1985) did not evaluate the effects of aircraft overflights, but found that ferruginous hawks (*B. regalis*) are sensitive to certain types of ground-based human disturbance to the point that reproductive success may be adversely affected. However, military jets that flew low over the study area during training exercises did not appear to bother the hawks, and nor did the hawks get alarmed when the researchers flew within 100 feet in a small fixed-wing aircraft (White and Thurow 1985). White and Sherrod (1973) suggested that disturbance of raptors by aerial surveys with helicopters may be less than that caused by approaching nests on foot. Ellis (1981) reported that five species of hawks, two falcons (*Falco spp.*), and golden eagles (*Aquila chrysaetos*) were incredibly tolerant of overflights by military fighter jets, and observed that, although birds frequently exhibited alarm, negative responses were brief and the overflights never limited productivity.

Krausman et al. (1986) reported that only 3 of 70 observed responses of mule deer to small fixed-wing aircraft overflights at 150 to 500 feet above ground resulted in the deer changing habitats. They believed that the deer may have been accustomed to overflights because the study area was near an interstate highway that was frequently followed by aircraft. VerCauteren and Hygnstrom (2002) noted that when studying the efficacy of hunting to manage deer populations, that when deer were flown over during their censuses, they typically just stood up from their beds, but did not flush. In addition, WS aerial hunting personnel frequently observe deer and antelope standing apparently undisturbed beneath or just off to one side of aircraft. Krausman and Hervert (1983) reported that, in 32 observations of the response of bighorn sheep to low-level flights by small fixed-wing aircraft, 60% resulted in no disturbance, 21% in slight disturbance, and 19% in great disturbance. Another study (Krausman et al. 1999) found that 14% of bighorn sheep had elevated heart rates that lasted up to 2 minutes after an F-16 flew over at an elevation of 400 feet, but it did alter the behavior of penned bighorns. Weisenberger et al. (1996) found that desert bighorn sheep and mule deer had elevated heart rates for 1 to 3 minutes and changed behavior to alerted for up to 6 minutes following exposure to jet aircraft. Fancy (1982) reported that only 2 of 59 bison (*Bison bison*) groups showed any visible reaction to small fixed-wing aircraft flying at 200-500 feet above ground. These studies indicate that ungulates are relatively tolerant of aircraft overflights, even those that involve noise at high decibels.

WS has actively used fixed-wing aircraft and some helicopters at low levels for years in areas inhabited by wildlife in operational wildlife damage management. No known problems to date have occurred from APHIS-WS aircraft overflights on wildlife and these were analyzed in detail in several APHIS WS predator damage management EAs (e.g., WS 2005, 2006 (CO, NM EAs). Overflights for the purposes of ORV bait distribution activities would only occur once or twice per year and aircraft would only fly quickly over any one point on the ground. The aircraft do not circle over areas repeatedly, but fly in straight "transect" lines for the purposes of bait distribution. The potential impact would be of short-term (only momentary) duration, on a local scale, with negligible intensity and should not add appreciably to the frequency of overflights. The addition of one more overflight per year for ORV bait distribution should not constitute a substantive increase in any effects that might occur as a result of overflights. Furthermore, the types of aircraft used in bait distribution, the DeHavilland (DHC-6) Twin Otter and Beechcraft King Air B200, meet all Federal Aviation Regulation (FAR) requirements regarding noise limits (FAR Part 36). No evidence has been found to indicate harm to nontarget wildlife including bald eagles. In addition, the annual

overflight is even less likely to adversely impact migratory birds if flights occur in the fall after the birds have dispersed. Thus, the short-term duration, infrequency, and negligible intensity of flights over any given area, in addition to the tolerance of wildlife of such activity, indicates ORV program overflights would have a negligible adverse environmental impact on wildlife. Based on the above information and analysis, it is reasonable to conclude that APHIS-WS the ORV bait distribution program low-level flights should not cause any adverse impacts to nontarget wildlife including T&E species. Therefore, this issue will not be considered further.

2.2.4 Potential for ORV Bait Distribution to Affect Organic Farming.

This issue concerns the potential for ORV baits dropped on crops and livestock operations certified as "organic" under federal regulations to affect the status of the organic certification of such farms. Farmers and livestock producers were concerned they would not be able to sell, label, or represent their harvested crop or plant as organically produced if it had contact with the prohibited substance, which is the vaccine – V-RG (7 CFR Part 205.672). The ORV baits are comprised of a matrix of dog food or fishmeal and an ethylene copolymer which is a plastic material. The purpose of the polymer is to hold the fishmeal attractant together in a block that can withstand being dropped from an airplane and not dissolve or crumble readily when exposed to rain or melting snow. The process for producing the bait blocks eliminates all potentially reactive compounds (such as ethylene and vinyl acetate) that might have the potential for uptake by plants or absorption into the tissues of animals that consume the baits. Thus, the inorganic polymer in the ORV baits is totally nonreactive and cannot be absorbed by plants or animals (M. Smith, Bait-Tek, pers. comm. 2001 as cited in USDA 2001a). It is also among the types of materials approved by the Food and Drug Administration for use in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding food (21 CFR Part 177). Therefore, the fishmeal polymer baits pose no risk of contaminating crops or animals raised for food and, consequently, will have no effect on the ability of certified organic farms to maintain their status.

On April 15, 2003, the USDA-Agricultural Marketing Service (AMS) ruled that ORV bait blocks, consisting of a recombinant vaccine imbedded in fishmeal bound by a polymer binding agent, on an organic operation would not have an adverse impact on organic operations (see USDA-AMS letter in Appendix G). This ruling is posted on the USDA-AMS website at www.ams.usda.gov/nop. The USDA-AMS considers the ORV program to be an emergency disease treatment for the control of rabies and, as such, is addressed under National Organic Program (NOP) Section 205.672, Emergency Pest or Disease Treatment. The USDA-AMS determined that "…in the unlikely event that a bait block breaks and exposes a plant(s) to the vaccine, the organic producer can remove the affected plant(s) with no adverse effect on the operation's certification. This would comply with NOP Section 205.672(a). The organic status of animals feeding on the ORV bait block and not penetrating the vaccine would not be adversely affected. In the unlikely event that an animal consumes the vaccine within the ORV bait block that animal would lose organic status as provided in NOP Section 205.672(b)." The USDA-AMS believes there to be little chance that an organic animal would consume the vaccine within an ORV bait block; however, to reduce the chances of livestock consumption, producers can relocate any bait found within an area containing livestock to a point outside of that area.

Additionally, field baiting studies suggest deer are not generally attracted to the ORV baits. Out of more than 4,300 baits exposed to target and nontarget animals in field bait acceptance studies in Georgia, Ohio, and Texas, none were observed to have been taken or consumed by deer, despite the prevalence of deer in the areas where the bait studies were conducted (Linhart et al. *unpublished* 2001). Sulfur compounds are a byproduct of the breakdown of animal proteins, including those found in fishmeal (D. Nolte, APHIS-WS, NWRC, pers. comm. 2001 as cited in USDA 2001a) and are generally repellent to herbivores (Nolte et al. 1994). Therefore, the ORV baits used to address coyote and raccoon rabies problems are probably at least somewhat repellent to deer, which probably accounts in part for the lack of observed bait take by deer in the studies reported in Linhart et al. (*unpublished* 2001). For these reasons, it is unlikely that the ORV baits would be consumed by deer on venison farms that are certified as organic producers.

2.2.5 Potential for ORV to Cause Abortions in Cattle.

This issue was raised by a cattle producer in Ohio who reported an increase in abortions of pregnant cows following an ORV bait distribution project. V-RG vaccine was tested in a number of wild and domestic animal species, including cattle, and produced no adverse effects (see Section 4.1.3.1). Although pregnant cattle have not been specifically tested, V-RG has produced no adverse effects on gestation in pregnant female raccoons (C. Rupprecht, CDC, pers. comm. to K. Smith, Ohio Dept. of Health 2001 as cited in USDA 2001a). Recently, a woman who was 18 weeks pregnant in Ohio was exposed to the vaccine when she took a bait away from her dog and later delivered a healthy baby (see Section 4.1.1.2). ORV program administrators with the TDSHS have not received any other reports of this nature despite the distribution of millions of ORV baits in cattle and other livestock production areas since 1995 (E. Oertli, TX Dept. of Health, pers. comm. 2001 as cited in USDA 2001a). In the U.S., approximately 43.75 million doses of V-RG have been distributed by APHIS-WS to date without any other reported concerns of this nature being raised. Therefore, the reported increase in cattle abortions was determined to be coincidental and not related to ORV. The Ohio producer was provided with further information and advice on determining which of a number of other known possible causes of abortions in cattle might be responsible (R. Hale, Ohio Dept. of Health, pers. comm. 2001 as cited in USDA 2001a).

New vaccines may be considered for future use by the APHIS-WS ORV program and any environmental effects of the new vaccines on cattle not analyzed in this EA will be appropriately evaluated in further environmental documentation.

2.2.6 Potential Human Health Impacts in the Event of Human Consumption of Vaccinated Wildlife.

The issue expressed here is the potential to develop a vaccinia infection from eating a vaccinated raccoon or some other animal that has eaten one or more ORV baits. Dr. Carolin Schumacher of MERIAL, Inc. was consulted to obtain information on this issue. Mahnel (1987) reported results of experiments to determine the stability of poxviruses (which include vaccinia used in the V-RG vaccine). "Naked" vaccinia (i.e., vaccinia found outside of host cells) will be inactivated within minutes by heat above 133 degrees Fahrenheit (56 degrees Celsius), by ultra-violet irradiation (sunlight), or by exposure to acid with a pH of 3 or less[5] (e.g., similar to the acid environment found in the stomach of raccoons which is where the bulk of V-RG vaccine would end up). In contrast, poxviruses can be relatively stable for years in dry dust or in dried lesion crusts.

The vaccinia from V-RG generally only binds to animal tissues in the mucous membrane of the oral cavity, pharynx and esophagus since V-RG does not have the tendency to spread throughout the animal. Those particular tissues are rarely consumed by humans, but if they were, they would most likely be cooked which would kill the virus. Also, concentrations of vaccinia in those tissues should be low because mucosa is not considered a tissue where the virus tends to accumulate (C. Schumacher, MERIAL, Inc., pers. comm. 2001 as cited in USDA 2001a) as the virus infects the cells of the oral cavity, produces the glycoprotein, and then dies (J. Maki, MERIAL, Inc., pers. comm. 2009).

Although cell-bound vaccinia is generally more resistant than free virus, humidity and cellular enzyme activity in the tissues as well as bacterial decomposition (e.g., in the gut of ruminants), normally results in inactivation of the virus. In the environment, inactivation of pox viruses is accelerated by temperature changes (C. Schumacher, MERIAL, Inc., pers. comm. 2001 as cited in USDA 2001a).

The above information suggests that possible sources of contamination with vaccinia would be V-RG dried onto the fur of an animal, ingested virus in the stomach, or cell-bound virus in mucous membranes. However, with the combined activity of sunlight and ultraviolet light, humidity, stomach pH or bacteria, enzymes, temperature fluctuations, and cooking heat, the risk to human health should be low, especially when taking into consideration the attenuated or weakened condition of the vaccinia in the V-RG vaccine.

[5] pH is the measure of acidity or alkalinity of a solution with numbers below 7 representing a progressively more acidic solution. A pH of 3 is highly acidic.

Therefore, the potential for adverse health effects from consuming animals that have eaten ORV baits should be negligible.

New vaccines may be considered for future use by the APHIS-WS ORV program and any environmental effects of the new vaccines on humans who consume vaccinated wildlife not analyzed in this EA will be appropriately evaluated in further environmental documentation.

2.2.7 Potential Impacts on Water Resources, including Aquaculture, Fish, Reptiles, and Amphibians.

A concern has been expressed regarding the potential impacts of unconsumed V-RG vaccine and baits adversely impacting ground and surface water resources and aquaculture through direct and indirect exposure. Baits that are not consumed may remain in the environment for several months after placement, which is dependent upon environmental conditions (precipitation, temperature, etc.) and the physical condition of the baits. Potential impacts to water resources are greatly reduced by the limited number of baits that are dropped in a specific area, the biodegradability of the vaccine liquid and baits, the high consumption rate of ORV baits by animals, the safety and efficacy of the vaccine, and the Standard Operating Procedures (SOPs) that are used when dropping baits near a large water source. This conclusion is based upon:

- The possibility of a large quantity of ORV baits being exposed to a specific water resource is extremely low due to the bait distribution densities used by the program. Under the proposed program, ORV baits would be distributed from aircraft at an average density of 75 baits per km^2 for raccoons in the eastern U.S., 39 baits per km^2 for gray foxes in Texas, and 27 baits per km^2 for coyotes in Texas.

- The baits are non-toxic. The baits used for the ORV program are small blocks of either dog food or fishmeal that are held together with a polymer binding agent and are considered to be "food grade" materials. Therefore, the unconsumed bait material would biodegrade when exposed to the environment causing little to no effect on water resources.

- The vaccinia virus and other orthopoxviruses will not replicate in water and do not replicate or reproduce themselves in non-warmblooded species (Rupprecht, CDC, pers. comm. 2002 as cited in USDA 2003a). Therefore, ORV is not expected to cause any adverse effects on fish, reptiles, amphibians, or any invertebrate species should any members of these species groups consume ORV baits or otherwise be exposed to the vaccine.

- The ORV baits are readily taken up and consumed by animals, thereby limiting long term exposure to the environment. The likelihood of a bait being consumed is dependent upon several factors including animal population densities (target and non-target species), bait preference, and the availability of alternative food sources. In field tests conducted in the U.S., the majority of ORV baits have been consumed within the first 7 to 14 days after placement, with reports of up to 100 percent of the baits being consumed within a 7 day period (Farry et al. 1998b, Hable et al. 1992, Hadidian et al. 1989, Hanlon et al. 1989a, Linhart et al. 1994, Steelman et al. 2000; USDA 1995a).

The V-RG virus biodegrades when exposed to the environment. The V-RG virus that is not consumed by the target species or other vertebrates will become inactivated over a relatively short period of time. Persistence and stability of the V-RG virus outside of an organism is highly dependent on ambient temperature and local environmental conditions; the higher the temperature, the quicker the virus becomes inactive (USDA 1992; USDA 1995a). For example at temperatures of 68 and 100 degrees Fahrenheit (20 and 37.8 Celsius), the liquid vaccine potency remains stable for approximately 14 to 7 days, respectively, in the un-punctured sachet or inside the bait. In situations where the bait and sachet are damaged inactivation of the V-RG virus will occur more rapidly. A more detailed discussion of the development of ORV baits can be found in Chapter 1.

Program SOPs limit the possibility of ORV baits being directly dropped into large water sources such as rivers, lakes, and reservoirs. When the aircraft approaches a large body of water the bait dropping

equipment is shut off approximately 0.25 mile from the water source to reduce the possibility of ORV baits falling into the water. Nevertheless, due to changing environmental conditions and the limited possibility of human error when operating the bait dropping equipment, there is the possibility that baits may inadvertently be dropped into a body of water. Exposure of the V-RG vaccine into a water source from an intact bait and sachet is highly unlikely. The vaccine is enclosed in a sealed sachet thereby limiting the possibility of the vaccine liquid being directly released into a water source. Even if the vaccine was released into a water source through a damaged or punctured sachet, it is highly unlikely that the vaccine would cause any adverse effects since the vaccine liquid is biodegradable and nontoxic (USDA 1991; USDA *undated a, undated b*).

The above information indicates that V-RG vaccine and baits pose no threat to groundwater or surface water through direct or indirect means. New vaccines may be considered for future use by the APHIS-WS ORV program and any environmental effects of the new vaccines on water resources not analyzed in this EA will be appropriately evaluated in further environmental documentation.

2.2.8 Effects on Carnivore Populations in the Absence of Rabies.

Concern has been expressed that specific carnivore populations, namely raccoons, may increase in the absence of the rabies virus as a mortality factor, leading to adverse effects on prey populations such as T&E species. The raccoon strain of the rabies virus has only relatively recently spread, and is contiguously distributed from Alabama to Maine, west to the eastern Ohio border with Pennsylvania (Krebs et al. 2000, Kemere et al. 2001). Translocation of rabid raccoons to the mid-Atlantic states has been implicated in establishing a new rabies foci in the mid-1970's (Krebs et al. 1999), from which rabies has spread through the raccoon population at rates averaging about 30 miles/year (48.3 km/year) (Kemere et al. 2001).

Rabies is only one of several diseases that may help regulate carnivore populations. In fact, the article by Guerra et al. (2003) does not support the idea that rabies exists specifically to control raccoon populations. Guerra et al. (2003) state that after an initial peak, populations approach lower 'steady-state' conditions. Based on surveillance data, raccoon rabies did not exist outside a focus in Florida before the 1940s. Therefore, elimination of raccoon rabies should merely create the scenario before raccoon rabies spread in the eastern U.S. (Rupprecht and Smith 1994). No evidence exists that the carrying capacity for raccoons could be increased by the implementation of ORV programs compared to population levels before the introduction of rabies (C. Rupprecht, CDC, pers. comm. 2003 as cited in USDA 2004a).

Prior to the introduction of raccoon rabies into the mid-Atlantic region in the late 1970's, canine distemper was considered a primary disease mortality factor in raccoons, gray foxes, and skunks (Roscoe 1993, Davidson et al. 1992). The epizootiology of canine distemper in raccoons in New Jersey and Florida has been characterized by outbreaks at the end of the mating season in March and with increased movements of young in September (Roscoe 1993, Hoff et al. 1974). Because of the cyclic nature of canine distemper outbreaks (4 year intervals), the wide distribution of canine distemper cases, and the low incidence of the disease between epizootic peaks in New Jersey, Roscoe (1993) proposed an enzootic status for canine distemper for raccoons that becomes epizootic when raccoon densities reach high levels. Evans (1982) found that 50 to 90 percent of raccoons and gray foxes may be incapable of producing protective levels of antibodies against the canine distemper virus, implicating it as a potentially important disease mortality factor. Davidson et al. (1992) diagnosed canine distemper in 78 percent of gray foxes studied in the southeastern U.S. and found canine distemper to be more significant as a mortality factor for gray foxes than all other infectious and noninfectious diseases combined. Roscoe (1993) reported that the effects of canine distemper on raccoon populations may diminish if raccoon rabies spreads and that concurrent canine distemper and rabies epizootics may become more common. The dynamics of sympatric rabies and canine distemper are not well understood; however, rabies may compensate for deaths that would have historically occurred due to canine distemper infection. Important attributes of canine distemper include that it is not a zoonotic disease like rabies and, historically, it has been implicated as a virus of importance to carnivore mortality.

2.2.9 The Affected Area Described in the EA includes Lands that Have Not Been Identified as Having a Rabid Raccoon Problem.

The affected area of the EA includes some lands that have or have the potential for a raccoon, coyote, and gray fox rabies outbreak to occur. ORV baits are distributed based upon vaccination zones. These vaccination zones are determined in cooperation with the involved state rabies task forces, state agencies, or other agencies with jurisdiction over vaccine use and application in wildlife and domestic animal species. Vaccination zones are delineated based on the most current distribution of rabies cases and the expected direction of disease spread. Therefore, some, all, or none of the lands, including National Forest System and BLM lands, identified in this EA may be involved in an ORV bait distribution program on an annual basis. Figures 1-6 and 1-7 in Chapter 1 show the current anticipated ORV zone based upon recent outbreaks of the virus. The states and National Forest System and BLM lands included in this EA were chosen since they have the greatest possibility of being involved in the overall efforts of stopping the northward and westward spread of the raccoon rabies virus in the eastern U.S., the northward expansion of coyote and gray fox rabies in Texas, and outbreaks of rabies in New Mexico and Arizona.

2.2.10 Effects of Nontarget Species Consumption of ORV Baits on Program Effectiveness

Consumption of ORV baits by nontarget species is not expected to impact program effectiveness. As described in Section 1.1.5, baits are developed to attract target species. The use of target-preferred baits increases the likelihood of the target species consuming the baits prior to the discovery of baits by nontarget species. Furthermore, bait distribution densities are developed to compensate for the uptake of baits by nontarget species. Baits are distributed at densities that allow raccoons, gray foxes, and coyotes the opportunity to find intact baits. It has been determined, based upon the success of previous ORV bait distribution activities, that baits should be disbursed at an average density of 27 baits per km^2 in the coyote rabies zone and 39 baits per km^2 in the gray fox rabies zone in Texas. Baiting density averages 75 baits per km^2 in eastern states where raccoon rabies is targeted. In addition, surveillance activities have been and continue to be conducted to assess aerial or ground ORV baiting efficacy, summer versus fall baiting schedules, and seasonal raccoon movement in a number of states. Numerous density studies also continue to be conducted in the majority of participating states to determine raccoon densities in relation to habitat, elevation, and numbers of baits distributed. In areas where raccoon densities are low, bait distribution numbers may be reduced (USDA 2008a, 2008b).

2.2.11 Effects of Global Warming, Habitat Loss, and Pollution on Wildlife Populations

A concern has arisen that APHIS-WS fails to look at a variety of factors such as global warming, habitat loss, and pollution on wildlife populations under cumulative impacts to species where APHIS-WS lethally takes species. APHIS-WS acknowledges that many factors influence wildlife population levels including these and predation, inter- and intra-specific competition especially with invasive species, stochastic events such as hurricanes, tornadoes, earthquakes, floods, wild fires, and extreme climatic conditions such as extended drought and exceptionally hard winters. Wilcove et al. (1999) assessed the causes of extinction by looking at causes listed in T&E species USFWS recovery plans for vertebrates (n=1,880) and, not surprisingly, found that endangerment of species was caused, often by a combination of factors, but mostly included habitat degradation (85%), invasive species (49%), pollution (24%), overexploitation (17%), and disease (3%) as the leading causes of endangerment. Global warming is a relatively recent concern, but it is thought that it will cause a loss of 25% of the species on earth by 2050; the first victim of global warming is believed to be the Lemur-like ringtail possum (*Hemibelideus lemuroides*) of Australia due to excessive extended temperatures. It is assumed that global warming will increase some species' range while shrinking others such as the polar bear (*Thalarctos maritimus*) which was listed as threatened under the ESA in 2008. In the listing it was stated that global warming was the causative agent for their listing, essentially due to a reduction in habitat from melting arctic ice floes. The then Secretary of Interior Dirk Kempthorne stated, "*While the legal standards under the ESA compel me to list the polar bear as threatened, I want to make clear that this listing will not stop global climate change or prevent any sea ice from melting. Any real solution requires action by all major economies for it to be effective. That is why I am taking administrative and regulatory action to make certain the ESA isn't abused to make global*

warming policies." Thus, at this point, global warming changes are going to occur, part of the environmental status quo, unless a world-wide effort is conducted to reduce the causative agents.

APHIS-WS is concerned that cumulative impacts to species from these factors are a concern, but feel that these are analyzed under the different alternatives. These factors can contribute greatly to species abundance and distribution, and have been a major factor in declines and increases in species abundance in the past and into the future. However, WS uses the best available information to determine the status of different species' populations. Often, State wildlife agencies provide APHIS-WS with population estimates or trends to determine impacts. However, these factors would be consistent under all of the alternatives. The best information on these populations, which include the effects of these environmental pressures, is used in the analysis to determine impacts of lethal take on these species. Thus, we believe these outside forces are included in the analysis of impacts in Chapter 4 and that currently no data exists to quantify losses to such events. However, APHIS-WS will monitor such events and take appropriate actions to minimize further impacts if necessary in an Adaptive Management approach.

2.3 AFFECTED ENVIRONMENT

This section presents some descriptive information on the environment of the areas that may be affected by the proposed action. Other descriptive aspects of the affected environment are included in Chapter 4 in the analysis of effects which is based on environmental and other types of issues identified in Section 2.1.

The area of the proposed action encompasses 25 eastern states and the District of Columbia and National Forest System and BLM lands, but excluding Wilderness Areas, where raccoon rabies outbreaks currently or are expected to occur and Texas where gray fox and coyote rabies strains occur. Additionally, due to the recent spread of gray fox variant rabies west of the original ORV zone in Texas toward the New Mexico border with a possible host shift from gray foxes to coyotes and an ongoing outbreak of gray fox variant rabies in western New Mexico and eastern Arizona, program activities will be expanded to include New Mexico and Arizona. New Mexico and Arizona would participate in and assist with the ORV program to control gray fox variant rabies. APHIS-WS involvement would therefore be continued or expanded in the following states: Arizona, Alabama, Connecticut, Delaware, Florida, Georgia, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, and West Virginia. ORV baiting programs are conducted or are planned to be conducted in most of the aforementioned states. Currently, cooperative rabies surveillance activities are conducted in most of the aforementioned states and would likely be expanded to include all listed states.

The potential areas involved in the ORV program are extensive and may cover several land ownership types and diverse land uses, including cultivated agricultural lands, forests, meadows, wetlands, rangelands, and pastures. Aerial distribution of ORV baits would avoid urban and suburban areas that support high human population densities, as well as lakes, rivers, and Wilderness Areas. Aerial distribution of baits would primarily target rural areas as well as known areas of habitat suitable for the target species. When aerial distribution by fixed-wing or helicopter aircraft is not practical, baits would be distributed by careful hand placement to help to minimize contact by humans, pets, and other domestic animals.

Figure 1-5 in Chapter 1 shows the states and Appendices I and J show the National Forest System and BLM lands where APHIS-WS would continue or expand assistance to and participation in ORV programs under the proposed action. Figures 1-6 and 1-7 in Chapter 1 show the approximate ORV bait disbursal areas anticipated for 2009 and beyond. It must be kept in mind, however, that ORV baiting activities might be needed, and might therefore be conducted, in other areas within the involved states, or on other National Forest System and BLM lands, as part of the proposed action. In addition, the ORV bait disbursal areas would be the primary expected areas where assistance by APHIS-WS is expected to be requested to collect blood, tooth, and other biological samples from target animals for monitoring and surveillance. However, monitoring or surveillance activities by APHIS-WS could also occur anywhere in the respective states where state health or other appropriate agency officials determine there is a need to insure project effectiveness. Implementation of emergency response and contingency action plans that involve localized population suppression of target species could similarly be needed anywhere in the involved states where

outbreaks of the targeted rabies strains occur. Furthermore, changes in funding levels over time could create changes in ORV program activities, such as increasing or decreasing the size of the ORV barrier zone and other areas to be baited and varying the types of monitoring and surveillance and research conducted.

"Major Habitat Types" as described by Ricketts et al. (1999) that are found within the proposed project locations are: Temperate Broadleaf and Mixed Forests (AL, DE, GA, IN, KY, LA, ME, MD, MI, MS, NH, NJ, NY, NC, OH, PA, RI, SC, TN, VT, VA, WV), Temperate Coniferous Forests (AL, AZ, FL, GA, LA, MS, NM, NC, SC), Flooded Grassland (FL), Mississippi Riverine Forests (TN, KY), Temperate Grasslands/Savannah/Shrub (IN, LA, NM, TX), and Xeric Shrublands/Deserts (AZ, NM, TX). Appendix E shows the "ecoregions" (i.e., broad level ecosystems) that occur in the potentially affected states (Bailey 1995). Ecoregions range from dry desert and grassland-shrub communities in Texas, to humid tropical areas and southern pine and hardwood forest areas in the Southeast, to broadleaf deciduous forest, mixed-deciduous forest and coniferous forest, and boreal forest types in the East and Northeast.

Table 2-1 (USDC 2001, 2008) shows some descriptive statistics for the 28 states and District of Columbia proposed for federal assistance by APHIS-WS in ORV programs. These states contain about 66.7 percent of the U.S. resident population and possess average state population densities that range from about 16.1 (New Mexico) to nearly 9,471 (District of Columbia) people per mi^2. Rural area (i.e., nondeveloped) averages 80.8 percent for the 28 states, ranging from approximately 56.2 percent in Arizona to almost 94.7 percent in Maine. Population densities in rural areas are much lower than the statewide average figures shown. The percentage of federal land in each state ranges from 0.4 percent in Connecticut and Rhode Island to 48.1 percent in Arizona and averages 11.9 percent of the total area of affected states.

A number of federally and state recognized American Indian Tribes are located in the states included in the proposed action and are shown in Appendix F. State agencies that conduct ORV programs involving the use of APHIS-WS funds or assistance would be responsible for obtaining agreements as appropriate from Tribes to conduct baiting.

Chapter 4 contains further information on the affected environment with respect to target and nontarget species including T&E species.

Table 2-1. Some Descriptive Statistics of States Proposed for Federal Assistance by APHIS-WS ORV Programs (data from USDC 2001, 2008)

State	Resident population (1000s) from 2006	Population per sq mile from 2006	% popn. in nonmetro-politan areas from 2006	Popn. of nonmetro-politan areas (1000s) from 2000	Total area (1000 acres) from 1997 and 2004	Developed area (1000 acres) from 1997	Rural area (1000 acres) from 1997	% rural area from 1997	Land in farms (mil. acres) from 2006 Z<500,000 acres	National Forest Land (1000 acres) from 1999	Total area owned by federal govt. (1000 acres) from 2004	% area owned federalgovt. from 2004
AL	4,599	90.6	29.1%	1,338	32,678	3,728	28,950	88.6%	9	665	514	1.6%
CT	3,505	723.4	4.3%	149	3,135	957	2,178	69.5%	Z	0	14	0.4%
DE	853	436.9	18.4%	157	1,266	278	988	78.0%	1	0	26	2.0%
DC	582	9,471.2	0%	0	39	--	--	--	Z	0	10	24.7%
FL	18,090	335.5	6.3%	1,145	34,721	9,223	25,498	73.4%	10	1,147	2,859	8.2%
GA	9,364	161.7	26.9%	2,520	37,295	6,647	30,648	82.2%	11	865	1,409	3.8%
IN	6,314	176.0	26.8%	1,691	23,158	3,089	20,069	86.7%	15	196	463	2.0%
KY	4,206	105.9	49.2%	2,069	25,512	3,185	22,327	87.5%	14	693	1,379	5.4%
LA	4,288	98.4	25.6%	1,099	28,868	4,204	24,664	85.4%	8	604	1,475	5.1%
ME	1,322	42.8	61.1%	808	19,848	1,054	18,794	94.7%	1	53	2,080	1.1%
MD	5,616	574.6	6.9%	385	6,319	1,511	4,808	76.1%	2	0	179	2.8%
MA	6,437	821.1	4.1%	261	5,035	1,641	3,394	67.4%	1	0	94	1.9%
MI	10,096	177.7	17.5%	1,769	36,492	7,066	29,426	80.6%	10	2,857	3,638	10.0%
MS	2,911	62.0	62.6%	1,821	30,223	3,794	26,429	87.4%	11	1,159	2,197	7.3%
NH	1,315	146.6	37.7%	496	5,769	1,416	4,353	75.5%	Z	827	776	13.4%
NJ	8,725	1,176.2	0.0%	0	4,813	2,037	2,766	57.5%	1	0	148	3.1%
NY	19,306	408.9	7.8%	1,503	30,681	3,979	26,702	87.0%	8	0	234	0.8%
NC	8,857	181.8	29.5%	2,612	31,403	6,811	24,592	78.3%	9	1,244	3,710	11.8%
OH	11,478	280.3	18.6%	2,139	26,222	4,152	22,070	84.2%	14	229	448	1.7%
PA	12,441	277.6	15.2%	1,890	28,804	4,988	23,816	82.7%	8	513	720	2.5%
RI	1,068	1021.7	5.8%	62	677	219	458	67.7%	Z	0	3	0.4%
SC	4,321	143.5	27.9%	1,205	19,374	3,356	16,018	82.7%	5	613	561	2.9%
TN	6,039	146.5	30.3%	1,827	26,728	4,131	22,597	84.5%	11	634	866	3.2%
VT	624	67.5	70.4%	439	5,937	754	5,183	87.3%	1	368	443	7.5%
VA	7,643	193.0	20.3%	1,550	25,694	5,808	19,886	77.4%	9	1,659	2,534	9.9%
WV	1,818	75.5	57.4%	1,043	15,411	2,159	13,252	86.0%	4	1,033	1,146	7.4%
AZ	6,166	54.3	98.0%	604	72,688	31,830	40,858	56.2%	26	11,255	34,933	48.1%
NM	1,955	16.1	40.1%	784	77,766	27,695	50,071	64.4%	45	9,327	32,484	41.8
TX	23,508	89.8	13.4%	3,160	168,218	12,688	155,530	92.5%	130	755	3,130	1.9%
Total	199,447	16,957.1	17.3%	34,526	824,774	158,400	666,325	80.8%	364	36,696	98,473	11.9%
U.S.	299,398	84.6	18.5%	55,453	2,271,343	879,245	1,392,098	61.3%	943	191,910	653,299	28.8%

CHAPTER 3: ALTERNATIVES

3.1 ALTERNATIVES CONSIDERED, INCLUDING THE PROPOSED ACTION

Alternative 1. Current Action (the No Action Alternative). The "No Action" alternative is a procedural NEPA requirement (40 CFR 1502.14(d)), is a viable and reasonable alternative that could be selected, serves as a basis for comparison with the other alternatives and can be defined as the continuation of current management practices (CEQ 1981).

This alternative would involve the continued or expanded use of federal funds by APHIS-WS to purchase V-RG oral vaccine baits and to participate in their distribution under the authorities of the appropriate state agencies in selected areas of the several states listed in Section 1.2, not including New Mexico and Arizona, to stop or prevent raccoon, gray fox, and coyote rabies, and to assist with monitoring and surveillance efforts by capturing and releasing or killing target species for purposes of obtaining biological samples. APHIS-WS assistance could also include participation in implementing state contingency plans that involve target species population reduction or concentrated ORV baiting in localized areas if rabies outbreaks occur beyond the designated ORV vaccination barriers to stop such outbreaks from spreading.

Alternative 2. Proposed Action (the Preferred Alternative). This alternative would involve the expansion of Alternative 1 (Proposed Action) to include additional area where APHIS-WS would conduct the ORV Program and Alternative 3 (Live-Capture-Vaccinate-Release Only) from the 2004 supplemental EA. The former proposed action included the use of several contingency actions as part of the ORV program; however, it did not address trap-vaccinate-release as one of them. This new proposed action better defines and identifies the types of contingency actions that may be used as part of the ORV program. (See page 14 for a description of the contingency actions.) Therefore, this alternative would involve the continued and expanded use of federal funds by APHIS-WS to purchase V-RG oral vaccine baits and to participate in their distribution under the authorities of the appropriate state agencies in selected areas of the several states listed in Section 1.2, including Arizona and New Mexico to stop or prevent raccoon, gray fox, and coyote rabies, and to assist with monitoring and surveillance efforts by capturing and releasing or killing target species for purposes of obtaining biological samples. APHIS-WS assistance could also include participation in the implementation of one or more of the five state contingency actions as described in Section 1.2.1 if rabies outbreaks occur beyond the designated ORV vaccination barriers to stop such outbreaks from spreading.

Alternative 3. **Live-Capture-Vaccinate-Release Alternative.** This alternative would involve the live capture of species being targeted (e.g., raccoon, gray fox, coyotes) followed by administration of rabies vaccines by injection and release back into the wild. This strategy has been used in certain localized areas for reducing the incidence and spread of rabies in raccoons (Brown and Rupprecht 1990, Rosatte et al. 1990, Rosatte et al. 1992, Rosatte et al. 1993) and skunks (Rosatte et al. 1990, Rosatte et al. 1992, Rosatte et al. 1993). This method has not been attempted for vaccination of foxes and coyotes because they are much more difficult to capture in cage traps (Baker and Timm 1998). In addition, the use of other traps such as leghold traps and snares, for foxes and coyotes has shown to be problematic in capturing and releasing a large enough population (Rosatte et al. 1993; C. MacInnes, Ontario Ministry of Natural Resources pers. comm. 2001 as cited in USDA 2001a; personal observation of APHIS-WS personnel). Currently, no vaccine is specifically licensed for this type of use (CDC 2000). However, certain injectable vaccines may be used "off-label" under the direction of veterinarians to vaccinate wild animal species in certain situations (J. Mitzel, APHIS-Veterinary Services, pers. comm. 2001 as cited in USDA 2001a). This method generally results in a higher percentage of a raccoon population being vaccinated than ORV, but takes much longer to accomplish in a given area. For example, in Ontario, 7 trappers working from July to October were required to trap and vaccinate 50-85 percent of the raccoons in an area less than 700 $km.^2$ (270.3 mi^2), whereas the same area could have been treated with aerially dropped ORV baits in half a day (C. MacInnes, Ontario Ministry of Natural Resources, pers. comm. 2001, as cited in USDA 2001a).

Alternative 4. No Animal Surveillance or Monitoring or Lethal Removal Programs Alternative. Under this alternative, APHIS-WS would provide resources for and assistance in ORV bait distribution

only and would not engage in or provide funds for the collection of wild animal specimens by APHIS-WS for monitoring and project evaluation purposes or for implementation of localized lethal removal actions under state contingency plans. The states could still conduct these activities without APHIS-WS assistance.

Alternative 5. No Federal ORV Program. This alternative would imply no involvement by APHIS-WS in rabies prevention or control in the states identified in Section 1.2. Under this alternative, no APHIS-WS funds would be available for purchasing ORV baits. The states would likely still fund ORV programs to some degree without APHIS-WS' assistance.

3.2 ALTERNATIVES CONSIDERED, BUT NOT IN DETAIL WITH RATIONALE

3.2.1 Depopulation of Target Species.

This alternative would result in the lethal removal of raccoons (in the eastern states listed) and gray foxes and coyotes (in Arizona, New Mexico, and Texas) throughout the zones where outbreaks of the targeted strains of rabies are occurring or are expected to occur. The goal would be to achieve elimination of the rabies strains by severely suppressing populations of the target animal species over broad areas so that the specific strains of rabies could not be transmitted to susceptible members of the same species. This could theoretically stop the forward advance of the disease and potentially result in elimination of the particular rabies variants as infected animals die from rabies before they could transmit it to other members of the same species.

Localized population reduction has been proposed as part of local programs to address raccoon rabies outbreaks as they are just beginning (Rosatte et al. 1997). This was deemed necessary because by the time a suspected rabies case is confirmed through animal testing, other raccoons in the area have invariably been infected and are incubating the disease, at which point vaccination would not be effective for those individuals (Rosatte et al. 1997).

Population reduction is often suggested as a method to control rabies in wildlife populations since the disease is density dependent (Debbie 1991). Bounty incentives, regulated hunting and trapping, ingestible poisons, and fumigation of dens have all been employed to control populations with varying levels of success. MacInnes (1998) reviewed some of the past efforts to control rabies with population reduction of carrier species and concluded that, with a couple of exceptions, most such efforts have failed. In some of the situations, it could not be determined whether an observed decline or disappearance of rabies cases was attributable to population control or to the disease simply reaching some unexplainable geographical limitation or just dying out on its own (MacInnes 1998). Also, population control as a strategy can be questionable because the leading edges of rabies outbreaks do not necessarily coincide with the edge of the range of the principal "vectors" (e.g., raccoons, gray foxes, and coyotes), nor are they always related to the population density of such vectors (MacInnes 1998).

Hanlon et al. (1999) reviewed historical efforts to control rabies through population reduction and evaluated the potential for success with this strategy. Information and conclusions they presented are summarized as follows:

Skunk rabies was successfully controlled in Alberta, Canada by population reduction (Pybus 1988). Success was attributed to a high level of effort during several years, the well-defined behavior of skunks in prairie habitats, and access to an effective method (Pybus 1988). Compensatory changes in carnivore reproduction (i.e., the tendency for larger litters and larger percentages of adult females to have litters) and dispersal (i.e., immigration of animals from surrounding uncontrolled populations) can limit the effectiveness of controlling population numbers of other species in different conditions (Clark and Fritzell 1992, Thompson and Fleming 1994).

Population reduction with toxicants as a broad scale control alternative for rabies is impractical. The only approved toxicants currently registered are sodium cyanide in the M-44 device (registered for zoonotic disease control involving wild canids), and carbon monoxide-producing gas cartridges that can be used to

kill skunks, coyotes, and red foxes in dens. Currently, these methods are primarily used in limited areas of the western U.S. for livestock protection. Presently, population reduction is most likely to be publicly accepted and effective in localized or site-specific scenarios in the U.S. (e.g., reducing the density of raccoon populations in parks where visitors could potentially come into contact with rabid animals).

Population reduction using strychnine baits was successful in stopping the spread of rabies in foxes in Denmark (Gaede 1992). However, carcass recovery statistics indicated nontarget species [498 martens (*Martes* sp.), twelve European badgers (*Meles meles*), and four domestic dogs] were killed in slightly greater numbers than the targeted red foxes (n=482). The number of rabies cases declined sharply and the country has reportedly remained free of terrestrial rabies since 1982 (Gaede 1992). Broad scale population control with toxicants is most likely politically infeasible in the U.S. due to opposition by the public and state wildlife agencies.

This alternative was not considered in detail because it would be impractical to obtain approval from the many hundreds of thousands of landowners on whose properties the lethal control methods would have to be conducted. The greatest difficulty with population reduction as a strategy for reducing or eliminating rabies is that the high level of effort must be maintained almost indefinitely and would also undoubtedly be opposed by most members of the public (MacInnes 1998). Population suppression can be a challenge to maintain in many situations due to immigration (of other members of the same species from surrounding populations) and possibly compensatory reproduction (i.e., larger litters and greater percentages of females breeding following population reduction) (Clark and Fritzell 1992, Connolly and Longhurst 1975). These factors can mean local populations can recover to their previous levels within a year, thus requiring annual or more frequent suppression efforts to maintain such populations at low levels. Nevertheless, temporary localized population suppression activities could be conducted in an integrated program of ORV use as part of the proposed action, but such activities, if conducted at all, would be expected to occur as a part of contingency actions in response to a breach in a vaccination barrier. APHIS-WS has covered predator removal including to control disease, but mostly to resolve damage associated with them to resources such as livestock, in other EAs for Texas, New Mexico, and Arizona (Predator Damage Management EAs) and some eastern states for raccoons (APHIS-WS EAs can be found @ http://www.aphis.usda.gov/wildlife_damage/ nepa.shtml).

3.2.2 Population Control through Birth Control

Under this alternative, APHIS-WS would provide funds or operational assistance to implement one or more methods to control populations of the target species by reducing reproduction. Such methods could involve live capture and surgical sterilization [reviewed by Kennelly and Converse (1997)], the use of chemical reproductive inhibitors placed out in baits or delivery devices (Balser 1964, Linhart et al. 1968), or the application of *immunocontraception* strategies (i.e., vaccines that can cause infertility in treated animals).

The suppression of reproduction over time would eventually reduce the size of target species populations and lead to a reduction in the potential for the spread of rabies by reducing the chances of contact between infected and healthy animals. However, this approach would do nothing immediately in the short term to reduce the risk of rabies spread in the existing populations, since those animals would continue to be present and capable of contracting and passing on the disease. Therefore, this type of strategy would be viewed as a long-term remedy for stopping rabies spread. It would probably not be useful in meeting the immediate needs for stopping a localized outbreak of rabies that occurs beyond designated ORV baiting zones.

Live capture and surgical sterilization of whole local populations of animals would be extremely expensive, time-consuming, and difficult to achieve. Considerable expense would be involved in employing experienced and qualified veterinarians to perform large numbers of surgical procedures on captured animals. From a rabies control standpoint, if all or nearly all of a local population could be live captured, it would be more effective and less costly to administer rabies vaccinations by injection, which is already considered as Alternative 3.

Immunocontraception is a potentially useful concept for mammalian population suppression but is still in

the early stages of research and development (Bradley 1995, Miller 1997). Genetically engineered vaccines that cause a target species to produce antibodies against its own sperm or eggs or that affect reproductive hormone functions have been produced (Miller 1997). Several logistical concerns still would need to be addressed before this method could be applied successfully in the field. These concerns include: 1) durability of the contraceptive vaccines in baits after distribution in the field; and 2) the limitation of some current vaccine designs that require baiting an animal population twice about one month apart to successfully treat individual wild animals (Miller 1997). Furthermore, it is likely that a greater proportion of the population would have to be treated with contraceptive vaccines than with rabies vaccines in order to achieve effective rabies control. Thus, achieving effective control would be more costly and difficult under this alternative than under ORV programs (C. MacInnes, Ontario Ministry of Natural Resources, pers. comm. 2001 as cited in USDA 2001a). In addition, several environmental concerns regarding this strategy still need to be addressed, including safety of the proposed genetically engineered vaccines to humans, other wildlife species, and even nontarget members of the target species - e.g., juveniles that might consume baits (Miller 1997, Guynn 1997, Hanlon and Rupprecht 1997).

No contraceptive agents are currently registered for use on raccoons, gray foxes, or coyotes and, thus, are not legal for use. For all of the above reasons, birth control strategies to control rabies will not be considered further.

3.2.3 Employ Other Types of ORV instead of the V-RG Vaccine.

Under this alternative, APHIS-WS would provide funds to purchase and use "modified-live-virus" (i.e., "attenuated" or weakened strains that have been shown to have little chance of causing rabies in treated animals) or perhaps "killed-virus" (i.e., "inactivated" virus) oral vaccines instead of the V-RG vaccine in ORV baits. Modified-live-virus vaccines include those that have been used in the past in the U.S. to vaccinate domestic animals by injection. Oral baits that employed several strains of these types of virus vaccines have been investigated and used in Europe to stop the spread of rabies in red foxes (Flamand et al. 1993, Artois et al. 1993, Artois et al. 1997). They have also been tested in red foxes in Canada (Lawson et al. 1989, Lawson et al. 1997), and in red foxes and raccoons in the U.S. (Rupprecht et al. 1989, Rupprecht et al. 1992c).

The primary concern with attenuated or "live" virus vaccines (e.g., SAD and ERA) is that they can sometimes cause rabies (Flamand et al. 1993, Pastoret et al. 1992). Flamand et al. (1993) reported that one strain used widely in oral baits in Europe to vaccinate wild red foxes in the 1970s could cause rabies in rodents when injected and that the ability to cause rabies in nontarget animals by other modes (i.e., oral administration) could not be ruled out. Previously used attenuated strains are also "heat sensitive" which can limit their use in warmer seasons or climates (Pastoret et al. 1992). These types of safety concerns with attenuated rabies virus vaccines have been sufficient to prevent their approval for use in the U.S. (Rupprecht et al. 1992c).

"Inactivated" virus or "killed-virus" rabies vaccines are safer than "live" vaccines in that they cannot cause rabies. This type of vaccine was found to be less effective in causing immunity when delivered into the intestinal tract in foxes (only 30 percent effective in test animals) and took two doses to cause immunity in the foxes that were successfully immunized (Lawson et al. 1989). Also, the amounts of virus particles that would have to be ingested in oral baits by wild carnivores to effectively vaccinate them would be 100 to 1000 times the amount of the live-attenuated virus particles required (Rupprecht et al. 1992c). To manufacture vaccines with these amounts would likely be cost-prohibitive (Rupprecht et al. 1992c).

Research is underway to identify a vaccine that is safe and effective not only in raccoons and foxes, but other carnivores as well such as skunks and dogs. Live modified canine adenovirus type 2 (CAV2), which is already used worldwide for the routine vaccination of dogs against both CAV1 and CAV2 and has an excellent safety record (Fisher et al. 2002, Appel et al. 1975), represents an almost ideal vaccine vector for immunization of carnivores against rabies (Li et al. 2006). In 2006, external research was conducted at Thomas Jefferson University in Philadelphia, Pennsylvania on the development of new, safe, and effective oral rabies vaccines. Because CAV2 is licensed for use as a live vaccine for dogs and has an excellent safety record, it was used as an expression vector for the rabies virus (RV) glycoprotein (G). This research

indicated that the resulting CAV2 RVG vaccine is expected to have a potency comparable to that of the V-RG vaccine (Li et al. 2006) and could, pending further research, provide a vaccine alternative suitable for use in feral dogs and other wildlife.

Currently, RABORAL V-RG® is the only vaccine licensed for use in raccoons or approved for experimental use in wild gray foxes and coyotes in the U.S. (CDC 2000). For all of the above reasons, this alternative was not considered further.

3.3 SOPs TO MINIMIZE POTENTIAL IMPACTS OF THE RABIES ORV PROGRAMS

An SOP is any aspect of an action that serves to prevent, reduce, or compensate for negative impacts that otherwise might result from that action. The current ORV program uses many such SOPs which would be incorporated in to programs initiated in Arizona and New Mexico or other States where the ORV program expands. Many WS SOPs are discussed in depth in USDA (1997, Chapt. 5). The key SOPs are incorporated into all alternatives as applicable, except the no federal program alternative (Alternative 2). Most SOPs are instituted to abate specific issues while some are more general and relate to the overall program. SOPs include those recommended or required by regulatory agencies such as EPA and these are listed where appropriate. Additionally, specific measures to protect resources such as T&E species that are managed by other agencies (USFWS and State Departments of Wildlife) are included in the lists below.

- Public information, education, and media announcements would be made available to inform the public about ORV bait distribution activities in each county before they occur. APHIS-WS would coordinate with the appropriate state agency involved in the ORV program on preparing leaflets, posters, press releases, or other media to distribute to the public. Leaflets and posters would be posted in schools, hospitals, campgrounds, visitor centers, and state and county public agency offices. Notification of ORV bait drops would be sent to the state police, state emergency management associations, county hazardous materials coordinators, county cooperative extension agents, state and federal correctional facilities, wildlife rehabilitators, and medical and veterinary facilities within the ORV area informing them of the program and providing information about the ORV bait and vaccine and potential exposure issues.

- Dog food baits for gray fox rabies control are now prepared from poultry-based dog food as concerns were raised regarding the possibility of beef-based dog food containing bovine spongiform encephalopathy (BSE, also known as mad cow disease). To address these concerns, the change to poultry-based products was made on a voluntary basis by MERIAL, Inc. (J. Maki, MERIAL, pers. comm. 2003 as cited in USDA 2004a).

- Toll-free telephone numbers would be advertised in the media and on web sites for people to call for answers to questions.

- In the unlikely event that an adverse vaccinia virus exposure in humans occurs (see recent example described in Section 4.1.1.2), the CDC can make vaccinia immune globulin available to a state on a case-by-case basis to provide a level of additional assurance that such a reaction would be successfully treated.

- Bait distribution navigators would be trained to avoid dropping baits on people or structures. During aerial bait drop operations, the bait dispensing equipment is temporarily turned off over human dwellings, cities, towns, greenhouses, certain sensitive domestic animal pens, and when people are observed below.

- APHIS-WS personnel would adhere to air safety standards.

- ORV baits would not be distributed by aircraft within 0.25 miles of water bodies to reduce the potential of baits entering the water source.

- APHIS-WS personnel would be trained in hand distribution of baits to avoid properties with greater risk of human or pet encounters with baits.

- The appropriate government authorities/officials would be notified prior to distributing ORV baits along the U.S.-Mexico border.

- The appropriate federal land management agency would be notified prior to distributing ORV baits on federal lands.

- Labels would be placed on each ORV bait instructing persons not to disturb or handle them. Labels would contain a toll-free telephone number to call for further information and guidance in the event of accidental exposure to the vaccine (see Figure 1-2 in Chapter 1).

- Methods used to capture raccoons would mainly involve the use of cage traps; however, other methods such as shooting, leg hold traps, and snares may be used in some programs. Animals caught in cage traps that are killed for monitoring and testing, purposes, local depopulation, or per cooperating landowner's request would be euthanized in accordance with APHIS-WS policy in a manner as a humane as allowable under the circumstances.

- Capture devices would be checked on a daily basis.

- Field personnel involved in trapping and handling animals for monitoring and surveillance purposes would be immunized against rabies and tetanus.

- All drugs designated for capturing and handling raccoons and other animals would be used under the direction of state or federal veterinary authorities, either directly or through procedures agreed upon between those authorities and APHIS-WS.

- Monitoring and surveillance activities may extend into the hunting season during late summer/fall ORV baiting schedules. Therefore, target species would either be ear tagged, marked in some other way, or euthanized if capture and handling activities that utilize immobilizing drugs are used within 30 days of hunting or trapping seasons. These measures would be taken to avoid release of animals that may be consumed by hunters prior to the end of established withdrawal periods for the particular drugs used. Most animals administered immobilizing drugs, however, would be released well before state controlled hunting/trapping seasons which would give the drug time to completely metabolize out of the animals' systems before they might be taken and consumed by humans.

- Aerial baiting would not be conducted on any designated Wilderness Areas of National Forest System or BLM lands. APHIS-WS flight transects would be drawn around Wilderness Areas during preparation for baiting campaigns. If this is not possible, aircraft pilots would increase their altitude to 609.6 m (2000 ft) over Wilderness Areas.

3.3.1 Monitoring

APHIS-WS, in coordination with the appropriate agencies, would monitor any program that results from this EA. The impacts discussed in this EA would be monitored and used in two ways:

1) APHIS-WS would determine if any additional information that arises subsequent to a NEPA decision from this EA would trigger the need for additional NEPA compliance. APHIS-WS would review program results and related NEPA documents annually, or as needed, to ensure that the need for action, issues identified, alternatives, regulatory framework, and environmental consequences are consistent with those identified in the final NEPA documents.

2) APHIS-WS would monitor impacts on target and nontarget wildlife populations through its Management Information System (MIS) database. The MIS information would be used to assess the

localized and cumulative impacts of the program on wildlife populations. APHIS-WS provides detailed information on animals removed to the involved state agencies to assist those agencies with managing species and resources under their jurisdiction.

4.0 CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

This chapter analyzes potential environmental consequences using Alternative 1 (the current action) as the baseline for comparison with the other alternatives to determine if the real or potential impacts are greater, lesser or the same. Table 4-6 at the end of this chapter summarizes a comparison of the issues and impacts to each alternative.

The following resource values within the state are not expected to be negatively impacted by any of the alternatives analyzed: soils, geology, minerals, floodplains, wetlands, visual resources, air quality, aquatic resources and range. These resources will not be analyzed further.

Other than minor uses of fuels for motor vehicles and other materials, there are no irreversible or irretrievable commitments of resources. The contribution of the proposed action to the emission of gases that potentially contribute to global warming will be similar to the other alternatives and is expected to be minimal. Thus, these will not be analyzed further.

The proposed action does not involve construction, major ground disturbance, or habitat modification. Therefore the following resource values are not expected to be affected by the proposed action: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, vegetation, timber, and range. These resources will not be analyzed further.

4.1 ENVIRONMENTAL CONSEQUENSES FOR ISSUES ANALYZED IN DETAIL

4.1.1 Potential for Adverse Effects on Target Wildlife

4.1.1.1 Alternative 1: Current Action (the No Action Alternative)

Effects of the ORV V-RG Vaccine on Raccoons, Gray Foxes, and Coyotes

The primary concern here is whether the V-RG virus might cause disease in target animals that consume the ORV baits. Large numbers of raccoons have been inoculated with or have consumed baits containing the vaccine without ill effects, with most being successfully immunized against rabies (USDA 1991, p. 25; Rupprecht et al.1986) without showing adverse effects. Tests showed that the V-RG virus did not invade the CNS or the cerebrospinal fluid of treated raccoons which indicated no adverse effects on the CNS are likely (USDA 1991, p. 25; Hanlon et al. 1989b). Other tests showed that the V-RG vaccine did not cause any lesions or viremia (i.e., presence of the virus in the blood) in tissues sampled from treated raccoons (Rupprecht et al. 1988). These studies, in addition to the absence of reports of adverse effects in free-ranging wildlife in ORV program areas, have demonstrated the safety and effectiveness of the V-RG vaccine in raccoons. ORV baits containing the V-RG vaccine would thus have no adverse impact on raccoon populations.

Artois et al. (1990) evaluated the safety of V-RG oral vaccine in coyotes and found no evidence of vaccinia virus infections or other complications. Rupprecht et al. (1992a) reported no adverse effects in gray foxes tested. Also, extensive experimental field testing of V-RG vaccine with subsequent collections and necropsies of gray foxes and coyotes for monitoring purposes in Texas have not produced any observed pathological signs of disease or other adverse effects on this species (E. Oertli, TX Dept. of Health, pers. comm. 2001 as cited in USDA 2001a). Extensive laboratory and field testing of V-RG vaccine in many nontarget species, including other closely related members of the canid (dog) family (Rupprecht et al. 1992a), indicates virtually no risk of oral baits containing V-RG adversely affecting gray fox or coyote populations.

To fulfill requirements for the USDA when using an experimental product, the TDSHS recently prepared the 2006 Texas Gray Fox after Action Report (TDSHS 2007). The report summarized ORV efficacy and safety following its use in the gray fox rabies control program. The TDSHS concluded that of the 2,030,500 dog food based ORV baits distributed in west-central Texas in 2006, none of the 194 target

species captured within the vaccination zones demonstrated lesions attributable to the vaccine. In addition, of the 146 gray foxes collected by the TDSHS, 74 (51%) contained levels of neutralizing rabies antibodies. Rabies surveillance data (n = 728 submissions) collected from counties outside the vaccination zone have not detected any animals infected with the gray fox strain of rabies. Therefore, as part of a rabies control program, this vaccine has prevented the further spread of the gray fox strain of rabies into uninfected parts of Texas. The report concluded that RABORAL V-RG® is a safe and efficacious vaccine for use in gray foxes and supports the continued use of ORV by the TDSHS to control rabies in gray foxes. The report will be submitted to the USDA towards full licensure of ORV for use in gray foxes.

Research is underway to identify a vaccine that is safe and effective not only in raccoons and foxes, but also in other carnivores as well such as skunks and dogs. Live modified canine adenovirus type 2 (CAV2), which is already used worldwide for the routine vaccination of dogs against both CAV1 and CAV2 and has an excellent safety record (Fisher et al. 2002, Appel et al. 1975), represents an almost ideal vaccine vector for immunization of carnivores against rabies (Li et al. 2006). The use of different vaccines is anticipated to have similar effects on targets as RABORAL V-RG®. Research tests such as Rupprecht et al. (1992) will be conducted to determine potential side-effects of the new vaccine to confirm the effects on target species. Any environmental effects of the new vaccines on raccoons, gray foxes, or coyotes not analyzed in this EA will be appropriately evaluated in further environmental documentation.

Effects of Monitoring and Surveillance on Raccoon Populations in Eastern States

The estimated cumulative size (over all involved states) of the proposed raccoon rabies ORV barrier zones to be treated with ORV baits purchased with USDA funds annually would be about 102,650 km^2 (or about 39,623 mi^2) (Kemere et al. 2001). Raccoon densities range from 0.9 to as high as 250 per km^2 (about 2 to 650 per mi^2) with most reported densities ranging from 4 to 30 per km^2. (about 10 to 80 per mi^2.) in rural areas (Riley et al. 1998). Assuming that this range of raccoon densities occurs in the treatment area, it is reasonable to assume that the raccoon population for the entire area would be between 400,000 and 3.1 million.

Raccoon populations can generally be expected to withstand harvest rates of about 49 percent or more annually (Sanderson 1987, USDA 1997j). APHIS-WS and cooperating state or local agencies expect to continue to live-trap or lethally remove less than one percent of the lowest estimated number of raccoons in all states combined for monitoring and surveillance purposes or implementation of localized contingency plans involving lethal population reduction. The 2006 Monitoring Report (USDA 2008b) for the APHIS-WS EA – Oral Vaccination to Control Specific Rabies Virus Variants in Raccoons, Gray Foxes, and Coyotes in the U.S. (2004a) indicates the lowest estimated size of the raccoon population totaled from those states participating in the ORV program is 2,225,031 raccoons. The APHIS-WS program killed 676 raccoons for enhanced rabies surveillance as a part of cooperative ORV efforts or 0.03 percent of the total lowest estimated population in 2006. The report summarizes that the ORV program continues to have no adverse impacts to raccoon densities and that, in the absence of the ORV program, it is highly likely that far more raccoons would die from rabies than are killed for surveillance and monitoring purposes to critically evaluate the integrity of ORV campaigns. In comparison, during 2005-2006, sportsmen in Pennsylvania and Ohio harvested 106,082 and 46,886 raccoons respectively (or 11.4% and 5.5% of the total raccoon populations in those states) (ODNR 2009, PGC 2009a, USDA 2008b).

The majority of raccoons captured for monitoring or surveillance purposes would be released at their site of live capture once they have fully recovered from anesthesia. Individual raccoons may be lethally removed and tested for rabies if they were demonstrating strange behavior symptomatic of the rabies virus or were injured. An exception may be when the animals were captured and drugged for handling purposes close to or during hunting/trapping seasons, at which times they may be euthanized to avoid concerns about hunters or trappers consuming raccoons that contain drug residues (see Section 2.2.1). Contingency actions would be considered that could result in lethal raccoon population suppression in small areas to attempt to contain an outbreak that could occur beyond an existing ORV zone. Given that hunter and trapper harvest and other sources of mortality would occur, there are no anticipated significant cumulative impacts to raccoon populations even if contingency actions would be infrequently conducted in small areas of the states involved in ORV programs.

The RABORAL V-RG® vaccine exhibits significant effectiveness in producing rabies VNA in target species. In all states conducting ORV bait distribution, APHIS-WS conducts post-ORV monitoring to evaluate program efficacy by collecting blood and tooth samples for determining rabies VNA levels and bait uptake (when appropriate) in raccoons, coyotes, and gray foxes. Serum samples are collected from unique (previously uncaptured and unsampled) raccoons captured. Table 4-1 displays the serology results for post-ORV raccoon monitoring and surveillance activities from 2002-2006. Positive rabies VNA results of ≥0.05IU indicate that the animal sampled displayed sufficient antibody results and were effectively vaccinated.

Table 4-1. Number of Post-ORV Raccoon Serum Samples Collected and Results.

	Post ORV Serum Samples					Positive Rabies Antibody Response (≥0.05IU)				
Year	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
AL	n/a	126	255	398	387	n/a	41(32.5%)	44(17.3%)	91(22.9%)	105(27.1%)
FL	n/a	201	83	548	271	n/a	16(8.0%)	4(4.8%)	96(17.5%)	32(11.8%)
GA	n/a	116	130	134	123	n/a	35(30.2%)	33(25.4%)	28(22.6%)	24(23.5%)
ME	n/a	117	128	85	94	n/a	28(23.9%)	67(52.3%)	55(69.6%)	44(48.9%)
MD	145	133	139	210	176	51(35.2%)	38(28.3%)	33(23.7%)	41(19.5%)	56(31.8%)
MA	94	40	478	24	29	n/a	15(37.5%)	80(16.7%)	5(14.7%)	11(37.9%)
NH	5	n/a	7	7	11	0(0%)	n/a	2(28.6%)	2(28.6%)	5(45.5%)
NJ	n/a	n/a	25	n/a	n/a	n/a	n/a	8(32.0%)	n/a	n/a
NY	256	313	295	101	198	66(25.8%)	92(29.4%)	83(28.1%)	28(27.7%)	43(21.7%)
NC	n/a	n/a	n/a	133	121	n/a	n/a	n/a	9(6.8%)	16(13.2%)
OH	118	143	191	838	453	11(9.3%)	43(30.1%)	14(7.3%)	88(10.5%0	163(36.0%)
PA	306	338	739	677	69	42(13.7%)	91(27.0%)	113(15.4%)	25(3.7%)	11(15.9%)
TN	74	217	437	488	267	8(10.8%)	34(22.2%)	129(29.5%)	111(22.7%)	94(35.2%)
VT	311	309	327	239	189	45(14.5%)	69(22.3%)	63(19.3%)	38(15.9%)	39(20.6%)
VA	71	110	129	194	238	17(23.9%)	38(34.5%)	48(37.2%)	63(32.5%)	135(56.7%)
WV	70	189	316	327	262	23(32.9%)	61(32.3%)	83(26.3%)	69(21.1%)	100(38.2%)

Effects of Monitoring/Surveillance on Gray Fox Populations in Texas

The APHIS-WS program in Texas has analyzed the impacts of program activities on gray fox populations including activities that involve assistance with rabies monitoring and surveillance in several previous EAs. Those EAs covered such activities in the area of the state affected by the ORV program as well as the entire state, and include analysis of the effects of all lethal removal of gray foxes by APHIS-WS. The analyses in, and subsequent monitoring reviews of, the EAs showed that APHIS-WS total gray fox take combined with other known take (e.g., annual trapper and hunter harvest), has been far below any level that would begin to adversely impact overall populations of gray fox (USDA 1996, 1997a, 1997b, 1997c, 1997d, 1997e, 1997f, 1997g, 1997h,1997i). Thus, the cumulative impact on gray fox populations in Texas would be insignificant.

These EA monitoring reports state that gray fox populations can generally be expected to withstand annual harvest rates of about 25 percent or more (USDA 2007b). The 2006 Monitoring Report (USDA 2008b) for the APHIS-WS EA – Oral Vaccination to Control Specific Rabies Virus Variants in Raccoons, Gray Foxes, and Coyotes in the U.S. (2004a) indicates the number of gray foxes removed in Texas by the APHIS-WS ORV program alone equated to 0.02% of the estimated population. In 2006, lethal removal (private harvest rates combined with APHIS-WS damage management activities) totaled 1.2% for gray foxes in Texas, far below the sustainable harvest level (USDA 2007b). Thus, the cumulative lethal removal of gray fox in Texas was far below a sustainable harvest of 25% (20 times as many gray fox could be taken and still be below a level of significance) (USDA 2008b). Therefore, the impacts associated with the ORV program alone (monitoring and surveillance, localized population reduction, annual trapper and hunter harvest, other mortality) and cumulatively to gray fox populations have been and would continue to be negligible under the proposed action.

The RABORAL V-RG® vaccine exhibits significant effectiveness in producing rabies VNA in target species. In all states conducting ORV bait distribution, APHIS-WS conducts post-ORV monitoring to evaluate program efficacy by collecting blood and tooth samples for determining rabies VNA levels and

bait uptake (when appropriate) in raccoons, coyotes, and gray foxes. Serum samples are collected from gray foxes captured. Table 4-2 displays the serology results for post-ORV gray fox monitoring and surveillance activities from 2002-2006. Positive rabies VNA results of ≥0.05IU indicate that the animal sampled displayed sufficient antibody results and were effectively vaccinated.

Table 4-2. Number of Post ORV Gray Fox Serum Samples Collected and Results.

	Post ORV Serum Samples					Positive Rabies Antibody Response (≥0.05IU)				
Year	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
Gray Fox	88	129	136	141	146	46(52.3%)	88(68.2%)	88(64.7%)	80(56.7%)	74(50.7%)

Effects of Monitoring/Surveillance on Coyote Populations in Texas

Impacts on coyote populations from APHIS-WS depredation management and rabies monitoring activities in Texas were also analyzed in prior EAs (USDA 1996, 1997a, 1997b, 1997c, 1997d, 1997e, 1997f, 1997g, 1997h, 1997i). Those EAs covered such activities in the area of the state affected by the coyote rabies ORV program and include analysis of the effects of all lethal removal of coyotes in those areas by APHIS-WS. Those analyses show that APHIS-WS' take in combination with other known harvest has been less than 15% of the estimated population in Texas [5.4% harvested by sportsman, 6% by WS] in any one year which is far below the 70% harvest level that can be sustained by coyotes (USDA 1997g, 1997i). Thus, the cumulative impact on coyote populations in Texas would be insignificant.

The 2006 Monitoring Report (USDA 2008a) for the APHIS-WS EA – Oral Vaccination to Control Specific Rabies Virus Variants in Raccoons, Gray Foxes, and Coyotes in the U.S. (2004a) indicates the number of coyotes removed in Texas by the APHIS-WS ORV program alone equates to 0.05 % of the estimated population. In 2006, lethal removal (private harvest rates combined with APHIS-WS damage management activities) totaled 9.8 percent for coyotes, far below the sustainable harvest level (USDA 2007b). Combining APHIS-WS lethal removal during the ORV program with the aforementioned take, cumulative lethal removal equates to 12.7 percent for the coyote population (USDA 2008a). Therefore, cumulative impacts (monitoring and surveillance, localized population reduction, annual trapper and hunter harvest, other mortality) to coyote populations have been and are expected to continue to be negligible.

The RABORAL V-RG® vaccine exhibits significant effectiveness in producing rabies VNA in target species. In all states conducting ORV bait distribution, APHIS-WS conducts post-ORV monitoring to evaluate program efficacy by collecting blood and tooth samples for determining rabies VNA levels and bait uptake (when appropriate) in raccoons, coyotes, and gray foxes. Serum samples are collected from coyotes captured. Table 4-3 displays the serology results for post-ORV coyote monitoring and surveillance activities from 2002-2006. Positive rabies VNA results of ≥0.05IU indicate the number of animals sampled that displayed sufficient antibody results to effectively vaccinate them.

Table 4-3. Number of Post ORV Coyote Serum Samples Collected and Results.

	Post ORV Serum Samples					Positive Rabies Antibody Response (≥0.05IU)				
Year	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
Coyote	124	30	100	115	145	68(54.8%)	25(83.3%)	50(50.0%)	29(25.2%)	95(33.8%)

Effects on other species not targets for purposes of ORV, but which may be considered targets for monitoring and surveillance, contingency actions, or limited wildlife damage management

Although the ORV program specifically targets raccoons, gray foxes, and coyotes, several other species may be treated as targets for rabies monitoring and surveillance, contingency actions, rabies testing in cases of human exposure, or for limited wildlife damage management purposes. These species will be referred to as non-ORV targets for purposes of this EA. The methods proposed for use in raccoon rabies monitoring and surveillance areas or in implementing localized population reduction under state contingency actions would have no significant adverse effects on non-ORV target species. Species which are considered targets for monitoring and surveillance, but might not be targets for specific ORV programs will include all known rabies reservoir species including raccoons, grey foxes, red foxes, coyotes, striped skunks, hooded skunks, spotted skunks, hog-nosed skunks, bobcats, ringtails, feral dogs, and feral cats. Occasionally samples are collected for serology from some mammal species which are incidentally captured during ORV

monitoring and surveillance activities, but not specifically targeted by the ORV program. They are opportunistically sampled to determine the potential effectiveness of RABORAL V-RG® as many of these species have a propensity for contracting, harboring, and spreading the rabies virus (Table 4-4). Non-ORV target animals captured in cage traps would normally be released unharmed unless lethal removal was requested by the cooperating landowner or if the animal appeared injured or sick. Therefore, monitoring and surveillance should have no effect on other target species populations. Species which have the potential to be targets on highly limited basis for wildlife damage management (WDM) include woodchucks, opossums, striped skunks, raccoons, gray squirrels, red squirrels, Norway rats, black rats, and armadillos. APHIS-WS has considered the effects of WDM on these species in several previous EAs which may be found at: http://www.aphis.usda.gov/wildlife_damage/nepa.shtml.

Table 4-4. Number of Non-ORV Target Serum Samples Collected and Results.

	Post ORV Serum Samples					Positive Rabies Antibody Response (≥0.05IU)				
Year	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
Coyote	23	52	42	26	19	8(34.8%)	31(59.6%)	9(21.4%)	6(23.1%)	4(21.1%)
Raccoon	8	17		10	9	4(50.0%)	7(41.2%)		2(20.0%)	1(11.2%)
Skunk	11	75	35	17	60	6(54.5%)	16(21.3%)	3(2.9%)	1(5.9%)	10(16.7%)
Red fox				1	1				0(0.0%)	0(0.0%)
Grey fox				1	2				1(100.0%)	2(100.0%)
Bobcat		2			8		1(50.0%)			1(12.5%)
Mountain lion			1					0(0.0%)		
Ringtail		1					0(0.0%)			

Non-ORV target wildlife species have been incidentally captured during ORV monitoring and surveillance efforts. A total of 3,847 non-ORV target animals were captured between 2006 and 2007 (Table4-5). Most non-ORV target species were captured in cage traps and released unharmed (3,297 or 86%). Some non-ORV target animals were euthanized (550 or14%) for rabies diagnostic testing, if they were injured, if they were demonstrating strange behavior symptomatic of the rabies virus, or for wildlife damage management in conjunction with rabies surveillance (these were animals targeted for reasons other than ORV surveillance and monitoring). The non-ORV targets that were euthanized were not considered to be from low density populations and removal was not expected to have any cumulative adverse effects on the populations in the area. The most common non-ORV target species taken (Table 4-5) was the Virginia opossum, accounting for 67% of the nonlethal take and 19% of the lethal take. Virginia opossums are abundant throughout much of the area where ORV baiting occurs and this take represents only a minor percent of their population. To compare to other mortality, sportsman harvest in Pennsylvania alone annually averaged over 44,000 opossums in the 2005-06 to 2007-08 seasons (PGC 2009a) illustrating the minimal take by WS. The second most frequently taken nontarget species were striped skunks accounting for 13% of the nonlethal and 58% of the lethal take. This species is abundant throughout the analysis area and would be expected to be commonly taken. For comparison, sportsmen in Pennsylvania took an average of 10,000 from 2005-06 to 20007-08 hunting seasons (PGC 2009a), again illustrating the minimal take by WS. The next most common nontarget species taken were woodchucks, accounting for 5% of the nonlethal take and 14% of the lethal take by WS (Table 4-5). Sportsman harvest woodchucks is usually higher; for example, in Pennsylvania alone, take was annually estimated at about 900,000 from 2005-2007 (PGC 2009b). As illustrated, WS has little effect on the woodchuck population. Finally, feral cats accounted for 14% of the nonlethal take and 5% of the lethal take. Some were feral cats running at large and returned to owners. Feral cats which exhibited unusual behavior associated with the rabies virus were humanely euthanized for rabies testing. These 4 species accounted for 99% of the nonlethal take and 96% of the lethal take with another 9 species taken accounting for the remaining 6% of the take.

Table 4-5. Non-ORV Target Species Taken by WS for the ORV Program 2006-2007.

Year	2006			2006		
Species	**Freed**	**Killed**	**Intent**	**Freed**	**Killed**	**Intent**
Striped skunk	301	-		134	-	
	-	1	Human exposure	-	1	Human exposure
	-	19	Surveillance	-	21	Surveillance
	-	70	Nuisance	-	201	Nuisance
	-	7	Found dead/died under care	-	-	
Hooded skunk	-	2	Human exposure	-	-	
Spotted skunk	-	1	Surveillance	-	-	
Red fox	-	-		23	-	
	-	-			1	Human exposure
	-	-			2	Surveillance
Feral cat	153	-		297	-	
	-	8	Human exposure	-	4	Human exposure
	-	5	Surveillance	-	4	Surveillance
	-	5	Nuisance	-	2	Nuisance
Feral dog	8	-		5	-	
	-	1	Human exposure	-	-	
Ringtail		1	Human exposure		-	
Woodchuck	81	-		74	-	
	-	2	Surveillance	-	3	Surveillance
	-	36	Nuisance	-	34	Nuisance
Virginia opossum	1,035	-		1,186	-	
	-	1	Surveillance	-	2	Surveillance
	-	32	Nuisance	-	67	Nuisance
Bobcat	-	8	Surveillance	-	4	Surveillance
	-	-		-	1	Nuisance
Ringtail	-	1	Human exposure	-	-	
	-	-		-	1	Surveillance
Snowshoe hare	-	-		-	1	Nuisance
Snake spp.	-	-		-	1	Nuisance
Total	**1,578**	**200**		**1,719**	**350**	

Research is underway to identify a vaccine that is safe and effective for other carnivores such as skunks and dogs as well as for raccoons and foxes. Live modified canine adenovirus type 2 (CAV2), which is already used worldwide for the routine vaccination of dogs against both CAV1 and CAV2 and has an excellent safety record (Fisher et al. 2002, Appel et al. 1975), represents an almost ideal vaccine vector for immunization of carnivores against rabies (Li et al. 2006). It should be noted that the ORV program could expand target species if new vaccines are manufactured that enable bait use for additional species such as skunks. Skunks are a primary reservoir of the rabies virus variants in several states. And it would be advantageous to vaccinate this species and others to promote the effectiveness of the rabies management program. The use of different vaccines is anticipated to have similar effects on other targets as RABORAL V-RG®. Research tests such as Rupprecht et al. (1992) will be conducted to determine potential side-effects of the new vaccine to confirm the effects to other target species. Any environmental effects of the new vaccines on other target species not analyzed in this EA will be appropriately evaluated in further environmental documentation.

4.1.1.2 Alternative 2: Proposed Action (the Preferred Alternative)

Effects of the ORV V-RG Vaccine on Raccoons, Gray Foxes, and Coyotes

As with Alternative 1, no adverse effects would be expected with Alternative 2. Contingency Action 2 (treatment with increased bait density to ensure sufficient baits for high density of target species or to bolster antibody response under "normal" target species densities) and Contingency Action 3 (increase baiting frequency more than once/year) utilize ORV. Current/historical ORV programs and research conducted on the V-RG vaccine have demonstrated its safety and effectiveness in target populations. The V-RG vaccine is currently licensed by the USDA for raccoons and coyotes and is approved for experimental use in gray foxes. New vaccines may be considered for future use by the APHIS-WS ORV program and any environmental effects of the new vaccines on raccoons, gray foxes, or coyotes not analyzed in this EA will be appropriately evaluated in further environmental documentation.

Effects of Monitoring and Surveillance or Contingency Actions on Raccoon Populations in Eastern States

As with the effects of monitoring and surveillance described above, the five Contingency Actions are also expected to have negligible adverse risks or impacts to raccoon populations. Contingency Action 2 (treatment with increased bait density to ensure sufficient baits for high density of target species or to bolster antibody response under "normal" target species densities) and Contingency Action 3 (increased baiting frequency more than once/year) use ORV and the ORV programs conducted thus far and research conducted on the V-RG vaccine have demonstrated its safety and effectiveness in target populations. The V-RG vaccine is currently licensed by the USDA for raccoons and coyotes and is approved for experimental use in gray foxes.

Contingency Action 1 (enhanced surveillance, which may include capture and release or euthanasia of target and specific nontarget species for rabies testing) and Contingency Action 5 (localized target species population reduction) involve the possible removal of raccoons. As discussed above, APHIS-WS and cooperating state and local agencies expect to lethally remove less than 1% of the lowest estimated number of raccoons in all states combined. To date, lethal removal has accounted for less than 0.006% - 0.12% of the lowest estimated raccoon population annually (USDA 2008b, 2007a, 2005, 2004c, 2004d, 2003b). The APHIS-WS rabies management program's lethal removal of far less than 1% of raccoons did not reduce statewide or regional densities of raccoons. As a result of the review of possible impacts to raccoons, the potential for cumulative impacts continues to be negligible. Therefore, the rabies management program continues to have no adverse impacts to raccoon densities. In the absence of the ORV program, it is highly likely that substantially greater numbers of raccoons would succumb to the invariably fatal rabies virus than are removed during contingency actions or other rabies management activities. These activities are integral to preserving the integrity of the ORV program, preventing rabies spread among raccoons to areas not infected with this fatal virus, and for monitoring effectiveness.

Contingency Action 4 (TVR) involves the use of a parenteral (injectable) vaccine, such as IMRAB®3, which can be used "off label" under the direction of veterinarians to vaccinate healthy wildlife. After being vaccinated against the rabies virus, healthy target species would be released at the site of capture. Therefore, injectable vaccine use would have no adverse effects on raccoons. Beneficial impacts include bolstering target species population immunity and preventing further rabies spread. Sick or injured target animals would likely be euthanized for rabies testing. Impacts of euthanasia and lethal removal on target species were discussed in the above paragraph.

Effects of Monitoring/Surveillance or Contingency Actions on Gray Fox Populations in Arizona, New Mexico, and Texas

The APHIS-WS programs in Arizona, New Mexico, and Texas have analyzed the impacts of program activities on gray fox populations including activities that involve assistance with rabies monitoring and surveillance in several previous EAs. Those EAs covered such activities in the area of the state affected by

the ORV program as well as the entire state, and include analysis of the effects of all lethal removal of gray foxes by APHIS-WS. The analyses in, and subsequent monitoring reviews of, the EAs showed that APHIS-WS total gray fox take combined with other known take (e.g., annual trapper and hunter harvest), has been far below any level that would begin to adversely impact overall populations of gray fox (USDA 1996, 1997a, 1997b, 1997c, 1997d, 1997e, 1997f, 1997g, 1997h,1997i, 1999, 2006b). In fact, gray fox populations can generally be expected to withstand annual harvest rates of about 25% or more (USDA 2007b). In 2007, cumulative take of gray fox (private harvest rates combined with APHIS-WS management actions including the ORV program) in Texas totaled 1.2% with the number of gray fox specifically taken by the APHIS-WS ORV program equating to 0.02% of the population (USDA 2009c). Thus, the cumulative impact on gray fox populations in Arizona, New Mexico, and Texas would be insignificant.

Contingency Action 1 -5 are also expected to have negligible adverse risk to the gray fox population. Contingency Action 2 (treatment with increased bait density to ensure sufficient baits for high density of target species or to bolster antibody response under "normal" target species densities) and Contingency Action 3 (increased baiting frequency more than once/year) utilize ORV. Current/historical ORV programs and research conducted on the V-RG vaccine have demonstrated its safety and effectiveness in target populations. The V-RG vaccine is currently licensed by the USDA for raccoons and coyotes and is approved for experimental use in gray foxes.

Contingency Action 1 (enhanced surveillance, which may include capture and release or euthanasia of target and specific nontarget species for rabies testing) and Contingency Action 5 (localized target species population reduction) involve the possible removal of gray foxes. As discussed above, gray fox populations can generally be expected to withstand harvest rates of about 25% or more annually (USDA 2007b). The ORV program in Arizona, New Mexico, and Texas targets coyote and gray fox variants of the rabies virus. The number of gray foxes removed annually by the APHIS-WS ORV program equates to an average of 0.03% of their estimated population (USDA 2009c, 2008b, 2007a, 2005, 2004c, 2004d, 2003b). The APHIS-WS rabies management program's lethal removal of less than 1% of gray foxes did not reduce the statewide densities of gray foxes and, if contingency actions are utilized, lethal removal is not expected to result in an appreciable increase in to number of gray fox taken by the rabies program. As a result of the review of the impacts to the gray fox population by the rabies program, APHIS-WS has determined that the potential for adverse cumulative impacts continues to be negligible. Therefore, the rabies management program continues to have no adverse impacts to gray fox densities.

Contingency Action 4 (TVR) involves the use of a parenteral (injectable) vaccine, such as IMRAB®3, which can be used "off label" under the direction of veterinarians to vaccinate healthy wildlife. After being vaccinated against the rabies virus, healthy target species would be released at the site of capture. Therefore, injectable vaccine use would have no adverse effects on raccoons. Beneficial impacts include bolstering target species population immunity and preventing further rabies spread. Sick or injured target animals would likely be euthanized for rabies testing. Impacts of euthanasia and lethal removal on target species were discussed in this section under Contingency Action 1.

Effects of Monitoring/Surveillance or Contingency Actions on Coyote Populations in Arizona, New Mexico, and Texas

Impacts on coyote populations from APHIS-WS depredation management and rabies monitoring activities in Arizona, New Mexico, and south Texas were also analyzed in prior EAs (USDA 1996, 1997a, 1997b, 1997c, 1997d, 1997e, 1997f, 1997g, 1997h, 1997i, 1999, 2006). Those EAs covered such activities in the area of the state affected by the coyote rabies ORV program and include analysis of the effects of all lethal removal of coyotes in those areas by APHIS-WS. Those analyses show that APHIS-WS' take in combination with other known harvest has been less than 15% of the estimated population in Texas [5.4% harvested by sportsman, 6% by WS] and less than 35% in Arizona [30% harvested by sportsman, 1% or less by WS] in any one year which is far below the 70% harvest level that can be sustained by coyotes (USDA 1997g, 1997i). Thus, the cumulative impact on coyote populations in south Texas, Arizona, and New Mexico would be insignificant.

Contingency Action 1 -5 are also expected to have negligible adverse risk to the coyote population. Contingency Action 2 (treatment with increased bait density to ensure sufficient baits for high density of target species or to bolster antibody response under "normal" target species densities) and Contingency Action 3 (increased baiting frequency more than once/year) utilize ORV. Current/historical ORV programs and research conducted on the V-RG vaccine have demonstrated its safety and effectiveness in target populations. The V-RG vaccine is currently licensed by the USDA for raccoons and coyotes and is approved for experimental use in gray foxes.

Contingency Action 1 (enhanced surveillance, which may include capture and release or euthanasia of target and specific nontarget species for rabies testing) and Contingency Action 5 (localized target species population reduction) involve the possible removal of coyotes. As discussed above, coyote populations can generally be expected to withstand harvest rates idefinitely of up to 60% or more annually (USDA 2007b). The ORV program in Arizona, New Mexico, and Texas targets coyote and gray fox variants of the rabies virus. The number of coyotes removed annually in Texas by the APHIS-WS ORV program equates to an average of 0.13% of their estimated population (USDA 2008b, 2007a, 2005, 2004c, 2004d, 2003b). The APHIS-WS rabies management program's lethal removal of less than 1% of coyotes did not reduce the statewide densities of coyotes. Based on this data, the potential for adverse cumulative impacts continues to be negligible. Therefore, the rabies management program continues to have no adverse impacts to coyote densities.

A population model (Pitt et al. 2001) assessed the impact of removing a set proportion of a coyote population during one year and then allowing the population to recover. In the model, all populations recovered within 1 year when <60% of the population was removed. Recovery occurred within 5 years when 60-90% of the population was removed. Pitt et al. (2001) also evaluated the impact of removing a set proportion of the population every year for 50 years. When the removal rate was <60% of the population, the population size was the same as for an unexploited population. These findings are consistent with an earlier model developed by Connolly and Longhurst (1975), and revisited by Connolly (1995) which indicated that coyote populations could withstand an annual removal of up to 70% of their numbers and still maintain a viable population.

Contingency Action 4 (TVR) involves the use of a parenteral (injectable) vaccine, such as IMRAB®3, which can be used "off label" under the direction of veterinarians to vaccinate healthy wildlife. After being vaccinated against the rabies virus, healthy target species would be released at the site of capture. Therefore, injectable vaccine use would have no adverse effects on raccoons. Beneficial impacts include bolstering target species population immunity and preventing further rabies spread. Sick or injured target animals would likely be euthanized for rabies testing. Impacts of euthanasia and lethal removal on target species were discussed in this section under Contingency Action 1.

Effects on other species not targets for purposes of ORV, but which may be considered targets for monitoring and surveillance, contingency actions, or limited wildlife damage management

As with Alternative 1, a similar negligible impact would be expected with Alternative 2.

4.1.1.3 Alternative 3: Live-Capture-Vaccinate-Release Alternative

Effects of the ORV V-RG Vaccine on Raccoons, Gray Foxes, and Coyotes

Under this alternative, APHIS-WS would not provide funds for ORV purchase and distribution but would assist in monitoring and surveillance programs involving the capture or lethal collection and testing of wild raccoons, gray foxes, and coyotes following live-capture-vaccinate and release activities. Under a live-capture-vaccinate-release alternative, it is expected that little or no ORV use by the states would occur. Thus, there would be little or no potential for the V-RG oral vaccine to affect these species.

Effects of Monitoring and Surveillance or Contingency Actions on Raccoon , Gray Fox, Coyote, and non-ORV Target Species

Under a live-capture-vaccinate-release alternative (Contingency Action 4), it is expected that extent of lethal removal of raccoons in eastern states and gray foxes and coyotes in Arizona, New Mexico, and Texas for monitoring/surveillance activities or localized population reduction under contingency plans to address rabies outbreaks would be similar to the proposed action. Contingency Actions 2 and 3 would not be utilized under this alternative. Thus, the impact on populations of raccoons, gray foxes, coyotes, and other target species would be similar to the proposed action and would be very low.

4.1.1.4 Alternative 4: No Animal Surveillance or Monitoring or Lethal Removal Programs Alternative

Under this alternative, the states would have to fund collection of target species for monitoring and surveillance without APHIS-WS funds or personnel assistance. This would likely mean that less monitoring would be conducted. If insufficient monitoring and surveillance occurs along the leading edge of the advancing rabies strains, rabies managers would not be able to plan the most efficient and effective use of ORV baiting strategies to control the specific strains spread by wild carnivores. One possibility is that, without adequate surveillance, managers would have to resort to distributing ORV baits across more areas than necessary. The ability to stop or prevent the forward advance of specific rabies strains would likely be reduced, perhaps to the point that cooperative efforts fail.

Effects of the ORV V-RG Vaccine on Raccoons, Gray Foxes, and Coyotes

This alternative would result in the same risk as the proposed action because although there would be no surveillance monitoring, or lethal removal, APHIS-WS would still conduct ORV programs. That risk is that adverse effects are highly unlikely. Positive effects on these species from protecting them against rabies would be similar to the proposed action. However, more animals are likely to die of rabies if the lack of federal assistance in monitoring and surveillance results in a reduction in the effectiveness of ORV programs.

Effects of Monitoring and Surveillance or Contingency Actions on Raccoon , Gray Fox, Coyote, and non-ORV Target Species

Under this alternative, APHIS-WS would not provide assistance in collecting animal specimens for monitoring purposes. The involved states could still conduct such collections; however, it is likely that fewer animals would be collected without APHIS-WS funds and assistance for that activity. Effects on raccoon, gray fox, coyote, and other target species populations would be exceedingly minor as supported by the analysis in Section 4.1.1.2.

4.1.1.5 Alternative 5: No Federal Program Alternative

It is most likely that fewer raccoons, gray foxes and coyotes in the proposed ORV zones would be vaccinated against rabies without APHIS-WS funds to contribute to ORV bait purchases and distribution. Therefore, more animals would likely die from rabies with potentially greater short-term population impacts. Such impacts would be expected to recur as raccoon, gray fox or coyote populations have strong capabilities to recover (Connolly and Longhurst 1975, Fritzell 1987, and Sanderson 1987), which would establish new populations susceptible to rabies mortality. If the state ORV programs failed for lack of APHIS-WS assistance, rabies epizootics may be expected to occur that would likely result in short-term die-offs of target species over broader geographic areas.

Effects of the ORV V-RG Vaccine on Raccoons, Gray Foxes, and Coyotes

Under the no federal program alternative, states would still be able to employ the V-RG oral vaccine to combat raccoon rabies, and Arizona, New Mexico, and Texas would still be able to use V-RG to combat gray fox and coyote rabies. As concluded in the analysis in Section 4.1.1.1 and 4.1.1.2, baits using the V-

RG vaccine would have no adverse impact on raccoon, gray fox, or coyote populations.

Effects of Monitoring and Surveillance or Contingency Actions on Raccoon Populations in Eastern States

Under the no federal program alternative, states would still likely implement some level of monitoring, control, and, potentially, implementation of contingency actions in response to breaches in vaccination barriers that result in localized population suppression to attempt to maintain the integrity of vaccination barriers. The numbers of raccoons killed under such programs would probably be less than if APHIS-WS funds and personnel were available. Therefore, as supported by the analysis in Section 4.1.1.1 and 4.1.1.2, effects on raccoon populations would be insignificant.

Effects of Monitoring/Surveillance or Contingency Actions on Gray Fox Populations in Arizona, New Mexico, and Texas

Under the no federal program alternative, the States of Arizona, New Mexico, and Texas would likely still conduct monitoring, surveillance and local depopulation activities without APHIS-WS assistance; however, such activities would probably occur on a lesser scale. Therefore, as supported by the analysis in Section 4.1.1.1 and 4.1.1.2, effects on gray fox populations would be insignificant.

Effects of Monitoring/Surveillance or Contingency Actions on Coyote Populations in Arizona, New Mexico, and Texas

Under the no federal program alternative, the States of Arizona, New Mexico, and Texas could still conduct monitoring, surveillance and local depopulation activities even without APHIS-WS assistance, but such activities would probably occur on a lesser scale. Therefore, as supported by the analysis in Section 4.1.1.1 and 4.1.1.2, effects on coyote populations would be insignificant.

Effects on other species not targets for purposes of ORV, but which may be considered targets for monitoring and surveillance, contingency actions, or limited wildlife damage management

Under the no federal program alternative, the states could still conduct monitoring, surveillance, and local depopulation activities even without APHIS-WS assistance, but such activities would probably occur on a lesser scale. Therefore, as supported by the analysis in Section 4.1.1.1 and 4.1.1.2, effects on non-ORV target populations would be insignificant.

4.1.2 Potential for Adverse Effects on Nontarget Wildlife Species, including Threatened or Endangered Species

4.1.2.1 Alternative 1: Current Action (the No Action Alternative)

Effects of the RABORAL V-RG® Vaccine on Nontarget Wildlife including Threatened or Endangered Species

A primary concern of the vaccinia virus-rabies glycoprotein combination (i.e., RABORAL V-RG® vaccine) is that it might cause the disease in nontarget animals that consume or contact the vaccine in baits. Rupprecht et al. (1992a) and Pastoret et al. (1995) summarized the results of V-RG safety trials in nontarget species. More than 50 species from Europe and North America have been tested which included relevant taxonomic groups believed to be potentially at risk for contact with the V-RG vaccine such as:

- Natural ecological competitors of raccoons and foxes such as the opossum (*Didelphis virginianus*), several mustelids [striped skunk (*Mephitis mephitis*), European badger (*Meles meles*), mink (*Mustela vison*), North American river otter (*Lontra canadensis*), domestic ferret (*Mustela putorius)*], other members of the Canid family [coyote, red fox, gray fox, arctic fox (*Alopex lagopus*), raccoon dog (*Nyctereutes procyonoides*)], bobcat (*Lynx (Felis) rufus*), and American black bear (*Ursus americanus*).

- Domestic cats (*Felix domesticus*) and dogs (*Canis familiaris*).

- Nineteen rodent species (Order *Rodentia*) that might be expected to gnaw on or consume baits. Families within this order represented in the studies included: *Muridae* (old World rats and mice), *Erethizontidae* [North American porcupine (*Erethizon dorsatum*)], *Sciuridae (Squirrels), Cricetidae (New World rats and mice),* and *Dipodidae (jumping mice – Subfamily Zapodinae)*.

- One bat species [Daubenton's bat (*Myotis daubentoni*)].

- Eight bird species, including three species of hawks [red-tailed hawk (*Buteo jamaicensis*), Eurasian kestrel (*Falco tinnunculus*), common buzzard (*Buteo buteo*)], and one species of owl [great horned owl (*Bubo virginianus*)], crow [carrion crow (*Corvus corone*) - similar to American crow (*C. brachyrhynchos*)], gull [ring-billed gull (*Larus delawarensis*)], magpie [European magpie (*Pica pica*) – similar to the once conspecific the black-billed magpie (*P. hudsonia*)] and jay [Eurasian jay (*Garrulus glandarius*)].

- Domestic livestock [cattle (*Bos taurus*) and sheep (*Ovis ovis*)].

- Two wild ungulate species [wild boar (*Sus scrofa*) and white-tailed deer (*Odocoileus virginianus*)].

- Two primate species [squirrel monkey (*Saimiri sciureus*) and common chimpanzee (*Pan troglodytes)*].

Rupprecht et al. (1992a) reported that the V-RG vaccine did not cause any mortality or morbidity (i.e., signs or symptoms of disease), or lesions typical of pox virus infections in over 350 individual animals representing some 20 taxonomic families of animals. They concluded that the extensive laboratory safety experiments showed V-RG to be safe in all species tested. In field trials with V-RG ORV baits to treat wild raccoons in which target and nontarget species were captured and tested, no vaccine-related lesions or other adverse effects were found to occur (Rupprecht et al. 1992a). The ORV program may, instead, actually reduce the likelihood of wildlife being exposed to the rabies virus. The Texas Department of Health (2007) concluded in their "2006 Texas Gray Fox after Action Report" that none of the 48 ORV nontarget species (19 coyotes, 12 striped skunks, 9 raccoons, 8 bobcats) captured within the vaccination zones exhibited lesions attributable to the vaccine. Other ORV nontargets observed during monitoring and surveillance activities within the vaccination zone had no indication of adverse reactions to the ORV baits.

Overdosage of RABORAL V-RG® vaccine by any route or from multiple doses has not been found to occur in target and nontarget species. A number of nontarget species have been dosed with 2 to 10 times the amount of vaccine in an ORV bait without adverse effects (USDA 1991; Rupprecht et al. 1992a). Therefore, even if domestic animals or wildlife received multiple doses of vaccine by consuming multiple baits, no adverse effects would be expected to occur.

The RABORAL V-RG® vaccine will not likely adversely affect any non-warm blooded animal species. The vaccinia virus and other orthopox viruses do not replicate or reproduce themselves in non-warm blooded species (C. Rupprecht, CDC, pers. comm. 2002 as cited in USDA 2003a). Therefore, ORV is not expected to cause any adverse effects on fish, reptiles, amphibians, or any invertebrate species should any members of these groups of species consume or otherwise be exposed to the vaccine.

The consumption or contact with RABORAL V-RG® vaccine distributed in baits would have no adverse effects on any state or federally listed threatened or endangered species or their critical habitats (see Appendices C and D for species lists). Some listed species could be attracted to and consume the ORV baits, but those species will not be affected, other than possibly becoming immunized against rabies.

The use of different vaccines is anticipated to have similar effects on nontargets as RABORAL V-RG®. Research tests such as Rupprecht et al. (1992) will be conducted to determine potential side-effects of new

the new vaccine to confirm the effects to nontarget species. New vaccines may be considered for future use by the APHIS-WS ORV program and any environmental effects of the new vaccines on nontargets not analyzed in this EA will be appropriately evaluated in further environmental documentation.

Annual reporting since preparation of the first ORV-related EA in 2001 and data analyzed for program activities through 2006 (USDA 2003b, 2004c, 2004d, 2005, 2007a, 2008b) indicate that nontarget populations have not been adversely affected by APHIS-WS actions. During this time, no reports were received regarding nontarget wildlife experiencing adverse reactions to baits. Therefore, we conclude that the RABORAL V-RG® vaccine will have no effect on nontarget species, including T&E species, because the baits have been extensively tested in many groups of animals with no adverse effects. Thus, the potential for ORV baits to adversely impact wildlife will not be considered further.

Effects of Capture/Removal Methods (Used in Monitoring and Surveillance or to Reduce Local Populations of Target Species under State Contingency Plans) on Nontarget Species, including Threatened or Endangered Species

The methods proposed for use in raccoon rabies monitoring and surveillance areas or in implementing localized population reduction under state contingency actions would have no significant adverse effects on nontarget species. Nontarget animals captured in cage traps would normally be released unharmed unless the animal appeared injured or sick. Therefore, monitoring and surveillance should have no effect on nontarget species populations.

Annual reporting since preparation of the first ORV-related EA in 2001 and data analyzed for program activities through 2006 (USDA 2008b, 2007a, 2005, 2004c, 2004d, 2003b) indicate that nontarget populations have not been adversely affected by APHIS-WS actions. No reports have been received regarding nontarget wildlife experiencing adverse reactions to baits. Nontarget wildlife species have been incidentally captured during ORV monitoring and surveillance efforts. A total of 3,182 nontargets were captured between 2006 and 2007. Most species were captured in cage traps and released unharmed (3,156 nontargets were released out of the total capture of 3,182). Some nontarget animals were euthanized if they were injured or died in the trap (26 nontargets were euthanized or died in the trap out of the total capture of 3,182 between 2006 and 2007). The nontargets that were euthanized or died were not considered to be from low density populations and removal was not expected to have any cumulative adverse effects on populations in the area.

Table 4-6. Nontarget Species Taken by WS for the ORV program 2006-2007.

Year	2006		2007		Average	
Species	**Freed**	**Killed**	**Freed**	**Killed**	**Freed**	**Killed**
Virginia Opossum (*Didelphis virginiana*)	1,035	5	1,186	1	1,111	3.0
Feral Cat (*Felis catus*)	153	-	297	-	225	-
Woodchuck (*Marmota monax*)	81	-	74	1	78	0.5
Eastern Cottontail (*Sylvilagus floridanus*)	49	-	36	1	43	0.5
Norway Rat (*Rattus norvegicus*)	28	-	7	1	18	0.5
Snowshoe Hare (*Lepus americanus*)	2	-	30	-	16	-
Eastern Gray Squirrel (*Sciurus carolinensis*)	30	1	-	-	15	0.5
Fox Squirrel (*Sciurus niger*)	1	2	21	1	11	1.5
Turtle spp.	20	-	-	-	10	-
Fisher (*Martes pennanti*)	4	-	13	-	8.5	-
Red Squirrel (*Tamiasciurus hudsonicus*)	4	-	-	12	2.0	6.0
Porcupine(*Erethizon dorsatum*)	6	-	8	-	7.0	-
Feral Dog (*Canis familiaris*)	8	-	5	-	6.5	-
Muskrat (*Ondatra zibethicus*)	4	-	9	-	6.5	-
Nine-banded Armadillo (*Dasypus novemcinctus*)	7	-	2	-	4.5	-
Mink (*Mustela vison*)	-	-	7	-	3.5	-
Eastern Chipmunk (*Tamias striatus*)	1	-	2	-	1.5	-
Field Mouse spp. (*Peromyscus spp*)	-	-	3	-	1.5	-
Cotton Rat (*Sigmodon hispidus*)	1	-	2	-	1.5	-
Ruffed Grouse (*Bonasa umbellus*)	-	-	2	1	1.0	0.5
Black Bear (*Ursus amicanus*)	-	-	2	-	1.0	-
Red-winged Blackbird (*Agelaius phoeniceus*)	-	-	2	-	1.0	-

Purple Finch (*Carpodacus purpureus*)	2	-	-	-	1.0	-
House Sparrow (*Passer domesticus*)	1	-	1	-	1.0	-
American Robin (*Turdus migratorius*)	-	-	2	-	1.0	-
Beaver (*Castor canadensis*)	1	-	-	-	0.5	-
Northern Flying Squirrel (*Glaucomys sabrinus*)	-	-	1	-	0.5	-
Eastern Woodrat (*Neotoma floridana*)	1	-	-	-	0.5	-
American Bittern (*Botaurus lentiginosus*)	-	-	1	-	0.5	-
Common Grackle (*Quiscalus quiscula*)	1	-	-	-	0.5	-
Mallard (*Anas platyrhynchos*)	1	-	-	-	0.5	-
Wood Duck (*Aix sponsa*)	-	-	1	-	0.5	-
Unidentified Bird	1	-	-	-	0.5	-
Total	**1,441**	**8**	**1,715**	**18**	**1,578**	**13**

From 2001 to 2005, several additional species were taken as nontargets. Most were similar to the nontarget or target species taken in 2006 and 2007. Other than the target and nontarget species taken and listed above, additional mammals trapped between 2001 and 2005 included a mountain lion, bobcat, marten, domestic ferret, long-tailed and least weasels, spotted skunk, and ringtail, rodents including beaver and black rat, and marsh rabbit. Additional birds included feral chickens, pheasants, wild turkeys, bobwhites, Turkey Vultures, Sharp-shinned Hawks, Red-tailed Hawks, Northern Flickers, American Crows, Blue Jays, Gray Catbirds, and Wood Thrush. Finally an alligator, several species of turtles, and bullfrogs have been taken. Most of these species were taken in cage traps and released. However, this gives the variety of species that can be taken, though most are taken in cage traps and released. Many of these species are likely taken more haphazardly (entering the trap not for the bait, but because it is there) rather than as a result of being attracted to the bait.

No T&E species have been adversely affected by APHIS-WS actions during the course of the ORV program between 2001 and 2007. Although data regarding T&E species continues to be collected, due to the time needed for laboratory analysis of biological specimens collected from target species there is generally a one to two year period before the ORV program is able to report on all data in monitoring and national reports. Therefore, T&E data from 2001 through 2007 is presented in this EA. Subsequent EAs and monitoring reports will include T&E data from 2008 and 2009. Between 2001 and 2007, a total of five T&E species were incidentally captured and all five were released unharmed. In 2001, one state-endangered river otter (*Lutra canadensis*) was incidentally captured in a cage trap during Ohio ORV surveillance activities, but was released unharmed in accordance with the direction of the Ohio Division of Wildlife. River otter have since been delisted due to rapidly increasing numbers of the species throughout OHION (USDA 2007c). APHIS-WS concluded in the monitoring report (USDA 2004d) that the cumulative impact on nontarget species is negligible and that APHIS-WS has not adversely affected the viability of any wildlife species populations. One American alligator (*Alligator mississippiensis*) was incidentally captured in Florida during the 2003 ORV program and a second was captured during the 2004 ORV program; however, both were released unharmed. The American alligator was delisted in 1987 and reclassified as "threatened due to similarity of appearance (T-S/A)" [50 CFR 17.42(a)] to the endangered crocodile and is state-listed as a species of concern in Florida. The federal designation regulates commercial sale and trade of alligator skins and other products. Because the animals were released unharmed, APHIS-WS did not violate the spirit of the "similarity of appearance" designation of the Endangered Species Act. In the 2006 ORV program, two Eastern box turtles (Terrapene carolina) in Massachusetts and one gopher tortoise (Gopherus polyphemus) in Florida were captured incidentally; however, all three animals were released unharmed. The Eastern box turtle is state-listed in Massachusetts as a Species of Concern and the gopher tortoise is state-listed in Florida as a Species of Special Concern. Again, APHIS-WS stated in the monitoring reports (USDA 2004c, 2005, 2008b) that the determination of no adverse effect is still valid for the proposed action. The report concluded that the cumulative impact on nontarget species is negligible and that APHIS-WS had not adversely affected the viability of any wildlife species populations.

Some of the methods proposed for use in collecting target species in ORV areas have the potential for accidentally catching or killing nontarget animals (i.e., leghold traps or snares). Methods such as ground-based and aerial shooting would have no effect on nontarget species because they are essentially 100 percent selective for target species. APHIS-WS has analyzed the effects on nontarget species by such methods in nine previous EAs which found no significant adverse effects on populations (USDA 1997a,

1997b, 1997c, 1997d, 1997e, 1997f, 1997g, 1997h, and 1997i).

APHIS-WS reviewed lists of federal and state T& E species (Appendices C and D) and USDA-Forest Service Regional Forester Sensitive Animals (Regions 8 and 9) to determine if any species might be affected. ORV programs or the methods used in capture/removal of target species in monitoring activities or contingency plan implementation would have no effect on any listed fish, invertebrate, or plant species.

Federally Listed T&E Species (USFWS 2009):

The ORV program has the potential to capture/take T&E species. The distribution and consumption of baits is expected to have no adverse effect on any species. The distribution and consumption by mammals is more likely to have a positive effect on mammals because a successful program will reduce the risk mammals contracting and dying from rabies. Although no T&E species was specifically tested for safety of vaccinia baits, safety studies on other species including all vertebrate classes indicate that no species will be affected by the baits (Rupprecht et al. 1992a). The only exception is the sensitivity to vaccines shown by black-footed ferrets. This particular issue will be addressed under that species' description. However, surveillance and monitoring does have the potential for take. Raccoons, coyotes, and gray fox are the primary targeted species in surveillance and monitoring with other species such as skunks and woodchucks being secondarily targeted to determine the prevalence of rabies in these species and the effectiveness of the ORV Program and for TVR contingency actions. Cage traps, leghold traps, snares, and firearms are used to capture/take these species and have the potential to take T&E species. Species on the federal T&E list that could be taken under the proposed action with cage traps, leghold traps and snares are mammals, birds, reptiles, and amphibians, mostly similar in size and weight to the target species . These are discussed below. The use of firearms is highly target-specific and will have no effect on T&E species.

Recently, APHIS-WS initiated formal consultation with the USFWS for those species where a "may affect" situation exists within the national program. Any new findings that result from this most recent consultation will supersede previous findings. Additionally, for those findings which are more stringent, all reasonable and prudent alternatives and measures required by the USFWS will be incorporated into the proposed program.

T&E Mammals

A total of 35 mammals are listed under the Endangered Species Act as T&E species (Table 4-7), excluding marine mammals, 6 whales and 1 manatee, because these will not be affected by the current ORV program. The Caribbean monk seal (*Monachus tropicalis*) is still listed as endangered on the USFWS website, but has been declared extinct and was not included in this list. Additionally, 3 species have been listed as candidates for the T&E list, but have not officially been listed. Finally, one species is listed in some states, the black bear, because of a similarity of appearance to the Louisiana black bear, a separate subspecies, but it is not threatened or endangered.

Although reports of rabies among carnivores other than primary reservoir host species are rare, other carnivorous mammals, including T&E species or closely related species, can be a source of rabies exposure to humans and domestic animals. A total of 2,851 cases of rabies among other carnivorous mammals of at least 17 different species were reported from 1960 through 2000. This total represents 1.5% of the 185,014 wildlife cases reported during the same time period. A total of 45 otters, 40 badgers, 31 wolves, 29 ringtails, 23 domestic ferrets, 12 coatis, 11 mink, 11 weasels, 8 fisher, 4 puma, 4 bears, and 1 ocelot tested positive for the rabies virus (Krebs et al., 2003). Rabies among some other carnivorous mammals has been regarded as a threat to the survival of certain rare or endangered species (MacDonald, 1993). An epizootic or rabies in Alaska was credited with decimating an entire pack of wolves in one instance (Chapman, 1978), and on several occasions a substantial number of wolves wearing radio-collars as part of long-term ecological studies have died of rabies (Ritter 1991; Theberge et al., 1994; Kat et al., 1995). Therefore, control of rabies in raccoons, foxes, and coyotes may have a potential indirect beneficial effect of preventing unnecessary die-offs of T&E and other sensitive species from rabies.

As discussed, the distribution of ORV baits will not have an adverse effect on these species. It is expected that the vaccination of animals, the primary target species, and potentially the T&E species, could have a beneficial effect on T&E mammals, especially the carnivores and ungulates which are more apt to be in contact with infected animals, but not be killed by them. Mammals succumb to the rabies virus, if exposed, unless vaccinated. The chance of a T&E mammal species being exposed in ORV treatment areas is much less. However, APHIS-WS does have the chance to incidentally capture T&E species during monitoring and surveillance. The primary methods used in the ORV monitor and surveillance program that could impact T&E species are cage traps, leghold traps, and snares with cage traps being used by the most.

Table 4-7. Federally listed T&E mammals in the range of the ORV projects.

Mammalian Species	Scientific Name	Status	States (# - Location)	ORV
Delmarva Peninsula Fox Squirrel	*Sciurus niger cinereus*	E	4 – DE, MD, PA, VA	-
Mount Graham Red Squirrel	*Tamiasciurus hudsonicus grahamensis*	E	1 - AZ	-
Carolina Northern Flying Squirrel	*Glaucomys sabrinus coloratus*	E	2 – NC, TN	-
Gunnison's Prairie Dog (N-central NM)	*Cynomys gunnison*	C	1 – NM	-
New Mexican Meadow Jumping Mouse	*Zapus hudsonius luteus*	C	2 – AZ, NM	0
Hualapai Mexican Vole	*Microtus mexicanus hualpaiensis*	E	1 - AZ	0
Florida Salt Marsh Vole	*Microtus pennsylvanicus dukecampbelli*	E	1 - FL	0
Key Largo Woodrat	*Neotoma floridana smalli*	E	1 - FL	0
Key Largo Cotton Mouse	*Peromyscus gossypinus allapaticola*	E	1 - FL	0
Choctawhatchee Beach Mouse	*Peromyscus polionotus allophrys*	E	1 - FL	0
Alabama Beach Mouse	*Peromyscus polionotus ammobates*	E	1 - AL	0
Southeastern Beach Mouse	*Peromyscus polionotus niveiventris*	T	1 - FL	0
St. Andrew Beach Mouse	*Peromyscus polionotus peninsularis*	E	1 - FL	0
Anastasia Island Beach Mouse	*Peromyscus polionotus phasma*	E	1 - FL	0
Perdido Key Beach Mouse	*Peromyscus polionotus trissyllepsis*	E	2 – AL, FL	0
Marsh Rice Rat	*Oryzomys palustris natator*	E	1 - FL	0
New England Cottontail	*Sylvilagus transitionalis*	C	7 – NE US	-
Lower Keys Marsh Rabbit	*Sylvilagus palustris hefneri*	E	1 - FL	0
Mexican Long-nosed Bat	*Leptonycteris nivalis*	E	2 – NM, TX	0
Lesser :Long-nosed Bat	*Leptonycteris curasoae yerbabuenae*	E	2 - AZ, NM	0
Virginia Big-eared Bat	*Corynorhinus townsendii virginianus*	E	4 – KY, NC, VA, WV	0
Gray Bat	*Myotis grisescens*	E	8 – Central SE US	0
Indiana Bat	*Myotis sodalis*	E	17 – E US	0
Ocelot	*Leopardus pardalis*	E	2 – AZ, TX	-
Margay	*Leopardus wiedii*	E	1 - TX	-
Canada Lynx	*Lynx canadensis*	T	5 - ME, MI, NH, NY,	-
Gulf Coast Jaguarundi	*Herpailurus yagouaroundi cacomitli*	E	1 - TX	-
Sinaloan Jaguarundi	*Herpailurus yagouaroundi tolteca*	E	1 - AZ	-
Florida Panther	*Puma concolor coryi*	E	7 – SE US	-
Eastern Puma*	*Puma concolor couguar*	E/SAT	20 - E US	-
Jaguar	*Panthera onca*	E	4 – AZ, LA, NM, TX	-
Gray Wolf	*Canis lupus*	E	28 - All	-
Mexican Wolf	Canis lupus baylei	E/X	AZ, NM/ AZ, NM	-
Red Wolf*	*Canis rufus*	E/X	1 – TX/ NC	-
Black-Footed Ferret	*Mustela nigripes*	E/X	3 –ZZ NM, TX/AZ,	-
American Black Bear	*Ursus americanus*	SAT	3 – LA, MS, TX	-
Louisiana Black Bear	*Ursus americanus luteolus*	T	3 – LA, MS, TX	-
Grizzly Bear*	*Ursus arctos horribilis*	T	2 – AZ, NM	0
Key Deer	*Odocoileus virginianus clavium*	E	1 - FL	0
Sonoran Pronghorn	*Antilocapra americana sonoriensis*	E	1 - AZ	0

**** Extirpated or not known to be present in State***

STATUS
E *- Endangered*

ORV Sampling Impacts
(-) *- Negative*

T *- Threatened* ***0*** *- none*
C *- Candidate* ***(+)*** *- Positive*
X *- Exp. nonessential pop.*
SAT =- Similarity of Appearance with T&E Spp.

The ORV Program will have no effect on several mammalian T&E species. Several species are outside of the projected area of surveillance including the Florida salt marsh vole (northwest Florida along Gulf Coast on Cedar Key and nearby mainland coastal marshes), six subspecies of beach mice (from northeast (2 pops.) and northwest coast Florida (4 pops.) and Alabama (this pop is in Florida too)), the Key Largo woodrat, Key Largo cotton mouse, silver rice rat, Lower Keys marsh rabbit, and Key deer (all 5 species in the Florida Keys, currently south of any possible surveillance work). The ORV program will have no effect on these species. The grizzly bear has been extirpated for more than 50 years from the analysis area with all known grizzly bears currently residing in states north of the analysis area. Although this species is currently listed in Arizona and New Mexico, the ORV Program will have no effect on it as the current distribution of grizzly bears is not known to extend into those states. The red wolf was believed to be extinct in the wild by 1980 with the last remaining known wolves in Texas captured for a captive breeding program. It is still listed in Texas. Two non-essential experimental red wolf populations (NEP) were designated in North Carolina and Tennessee (Parker and Philips 1991). One NEP was established in 1991 in the Great Smokey Mountains National Park of eastern Tennessee and western North Carolina, but was discontinued in 1998 primarily due to poor pup survival caused by domestic dog diseases (Henry 1998). The other NEP began in 1987 on the Albemarle Peninsula of northeastern North Carolina near the Outer Banks region; this population is currently the only population of red wolves known to exist in the wild. Annual counts for the red wolf NEP in North Carolina has been between 100 and 130 (USFWS 2007). The NEPs are not located within current or anticipated ORV zones. Therefore, the ORV bait distribution would have no effect on this species. The 5 species of bats listed in the analysis area will not be captured by ORV methods, and therefore, the ORV Program will have no effect on them. Finally, it is believed that Sonoran pronghorn will be outside the range of the ORV Program because most efforts will be focused in areas away from this species around Flagstaff and southeast Arizona. Even so, this species would not be impacted by the small cage traps that would be used to capture skunks and other species (snares would not be used in occupied habitat of the pronghorn).

On the other hand, 6 species of rodents (tree squirrels, ground squirrels, and vole), 1 rabbit, and 12 predator species have the potential of being taken during monitoring activities. WS maintains standard operating procedures to minimize risks, but as documented by Table 4-6, nontargets animals can be taken. WS may avoid take by refraining from using some methods in a T&E species' occupied habitat. These species will be discussed with measures to minimize the potential for take.

Tree Squirrels. Three species of tree squirrels are federally listed as endangered, the Delmarva fox squirrel, Mount Graham red squirrel, and Carolina northern flying squirrel. These squirrels could potentially be taken in cage traps, mostly being attracted to the different baits used or from curiosity. Leghold traps would only be used with pan-tension devices requiring an animal similar in size to the target species to activate the trap. Thus, it is not likely squirrels will be taken with this method. Snares could be used to take the primary target species, but these will not likely take and hold a squirrel. If APHIS-WS needed to conduct surveillance in an area where one of these species was present, APHIS-WS Specialists would implement measures to minimize the potential for take. Cage traps would be baited with unattractive baits. APHIS-WS would monitor the traps frequently and close them when the target species were not likely to be present (e.g., most target species are nocturnal whereas the fox and red squirrels are diurnal, thus, traps could be closed during daylight hours to avoid capture). If APHIS-WS uses leghold traps in any of these squirrels' ranges, pan-tension devices will be used on leghold traps to preclude capture. If a squirrel was inadvertently captured in a cage trap, it would be immediately released unharmed to avoid lethal take and reported to the appropriate wildlife agency. The USFWS issued a BO (USDA 1997, Appendix F) stating that the above mentioned tree squirrel species are not likely to be adversely affected by the APHIS-WS program. APHIS-WS has conducted Section 7 consultations in the range of the squirrels and abides by the Reasonable and Prudent Alternatives and Measures, and Terms and Conditions of all Biological Opinions.

Gunnison's Prairie Dog. The Gunnison's prairie dog is currently a candidate for the federal T&E species

list. The population of concern is in north-central New Mexico and south-central Colorado. Currently, no ORV project is being conducted in the area. However, APHIS-WS potentially could at some time expand to these areas in the future. Cage traps and leghold traps would possibly be used in and around prairie dog towns and have the potential for take; snares would probably not be used, but even so, would not likely capture and hold a prairie dog. APHIS-WS would avoid take by setting cage traps only at night since this species is diurnal and the primary target species are nocturnal or checking the traps frequently during daylight hours to minimize the chance of a prairie dog dying of exposure. Leghold traps would only be used with pan-tension devices for larger animals such as coyotes that preclude capture of prairie dogs. The ORV program has minimal potential for take and will not have more than a minimal chance, if that, to impact this population.

Small Field Rodents. Two small field rodents, the New Mexico meadow jumping mouse (candidate) and Hualapai Mexican Vole (endangered), are federally listed. These two species are currently outside the range of ORV projects, but have the potential for being in a designated ORV area in the future, depending on rabies epizootics locations in the future. These species only have a slight chance of being taken and only in cage traps. Most cage traps would preclude capture because the small rodents could exit the traps through gaps in the door. However, APHIS-WS would check traps frequently in these species' occupied habitat so that any individuals captured could be release unharmed. The primary concern is exposure to elements such as sun as they could perish. APHIS-WS will not likely take either species, but a very slight potential exists.

New England Cottontail. This species, another candidate for the federal T&E species list, potentially could be listed in the New England states from New York to Maine in the Appalachian Mountains. The cottontail could be taken in a cage trap, the most likely method to be used in its range. If cage traps are used in its range, they will be located such to minimize exposure and checked frequently enough to release them alive. Leghold traps will be equipped with pan-tension devices to preclude capture. Snares are unlikely to be used in their range, but can be set high enough off the ground to preclude capture. Therefore, WS will have minimal potential to take this species and will have no impact on its population.

Ocelot and Margay. These species are federally designated as endangered in Texas and the ocelot in Arizona. The margay is a Neotropical felid that ranges from northern Mexico to northern Argentina. It has not been recorded in Texas since one was taken in the 1850s. It is extremely unlikely this species would wander into portions of Texas where the ORV program is occurring. The ocelot is a medium-sized spotted cat that ranges from southern Texas and Arizona to northern Argentina (USFWS 1990). Although small populations of ocelots exist in southern Texas, populations are not known to occur in Arizona. Unconfirmed sightings of individual ocelots, however, have been reported infrequently in Arizona. Since 1900, only two ocelots have been killed in Arizona in 1927 and 1931/32. Ocelots were photographed in the Huachuca Mountains in 1964 and 1966 (Brown and Lopez Gonzales 2001). Brown and Lopez Gonzales (2001) stated that ocelots should not be considered a resident animal in the American southwest.

Krebs et al. (2003) documented one case of rabies in ocelots in the U.S. between 1960 and 1969, but none from 1970 to 2000. Thus, this suggests that ocelots and margays could be impacted by rabies, and benefit from its reduction. Therefore, APHIS-WS has determined that the proposed action would have no effect on this species. A potential benefit of rabies programs on ocelot and margay conservation would be a reduced risk of contracting and dying of rabies if the spread of rabies is successfully halted or if the variants located in Texas or Arizona were eliminated.

USFWS issued a Biological Opinion (USFWS 1997) which was supplemented (USFWS 1999) and provided incidental take for ocelots, but believed that incidental take would be unlikely from wildlife damage management activities of the Texas APHIS-WS program following the Reasonable and Prudent Alternatives and Terms and Conditions of the BO. USFWS believed that ocelots were extirpated in Arizona and the margays in Texas. APHIS-WS agrees with this assertion and, therefore, believes that the APHIS-WS Program will not impact them in these areas However, USFWS (1999) recognized that the margay and ocelot could potentially wander into Texas or Arizona, respectively, but believed that no breeding population exists in Mexico near enough to think that it would occur frequently. USFWS issued a *"may affect, but not likely to jeopardize"* BO with reasonable and prudent alternatives and measures to

avoid take and APHIS-WS abides by these. These measures have been successful since APHIS-WS has not taken an ocelot in south Texas even though a population of ocelots does occur there.

Canada Lynx. This species was recently declared federally threatened in the states of Maine, Michigan, New Hampshire, New York, and Vermont (68 FR 40076-40101, July 3, 2003) in the ORV analysis area. The primary habitat for this species is boreal forest with an abundance of snowshoe hare (*Lepus americanus*). The only breeding population in these states occurs in northern Maine where these conditions exist. A potential population could also occur in New Hampshire because of its direct connectivity with Maine and the Canadian boreal forest. Since 1900, lynx in Vermont, New York, and Michigan have always existed solely as dispersers. Lynx were also historically found in Colorado where it was listed as well. The Colorado Division of Wildlife initiated a reintroduction program into that state prior to their listing in 1999 which continued thru 2006 with 218 released. These lynx, trapped in Canada and Alaska where they are not endangered, became listed as threatened following the transplant. Some of these lynx have dispersed into New Mexico where they had never been officially documented until now (especially common following their release). However, the lynx was not listed in New Mexico because it historically did not occur there (no verified records). Thus, they were not offered protection under ESA. In 2007, the Western Environmental Law Center, on behalf of several special interest groups, petitioned the USFWS to change the listing status of the Canada lynx to incorporate the southern Rocky Mountains in north central New Mexico. The USFWS has since announced in a Federal Register Notice (73 FR 76990-76994, December 18, 2008) a 90-day finding on a petition to revise the listing of the Canada lynx as threatened under ESA to include New Mexico.

APHIS-WS wildlife biologists consulted USFWS on the Canada lynx in March 2001 for the northeastern U.S. The USFWS determined that Canada lynx are unlikely to be affected by WS wildlife damage management actions in the northeast. This letter states that a "not likely to adversely affect" determination is appropriate for APHIS-WS operation programs which was the conclusion of APHIS-WS for northeastern states. APHIS-WS abides by standard operating procedures to avoid take in the northeast and has not taken a lynx.

The lynx in New Mexico are most likely to be encountered in the north-central part of the state. In 2002, New Mexico WS consulted USFWS under Section 7 of the ESA and stated that their personnel would abide by WS Western Region Interim Guidance Policies to avoid capture of Canada lynx until a National consult was completed. However, the National Consultation excluded lynx. Therefore, Colorado WS consulted USFWS under the ESA and was provided a BO with incidental take. Lynx, at that point, were not listed in New Mexico and was not included in the consultation. Even so, WS in New Mexico abides by the Reasonable and Prudent Measures and Alternatives of the Colorado BO to avoid take. To date, New Mexico WS has not taken a lynx.

Based on a review of past capture records, APHIS-WS has determined there to be no risk to lynx from ORV programs, from rabies monitoring or surveillance (including the capture and testing of target animals) or other current APHIS-WS rabies-related activities in these states (USDA 2000). This is mostly because APHIS-WS has not conducted monitoring activities within occupied lynx habitat. If APHIS-WS conducts surveillance and monitoring in lynx occupied area, WS will only use cage traps and will check them frequently. Bobcats have been captured in cage traps and the potential exist for a lynx to be taken. Therefore, APHIS-WS determined that the proposed action has the potential to take a lynx if APHIS-WS conducts ORV monitoring and surveillance in their habitat, but currently will have no effect on this species.

Florida Panther and Eastern Puma. These subspecies of mountain lion or cougar have been federally designated as endangered in southeast and eastern U.S., respectively. In the 1990s, the Florida panther had been reduced to occupying less than 5% of its original range and gene flow had stopped. Thus, cougar numbers were continuing to decline and were dangerously low causing the remaining population to continue its decline. Cougars from Texas, the closest living subspecies, were transplanted into the range to bolster the population without genetic swamping. This project was successful as the declining population increased. In 2008, the population was estimated to be around 100 cougars in southern Florida. The Eastern cougar was considered extinct by USFWS with no verifiable evidence such as DNA to suggest otherwise. Some sightings have been reported in Minnesota and Michigan recently. These individuals are

believed to have originated from around New Brunswick or Manitoba, Canada (per http://endangered.fws.gov/). In addition, a number of sightings have been reported in the Southeast Region, but the best evidence for a small permanent population has come from the Great Smoky Mountain National Park Region. Sightings have also been reported in three other North Carolina areas including the Nantahala National Forest, the northern portion of the Uwharrie National Forest, and the State's southeastern counties. However, these potential populations have not been verified.

The potential take of these T&E species was analyzed in the 2004 supplemental EA (USDA 2004a). Animals the size of panthers with the exception of their kittens are not expected to be taken by the relatively small-sized cage traps used to capture raccoons for monitoring and surveillance purposes. Even so, the distribution or potential distribution of these subspecies would preclude capture by the APHIS-WS Program as they are not in areas where monitoring and surveillance are expected to be conducted. If APHIS-WS initiated a project in occupied habitat, APHIS-WS would conduct a more formal consultation on potential effects. Cage traps would be monitored frequently and nontargets including the cougar subspecies could be released. Leghold traps and snares would not likely be used in occupied habitat. However, APHIS-WS believes that the ORV Program will have no effect on this species considering areas under monitoring and surveillance.

Jaguarundi. Two subspecies of jagaurundis are listed by USFWS as endangered, one in Texas (Gulf Coast subspecies) and one in Arizona (Sinaloan subspecies). A population potentially occurs in south Texas. The USFWS provided APHIS-WS an opinion that ORV programs in south Texas are not likely to adversely affect this species (Letter dated January 18, 1995, copy contained in 1995b). APHIS-WS has agreed to certain program restrictions (the same as and similar to those used for ocelot) on the use of certain methods used to collect coyotes for monitoring purposes in areas where this species might occur in order to avoid incidental take or jeopardy to these species, and the USFWS has issued a BO and incidental take statement concurring that incidental take is unlikely to occur (USFWS 1997). The USFWS also recognized that a potential beneficial indirect impact of ORV programs on this species would be the reduced risk of contracting and dying of rabies if the spread of coyote rabies is successfully halted or if the variant is eradicated. As far as the Sinaloan subspecies, the Arizona Game and Fish Department does not recognize their presence within the state as there has been no documented record of their occurrence in Arizona or the Mexican bordering states of Sonora, or Chihuahua (AGFD 2004b). Therefore, expansion of APHIS-WS' ORV program into Arizona will have no effect on the jaguarondi in that state.

Jaguar. This species is federally designated as endangered in Arizona, New Mexico, Texas, andLousiana. The jaguar's historic range included the much of the southern U.S. from California, to Louisiana, south through Texas to central South America. However, the species' current distribution only includes central Mexico to central South America as far south as northern Argentina. There are no known breeding populations in the U.S., although individuals may cross into Texas, New Mexico, and Arizona. Except for occasional wanderers from Mexico, the jaguar is considered extirpated from the U.S. (USFWS 1990, 2007). McCain and Childs (2008) documented jaguars in Arizona frequently, continuously, and year-round, and videotaped several scent-marking behaviors, indicating the residency of adult jaguars within Arizona. After two sightings of jaguars in 1996, a camera monitoring program in southeastern Arizona was implemented. From March 2001 to July 2007, 9–44 trail cameras were maintained and opportunistic track surveys were conducted. Two adult males and a possible third unidentified jaguar were observed and recorded with 69 photographs and 28 sets of tracks. One jaguar, originally photographed in 1996, was resighted 64 times between 2004 and 2007 (McCain and Childs 2008). The USFWS (2007) recently concluded in a statement, however, that regular or intermittent use of the borderlands area by wide-ranging males, and no evidence of the presence of females or cubs, indicates that the U.S. does not support a separate breeding population. Therefore, actions taken within the U.S. are likely to benefit a small number of individual jaguars peripheral to the species' range, with little potential to effect recovery of the species as a whole. Thus, the USFWS does not support development of a formal recovery plan at this time.

APHIS-WS does not anticipate take of a jaguar because they are rare in the analysis area with only adult males being documented, are generally not attracted by the baits used, and are too large for most methods that would be used in ORV surveillance and monitoring program. It is conceivable that a jaguar cub could be taken, but highly unlikely. Additionally, the USFWS (1999a and b) issued a BO on the effects of the

APHIS-WS program on the jaguar in 1999 and determined that activities by APHIS-WS were not likely to jeopardize the continued existence of this species. The BO contained an incidental take statement with reasonable and prudent measures and terms and conditions that APHIS-WS follows to minimize the risk of incidental take (USFWS 1999a and b). APHIS-WS personnel abide by the requirements of the BO which minimize further the unlikely potential for take.

Gray and Mexican Wolf. Gray wolves, including the Mexican subspecies, are federally designated as endangered in all of the lower 48 states with the exception of Minnesota where they are classified as threatened and Northern Rocky Mountain Distinct Population Segment which was recently delisted. The USFWS recently issued final rules to delist both the Western Great Lakes and Northern Rocky Mountains Distinct Population Segments in 74 FR 15069-15123, April 2, 2009 and 74 FR 15123-15188, April 2, 2009 respectively. The rule became effective May 4, 2009. However, in response to a legal challenge, the decision to delist the Western Great Lakes Distinct Population Segment was withdrawn on July 1, 2009 to allow for additional opportunity for public comment. No population of gray wolves is currently found in the ORV area with the exception of a small portion of Indiana.

The Mexican gray wolf subspecies was extirpated from the southwestern U.S. by 1970. In 1998, the USFWS reintroduced the endangered Mexican gray wolf as a NEP into the Blue Range Wolf Recovery Area, a designated area within the subspecies' probable historic range. The Blue Range Wolf Recovery Area consists of the entire Apache and Gila National Forests in east-central Arizona and west-central New Mexico (63 FR 1752-1772, January 12, 1998). In 1998, the USFWS issued a BO, for naturally-occurring wolves, and Conference Opinion, on the NEP established in Arizona and New Mexico, regarding the effects of the APHIS-WS program on the Mexican wolf. In the BO, the USFWS determined activities by APHIS-WS were not likely to jeopardize the continued existence of this species or adversely modify its critical habitat (USDA 1997, Appendix F; USFWS 1998). However, the use of rabies management methods such as leghold traps, snares, and aerial shooting have the potential to affect the gray wolf. Thus, Reasonable and Prudent Measures and Terms and Conditions are followed by APHIS-WS to minimize effects. Reasonable and Prudent Measures relating to rabies program activities include: 1) taking all possible precautions to reduce incidental take, 2) monitoring incidental take to ensure compliance with anticipated take levels (1 wolf per state per year where wolves are located), and 3) immediately releasing any nontarget wolves inadvertently captured alive. The current USFWS 10(j) rule published in the Federal Register requires APHIS-WS to discontinue use of M-44s and choking-time snares in "occupied Mexican gray wolf range." Other predator management activities may be restricted or modified pursuant to a cooperative management agreement or conference between the USFWS and APHIS-WS (63 FR 1752-1772, January 12, 1998). The USFWS is expected to complete a Mexican Wolf Conservation Assessment to broadly address the long term conservation needs for the Mexican wolf as public comment ended in March 2009.

The ORV program would likely only use small cage traps in the range of wolves in the U.S. to preclude capture. However, all use of traps, including padded-jaw leghold traps, would comply with the Reasonable and Prudent Measures and Terms and Conditions of the B.O.s and 10j rules implemented to protect wolves. Any traps used would be checked frequently enough to allow release. WS does not anticipate taking any wolves, but the potential exists. It should be noted that Krebs et al. (2003) documented 31 cases of rabies in gray wolves in the U.S. between 1960 and 2000 and that the Mexican gray wolf NEP is in an area that has an ongoing outbreak of gray fox variant rabies. Thus, this subspecies would likely benefit from any reduction in rabies in Arizona and New Mexico because they have an increased potential to succumb to rabies.

Black-footed Ferret (*Mustela nigripes*). This species is federally classified as endangered in Arizona, New Mexico, and Texas. However, wild populations have likely been extirpated. An experimental nonessential population was released in Aubrey Valley including parts of Coconino, Mohave, and Yavapai Counties in northwestern Arizona and has been successfully established. The USFWS issued a BO (USDA 1997, Appendix F) that determined that cage traps and leghold traps could potentially take this species. WSW will not use these methods in occupied habitat. However, WS uses pan-tension devices on leghold traps to preclude capture and cage traps can be checked frequently enough to allow release (the proper authorities would be notified) in the vicinity of potential habitat for this species should it become necessary

for a rabies project. Thus, while there is a slight risk of take, APHIS-WS does not anticipate such an occurrence. The BO (USDA 1997, Appendix F) did note that the take of predators in or near occupied habitat would likely provide beneficial effects for the ferret from a reduction in predation and disease transfer. It must also be noted that, although not specifically tested for safety in this species, studies on other mustelids including the domestic ferret (*Mustela putorius*) (Rupprecht et al. 1992a) indicate these species would not be adversely affected if they were to consume baits. However, black-footed ferrets have not always shown the same response to vaccines as their domestic relatives. For instance, a modified-live virus vaccine for canine distemper, previously shown to be safe in domestic ferrets, caused fatal distemper in four of six captured black-footed ferrets. In contrast, inactivated vaccines for canine distemper, although not as long-lasting, have shown no adverse reactions and should continue to be used for vaccinating captive black-footed ferrets (Williams et al. 1996). Williams et al. (1996) suggested that the use of recombinant vaccines also be studied for efficacy in black-footed ferrets. Because it is unclear what effect recombinant oral rabies vaccines could have on black-footed ferrets at this time, baiting would not be conducted in and around reintroduced ferret colonies in Arizona.

Louisiana Black Bear. The Louisiana black bear and American black bear are federally listed species, threatened and similarity of appearance, in Louisiana, Mississippi, and Texas. This species could be taken with leghold traps and snares. However, these will not be used in occupied habitat. APHIS-WS was issued a BO for the Louisiana black bear (USDA 1997, Appendix F) and APHIS-WS abides by the Reasonable and Prudent Alternatives and Measures and Terms and Conditions. Thus far, these have been effective in minimizing take of this species APHIS-WS will continue to abide by the BO which covers the use of cage traps, leghold traps, and snares. APHIS-WS has taken a nontarget black bear, a cub, in a cage trap which was released, but not in the listed states. APHIS-WS does not anticipate taking a Louisiana black bear and will take measures to avoid take.

T&E Birds

A total of 27 birds are listed under the Endangered Species Act as federal T&E and candidate species (Table 4-8) in the range of the APHIS-WS proposed ORV programs. Additionally, 3 species have been listed as candidates for the T&E list, but have not officially been listed.

As discussed, the distribution of ORV baits will not have an adverse effect on birds, even though some could potentially be eaten by a few bird species. Rabies is a mammalian disease, and birds do not acquire the disease or become vaccinated against the disease if they consume ORV baits. However, APHIS-WS could incidentally capture T&E species during monitoring and surveillance. The primary methods used in the ORV monitor and surveillance program that could impact T&E species are cage traps, leghold traps, and snares. Of these, cage traps are most often used.

Table 4-8. Federally listed T&E birds in the range of the ORV projects.

Bird Species	Scientific Name	Status	States (# - Location)	ORV
Attwater's Greater Prairie-Chicken	*Tympanuchus cupido attwateri*	E	1 - TX	-
Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*	C	2 – NM, TX	-
Masked Bobwhite	*Colinus virginianus ridgwayi*	E	1 - AZ	-
Brown Pelican	*Pelecanus occidentalis*	E	3 – LA, MS, TX	0
Wood Stork	*Mycteria americana*	E	4 – AL, FL, GA, SC	0
California Condor	*Gymnogyps californianus*	E/X	1 – 0/AZ	-
Everglade Snail Kite	*Rostrhamus sociabilis plumbeus*	E	1 - FL	0
Bald Eagle, Southern DPS	*Haliaeetus leucocephalus*	T	1 - AZ	-
Audubon's Crested Caracara	*Polyborus plancus audubonii*	T	1 – FL	0
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	E	3 – AZ, NM, TX	0
Yuma Clapper Rail	*Rallus longirostris yumanensis*	E	1 – AZ	0
Mississippi Sandhill Crane	*Grus canadensis pulla*	E	1 – MS	0
Whooping Crane	*Grus americana*	E/X	1 – TX/	-
Piping Plover	*Charadrius melodus*	E/T	5/21– NE & Cen US	0
Eskimo Curlew*	*Numenius borealis*	E	28 - All	0
Red Knot	*Calidris canutus rufa*	C	14 – East US	0

Bird Species	Scientific Name	Status	States (# - Location)	ORV
Least Tern, Interior Population	*Sterna antillarum*	E	7 – Central US	0
Roseate Tern	*Sterna dougallii dougallii*	E	8 – ME to NC	0
Yellow-Billed Cuckoo, Western U.S. DPS	*Coccyzus americanus*	C	3 – AZ, NM, TX	0
Mexican Spotted Owl	*Strix occidentalis lucida*	T	3 – AZ, NM, TX	0
Red-Cockaded Woodpecker	*Picoides borealis*	E	9 – SE US	0
Ivory-Billed Woodpecker	*Campephilus principalis*	E	Not listed ORV area	0
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	E	3 – AZ, NM, TX	0
Black-Capped Vireo	*Vireo atricapilla*	E	1 - TX	0
Florida Scrub-Jay	*Aphelocoma coerulescens*	T	1 - FL	-
Bachman's Warbler*	*Vermivora bachmanii*	E	1 - SC	0
Golden-Cheeked Warbler	*Dendroica chrysoparia*	E	1 - TX	0
Kirtland's Warbler	*Dendroica kirtlandii*	E	1 - MI	0
Florida Grasshopper Sparrow	*Ammodramus savannarum floridanus*	E	1 - FL	0
Cape Sable Seaside Sparrow	*Ammodramus maritimus mirabilis*	E	1 - FL	0

**** Possibly extinct.***

STATUS
E *- Endangered*
T *- Threatened*
C *- Candidate*
X *- Exp. nonessential pop.*

ORV Sampling Impacts
(-) *- Negative*
0 *- none*
(+) *- Positive*

The ORV Program will have no effect on most avian T&E species. Several species are outside of the projected area of surveillance including the Brown Pelican (coastal), Everglade Snail Kite (southern Fla.), Yuma Clapper Rail (southwest Ariz.), Mississippi Sandhill Crane, Audubon's Crested Caracara (south central peninsular Fla.), Roseate Tern (coastal), Florida Grasshopper Sparrow (central peninsular Fla.), and Cape Sable Seaside Sparrow (southwest Fla.). The Eskimo Curlew and Bachman's Warbler are listed in all and 1 state, respectively, but are likely extinct with no recent documented records of their existence; however, the ORV program would have no effect on these species, even so, because of habitat selection. Another species that is likely extirpated from (if not extinct) and no longer listed in the analysis area is the Ivory-billed Woodpecker; the ORV program again would have no effect on this species because of habitat selection. Habitat selection of mostly mudflats and wetlands by several species of birds would preclude many avian T&E species from being affected by the ORV program and include the Wood Stork, Red Knot, interior Least Tern, and Piping Plover. Diet (insectivorous/frugivorous) and habitat usage (usually stays off ground in trees or shrubs) precludes capture of 6 species including the small insectivorous Southwestern Willow Flycatcher, Black-capped Vireo, Golden-cheeked Warbler, and Kirtland's Warbler, and the Western Yellow-billed Cuckoo; the Northern Aplomado Falcon takes birds and insects on wing eliminating them from being captured with monitoring and surveillance methods used in the ORV Program. Finally, the Mexican Spotted Owl lives in dense woodlands where it hunts for small mammals. The baits used in cage traps will not be attractive to them. The ORV Program will have no effect on these species.

On the other hand, 8 species of birds have the potential of being taken during monitoring activities. WS maintains standard operating procedures to minimize risks, but as documented by Table 4-6, nontarget animals can be taken. WS may not use some methods in a T&E species' occupied habitat to avoid take. These species will be discussed with measures to minimize the potential for take.

Attwater's Greater and Lesser Prairie-Chickens and Masked Bobwhite. Two species of ground-dwelling, gallinaceous birds are federally listed as endangered and a third a federal candidate. These 3 species could be potentially taken during ORV surveillance and monitoring activities. The Attwater's Greater Prairie-Chicken is outside the range of current ORV activities and will not likely be taken unless ORV activities move. However, pan-tension devices on leghold traps in use will preclude capture of this and the other 2 species. Snares can be set where the prairie-chickens will not be affected and will have no effect on the bobwhite. Cage trap use in the range of the bobwhite (far south-central Arizona) could take them, but are not likely to take the prairie-chickens because of their size. The bait used will not be attractive to these species and are, therefore, less likely to be taken. However, if cage traps are used in the range of these species, they can be closed during the day to preclude capture. APHIS-WS does not

anticipate taking any of these species, but does have minimum potential to take them. If taken, they will be released alive and the appropriate authority notified.

California Condor, Bald Eagle, Whooping Crane, and Mexican Spotted Owl. The Spotted Owl and Bald Eagle's southern population, are listed as threatened in the southwest, and the Whooping Crane as endangered in Texas. The California Condor and Whooping Crane have NEP populations in Arizona and much of the east. Large birds such as raptors (condor, eagle, and owl) and wading birds (crane) have the potential of being taken in traps and snares, but not likely in the smaller cage traps used to take the predators being monitored in these species' ranges. USFWS considered these species in the 1992 BO (USDA 1997) and APHIS-WS follows the Reasonable and Prudent Alternatives and Measures for these species to avoid take. Thus, APHIS-WS believes that the ORV Program will have minimal potential to take any of these species.

Florida Scrub-Jay. The Florida Scrub-Jay is currently a resident just outside the range of the ORV Program in Florida and is listed as a threatened species. APHIS-WS may conduct monitoring and surveillance in that area in the future. This species could be taken in a leghold trap without a pan-tension device and cage trap during monitoring and surveillance. To avoid take, APHIS-WS will use pan-tension devices on leghold traps in occupied habitat. For cage traps, APHIS-WS will either close traps during the day or monitor them frequently to avoid take. APHIS-WS believes that take is possible, but that if take occurs, they will be released unharmed.

T&E Reptiles

APHIS-WS has taken some reptiles as nontarget species during ORV operations including turtles and alligators. A total of 22 reptiles are listed under the Endangered Species Act as federal T&E and candidate species (Table 4-9) in the range of the APHIS-WS proposed ORV programs. Additionally, the American alligator is listed due to Similarity of Appearance with the American crocodile. Of the listed species, APHIS-WS believes that the species most likely to be taken are alligators and turtles with cage traps. As discussed, the distribution of ORV baits will not have an adverse effect on reptiles, even though some could potentially be eaten by a few reptile species. Rabies is a mammalian disease. Reptiles cannot be infected with rabies or would not be vaccinated against the disease, even if they consumed ORV baits. However, APHIS-WS could incidentally capture T&E species during monitoring and surveillance. The primary methods used in the ORV monitor and surveillance program that could impact T&E reptiles are cage traps and to a lesser extent snares and leghold traps.

Table 4-9. Federally listed T&E reptiles in the range of the ORV projects.

Reptile Species	Scientific Name	Status	States (# - Location)	ORV
American Crocodile	*Crocodylus acutus*	T	1 - FL	0
American Alligator	*Alligator mississippiensis*	SAT	1 - FL	-
Flattened Musk Turtle	*Sternotherus depressus*	T	1 - AL	-
Sonoyta Mud Turtle	*Kinosternon sonoriense longifemorale*	C	1 - AZ	-
Bog Turtle	*Clemmys muhlenbergii*	T	7 – NE US	-
Ringed Map Turtle	*Graptemys oculifera*	T	2 – LA, MS	-
Yellow-Blotched Map Turtle	*Graptemys flavimaculata*	T	1 – MS	-
Alabama Red-Bellied Turtle	*Pseudemys alabamensis*	E	1 – AL	-
Plymouth Red-Bellied Turtle	*Pseudemys rubriventris bangsi*	E	1 – MA	-
Gopher Tortoise	*Gopherus polyphemus*	T	2 – AL, LA	-
Dunes Sagebrush Lizard	*Sceloporus arenicolus*	C	2 – NM, TX	0
Bluetail Mole Skink	*Eumeces egregius lividus*	T	1 - FL	0
Sand Skink	*Neoseps reynoldsi*	T	1 - FL	0
Copperbelly Water Snake	*Nerodia erythrogaster neglecta*	T	3 – IN, MI, OH	-
Lake Erie Watersnake	*Nerodia sipedon insularum*	T	1 - OH	-
Atlantic Salt Marsh Snake	*Nerodia clarkii taeniata*	T	1 - FL	0
Concho Water Snake	*Nerodia paucimaculata*	T	1 - TX	-
Northern Mexican Gartersnake	*Thamnophis eques megalops*	C	2 – AZ, NM	0

Reptile Species	Scientific Name	Status	States (# - Location)	ORV
Eastern Indigo Snake	*Drymarchon corais couperi*	T	5 – AL, FL, GA, MS SC	-
Black Pine Snake	*Pituophis melanoleucus lodingi*	C	3 – AL, LA, MS	-
Louisiana Pine Snake	*Pituophis ruthveni*	C	2 – LA, TX	0
Eastern Massasauga	*Sistrurus catenatus catenatus*	C	5 – IN, MI, NY, OH, PA	-
New Mexican Ridge-Nosed Rattlesnake	*Crotalus willardi obscurus*	T	2 – AZ, NM	-

STATUS
E *- Endangered*
T *- Threatened*
C *- Candidate*
SAT *– Similarity of Appearance*

ORV Sampling Impacts
(-) *- Negative*
0 *- none*

The ORV Program will have no effect on 7 reptilian T&E species. Four species are too small (lizards and skinks) or skinny (garter snakes) to be trapped. The American Crocodile (Florida Keys), Atlantic salt marsh snake (East coast of Florida), and Louisiana pine snake (east-central Texas-Louisian border) are mostly outside of the areas that are being monitored and, thus, the ORV Program will have no effect on them.

American Alligator. This species was once a listed T&E species, but has made a remarkable recovery throughout its range with hunting seasons in some states. It is currently listed throughout its range because of similarity of appearance to other crocodilians. Two alligators were captured in cage traps in Florida during rabies monitoring and surveillance, one in 2003 and one in 2004. Both were released unharmed per the appropriate Florida wildlife agency. APHIS-WS uses cage traps almost exclusively in its range, but could potentially use snares and leghold traps. Thus, alligators could be captured in cage traps but are much less likely to be captured in snares and leghold traps. In most all cases, any alligator caught should be able to be released. Thus, the ORV Program would have minimal potential to impact this species. Even if APHIS-WS did accidentally lethally take an alligators, their population would not be impacted. Any alligator taken would be reported to the appropriate wildlife agencies. Thus, APHIS-WS will not have an adverse impact on this species.

Turtles. Eight species of turtles, including the gopher tortoise, are federally listed T&E, and candidate species. Though most are not in the range of surveillance activities, they could be and have the potential to be caught in cage traps, especially those that walk frequently over land, such as the gopher tortoise. The more water dwelling species, the other 7, are less likely to be trapped because they are strongly aquatic and do not venture far from the security of their wetland habitats. However, turtles have been taken in cage traps by the APHIS-WS ORV Program as nontargets (mostly box turtles). Because of their size and height, leghold traps and snares are highly unlikely to capture them. Thus far, APHIS-WS has released all turtles taken. If, per chance, a listed T&E turtle were captured, the appropriate regulatory agency would be notified and the turtle would be released or turned over to the agency per their direction (they may want to take measurements and radio-track some turtle species). It is highly unlikely that a turtle would be taken lethally. However, when APHIS-WS is working within the range of a T&E turtle species, cage traps will be monitored frequently to ensure that the turtles are released quickly, nullifying the risk of lethal take. APHIS-WS believes that it will have no adverse impact on turtle populations.

Snakes. A few snakes, primarily the larger adults, could be trapped and held in cage traps because they are too large to exit the wire mesh. Smaller snakes could get out because the wire mesh would not hold them. Large adults that enter a cage trap and set it off prior to having their entire body being inside, could also escape by following their tail back under the cage trap-door (not uncommon). However, some could potentially be caught. However, no snakes were taken by the APHIS-WS ORV Program from 2000 to 2007, suggesting the unlikelihood of such an occurrence. APHIS-WS believes that it is highly unlikely that a T&E species of snake will be taken, but if one is, the appropriate agency will be notified and the snake released, APHIS-WS believes that it will have no adverse effect on any T&E species of snake.

T&E Amphibians

APHIS-WS has taken a few larger amphibians, mainly bullfrogs. It is possible that APHIS –WS could take toads and larger frogs as nontarget species during ORV operations in cage traps. A total of 17 amphibians are federally listed as T&E or candidate species (Table 4-10). APHIS-WS believes that it will have no effect on any of these species. The only species that possibly could be taken would be the Houston toad. However, APHIS-WS does not conduct monitoring and surveillance in its range and does not anticipate doing so.

As discussed, the distribution of ORV baits will not have an adverse effect on amphibians, even though some could potentially be eaten by a few species. Rabies is a mammalian disease. Amphibians cannot be infected with rabies or would not be vaccinated against the disease, even if they consumed ORV baits.

Table 4-10. Federally listed T&E amphibians in the range of the ORV projects.

Amphibian Species	Scientific Name	Status	States (# - Location)	ORV
Black Warrior Waterdog	*Necturus alabamensis*	C	1 - AL	0
Frosted Flatwoods Salamander	*Ambystoma cingulatum*	E	4 – AL, FL, GA, SC	0
Sonora Tiger Salamander	*Ambystoma tigrinum stebbinsi*	E	1 - AZ	0
Cheat Mountain Salamander	*Plethodon nettingi*	E	1 - WV	0
Shenandoah Salamander	*Plethodon shenandoah*	E	1 - VA	0
San Marcos Salamander	*Eurycea nana*	T	1 - TX	0
Barton Springs Salamander	*Eurycea sosorum*	E	1 - TX	0
Austin Blind Salamander	*Eurycea waterlooensis*	C	1 - TX	0
Georgetown Salamander	*Eurycea naufragia*	C	1 - TX	0
Jollyville Plateau Salamander	*Eurycea tonkawae*	C	1 - TX	0
Salado Salamander	*Eurycea chisholmensis*	C	1 - TX	0
Texas Blind Salamander	*Typhlomolge rathbuni*	E	1 - TX	0
Houston Toad	*Bufo houstonensis*	E	1 - TX	0
Arizona Treefrog, Huachuca/Canelo Pop.	*Hyla wrightorum*	C	1 - AZ	0
Chiricahua Leopard Frog	*Rana chiricahuensis*	T	2 – AZ, NM	0
Relict Leopard Frog	*Rana onca*	C	1 - AZ	0
Mississippi Gopher Frog	*Rana capito sevosa*	E	3 – AL, LA, MS	0

STATUS
E *- Endangered*
T *- Threatened*
C *- Candidate*

ORV Sampling Impacts
(-) *- Negative*
0 *- none*

State Listed Species (USFWS 2009b, NMDGF 2008a, AGFD 2007b[6]):

APHIS-WS is also concerned with the take of state listed T&E and sensitive (includes only species in the S1 (imperiled) or S2 (vulnerable) categories) species (*species listed obtained from state agency websites*), but does not believe that the APHIS-WS ORV Program will have more than a minor impact on any listed species. From 2000 to 2007, APHIS-WS has trapped thousands of animals for monitoring and surveillance, but has lethally taken only a handful of nontarget species (Table 4-6) where more than one was taken in a year. Those nontargets taken lethally have been representatives from 3 groups of mammals: the carnivores, rodents, and lagomorphs. Other vertebrates could be taken lethally by APHIS-WS, but it is anticipated that this will be no more than a few, at most, in any given year. This take will not have an impact on any species, including state listed T&E species. APHIS-WS will consult with states and provide them information on any listed species taken during ORV monitoring and surveillance, but believes that any take will be minimal enough not to have more than a minor impact on any population. As discussed above for federal T&E species impacts, APHIS-WS believes that the consumption of ORV baits will have no effect on state listed species, but the overall effect of the program will be beneficial if the prevalence of

[6] The state of Arizona does not have a separate state listing for threatened or endangered species and instead uses the USFWS federal listing of protected species in Arizona. Arizona designates these protected species as Wildlife of Special Concern (WSC).

rabies is reduced.

APHIS-WS has the potential to take some State listed T&E and sensitive species. APHIS-WS believes, though, that state listed species from the following groups will not be impacted, except potentially very minimally, and, therefore, will not be discussed further including some mammals (bats, insectivores (moles/shrews), and ungulates (deer)), birds, reptiles, amphibians, invertebrates, and plants. APHIS-WS believes that if APHIS-WS does have any potential to impact species it would be from the following groups of mammals: the rodents, lagomorphs, and carnivores. Table 4-11 lists all species in these groups that are state listed T&E or sensitive (those listed as S1 and S2 only and not including S3 - rare) species. The following list does not include those species that are federally listed as these were discussed above.

Table 4-11. State listed T&E and sensitive (S1, S2) mammals in the range of the ORV projects.

Mammalian Species	Scientific Name	Status	States (# - Location)	ORV
Goat Peak Pika	*Ochotona princeps nigrescens*	P	NM	0
Appalachain Cottontail	*Sylvilagus obscurus*	P	AL, GA	-
Swamp Rabbit	*Sylvilagus aquaticus*	E	IN, SC	-
Snowshoe Hare	*Lepus americanus*	E	OH, NM, VA	-
White-tailed Jackrabbit	*Lepus townsendii campanius*	P	NM	0
White-sided Jackrabbit	*Lepus callotis*	T	NM	-
Plains Pocket Gopher	*Geomys bursarius*	P	IN	0
Southeastern Pocket Gopher	*Geomys pinetis*	T	GA	0
Southern Pocket Gopher	*Thomomys umbrinus*	T	NM	0
American Porcupine	*Erethizon dorsatum*	P	MD	-
Houserock Valley Chisel-toothed Kangaroo	*Dipodomys microps leucotis*	P	AZ	-
Texas Kangaroo Rat	*Dipodomys elator*	T	TX	-
Woodland Jumping Mouse	*Napaeozapus insignis*	P	OH	0
Southern Rock Vole	*Microtus chrotorrhinus carolinensis*	E/P	MD, VA/NC, TN, VT,	-
Navajo Mexican Vole	*Microtus mexicanus navaho*	P	AZ	-
Arizona Montane Vole	*Microtus montanus arizonensis*	E	NM	-
Prairie Vole	*Microtus ochrogaster*	E/P	MI/AL, NM	-
Red-backed Vole	*Myodes gapperi*	P	OH, SC	-
Round-tailed Muskrat	*Neofiber alleni*	T	GA	-
Western/Eastern Harvest Mouse	*Reithrodontomys megalotis/humulis*	P	IN/WV	0
Northern/Southern Bog Lemming	*Synaptomys borealis/cooperi*	T/P	ME/CT, MA, RI, WV	-
Northern Pygmy Mouse	*Baiomys taylori*	P	NM	0
Eastern/Southern Appalachian Woodrat	*Neotoma floridana floridana/haematoeia*	P	NC/TN	-
Allegheny Woodrat*	*Neotoma magister*	T/E/P	NE US 1/5/3 States	-
Golden Mouse	*Ochrotomys nuttali*	P	WV	0
Palo Duro Mouse	*Permyscus truei comanche*	T	TX	0
Buxton Woods/Pungo White-footed Mouse	*Peromyscus leucopus buxtoni/easti*	P	NC	0
Coleman's Oldfield Mouse	*Peromyscus polionotus colemani*	P	NC	0
Coue's Rice Rat	*Oryzomys couesi*	T	TX	-
Camp Verde Cotton Rat	*Sigmidon arizonae arizonae*	P	AZ	-
Yellow-nosed Cotton Rat	*Sigmidon ochrognathus*	P	NM	-
Arizona Gray Squirrel	*Sciurus arizonensis arizonensis*	P	NM	-
Big Cypress/Sherman's Fox Squirrel	*Sciurus niger avicennia/shermani*	T/P	FL	0
Abert's Squirrel	*Sciurus aberti chuscensis/kaibabensis*	P	NM/AZ	
West Virginia Northern Flying Squirrel	*Glaucomys sabrinus fuscus*	P	WV	-
Franklin's Ground Squirrel	*Spermophilus franklinii*	E	IN	-
Black-tailed Prairie Dog	*Cynomys ludovicianus*	P	AZ/NM	-
Eastern Chipmunk	*Tamias striatus*	P	FL	
Organ Mtns/Oscura Mtns Colorado Chipmunk	*Tamias quadrivittatus australis/ oscuraensis*	T	NM	-
Peñasco Least Chipmunk	*Neotamias minimus atristriatus*	E	NM	-
Bobcat	*Lynx rufus*	T/E/P	MA/NJ, OH/IN	-
Swift Fox	*Vulpes velox velox*	P	NM	-
American Black Bear	*Ursus americanus (*FL – subspp. *floridanus)*	T/E/P	FL/OH, TX/AL	-
Eastern Spotted Skunk*	*Spilogale putorius*	E/P	AL, MD, WV	-
Ermine	*Mustela erminea*	P	OH	-

Mammalian Species	Scientific Name	Status	States (# - Location)	ORV
Least Weasel	*Mustela nivalis*	P	IN, MD, TN	-
American Marten	*Martes americana*	T/E	NH, NM/VT	-
Everglades Mink	*Neovison vison evergladensis*	T	FL	0
American Badger	*Taxidea taxus*	P	IN, OH	-
North American River Otter	*Lontra canadensis*	P	AZ, IN	-
White-nosed Coati	*Nasua narica*	E/P	TX, NM	-

STATUS
E *- Endangered*
T *- Threatened*
P*- Protected (Sensitive S1 & S2 spp.)*
* States = PA/IN, MD, NJ, NY, OH/CT, IN, NC

ORV Sampling Impacts
(-) *- Negative*
0 *- none*
(+) *– Positive*

A few of the state listed T&E and sensitive species (Table 4-11) will be unaffected by the APHIS-WS Program. This includes species outside the expected range of monitoring (pika ,white-tailed jackrabbit, the Sherman and Big Cypress fox squirrels, and Everglades mink), dominantly fossorial (*underground*) species (plains, southeastern, and southern pocket gophers) and species too small to be held by cage traps or other monitoring methods (woodland and meadow jumping mice, western and eastern harvest mice, northern pygmy mouse, and golden, Palo Duro. white-footed, and Coleman's oldfield mice). These will not be discussed further. As discussed, ORV is not expected to cause any adverse effects on any of the sensitive species listed (Ruprecht et al.1992a). It is expected that the vaccination of wild animals, including the primary target species and, potentially, the T&E species, could have a beneficial effect on T&E mammals, especially the carnivores and ungulates which are more likely to be in contact with infected animals. Mammals succumb to the rabies virus, if exposed, unless vaccinated. The chance of a T&E mammal species being exposed in ORV treatment areas is much less. However, APHIS-WS does have the potential to incidentally capture T&E species during monitoring and surveillance. The primary methods used in ORV monitoring and surveillance programs that could impact T&E species are cage traps, leghold traps, and snares with cage traps used to capture target species.

Rabbits. Four state listed species of rabbits are found in the ORV area that could potentially be in a surveillance area. These species could be taken in cage traps, leghold traps, or snares. If cage traps are used in their ranges, they will be located such to minimize exposure and checked frequently enough to release them alive. Leghold traps will be equipped with pan-tension devices to preclude capture. Snares will be elevated off the ground high enough to minimize potential exposure especially for cottontails or not set in areas where they would likely be taken. Therefore, WS will have minimal potential to take these species and will have virtually no impacts on their populations.

American Porcupine and Round-tailed Muskrat. The porcupine is common in the United States, but a species of concern in Maryland. The round-tailed muskrat, a small relative of the common muskrat, has a limited range in Georgia and much of Florida. It is listed as threatened in Georgia. The method of capture most likely to be used in these two species' ranges is the cage trap which has the potential to capture either species. Cage traps will be checked frequently enough and placed in areas to minimize exposure to reduce the potential for lethal take. If one or the other was inadvertently captured in a cage trap, it would be released unharmed to avoid lethal take and reported to the appropriate state agency. Therefore, the proposed action should have negligible potential to impact these populations in Maryland and Georgia.

Small Field Rodents. Several field rodents are large enough to be captured in cage traps and include kangaroo rats, voles, muskrats, lemmings, woodrats, rice rats, and cotton rats with 17 species and subspecies that could potentially be taken, but only in small wire-mesh or enclosed cage traps used for monitoring smaller predators (e.g., spotted skunks). These species only have a slight chance of being taken even in cage traps because the small rodents could exit the traps through gaps in the door. The primary concern with these species is exposure to the elements such as excessive sun/heat as this could result in a lethal take. However, APHIS-WS would check traps frequently in these species' occupied habitat so that any individuals captured could be release unharmed. APHIS-WS will not likely take these species, but a very slight potential exists.

Tree/Ground Squirrels. Nine species of tree and ground squirrels, including chipmunks, are state listed

as T&E or sensitive species (Table 8). These species could potentially be taken in cage traps, mostly being attracted to the different baits used or from curiosity. Leghold traps would only be used with pan-tension devices requiring a heavier animal to activate the trap. Thus, it is not likely squirrels will be taken with this method. Snares could be used to take the primary target species, but these will not likely take and hold a squirrel. If APHIS-WS needed to conduct surveillance in an area where one of these species was present (many are currently outside surveillance areas), APHIS-WS Specialists would implement measures to minimize the potential for take. Cage traps would be baited with unattractive baits, though squirrels are often attracted to a wide variety of baits. APHIS-WS would monitor the traps frequently and may close them when the target species were not likely to be present (e.g., most target species are nocturnal whereas the fox and red squirrels are diurnal, thus, traps could be closed during daylight hours to avoid capture). If APHIS-WS uses leghold traps in any of these squirrels' ranges, pan-tension devices will be used on leghold traps to preclude capture. If a squirrel was inadvertently captured in a cage trap, it would be immediately released unharmed to avoid lethal take and reported to the appropriate wildlife agency, if listed as T&E.

Black-tailed Prairie Dog. The black-tailed prairie dog is listed as a sensitive species. Cage traps and leghold traps would possibly be used in or around prairie dog towns and have the potential for take; snares would probably not be used because prairie dogs are not found in habitat conducive for setting snares, but even so, would not likely capture and hold a prairie dog. APHIS-WS would avoid lethal take by checking the traps frequently during daylight hours to minimize the chance of a prairie dog dying of exposure. Leghold traps would only be used with pan-tension devices for larger animals such as coyotes that preclude capture of prairie dogs. The ORV program has minimal potential for take and will not have more than a minimal chance, if that, to impact this population.

Bobcat. The bobcat is state-listed in five northeastern states (Table 4-11). While bobcats are not likely to be attracted to lures used for raccoons and other predators, they potentially could be. Additionally, they may investigate new things in their environment. From 2001 to 2007, APHIS-WS captured an average of about 4 bobcats annually as targets and nontargets throughout the ORV area (excluded Arizona and New Mexico). Those captured as nontargets were released unharmed. Thus, they could be captured in cage traps, leghold traps, and snares. Northeastern states generally use cage traps to capture raccoons for surveillance, but could use other methods should a species, such as the coyote, which is extremely difficult to lure to a cage trap was targeted. In areas where bobcats are listed, APHIS-WS will ensure that cage traps and leghold traps are checked frequently to ensure prompt release of bobcats and that traps are placed in areas, as possible, to ensure that bobcats do not die from exposure. It should be noted that some bobcats may be targeted during surveillance, primarily in states where they are not listed. However, even so, the APHIS-WS ORV Program will have no adverse effects on their population.

Swift Fox. This species, a small fox, is listed as a species of conservation concern in New Mexico. It could be taken as a nontarget with cage traps, leghold traps, and snares during ORV surveillance activities. To minimize take, cage traps will be checked frequently and placed in areas not exposed to harsh elements as possible. Pan-tension devices will be used on traps to exclude capture of smaller predators. Neck snares will be used at a minimum in the swift fox range. This species was analyzed in the New Mexico Predator Damage Management EA (2006) and it was concluded that the take of up to 100 cumulatively (sportsman harvest and WS take) would have no noticeable effect on the population, estimated at almost 14,000 for New Mexico. Thus, even if WS took a few (some may be targeted in rabies areas), it is doubtful that the population would be impacted to any extent. Therefore, APHIS-WS believes that the ORV Program will not have a noticeable effect on the swift fox population. Of all species, this species would likely experience a very noticeable positive effect from the reduced spread of rabies.

Black Bear/Florida Black Bear. Black bears, including the Florida subspecies, are listed in 4 states as T&E or sensitive species. Precautions will be taken in these states similar to those taken for the Louisiana black bear described in the previous section. The APHIS-WS ORV Program will not adversely impact this species, including the Florida subspecies because take will be minimal. It should be noted that the black bear population in the eastern United States is expanding and growing, with several states now having more frequent damage problems associated with the increase.

Eastern Spotted Skunk. This species is state-listed as a sensitive species in Alabama, Maryland, and

West Virginia. This species is taken as a target or nontarget infrequently (2 from 2001-2007) due to its rarity in most areas where APHIS-WS has been conducting ORV surveillance. However, it is attracted to baits often used in cage traps, the most prevalent method used to take species in the raccoon rabies strain surveillance area. APHIS-WS personnel will check cage traps frequently and keep them in areas where animals captured are not exposed to the elements. Leghold traps will be fitted with pan-tension devices where appropriate (e.g., in area where smaller mammals are not being targeted, including the spotted skunk). Neck snares would not likely capture this species, unless they were of smaller gauge wire for smaller animals. However, this method is rarely used. This species, along with the other skunks, frequently contract rabies and, therefore, are monitored and taken as targets. However, APHIS-WS will not have more than a minor effect on their populations, including those states where they are listed as sensitive.

Ermine and Least Weasel. These two small weasels are listed in Ohio, and Indiana, Maryland and Tennessee as sensitive species, respectively. These species could be taken in cage traps, but will be precluded from capture in leghold traps with pan-tension devices and larger neck snares. Cage traps in their range will be checked frequently and placed in areas that limit exposure to minimize the potential for lethal take. In fact, from 2001 to 2007, APHIS-WS took 2 least weasels (no ermine) in cage traps, but both were released. Therefore, APHIS-WS had no impact from lethal take on these species for the 7 year period. APHIS-WS expects not to have more than a minimal effect, if any, on their populations.

American Marten. This species is state-listed as threatened in New Mexico. It is conceivable that this species could consume ORV baits intended for gray foxes. Although not specifically tested for safety in this species, safety studies on other closely related Mustelid species (e.g., skunk, mink, badger, ferret, and otter) (Rupprecht et al. 1992) indicate martens would not be adversely affected if they were to consume ORV baits. If a marten was inadvertently captured in a trap set for the target species, it would be released unharmed to avoid lethal take and reported to the appropriate state agency to complement their population monitoring data for this state-listed species. An indirect benefit of rabies management programs would be a reduced risk of the species suffering further declines due to a rabies epizootic. Therefore, the proposed action should have no significant impact on this species.

American Badger. This large mustelid is listed as a sensitive species in Indiana and Ohio, the eastern most part of their range. Within the ORV area their range includes only Indiana, Ohio, Arizona, New Mexico, and Texas. This species could be taken with any method used by the APHIS-WS ORV program. However, none were taken by APHIS-WS from 2001 to 2007 including Texas where they are most common. As with other predators, APHIS-WS will check traps and snares often to release badgers alive and keep them in areas, as possible, where they are not exposed to the elements. Badgers are often freed from cage and leghold traps. Neck snares generally do not take badgers as their posture is low to the ground. APHIS-WS believes that few, if any, will be taken in Indiana or Ohio where they are listed.

River Otter. The river otter is listed in Arizona and Indiana as a sensitive species. The Arizona Game and Fish Department reintroduced a Louisiana subspecies (*Lontra canadensis lataxina*) into central Arizona (Verde River drainage) during 1981-1983. Though a debated subspecies, the Southwestern river otter (*L.c. sonrae*), is considered extirpated from Arizona and New Mexico. Some believe, with undocumented sightings, that they still could potentially persist in the lower Colorado River (AGFD 2002). It was believed to have inhabited the Colorado and Gila rivers and their major tributaries, but current distribution is uncertain. The Southwestern river otter was originally state-listed as endangered in New Mexico; however, in 1975 it was removed from listing as the subspecies was considered extirpated throughout its historic range. It is now classified as a protected furbearer with a closed season in New Mexico with the State reintroducing Northern river otters from Oregon (NMDGF 2008). The New Mexico Department of Game and Fish (NMDGF) and cooperating special interest groups are currently in the process of reintroducing otters into the Upper Rio Grande (NMDGF 2008, 2006), which is located within the current outbreak of gray fox variant rabies. Krebs et al. (2003) documented 45 cases of rabies in otters in the U.S. between 1960 and 2000. Thus, an indirect benefit of rabies management programs would be a reduced risk of the species suffering further declines because of a rabies epizootic. Therefore, the proposed action should have no significant adverse impact on this species.

White-nosed Coati. This species is state-listed as an endangered species in Texas and is state-listed as

sensitive in New Mexico. It could be taken as a nontarget with cage traps, leghold traps, and snares during ORV surveillance activities. To minimize take, cage traps will be checked frequently and placed in areas not exposed to harsh elements as possible. Pan-tension devices will be used on traps to exclude capture of larger predators. Neck snares will be used at a minimum in their range. According to ADHS (2007) eight coatis were found positive for rabies in Arizona between 1968 and 1977 and Krebs et al. (2003) documented 12 cases of rabies in coatis between 1960 and 2000. In March, 2008 a coati tested positive for rabies in Pinal County, Arizona (KVOA NEWS 2008). Thus, an indirect benefit of rabies management programs would be a reduced risk of the species suffering further decline because of a rabies epizootic. Therefore, the proposed action should have no significant impact on this species.

USFS and BLM Sensitive Species (USDA 2008c):

USFS and BLM list several species as sensitive and monitor the presence of these species on their lands. Most of the species have been discussed above (e.g. river otter, bobcat, marten, black bear, badger, wolf, spotted skunk, and mink). However, several additional species such as yellow-bellied marmots (*Marmota flaviventris*), Mexican fox squirrel (*Sciurus nayaritensis chiricahuae*), and others are also listed. APHIS-WS has reviewed the lists of USFS (USDA 2008c, 2007d, 2001c) and BLM (USDI 2007, 2005, 1999) sensitive species and has determined that the ORV Program will have no effect on these species. Although few of the sensitive species were specifically tested for the safety of vaccinia baits, safety studies on other species including all vertebrate classes indicate that no species will be adversely affected by the baits (Rupprecht et al. 1992a). As discussed, the distribution of ORV baits will not have an adverse effect on these species. It is expected that the vaccination of animals, the primary target species, and potentially the T&E species, could have a beneficial effect on T&E mammals, especially the carnivores and ungulates which are more likely to be in contact with infected animals, but not be killed by them. Mammals succumb to the rabies virus, if exposed, unless vaccinated. The chance of a T&E mammal species being exposed in ORV treatment areas is much less. However, APHIS-WS does have the chance to incidentally capture sensitive species during monitoring and surveillance. The primary methods used in the ORV monitoring and surveillance programs that could impact USFS and BLM sensitive species are cage traps, leghold traps, and snares with cage traps. However, most of the nontarget species taken will be released at the capture site. Thus APHIS-WS does not anticipate having more than a minimal effect on any species.

4.1.2.2 Alternative 2: Proposed Action (the Preferred Alternative)

Effects of the RABORAL V-RG® Vaccine on Nontarget Wildlife including Threatened or Endangered Species

As with monitoring and surveillance activities, Contingency Actions 1-5 are also expected to have a negligible adverse risk or effect on nontarget wildlife. Contingency Action 2 (treatment with increased bait density to ensure sufficient baits for high density of target species or to bolster antibody response under "normal" target species densities) and Contingency Action 3 (increase baiting frequency more than once/year) utilize ORV. As discussed in Section 4.1.3.1, more than 50 wildlife species from Europe and North America have been tested, including relevant taxonomic groups believed to be potentially at risk for contact with the RABORAL V-RG® vaccine. Rupprecht et al. (1992a) reported that the V-RG vaccine is safe in all species (more than 350 individual animals) tested to date. In addition, there is no evidence of potential harm to target or nontarget species from overdosage of V-RG vaccine by any route or from multiple doses (Rupprecht et al. 1992a). Few nontarget species are likely attracted to the ORV baits, and the few carnivore species that might consume baits would be expected to experience no effect other than possibly becoming immunized against rabies. The ORV program may instead reduce the likelihood of rabies virus exposure by wildlife, including protected species.

New vaccines may be considered for future use by the APHIS-WS ORV program and any environmental effects of the new vaccines on nontargets not analyzed in this EA will be appropriately evaluated in further environmental documentation.

Effects of Capture/Removal Methods (Used in Monitoring and Surveillance or to Reduce Local Populations of Target Species under State Contingency Plans) on Nontarget Species, including Threatened or Endangered Species

Contingency Action 1 involves enhanced surveillance, which may include capture and release or euthanasia of specific nontarget animals for rabies testing. Nontarget wildlife species have been incidentally captured during ORV monitoring and surveillance efforts. As discussed above, over 6 years of data for the ORV program indicate that 88% of nontargets (9,051 nontargets were released out of the total capture of 10,304) were released at the site of capture. The remaining (12%) nontargets were euthanized for rabies diagnostic testing, if they were sick, injured, or were demonstrating strange behavior symptomatic of the rabies virus. The nontargets that were euthanized were not considered to be from low density populations and removal was not expected to have any cumulative adverse effects on populations in the area. Any T&E species incidentally trapped during surveillance activities were released unharmed. Therefore, nontarget populations would not be adversely affected by trapping methods used during enhanced surveillance.

Contingency Action 5 (localized target species population reduction). Some of the methods proposed for use in collecting target species within ORV zones or other contingency action locations have the potential for accidentally catching or killing nontarget animals (i.e., cage traps, leghold traps, or snares). However, measures such as size or location of traps and types of baits used help to minimize the potential for capturing nontargets. Methods such as ground-based and aerial shooting have no effect on nontarget species as they are essentially 100 percent selective for target species. APHIS-WS has analyzed the effects on nontarget species by such methods in numerous EAs, including this EA, which found no significant adverse effects on populations (USDA 2004a, USDA 1997b-j).

Contingency Action 4 (TVR of targets and specific nontargets, such as skunks and feral cats that are known to harbor and transmit rabies) involves the use of a parenteral (injectable) vaccine, such as IMRAB® 3, which can be used "off label" under the direction of veterinarians to vaccinate healthy wildlife. Although targeted species include raccoons in the eastern U.S. and coyotes and gray foxes in Texas, some nontargets have a propensity for contracting, harboring, and spreading the rabies virus which complicates rabies control. Therefore, some nontarget wildlife species, such as skunks, may be vaccinated if incidentally captured during TVR activities. Healthy nontarget animals that are vaccinated should exhibit no effect other than becoming immunized against rabies. The majority of nontargets would be released at the site of capture, whether vaccinated or not. As described above in Contingency Action 1, nontargets would be euthanized for rabies diagnostic testing, if they appear sick, injured, or are demonstrating strange behavior symptomatic of the rabies virus.

Some of the methods proposed for use in collecting target species within ORV zones or other contingency action locations have the potential for accidentally catching or killing free-roaming, domestic animals (i.e., cage traps, leghold traps, or snares). However, measures such as size or location of traps and types of baits used help to minimize the potential for capturing nontargets, including domestic animals. Methods such as ground-based and aerial shooting have no effect on nontarget species as they are essentially 100 percent selective for target species. APHIS-WS has analyzed the effects on nontarget species by such methods in numerous EAs, including this EA, which found no significant adverse effects on populations (USDA 2004a, USDA 1997b-j). Pets and other domestic animals captured incidentally in traps would either be released at the site of capture or brought to the local animal control shelter.

4.1.2.3 Alternative 3: Live-Capture-Vaccinate-Release Alternative

Effects of the RABORAL V-RG® Vaccine on Nontarget Wildlife including Threatened or Endangered Species

Under a live-capture-vaccinate-release alternative, it is expected that little or no ORV use by the states would occur. Thus, there would be no potential for the V-RG oral vaccine to affect nontarget species. Live-capture-vaccinate-release programs would be virtually 100 percent selective for target species and would therefore have little or no potential to affect nontarget wildlife.

Effects of Capture/Removal Methods (Used in Monitoring and Surveillance or to Reduce Local Populations of Target Species under State Contingency Plans) on Nontarget Species, including Threatened or Endangered Species

Under this alternative, APHIS-WS would continue to assist in monitoring activities and, potentially, in localized contingency plans that involve the use of lethal methods such as those discussed under the proposed action. The potential for effects on nontarget species would be similar to the current and proposed actions. The analysis in Sections 4.1.2.1 and 4.1.2.2 shows that effect on nontarget and T&E species would be negligible.

4.1.2.4 Alternative 4: No Animal Surveillance or Monitoring or Lethal Removal Programs Alternative

Effects of the RABORAL V-RG® Vaccine on Nontarget Wildlife including Threatened or Endangered Species

Effects of the V-RG vaccine on nontarget wildlife would be the same as under the current and proposed actions. The analysis in Sections 4.1.2.1 and 4.1.2.2 showed that adverse effects are unlikely. However, more animals are likely to die of rabies if the lack of federal assistance in monitoring and surveillance results in a reduction in the effectiveness of ORV programs.

Effects of Capture/Removal Methods (Used in Monitoring and Surveillance or to Reduce Local Populations of Target Species under State Contingency Plans) on Nontarget Species, including Threatened or Endangered Species

Under this alternative, APHIS-WS would not continue to assist in monitoring activities or local depopulation activities that involve the use of lethal methods such as those discussed under the proposed action. Therefore, the potential for adverse effects on nontarget species would be even lower than under the proposed action. States would still likely implement monitoring and localized population reduction actions even without APHIS-WS, but such activities would likely be on a lesser scale without APHIS-WS funds. However, the analysis in Sections 4.1.2.1 and 4.1.2.2 indicates that the effects on nontarget and T&E species would not be significant under the proposed action and would likely also not be significant even without APHIS-WS assistance.

4.1.2.5 Alternative 5: No Federal Program Alternative

Effects of the RABORAL V-RG® Vaccine on Nontarget Wildlife including Threatened or Endangered Species

Under the no federal program alternative, there would be no potential for APHIS-WS assistance to result in adverse impacts on nontarget wildlife because of ORV programs. However, states would still be free to conduct ORV programs using the V-RG vaccine. Such programs would probably be conducted on a reduced scale without APHIS-WS funds. However, based on the analysis in Section 4.1.2.1 and 4.1.2.2, there is almost no potential for adverse effects on nontarget wildlife because of ORV bait consumption under any scenario involving the distribution of baits containing the V-RG vaccine.

Effects of Capture/Removal Methods (Used in Monitoring and Surveillance or to Reduce Local Populations of Target Species under State Contingency Plans) on Nontarget Species, including Threatened or Endangered Species

Under the no action alternative, the potential for APHIS-WS assistance to result in adverse impacts on nontarget wildlife would be zero. However, states could still conduct ORV programs and monitoring that include the capture and/or killing of wild animals for monitoring purposes or localized depopulation under contingency plans. The potential effect on nontarget wildlife and T&E species from methods used in monitoring and surveillance programs would be less than the proposed action, but, similar to the proposed action, would be insignificant.

4.1.3 Potential for adverse effects on people, pets, and livestock that are exposed to or consume the vaccine laden baits

Direct tests of the safety of V-RG in humans have not been conducted, for understandable reasons. Prior EAs by APHIS have analyzed in detail the potential for adverse effects on humans from V-RG exposure as a result of ORV experimental programs (USDA 1991, 1992). New vaccines may be considered for future use by the APHIS-WS ORV program and any environmental effects of the new vaccines on people, pets, and livestock not analyzed in this EA will be appropriately evaluated in further environmental documentation.

4.1.3.1 Alternative 1: Current Action (the No Action Alternative)

Potential to Cause Rabies in Humans

The nature of the recombinant virus used as the V-RG vaccine is such that it cannot cause rabies. This is because the V-RG vaccine only carries the gene for producing the outer coating of the rabies virus (i.e., rabies virus *glycoprotein*) and not those portions of the virus that could result in replication of the rabies virus which would have to happen for the disease to occur. Implementation of ORV programs would reduce the risk of humans contracting rabies by reducing the chance of encountering rabid animals that have been infected by rabid raccoons, gray foxes, or coyotes.

Potential for Vaccinia Virus to Cause Disease in Humans

The vaccinia virus portion of the V-RG vaccine has been recognized as having the potential to cause infections in persons exposed to the vaccine, either through direct contact with the liquid or through contact with the mouth of an animal that has recently ingested the oral vaccine (USDA 1991, p. 39). Because the vaccinia virus used in the V-RG vaccine is the same type of virus that was used in smallpox eradication, although more *attenuated* or weakened, persons who have been immunized against smallpox would likely not experience any adverse reaction to the vaccinia virus, but would likely experience at worst a "booster" in immunity against vaccinia virus. However, the routine administration of smallpox vaccinations was discontinued after smallpox was eradicated. Thus, a large percentage of the population (particularly younger individuals) has not been vaccinated against vaccinia. Vaccinia virus rarely poses much risk of serious health effects – even when it was *directly applied* (via "scarification" or by scratching the skin) to many hundreds of millions of people during smallpox eradication campaigns, the number that developed vaccinia virus-related illness was only a few per million. In most of those cases the extent of the illness was a mild fever and some lesions or pustules at the site of the injection, followed by full recovery and subsequent immunity to the vaccinia virus (USDA 1991, p. 39; Elvinger 2001). In most people, localized lesions occurred around the site on the arm where the smallpox vaccine was applied, but this a normal and expected response and, in general, no cause for concern.

More severe complications involving the central nervous system can occur with vaccinia virus and the nature of these complications is generally thought to be allergic in nature (USDA 1991, p. 39). Central nervous system complications occurred at an average rate of three per million among persons vaccinated with vaccinia virus (e.g., to prevent smallpox) with about 10 to 30 percent of those cases resulting in death (USDA 1991, p. 39). Thus, the chance of a person dying from direct application of a high dose of vaccinia virus via scarification would be about 1 in a million cases or less. With ORV baits distributed in the wild, people would run far less risk of being exposed to vaccinia virus or the V-RG vaccine in a way similar to deliberate smallpox vaccinations, but would primarily only run the risk of skin contact by handling broken baits or coming into contact with the oral regions of pets that had just consumed a bait. For that type of exposure, the chance of adverse effects from human infection with vaccinia virus would be far less than 1 in a million.

Another highly important characteristic of the V-RG vaccine is that it is weaker (more "attenuated") than the original parent vaccinia strain used in making it, and this has been proven in laboratory tests with mice (USDA 1991, p. 18-19). This characteristic even further reduces the risk of V-RG vaccine causing

vaccinia-related illness in humans. However, persons with immune system deficiencies (e.g., AIDS) run a relatively greater risk of experiencing adverse effects if directly exposed to the vaccinia virus than would persons with normal immune systems (USDA 1991, p. 40; USDA 1995a; USDA *undated a, undated b*). Experiments in mice suggest that immune-deficient people would be at minimal risk of adverse effects when exposed to V-RG vaccine (Hanlon et al. 1997; USDI 1991, p. 41 and Appendix E therein). To aid in further minimizing the potential for adverse effects on humans because of contact with V-RG vaccine, each ORV bait contains a warning label and telephone number advising persons who make contact with baits or the vaccine liquid to call the number for further guidance.

An indirect source of information on this issue is the safety record of laboratories that have worked with the V-RG vaccine (USDA 1991, p. 27). Ordinarily, lab personnel working with infectious materials or animals are protected by immunization and by procedures and equipment that minimize risk. V-RG vaccine has been completely safe for humans in laboratory situations (USDA 1991, p. 27). Potential nonlaboratory exposure of humans in the various European field trials of V-RG vaccine has been considerable, with no program in place that monitors antibody levels of residents before and after the field trials. However, there have not been any reports of increased incidence of sickness in the field trial areas that could be attributable to the V-RG vaccine (USDA 1991, p. 27; G. Moore, TX Dept. of Health, pers. comm. 2001 as cited in USDA 2001a).

Studies of the effects of V-RG vaccine on nonhuman primates can provide an indication of the potential to affect humans (USDA 1991, p. 27). Studies in which squirrel monkeys (*Saimiri sciureus*) and chimpanzees (*Pan troglodytes*) were inoculated with the V-RG vaccine demonstrated that indirect human exposure to the vaccine that might occur via a bite or from contact with body fluids of a recently vaccinated animal is unlikely to produce adverse effects in healthy individuals (Rupprecht et al. 1992b; USDA 1991, p. 27).

McGuill et al. (1998) conducted a retrospective four-year survey of directors of six ORV programs using V-RG vaccine that were conducted from 1992-1996 to evaluate the potential for human health problems. The programs occurred in Florida, Massachusetts, New Jersey, New York, and Texas. Altogether, they involved a total of 109,276 km^2 (42,181 mi^2) of treated area and a total of nearly six million baits distributed. Human contacts with the baits totaled 316, of which 53 resulted in contact with the actual vaccine liquid. The directors of all programs reported that human contact was minimal and that there were no reported adverse reactions in people exposed to the baits. Human contact with the baits was more likely in areas where bait had white labels vs. lettering in black ink, and the authors speculated the reason to be because the white labeled baits were more visible and, thus, more likely to be noticed. The authors concluded that, based on their survey, major concerns about public health risks from V-RG vaccine were unfounded.

Out of approximately 76.6 million baits disbursed since APHIS-WS program inception in 1995, only 1128 people reported contacting or potentially contacting a bait (i.e., picking up bait, finding a bait in yard, or removing bait or sachet from pet's mouth, feces, or vomit - any type of contact with a bait is also defined throughout the document as an "exposure"). This equates to one human exposure per 74,278 baits distributed (0.0013 percent contact cases) (USDA 2008a). In addition, exposure cases were generally insignificant as most involved finding an intact bait. Very few cases involved touching a broken bait, sachet, or liquid vaccine. Furthermore, of the 0.0013 perent of contact cases reported since APHIS-WS ORV program inception in 1995, only two known adverse reactions have occurred (USDA 2004a, 2008a; CDC 2009c).

The first adverse reaction occurred in Ohio in September, 2000, when a woman was bitten by her dog while trying to take away an ORV bait. The vaccine liquid was exposed to the bite area, resulting in localized inflammation and pox virus lesions at the site of the bite, as well as a whole body rash. She further experienced sloughing of the outer layers of skin from some portions of her body, similar to what occurs in the skin condition eczema (C. Rupprecht, CDC, pers. comm. 2001 as cited in USDA 2001a). The woman, who was in her first trimester of pregnancy, is reported to have recovered from complications and gave birth to a 10-lb. baby boy with no apparent adverse health effects (R. Krogwold, OH Dept. of Health, pers. comm. 2001 as cited in USDA 2001a). Most recent reports attribute her response to the vaccinia virus as likely due to the reduced state of immunity typical during pregnancy and an underlying skin disorder

(epidermolytic hyperkeratosis) that the woman already had (C. Rupprecht, CDC, pers. comm. 2001 as cited in USDA 2001a). The woman also tested positive for rabies antibodies three weeks after the exposure, indicating she may also have developed rabies immunity (Rupprecht et al. *unpublished* 2000, Rupprecht et al. 2001). A lawsuit was filed in 2001 and a judgment was determined in favor of the defendant, the Ohio Department of Health, in May 2003. This type of incident appears to be unusual, but, nevertheless, points to the need for continued public information and education activities and field surveillance for accidental human exposure to the V-RG virus.

The second adverse reaction occurred in Pennsylvania in August, 2009. A dog belonging to a 35 year old woman picked up a bait in his mouth and punctured the bait with his teeth. After the dog dropped the bait, the woman picked it up, and V-RG vaccine dripped from the bait onto her right hand and wrist. Before the incident the woman was picking blackberries and had several abrasions on the exposure sites from the blackberry thorns. Approximately 30 minutes passed before the woman was able to wash her hands. The woman had a history of inflammatory bowel disease, for which she was taking multiple immunosuppressive medications (CDC 2009c).

By day 4 after the exposure, the woman reported several red papules on her right hand and was advised to stop taking her immunosuppressant medication. On day 5, a real-time polymerase chain reaction (PCR) assay of scrapings from her papules tested positive for nonvariola *Orthopoxvirus* DNA. Subsequent testing preformed at CDC confirmed the presence of vaccinia virus DNA and rabies virus G protein DNA in papule material and serologic evidence of rabies virus neutralizing antibodies. Neither *Orthopoxvirus* IgG nor IgM antibodies were detected. By day 6 the papules had increased in number and size and the woman was hospitalized. Because of the woman's immune suppression and concerns about progressive vaccinia, she was administered a single dose of human vaccinia immune globulin intravenous (VIGIV) (Cangene Corporation, Winnipeg, Canada). The woman began to experience myalgia and headache, had pronounced redness in her right hand, and right axillary adenopathy by day 11. On day 12, in an attempt to reduce viral replication and prevent progressive vaccinia, a second dose of VIGIV was administered along with the investigational antiviral agent, ST-246 (SIGA Technologies, Corvalis, Oregon). On day 13 the woman began receiving phased reintroduction of her immunosuppressive medications. She was discharged on day 19 and by day 28 all scabs from her legions had separated and her underlying inflammatory bowel disease condition was stable. The woman remained *Orthopoxvirus* IgM negative throughout her illness (CDC 2009c).

This case marks the first infected person taking immunosuppressive medication. The woman was of particular concern for three reasons. First, she was immunosuppressed from medications to treat her inflammatory bowel disorder. Second, she had fresh abrasions and prolonged contact with V-RG vaccine (approximately 30 minutes) before washing her hands. Third, she did not exhibit features of a normal immune response for a person previously naïve for *Orthopoxvirus* infection. Careful monitoring and prompt diagnostic evaluation allowed for timely medical interventions, and the vaccinia virus infection resolved. Although her treatment with 2 doses of VIGIV and ST-246 might have contributed to her recovery, the role of these agents is difficult to assess (CDC 2009c).

Recent bait exposure information during an ORV project in western Pennsylvania (August-September, 2003) revealed that out of 1,710,399 baits distributed over approximately 25,189 km^2, 190 humans or pets were exposed to a bait. This equates to one exposure per 9,002 baits disbursed or 0.011 percent of distributed baits being found by pets or people. In at least 69 of the 190 potential contact cases, the household pet (dog or cat) found the bait; however, the bait and sachet or sachet alone was normally still intact (at least 91 percent of cases). Of the six cases where the sachet was ruptured, no reports were submitted regarding the development of an adverse reaction (i.e., lesions) (USDA 2004c). This ORV project involved hand baiting in several urban areas such as Allegheny County, and aerial baiting of the rural areas. Therefore, pets and other domestic animals were more likely to find the baits and are the primary source for potential and human exposure to ORV baits. Most ORV baiting locations occur over rural or undeveloped lands where human exposure cases can be expected to be much lower.

Although there is no approved anti-viral compound available yet for treatment of suspected vaccinia virus complications, the CDC can make vaccinia immune globulin available to the state on a case-by-case basis,

with a requirement that certain specimens (such as acute and convalescent sera and swabs/scabs of the affected site) be collected for diagnosis (C. Rupprecht, CDC, pers. comm. 2001 as cited in USDA 2001a). This option provides some level of additional assurance that severe adverse effects on humans from vaccinia virus reactions would be successfully treated to avoid significant public health problems.

A recent study indicates vaccinia virus that originated from a strain used in smallpox vaccinations in Brazil may have become established in domestic cows in that country (Damaso et al. 2000). This indicates there is some potential for the use of vaccinia virus to result in a new emerging infectious disease. There is currently no evidence that this type of phenomenon has occurred in the U.S. (C. Rupprecht, CDC, pers. comm. 2001 as cited in USDA 2001a). Also, the vaccinia virus strain used for smallpox vaccination in Brazil was different than the strain that is currently used in the V-RG vaccine, and the vaccinia virus portion of V-RG is more attenuated (i.e., *weaker*) than the strains used in smallpox vaccines (USDA 1991, p. 18-19). Thus, it is less likely that V-RG vaccine would result in the establishment and persistence of vaccinia virus in wild or domestic animals. However, no surveillance or testing of animals for this virus has been done in the U.S. to test this hypothesis (C. Rupprecht, CDC, pers. comm. 2001 as cited in USDA 2001a).

The above information shows there is some potential for unusual circumstances to result in short-term adverse health effects from exposure to the vaccinia virus in the V-RG vaccine. However, the overall risk of such effects appears to be low based on the extremely low rate of reported occurrences in ORV programs.

Potential to Cause Cancer (Oncogenicity)

This issue has been addressed in a previous EA and in formal risk analyses (USDA 1991, p. 40; USDA *undated a, undated b*). Vaccinia virus is not known to be a tumor-inducing virus. There have been no documented reports of oncogenicity associated with natural vaccinia virus infections in any animal species. The recombinant DNA methods used for preparation of the V-RG vaccine do not introduce any known oncogenes (i.e., cancer-causing genes) into the vaccinia virus strain that could cause it to become tumor-inducing.

Based on this information, risks to humans from contact with the V-RG vaccine are believed to be minimal. The risk and potential severity of adverse effects from rabies exposures in humans would probably be greater without ORV programs than would be the risk of serious adverse effects from vaccinia virus infections with ORV programs.

Potential for Adverse Effects on Pet Dogs or Other Domestic Animals that Might Consume the Baits

Rupprecht et al. (1992a) and Pastoret et al. (1995) summarized the results of V-RG safety trials in nontarget species (USDA 2004a). The studies included oral vaccination of domestic dogs, cats, cattle, and sheep and found no adverse effects on those species. More than 76.6 million ORV baits using the RABORAL V-RG® vaccine have been distributed in the U.S. during the APHIS-WS program thus far with no reported adverse effects on domestic animals (USDA 2008b). Between 1995 and 2006, 843 instances have been reported where a pet or other domestic animal had contact with a bait (i.e. carrying bait in mouth, chewing bait, vomiting sachet, etc. are considered "contact" or "exposures" for the purposes of this document). This equates to 0.001% contact cases or 1 domestic animal per 90,807 baits disbursed (USDA 2008b).There is no evidence of potential harm to target or nontarget species, including domestic dogs, cats, cattle, and sheep, from overdosage of RABORAL V-RG® vaccine by any route; a number of species have been dosed with 2 to 10 times the amount of vaccine in an individual ORV bait without adverse effects (USDA 1991, p. 47; Rupprecht et al. 1992a). Therefore, even if domestic animals received multiple doses of vaccine by consuming multiple baits, no adverse effects would be expected to occur.

As discussed in Section 4.1.1.2, a recent study indicates vaccinia virus that originated from a strain used in smallpox vaccinations in Brazil may have become established in domestic cows in that country (Damaso et al. 2000). This indicates there is some potential for use of vaccinia virus in vaccinations to result in a new emerging infectious disease in domestic animals; however, there is currently no evidence that this type of

phenomenon has occurred in the U.S. (C. Rupprecht, CDC, pers. comm. 2001 as cited in USDA 2001a). Also, the vaccinia virus strain used for smallpox vaccination in Brazil was different than the strain that is currently used in the V-RG vaccine, and the vaccinia virus portion of V-RG is more attenuated (i.e., *weaker*) than strains used in smallpox vaccines (USDA 1991, p. 18-19). Thus, it is less likely that V-RG would result in the establishment and persistence of vaccinia virus in wild animal populations.

Instances have been reported where a pet dog has consumed several baits and then vomited the plastic sachets (R. Hale, Ohio Dept. of Health, pers. comm. 2001 as cited in USDA 2001a). Reports of these types of instances have been few, and the dogs have reportedly not experienced any substantive or long term adverse effects. USDA (2008b) documented that of the 76.6 million baits distributed during the APHIS-WS program between 1995 and 2006 only 843 instances have been reported where a pet or other domestic animal had contact with a bait. This equates to 1 domestic exposure per 90,807 baits disbursed or 0.001 % contact cases. No cases of adverse reaction in pets or other domestic animals have ever been reported during the APHIS-WS program. In addition, USDA (2008b) documented that 172 incidents were reported where pets came into contact with a bait in 2006; however, no reports of pets or other domestic animals experiencing any type of adverse reaction were submitted. Domestic animals that bite into and ingest a bait are most likely to be immunized against rabies or receive a boost from a previous vaccination. USDA (2008b) also documented the number of baits distributed in those states conducting ORV programs and the number of people who reported contact or potential contact with a bait by their pet or other domestic animal (i.e., carrying bait in mouth, chewing bait, vomiting sachet). In 2006, 172 incidents were reported where pets came into contact with a bait. The number of documented exposures equates to 0.001% of the 12.1 million baits distributed in 2006 or one domestic animal exposure per 70,391 baits distributed (USDA 2008b). In the monitoring report (USDA 2008b), APHIS-WS concluded that adverse cumulative impacts to pets and other domestic animals continue to be negligible.

Research is underway to identify a vaccine that is safe and effective not only in raccoons and foxes, but in other carnivores as well such as skunks and dogs. Live modified canine adenovirus type 2 (CAV2), which is already used worldwide for the routine vaccination of dogs against both CAV1 and CAV2 and has an excellent safety record (Fisher et al. 2002, Appel et al. 1975), represents an almost ideal vaccine vector for immunization of carnivores against rabies (Li et al. 2006). The use of different vaccines is anticipated to have similar effects on pet dogs and other domestic animals as RABORAL V-RG®. Research tests such as Rupprecht at al. (1992) will be conducted to determine potential side-effects of new the new vaccine to confirm the effects to pet dogs and other domestic animals. Additionally, CAV2 is licensed for use as a live vaccine for dogs and has an excellent efficacy and safety record (Li et al. 2006). New vaccines may be considered for future use by the APHIS-WS ORV program and any environmental effects of the new vaccines on pet dogs or other domestic animals not analyzed in this EA will be appropriately evaluated in further environmental documentation.

4.1.3.2 Alternative 2: Proposed Action (the Preferred Alternative)

Potential for Adverse Effects on People that Become Exposed to the Vaccine or the Baits

Implementation of Contingency Action 2 (treatment with increased bait density to ensure sufficient baits for high density of target species or to bolster antibody response under "normal" target species densities) and Contingency Action 3 (increase baiting frequency more than once/year) as described in Section 1.2.1 are not expected to increase the potential for adverse effects on humans. The potential for humans to become exposed to a bait is remote (1 human contact per 74,278 baits distributed under current baiting practices) (USDA 2008a).

Potential for Adverse Effects on Pet Dogs or Other Domestic Animals that Might Consume the Baits

The EA concluded that the ORV program had a negligible risk of adversely affecting pet dogs or other domestic animals that might consume ORV treated baits. A similar impact is expected with regard to Contingency Action 2 (treatment with increased bait density to ensure sufficient baits for high density of target species or to bolster antibody response under "normal" target species densities) and Contingency Action 3 (increase baiting frequency more than once/year). Rupprecht et al. (1992) and Pastoret et al.

(1995) summarized the results of RABORAL V-RG® safety trials in nontarget species (USDA 2004a). The studies included oral vaccination of domestic dogs, cats, cattle, and sheep and found no adverse effects on those species. In addition, more than 66.3 million ORV baits using the V-RG vaccine have been distributed in the U.S. with no reported adverse effects on pets or other domestic animals. The potential for domestic animals to become exposed to a bait is remote, even with an increase in baiting density or frequency during localized contingency actions. A beneficial effect involved includes the possibility of vaccinating strays and other previously unvaccinated pets, thereby immunizing them against the rabies virus.

Oral rabies vaccines and baits are not used during Contingency Action 1 (enhanced surveillance, which may include capture and release or euthanasia of target and specific nontarget animals for rabies testing) or Contingency Action 5 (localized target species population reduction), therefore, there would be no effect on domestic animals with regard to vaccines or baits.

New vaccines may be considered for future use by the APHIS-WS ORV program and any environmental effects of the new vaccines on pet dogs or other domestic animals not analyzed in this EA will be appropriately evaluated in further environmental documentation.

4.1.3.3 Alternative 3: Live-Capture-Vaccinate-Release Alternative

Under this alternative, APHIS-WS would not provide funds to purchase or distribute ORV baits but would provide such funds for live-capture-vaccinate-release programs. For purposes of comparison, it is assumed that, with adequate APHIS-WS funding to conduct these types of programs, states would choose not to implement ORV programs.

Potential for Adverse Effects on People that Become Exposed to the Vaccine or the Baits

Live-capture-vaccinate-release programs might be as effective as ORV programs in stopping the spread of the three variants of rabies if conducted throughout all areas where ORV programs would have been conducted under the proposed action. The method itself would not present risk of causing rabies in members of the public. The risk of increases in human rabies cases because of the failure to stop epizootics of raccoon, gray fox, and coyote rabies would be about the same as with ORV programs under the proposed action. Because it is assumed that ORV using the vaccinia virus vector in V-RG would not be used by states or by APHIS-WS, there should be no risk of vaccinia virus infections in humans caused by contact with the vaccine from ORV baits. No increased risk of cancer would result from this alternative.

Potential for Adverse Effects on Pet Dogs or Other Domestic Animals that Might Consume the Baits

Live-capture-vaccinate-release programs would pose no risk of inadvertent vaccine exposure to pets or other domestic animals.

4.1.3.4 Alternative 4: No Animal Surveillance or Monitoring or Lethal Removal Programs Alternative

Under this alternative, the states would have to fund collection of target species for monitoring and surveillance without APHIS-WS funds or personnel assistance. This would likely mean that less monitoring would be conducted. If insufficient monitoring and surveillance occurs along the leading edge of the advancing rabies strains, rabies managers would not be able to plan the most efficient and effective use of ORV baiting strategies to control the specific strains spread by wild carnivores. One possibility is that, without adequate surveillance, managers would have to resort to distributing ORV baits across more areas than necessary. The ability to stop or prevent the forward advance of specific rabies strains would likely be reduced, perhaps to the point that cooperative efforts fail.

Potential for Adverse Effects on People that Become Exposed to the Vaccine or the Baits

This alternative would present the same risk as the proposed action. Since the V-RG vaccine cannot cause

rabies, there would be no potential for the ORV baits to cause rabies in humans under this or any other alternative or scenario involving the distribution of V-RG oral vaccine baits. However, there would be a greater risk of human rabies cases if the lack of federal assistance in monitoring and surveillance results in a reduction in the effectiveness of ORV programs. As shown by the analysis in Section 4.1.1.2, the risk of V-RG vaccine in ORV baits causing any health problems in humans is exceedingly low. This alternative would result in no probable risk of causing cancer in humans or animals, similar to the proposed action and other alternatives.

Potential for Adverse Effects on Pet Dogs or Other Domestic Animals that Might Consume the Baits

Under this alternative, the potential for adverse effects on domestic animals from ORV baits would be the same as the proposed action. Based on the analysis in Section 4.1.4, there is almost no potential for significant adverse effects on domestic animals because of ORV bait consumption under any scenario involving the distribution of ORV baits containing the V-RG vaccine. Stopping or preventing the spread of rabies would result in beneficial effects on domestic animals by reducing their likelihood of contracting rabies. However, more domestic animals are likely to die of rabies if the lack of federal assistance in monitoring and surveillance results in a reduction in the effectiveness of ORV programs.

4.1.3.5 Alternative 5: No Federal Program Alternative

Under this alternative, no APHIS-WS funds would be available for purchasing ORV baits. The states would still likely fund ORV programs to some degree without APHIS-WS' assistance. They may seek other sources of federal funds to complement state or other sources of funding. Thus, people would still have the potential to come into contact with baits or the vaccine; however, the potential would be less. Actual risks of adverse effects from exposure to vaccinia virus would still be exceedingly low and insignificant.

It is conceivable that federal coordination of ORV programs would actually result in fewer numbers of ORV baits used over the years or that ORV bait use in many areas would be for shorter time periods. This is because effective federal coordination may have a better chance of stopping or even eliminating one or more of the several rabies strains from large areas than if the individual states are left to themselves to conduct ORV programs.

Based on the following information, risks to humans from contact with the V-RG vaccine are believed to be minimal with or without APHIS-WS funding or assistance. The risk and potential severity of adverse effects from rabies exposures in humans would probably be greater without ORV programs than would be the risk of serious adverse effects from vaccinia virus infections with ORV programs.

Potential to Cause Rabies in Humans

The no federal program alternative would most likely result in greater risk of human exposure to rabies than the proposed action because state-run ORV programs without APHIS-WS funds would have less chance of being successful in stopping or preventing the spread of the three rabies variants. Therefore, an absence of APHIS-WS cooperative funding could be expected to result in increased risk of human rabies cases because of expanding epizootics. The V-RG vaccine would not cause rabies under any expected scenario involving the distribution of ORV baits.

Potential for Vaccinia Virus to Cause Disease in Humans

Under the no federal program alternative, V-RG oral vaccine containing the vaccinia virus vector would still be available for state-approved use in ORV programs. Such programs would probably be on a lesser scale without APHIS-WS funds. The potential for vaccinia-related disease cases would be lower than under the proposed action. The likelihood that any cases would occur is extremely remote under any expected scenario involving the distribution of ORV baits.

Potential to Cause Cancer (Oncogenicity)

Under the no federal program alternative, V-RG oral vaccine containing the vaccinia virus vector would still be available for state-approved ORV programs but would probably be used on less total land area without APHIS-WS funds. Because vaccinia virus used in the V-RG vaccine is not a cancer-causing agent, expected scenarios involving the use of ORV baits by the states would not result in increased cancer risks.

Potential for Adverse Effects on Pet Dogs or Other Domestic Animals that Might Consume the Baits

Under the no federal program alternative, the potential for APHIS-WS assistance to result in adverse impacts on domestic pets or other domestic animals would be zero. However, states could still conduct ORV programs, but such programs would probably be accomplished on a reduced scale without APHIS-WS funds. Based on the analysis in Section 4.1.3.1 and 4.1.3.2, there is almost no potential for adverse effects on domestic animals because of ORV bait consumption under any scenario involving the distribution of baits containing the V-RG vaccine. On the other hand, failure to stop or prevent the spread of rabies would result in adverse effects on domestic animals by increasing their likelihood of exposure to rabid wild animals.

4.1.4 Potential for the recombined V-RG virus to "revert to virulence" or recombine with other viruses and result in a virus that could cause disease in humans or animals.

4.1.4.1 Alternative 1: Current Action (the No Action Alternative)

Potential for the Recombined V-RG Virus to "Revert to Virulence" and Result in a Virus that could Cause Disease in Humans or Animals

The concern here is whether the V-RG recombinant virus is genetically stable so that it would not become virulent (i.e., capable of causing disease) after it replicates (or reproduces) in animals that eat ORV baits containing the RABORAL V-RG® vaccine and, perhaps, be transmitted on to other animals. This issue was addressed in previous EAs and in formal risk assessments by APHIS (USDA 1991, p. 41-42; USDA *undated a*, *undated b*). The Wistar Institute conducted experiments with mice in which the V-RG was

"subpassaged[7]" four times into groups of mice (results cited in USDA 1991, p. 41). The V-RG virus could not be found after passage through the second or third groups of mice. The experiments demonstrated that the ability of the V-RG virus to cause disease does not increase by repeated animal passage, thus "reversion to virulence" is unlikely. Further alleviating the concern about this issue is the evidence that V-RG virus does not transmit readily to other animals from animals that have consumed ORV baits (Rupprecht and Kieny 1988). Impacts of the program on this issue are expected to remain insignificant or nonexistent (USDA 2008b).

Further, the use of potential new vaccines such as CAV2 RVG is expected to have similar results. New vaccines may be considered for future use by the APHIS-WS ORV program and any environmental effects of the new vaccines or on their potential to "revert to virulence" not analyzed in this EA will be appropriately evaluated in further environmental documentation.

Potential for the RABORAL V-RG® Vaccine to Recombine with Other Viruses in the Wild to Form New Viruses that could Cause Disease in Humans or Animals

The concern here is whether the RABORAL V-RG® vaccine in the ORV baits might encounter other

[7] This means the V-RG was inoculated into one group of mice from which material containing the virus was obtained later and injected into a second group of mice, and then material obtained from the second group was injected into a third group, etc., until four such passages had been conducted.

viruses in animals, exchange genetic material with them during replication, and result in new viruses that could cause serious diseases in humans or animals. This potential recombination has been recognized as being more probable with wild pox viruses that are genetically similar to the vaccinia virus used as the vector in the RABORAL V-RG® vaccine.

Wild pox viruses present in the U.S. include skunk, rodent, and raccoon pox viruses (C. Rupprecht, CDC, pers. comm. 2001 as cited in USDA 2001a). One type of wild pox virus that would logically be considered for the possibility of recombination with vaccinia virus is raccoon pox which could occur in raccoons targeted by ORV programs in the eastern U.S. For this type of unanticipated spontaneous recombination to occur, the V-RG and RP would have to simultaneously infect the same cells in the same animal at the same time. RP has not been found to be prevalent in the environment, with only two concurrent isolations (or detections) of it having occurred in the U.S. (Herman 1964, cited in USDA 1991, p. 42). Laboratory experiments on mice infected with RP and inoculated with V-RG showed no adverse effects on the mice (USDA, 1991, p. 42).

The Wistar Institute identified three circumstances that would have to occur simultaneously for there to be a chance of a hazardous recombination between V-RG and RP virus: (1) they would have to occur at the same time in the same animal; (2) "genome contact" (i.e., contact between the actual genetic material in the two viruses as they replicate in an infected cell); *and* (3) the regeneration of the gene that was previously removed from the vaccinia virus (known as the thymidine kinase "TK" gene) (USDA 1991, p. 42). Wistar determined the probability of all three circumstances occurring at the same time was 1 chance in 100 million or less (USDA 1991, p. 42). Also, if this did somehow occur resulting in a recombined virus with the functional "TK" gene reestablished, the properties and virulence of the new virus would probably be similar to the original recipient virus which is vaccinia (USDA *undated b*, p. 28). Vaccinia only causes mild short-term symptoms in most cases (i.e., similar to the localized rash and pustules that occurred on the arms of many persons who received smallpox vaccinations) (USDA 1991, p. 39; Elvinger 2001). Thus, recombination with wild viruses is unlikely, but, if it did occur, it is also unlikely to result in significant adverse effects on animals or people.

The combination of two types of pox viruses in rabbits or hares (leporipoxviruses) has been known to occur (Omlin 1997), but the combination of a leporipoxvirus with another unrelated pox virus has not been known to occur (USDA 1991, p. 42). Rare examples of recombination between different poxviruses in animal hosts have been documented, although the probability of two viruses infecting the same cell at the same time (which is required for recombination to occur) under natural conditions remains very low (Omlin 1997). Recombination of V-RG with viruses other than orthopoxviruses is not likely (Omlin 1997). In formal risk analyses, APHIS concluded that the probability of recombination with other orthopoxviruses would be limited due to the low prevalence of orthopoxviruses in wildlife species in the U.S. (USDA *undated a, undated b*).

Hahn (1992) concluded that vaccines developed by the newer recombinant techniques such as the ones used to make V-RG vaccine, are no more hazardous than vaccines created by more conventional methods (e.g., "attenuation" and "fractionation"). He further indicated that, with recombinant technology, the potential for ending up with a dangerous virulent strain is probably less than with the older "hit-or-miss" methods, because the specific genetic material responsible for making a virus virulent can be removed or altered which makes the virus safer.

This analysis, which incorporates previous analyses by reference, supports a conclusion that adverse environmental effects from spontaneous recombination of V-RG with other wild viruses are exceedingly unlikely. This is further supported by the fact there have been no observed adverse effects in wildlife and humans both in Europe and North America following a number of years of experimental and field use of the V-RG vaccine.

Further, the use of potential new vaccines such as CAV2 RVG is expected to have similar results. New vaccines may be considered for future use by the APHIS-WS ORV program and any environmental effects of the new vaccines or on their potential to "revert to virulence" not analyzed in this EA will be appropriately evaluated in further environmental documentation.

4.1.4.2 Alternative 2: Proposed Action (the Preferred Alternative)

Potential for the recombined V-RG virus to revert to virulence and result in a virus that could cause disease in humans or animals

A similar impact, as with Alternative 1, is expected with regard to Contingency Action 2 (treatment with increased bait density to ensure sufficient baits for high density of target species or to bolster antibody response under "normal" target species densities) and Contingency Action 3 (increase baiting frequency more than once/year). The V-RG vaccine is not used in Contingency Action 1 (enhanced surveillance, which may include capture and release or euthanasia of target and specific nontarget animals for rabies testing), Contingency Action 4 (TVR of targets and specific nontargets, such as skunks and feral cats that are known to harbor and transmit rabies), and Contingency Action 5 (localized target species population reduction). Therefore, APHIS-WS has determined no effect regarding this potential issue.

Potential for the V-RG virus to recombine with other viruses in the wild to form new viruses that could cause disease in humans or animals

A similar impact, as with Alternative 1, is expected with regard to Contingency Action 2 (treatment with increased bait density to ensure sufficient baits for high density of target species or to bolster antibody response under "normal" target species densities) and Contingency Action 3 (increase baiting frequency more than once/year). The V-RG vaccine is not used in Contingency Action 1 (enhanced surveillance, which may include capture and release or euthanasia of target and specific nontarget animals for rabies testing), Contingency Action 4 (TVR of targets and specific nontargets, such as skunks and feral cats that are known to harbor and transmit rabies), and Contingency Action 5 (localized target species population reduction). Therefore, APHIS-WS has determined that adverse effects regarding this potential issue would be minimal.

4.1.4.3 Alternative 3: Live-Capture-Vaccinate-Release Alternative

Under this alternative, it is assumed that the states would not use ORV baits with the V-RG vaccine. Thus, there would be no potential for the V-RG virus to revert to a more virulent strain to recombine with other viruses in the wild.

4.1.4.4 Alternative 4: No Animal Surveillance or Monitoring or Lethal Removal Programs Alternative

This potential would be the same as under the proposed action. The risk of adverse effects from the V-RG virus possibly reverting to a more virulent strain or recombining with other viruses in the wild and resulting in significant adverse effects on humans or animal health would be highly remote.

4.1.4.5 Alternative 5: No Federal Program Alternative

Potential for the recombined V-RG virus to revert to virulence and result in a virus that could cause disease in humans or animals

Under the no federal program alternative, ORV baits with the V-RG vaccine would probably still be used by the states even without APHIS-WS funds, although such use would likely be on a reduced scale. As shown by the analysis in Sections 4.1.4.1 and 4.1.4.2, the potential for serious environmental effects with regard to this issue is very low.

Potential for the V-RG virus to recombine with other viruses in the wild to form new viruses that could cause disease in humans or animals

Under the no federal program alternative, ORV baits with the V-RG vaccine would probably still be used by the states even without APHIS-WS funds, although such use would likely be on a reduced scale. As

shown by the analysis in Section 4.1.4.1 and 4.1.4.2, the potential for serious environmental effects with regard to this issue is very low.

4.1.5 Potential for aerially dropped baits to strike and injure people or domestic animals

4.1.5.1 Alternative 1: Current Action (the No Action Alternative)

ORV baits would be distributed from aircraft at an average density of 27 baits per km^2 (70 baits per mi^2) in the coyote rabies zone and 39 baits per km^2 (100 baits per mi^2) in the gray fox rabies zone in Texas under the proposed action. Bait density would average 75 baits per km^2 (194 baits per mi^2) in eastern states where raccoon rabies is targeted. These densities are sparse enough to predict that the chance of a person being struck and harmed by a falling bait is extremely remote. For example, if 100 persons were standing outdoors in a square mile of area in which ORV baits were being dropped, and each person occupies about 2 square feet of space at the time that baits were dropped, the chance of being struck would be 1 in 139,000 (200 ft^2 total space occupied by persons divided by 27.8 million ft^2 per mi^2). The negligible risk of being struck is further supported by the fact that out of more than 76.6 million baits distributed in the U.S. by APHIS-WS between 1995 and 2006, only 10 incidents have been reported in which a person claimed to have been struck by a falling bait (0.00001 percent chance of being struck by a bait or 1 strike per 7.6 million baits dropped) (USDA 2008b). None of the reports since APHIS-WS' ORV program inception have resulted in any injury or harm to the individuals involved. Eight of these incidents occurred in Pennsylvania, Texas, Ohio, and Ontario and did not result in any significant injury or harm to the individuals involved (G. Moore, TX Dept. of Health, pers. comm. 2001; R. Hale, OH Dept. of Health, pers. comm. 2001; C. MacInnes, Ontario Ministry of Natural Resources, pers. comm. 2001 all as cited in USDA 2001a).

Of the 12.1 million baits that were distributed by APHIS-WS in 2006, no incidents were reported in which a person claimed to have been struck by a falling bait . No reports of injury were received during the 2006 APHIS-WS ORV program (USDA 2008b). In 2006, no cases were documented involving falling baits striking or injuring domestic animals. Additionally, in 2006, no reports were received regarding baits striking property (USDA 2008b). The potential for falling baits to strike or injure people or domestic animals continues to be insignificant. Impacts of the program on this issue are expected to remain negligible. The potential for baits to strike people or animals is further mitigated by the fact that bait disbursal crews avoid dropping baits into cities, towns, and other areas with human dwellings, or if humans are observed below. Hand placement or dropping of baits from slower moving helicopters to allow for more precise control over the areas on which the baits are dropped would primarily be used in urban parks or suburban situations, which would further reduce the risk of being struck.

4.1.5.2 Alternative 2: Proposed Action (the Preferred Alternative)

A similar impact, as with Alternative 1, is expected with regard to Contingency Action 2 (treatment with increased bait density to ensure sufficient baits for high density of target species or to bolster antibody response under "normal' target species densities) and Contingency Action 3 (increased baiting frequency more than once/year). Bait distribution densities are spares enough to predict that the chance of a person being struck and harmed by a falling bait is extremely remote. In fact, the chance of being struck by a bait is 1 per 7.6 million baits dropped (USDA 2008b). In addition, trained air crews avoid dropping baits into cities, towns, and other areas with human dwellings, or if humans are observed below. In areas of higher human density, ground placement of baits is normally used. Thus, the potential of falling baits striking people, domestic animals, or property continues to be insignificant, even with an increase in baiting density or frequency used during localized contingency actions.

ORV baits are not used during Contingency Action 1 (enhanced surveillance, which may include capture and release or euthanasia of target and specific nontarget animals for rabies testing), Contingency Action 4 (TVR of targets and specific nontargets, such as skunks, and feral cats that are known to harbor and transmit rabies), and Contingency Action 5 (localized population reduction). Therefore, APHIS-WS has determined that adverse effects regarding this potential issue would be minimal.

4.1.5.3 Alternative 3: Live-Capture-Vaccinate-Release Alternative

Under this alternative it is assumed there would be few or no ORV baits dropped from aircraft. Thus, there would be no potential for such baits to strike people or animals.

4.1.5.4 Alternative 4: No Animal Surveillance or Monitoring or Lethal Removal Programs Alternative

This potential would be the same as under the proposed action. The risk of striking and injuring people or domestic animals with baits is highly remote.

4.1.5.5 Alternative 5: No Federal Program Alternative

Under the no federal program alternative, the potential for APHIS-WS assistance to result in this risk would be zero. States could still implement ORV programs, but such programs would probably be accomplished on a lesser scale without APHIS-WS funds. As discussed in Sections 4.1.5.1 and 4.1.5.2, the risk of persons or animals being struck by ORV baits is extremely remote.

4.1.6 Cost of the program in comparison to perceived benefits

4.1.6.1 Alternative 1: Current Action (the No Action Alternative)

Raccoon Rabies ORV Programs

The median number of annual human death rates from rabies in the U.S. is low – less than 3 per year (Childs 2002, Krebs et al. 2003b). Still, this disease poses a major economic and public health concern due to diverse costs incurred from human or domestic animal contacts with suspected rabid animals such as veterinary, medical, legal, and insurance costs (Meltzer and Rupprecht 1998 a,b).

Human postexposure prophylaxis (PEP) and pet vaccinations are probably the two greatest factors determining the societal costs of rabies (Meltzer 1996). In an archival and interview study to determine direct and indirect costs associated with human exposures to suspected rabid wildlife in two southern California counties, Shwiff et al. (2007) estimated a mean direct cost of a suspected human rabies exposure was $2,564 and the mean indirect cost was $1,124. Thusly, it was concluded that indirect costs of suspected human rabies exposures can add one third to the direct costs commonly associated with these cases and that suspected rabies exposures exert sizable economic burdens on local municipalities and county governments in rabies endemic areas.

Sterner and Sun (2004) recently developed a comprehensive model of the costs associated with rabies. They analyzed minimum-maximum estimates of the individual costs (i.e. per unit cost) for 11 factors in an attempt to reduce the uncertainty of economic costs and to identify key sources of potential savings as a result of rabies management activities. The 11 factors included: 1) pet vaccination, 2) livestock vaccination, 3) pet replacement, 4) livestock replacement, 5) pre-exposure prophylaxis, 6) post-exposure prophylaxis, 7) adverse reactions, 8) public health, 9) animal control, 10) quarantine, and 11) human death. Sterner and Sun (2004) stated that although pet vaccination and post-exposure prophylaxis have traditionally been cited as the major cost impacts of the disease, they found that the maximum and largest ranges per unit cost were associated with livestock replacement, post-exposure prophylaxis, animal replacement, and human death. Further, the maximum values for livestock replacement and human death were estimated to be as high as $30,000 and 500,000 respectively. These factors help reduce the uncertainty surrounding the economic impacts of wildlife rabies and allow for improved policy decisions involving the development and distribution of ORV for wildlife.

Meltzer (1996) described a model for estimating the costs and benefits of using oral vaccines to stop or prevent raccoon rabies and identified factors important for consideration. Preventing raccoon rabies from moving into an area is generally much less expensive than the cost of elimination. The cost of eliminating

raccoon rabies from New York using ORV was estimated at $72.9 million over a 10-year period. Statewide cost of raccoon rabies was estimated at $0.23 per capita pre-epizootic to $0.89 per capita once the area became infected. Comparing 1990 to 1994, New York found the rabies epizootic increased that state's annual costs over $10 million per year (Huntley et al. *unpublished* 1996).

Benefit-cost ratios of using V-RG vaccine in oral baits to control raccoon rabies in two counties in New Jersey were estimated by Uhaa et al. (1992). In that study, the estimated value of benefits was 2.21 times the cost for the most expensive vaccination program. The least expensive program resulted in benefits that exceeded costs by a factor of 6.8. The authors concluded that the program would be cost effective (Uhaa et al. 1992).

Kemere et al. (2001) conducted a detailed analysis of the expected costs compared to the expected value of benefits for establishing a barrier to prevent further westward spread of raccoon rabies that would extend from Lake Erie to the Gulf of Mexico. The barrier would combine natural barriers provided by geographical features such as the Appalachian Mountains with ORV zones. All program costs and benefits (in terms of avoided costs) were discounted to present values to provide valid comparisons. The types of costs avoided by preventing the westward spread of raccoon rabies included post-exposure vaccination treatments for humans, need for increased livestock vaccinations, and costs of increased surveillance and monitoring of rabies in wildlife and domestic animals (including laboratory diagnostic costs, costs of preparing samples for testing, and animal bite investigations). The analysis did not factor in an economic benefit for lives saved. It also did not factor in the potential benefit of decreased costs associated with nuisance and damage by raccoons or of raccoon impacts on ground nesting birds that might occur if the epizootics were not treated and raccoon populations declined as a result. It is probable that such a potential benefit would be short term (1-3 years) until local raccoon populations recovered, or were affected by other disease cycles. However, these types of outcomes are largely unpredictable.

Costs of establishing and maintaining the raccoon rabies barrier are estimated to total between $58 million and $148 million, while the estimates of net benefits ranged between $48 million and $496 million. The analysis indicated that a large scale ORV program should be economically feasible and that net economic benefits would most likely be substantial (Kemere et al. 2001).

WS and cooperators continue to shift from fishmeal polymer (FMP) baits to coated sachets (CS). At $1.00/bait CS's are $0.25 less expensive than FMP baits, less likely to cause damage from aerial distribution, more palatable to smaller carnivores like skunks, and perform generally at least as well as FMP baits based on field titer responses from Cornell University. The shift to CS's is currently viewed as only an interim management step until improved or new baits can be developed, licensed and produced (USDA 2009a).

Surveillance activities were conducted in all states participating in ORV to assess aerial and/or ground ORV baiting efficacy, summer versus fall baiting schedules, and seasonal raccoon movement in a number of states. Numerous density studies were also conducted in the majority of participating states to determine raccoon densities in relation to habitat, elevation, and numbers of baits distributed. In areas where raccoon densities are low, baiting may be reduced to increase cost effectiveness of the ORV program (USDA 2009a).

Gray Fox and Coyote Rabies ORV Programs in Texas

Although no detailed economic analysis of the costs and benefits of the gray fox and coyote rabies programs has been conducted, the assumption about the potential spread of rabies across much of the U.S. without effective ORV programs is most likely also valid for the gray fox and coyote rabies variants. Thus, it is probable that the Texas ORV programs would be found to be cost effective under similar analysis.

4.1.6.2 Alternative 2: Proposed Action (the Preferred Alternative)

Raccoon Rabies ORV Programs

Contingency actions, such as TVR and population reduction, may be more labor intensive and time consuming, but these actions are conducted relatively infrequently and on a localized scale to prevent the spread of rabies during emergency situations. When used as a part of an integrated rabies management program with ORV, the benefits (I.E., bolstering population immunity, stopping disease spread to new areas) likely outweigh the costs involved.

- In Maryland, 19 rabies cases were reported per year on the Annapolis Peninsula alone before the ORV program began in 1998. Between 1998 and 2007, with the intervention of 412,441 FMP baits, only 21 raccoons have been reported from the Annapolis Peninsula, indicating success of the Anne Arundel County ORV Program (USDA 2009a).

- In New York, an ORV program was implemented in 1998 to prevent the northward spread of the virus. Prior to the ORV program in New York, almost 150 positive rabies cases were recorded in 1998 and 1999 in the St. Lawrence Region (SLR) ORV zone alone. In 2007, New York reported a decline to 35 positive rabies cases in the SLR zone. Further, out of an additional 3089 animals tested for rabies from the three remaining NY ORV zones on 95 were reported positive. The majority (75) of these came from the Long Island ORV zone which, as of 2007, is only in its fourth year of operation. (USDA 2009).

- Vermont has been participating in the ORV program since 1996. However, in June 2006, the province of Quebec confirmed its first-ever case of raccoon rabies approximately 11 km (6.6mi) north of the Vermont border. Subsequently, a second positive case in Quebec was discovered in July 2007. In a continuing effort to stop the spread of raccoon rabies in northern Vermont, WS implemented several TVR campaigns throughout the standard and high bait density ORV zones. In 2008, WS will continue coordinated TVR efforts, but shift focus to the Lake Memphremagog basin in Orleans County to prevent rabies from entering Quebec from that area. WS will maintain communications and work closely with Quebec officials to coordinate field work and maximize efforts to contain (and explore strategies to eliminate) the raccoon variant of rabies from Vermont and Quebec (USDA 2009a).

- In Ohio, 62 positive rabies cases were recorded prior to program implementation in 1997. From 2001-2003, three cases were reported near the Pennsylvania border where raccoon rabies is still enzootic. In 2001, APHIS-WS, in coordination with state agencies, began an ORV program in Pennsylvania (USDA 2009a) to address this issue. The ability to create rabies-free zones, within raccoon rabies enzootic areas, is a requisite to achieve elimination of this variant of the rabies virus.
  In mid-July 2004, a raccoon infected with raccoon variant of the rabies virus was confirmed just west of the ORV zone near Lake Erie in Lake County in northeastern Ohio. This cooperative ORV project began in 1997 and has expanded to include the states of Pennsylvania, West Virginia, Virginia, Tennessee, Maryland, Georgia and Alabama. Throughout its length from Ohio to northeastern Alabama, the ORV zone is at least 30-miles in width to attempt to prevent the westward spread of raccoon rabies. APHIS-WS and state, county and municipal cooperators responded immediately to this high priority rabies issue. A contingency action plan that included enhanced rabies surveillance, trap-vaccinate-release, and ORV was implemented upon detection of the index case. High raccoon population densities and additional rabies cases based on enhanced surveillance suggest that additional action may be required. Enhanced rabies surveillance is being maintained on the south and west sides of this outbreak to determine the next course of action, if required.

  As a component of the greater Appalachian Ridge ORV zone, Ohio continued biannual baiting of the Contingency Action (CA) ORV zone (east of Cleveland) in the spring and fall of 2007. Wildlife Services integrated TVR into the rabies control campaign within the CA zone to prevent the spread of raccoon rabies that was first detected there in 2004. As a result of this effort, 1,285 animals were hand vaccinated and released in northeastern Ohio. The number of rabid animals with raccoon variant in

this CA zone decreased to 19 cases in 2007 with enhanced surveillance in place (from a high of 46 cases in 2004) (USDA 2009a).

- In Massachusetts, the rabies virus had not spread to the Cape where intensive baiting programs at the peninsular neck (since 1995), combined with the natural barrier of Cape Cod Canal, seemed to act as effective barriers (Robbins et al. 1998). In early March 2004, however, raccoon variant of the rabies virus was confirmed east of the Cape Cod Canal for the first time and by 2006 it was confirmed on the outer Cape (USDA 2009a). The canal served as the eastern anchor point for the ORV zone which was designed to prevent raccoon rabies from spreading east onto the Cape. This cooperative project was initiated in the mid-1990s by Tufts University and the State of Massachusetts Health Department. APHIS-WS became a partner in this effort in 2001. APHIS-WS, Tufts University, and the State of Massachusetts Health Department immediately implemented enhanced rabies surveillance, followed by trap-vaccinate-release and ORV as a contingency action plan to prevent further spread, with the long range goal of eliminating raccoon rabies from the area. It is not known if raccoon rabies spread to the Cape through the long range movement of an individual rabid raccoon or skunk infected with raccoon variant of the rabies virus or if the virus spread animal to animal approaching the canal, with rabies spreading to the Cape through a short range raccoon or skunk movement across the canal. Translocation, either intentional or unintentional (i.e., raccoon "hitch-hiking" in a garbage truck or tailored boat and escaping once on the Cape), represents another potential source of spread.

  The Cape Cod ORV zone now includes all townships on Cape Cod. In 2007, only 5 cases of raccoon variant rabies were confirmed on the Cape, down from 50 cases in 2006. (USDA 2009a).

- In Maine, WS initiated rabies management efforts during 2003 in collaboration with New Brunswick, Canada to vaccinate raccoons and skunks. As rabies has progressed north and eastward, rabies vaccination efforts have been targeted along the Maine, USA and New Brunswick, Canada border creating a "barrier" to protect raccoon populations against rabies. Through vaccination efforts New Brunswick has maintained a terrestrial rabies-free status since 2002 and continued rabies surveillance and TVR rabies management efforts throughout 2007. Maine WS continues to support the international eradication of rabies through enhanced surveillance along the front line of documented cases and ORV bait distribution along the international border (USDA 2009a).

- In November 2003, WS established the Georgia-Alabama-Tennessee (GAT) ORV zone where the Georgia and Alabama borders meet southern Tennessee. At the time, raccoon rabies was in northwestern Georgia and moving westward. The Alabama-Coosa River system to the south and the Appalachian Mountains to the north were serving as potential natural barriers to the westward spread of raccoon rabies. The GAT zone was established to help fill a gap between these potential barriers and to prevent the spread of raccoon rabies into the Tennessee Valley and subsequently the interior of the United States. In January 2004, raccoon rabies entered southeastern Tennessee from Georgia and reached the GAT ORV zone. In response to the first positive case of raccoon rabies inside the GAT zone, WS began baiting the city of Chattanooga and surrounding areas of Hamilton County in the spring, while baiting these areas again in the fall as part of the larger GAT ORV effort. During 2004, 14 cases of raccoon rabies were documented in wildlife in Hamilton County. During 2005, only 1 animal (a raccoon) was confirmed with raccoon rabies in Hamilton County and the virus was not detected in any surrounding counties. Although no cases of raccoon rabies were documented in Hamilton County in 2006, 1 case was confirmed in adjacent Bradley County in a gray fox (*Urocyon cineroargenteus*). In 2007, 1 raccoon case was confirmed in Hamilton County, but no additional cases were detected in Bradley or other surrounding counties (USDA 2009a).

- Projects have also been conducted or are in progress in New Jersey (1992-1994, with additional projects reinitiated in the last few years), Florida (1995-present), Virginia (2000-present), West Virginia (2001-present), Pennsylvania (1995-present), NH (2002-present), AL (2003-present), GA (2003-present), and NC (2005-present).

Gray Fox and Coyote Rabies ORV Programs in Arizona, New Mexico, and Texas

Although no detailed economic analysis of the costs and benefits of the gray fox and coyote rabies programs has been conducted, the assumption about the potential spread of rabies across much of the U.S. without effective ORV programs is most likely also valid for the gray fox and coyote rabies variants. Thus, it is probable that the Arizona, New Mexico, and Texas ORV programs would be found to be cost effective under similar analysis.

Contingency actions, such as TVR and population reduction, may be more labor intensive and time consuming, but these actions are conducted relatively infrequently and on a localized scale to prevent the spread of rabies during emergency situations. When used as a part of an integrated rabies management program with ORV, the benefits (I.E., bolstering population immunity, stopping disease spread to new areas) likely outweigh the costs involved.

- Since 1995, 12.31 million ORV baits have been distributed over south Texas by the coyote ORVP. This has proved to be highly effective in the elimination of the canine variant of rabies in that area, leading to a declaration of canine rabies-free status in the United States in 2007. A barrier strategy has been developed to sustain a zone of immunized wildlife along the Texas-Mexico border with only two incursions into the zone at Laredo since 2001, thus preventing the re-emergence of the variant (USDA 2009a).

- Early in 2007, the Texas cooperative ORVP program observed an outbreak of the Texas Fox variant of rabies in far west-central Texas (west of the then current gray fox ORV zone). The high number of coyotes affected with this rabies variant and the possibility of coyote-to-coyote transmission further complicated this outbreak. Contingency actions were immediately implemented via local population reduction of rabies vector species, additional ORV bait distribution, and enhanced rabies surveillance throughout the entire outbreak area.

- In spite of this recent outbreak, the cooperative ORVP in west-central Texas has been successful in reducing (by more than half) the size of the gray fox epizootic from 186,554 km^2 (72,029 mi^2) in 1996 to approximately 88,098 km^2 (34,015 mi^2) by 2007. With continued support for the cooperative ORVP effort, ongoing success with the gray fox epizootic is expected in west-central Texas where 19.28 million ORV baits have been distributed since 1996 (USDA 2009a).

4.1.6.3 Alternative 3: Live-Capture-Vaccinate-Release Alternative

Raccoon Rabies ORV Programs

A live-capture-vaccinate-release program to control rabies in skunks and raccoons was implemented in Toronto in 1992 and cost an estimated \$450 to \$1,150/km^2 (\$1,165 to \$2,979/mi^2) in Canadian dollars (Rosatte et al. 1992). A more recent cost estimate of \$500 Canadian/km^2 for a trap-vaccinate-release program in Ontario was presented by Rosatte et al. (2001). This analysis assumes the latest cost estimate in Rosatte et al. (2001) is the most applicable for comparing this alternative with ORV programs. At the current exchange rate of 0.78 U.S. dollars per Canadian dollar (OANDA 2009), the cost would be about \$390/km^2 (\$1006/mi^2) in U.S. dollars. In contrast, Kemere et al. (2001) estimated the cost of establishing an ORV barrier of 102,650 km^2 (39,623 mi^2) from Lake Erie to the Gulf Coast as totaling about \$121/km^2 (\$313/mi^2) (costs included \$1.30/bait, 75 baits/km^2, \$8.62/km^2 for aerial distribution cost, and \$15/km^2 for program evaluation). This is comparable to the reported cost of ORV in Ontario of \$200 Canadian/km^2 (\$152 U.S./km^2) (Rosatte et al. 2001). Therefore, it appears a live-capture-vaccinate-release alternative to manage raccoon rabies could cost about 2.5 times as much as the proposed action. Although a greater known proportion of targeted raccoon populations may be vaccinated by this approach (Rosatte et al. 2001), it is probably not necessary to achieve such greater vaccination rates because ORV programs have been successful in stopping or eliminating raccoon rabies outbreaks (see Section 1.1.5). Based on the analysis in Section 4.1.8, it appears benefits may not exceed costs under this alternative.

Gray Fox and Coyote Rabies ORV Programs in Arizona, New Mexico, and Texas

Live-capture-vaccinate-release programs have not been attempted for these species. It is believed this alternative would be highly difficult to achieve with these species, particularly with coyotes. Although coyotes can be captured with certain devices such as leghold traps and snares, they are generally too wary to capture in cage traps (Baker and Timm 1998) and it is difficult to live capture and release a large enough proportion of fox or coyote populations with other traps such as leghold traps and snares (Rosatte et al. 1993; C. MacInnes, Ontario Ministry of Natural Resources pers. comm. 2001 as cited in USDA 2001a; personal observation of APHIS-WS personnel). The aerial ORV programs in Texas cost about \$64 /km^2 (\$166/mi^2), including the cost of aircraft, crew, ORV baits, ground crews, surveillance, and laboratory testing (derived from information from E. Oertli, TX Dept. of Health, pers. comm. 2001[8] as cited in USDA 2001a). Based on the estimated costs of live-capture-vaccinate-release actions shown in Section 4.3.8.1, it is expected that this type of program would be much more expensive and time consuming to implement than ORV programs and would result in costs that exceed benefits.

4.1.6.4 Alternative 4: No Animal Surveillance or Monitoring or Lethal Removal Programs Alternative

Raccoon Rabies ORV Programs

Costs of the federal portion of state-run ORV programs would be less since no APHIS-WS funds would be spent on animal collections to be used in monitoring. Benefits would probably be similar to the proposed action. Total costs, including the expenditure of federal and state funds, might be similar if states increased activities for monitoring because of the lack of APHIS-WS funds for this type of activity. Benefits would still probably exceed costs unless reduced monitoring/surveillance results in a reduction in the effectiveness of ORV programs.

Gray Fox and Coyote Rabies ORV Programs in Arizona, New Mexico, and Texas

Costs of the federal portion of state-run ORV programs would be less since no APHIS-WS funds would be spent on animal collections to be used in monitoring. Benefits would probably be similar to the proposed action. Total costs, including the expenditure of federal and state funds, might be similar if states increased activities for monitoring because of the lack of APHIS-WS funds for this type of activity. Benefits would still probably exceed costs unless reduced monitoring/surveillance results in a reduction in the effectiveness of ORV programs.

4.1.6.5 Alternative 5: No Federal Program

Under the no federal program alternative, the states or others would be left to conduct ORV programs in the absence of APHIS-WS participation. Without APHIS-WS funds and assistance, such programs would probably be conducted on a reduced scale and may be less successful in stopping the forward advance of the three rabies variants across much of the U.S. Overall program costs would decline, but benefits, in terms of avoided costs (described in Section 4.1.6.1), would also decline with the most likely result being greatly increased state and private costs to monitor and vaccinate for rabies across large areas of the U.S. It is believed that, based on the analysis in Section 4.1.6.1 and 4.1.6.2, the increased state and private costs resulting from failure to stop the spread of the rabies variants would exceed by a substantial margin the savings in program costs that would occur by implementing the no action alternative. Thus, the benefit-cost ratio of this alternative would be expected to be much less (i.e., less desirable) than that of the

[8] Reported cost of \$152.83 per sq mile for the 2001 TX ORV program bait drop from E. Oertli (pers. comm. 2001), which included cost of baits, aircraft use, pilot and 3 crew members, fuel, surveillance, laboratory titer costs, and laboratory biomarker analysis, but not salary/benefits of other involved personnel. Additional personnel totaled 64 over two 13-day bait drop periods (one each for gray fox and coyote ORV areas), for a total of 1,664 person-days. At an assumed daily cost of \$150 per person-day for salaries/benefits, and total treated area of 7,700 sq km (20,000 sq mi), the cost per unit area for additional personnel is estimated to be \$4.90/sq km (\$12.80/sq mi). Total estimated cost per unit area was therefore about \$64/sq mi (\$166/sq mi).

proposed action.

4.1.7 Humaneness of methods used to collect wild animal specimens critical for timely program evaluation or to reduce local populations of target species under state contingency plans.

4.1.7.1 Alternative 1: Current Action (the No Action Alternative)

Some people would view methods employed to capture and/or kill raccoons, gray fox, coyotes, and other wild animals for monitoring and surveillance or local depopulation purposes as inhumane. Humaneness, as it relates to the killing or capturing of wildlife is an important but complex concept that can be interpreted in a variety of ways. Humaneness is a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently.

However, humaneness as it relates to the natural world through natural mortality versus man-induced mortality must be brought into perspective. DeVos and Smith (1995) explain the characteristics of natural mortality in wildlife populations. There seems to be an increasing public perception that, left alone by humans, animal populations will experience few premature deaths and live to an old age without harm, pain or suffering. It should be recognized that wildlife populations reproduce at far greater rates than would be necessary to replace deaths if all lived to old age. To counterbalance this high reproduction, it is natural for most individuals of most species to die young, often before reaching breeding age. Natural mortality in wildlife populations includes predation, malnutrition, disease, inclement weather, and accidents. These "natural" deaths are often greater in frequency than human-caused deaths through regulated hunting, trapping, and wildlife damage management operations. From the standpoint of the animal, these natural mortality factors also may cause more suffering by wildlife, as perceived by humans, than human-induced mortality. Under given habitat conditions, most wildlife populations fluctuate around a rather specific density, sometimes called the carrying capacity. Populations that overshoot this density via reproduction become very sensitive to various sources of mortality, and death rates increase. Conversely, as populations drop, mortality rates decline (DeVos and Smith 1995). Thus, human-induced mortality, which often involves much less suffering of individual animals, invariably lessens mortality from other sources. For example, it would seem that an animal taken in a leg-hold trap or by a snare, would certainly suffer less than if it died from rabies. A similar impact is expected with regard to the contingency actions defined previously that involve capture methods, handling, euthanasia, and localized population reduction.

Research suggests that with some methods, such as restraint in leghold traps, changes in the blood chemistry of trapped animals indicate "stress." Blood measurements indicated similar changes in foxes that had been chased by dogs for about five minutes as those restrained in traps (USDA 1997j). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness. The challenge in coping with this issue is how to achieve the least amount of animal suffering with the constraints imposed by current technology. To insure the most professional handling of these issues and concerns, APHIS-WS has policies giving direction toward the achievement of the most humane program possible while still accomplishing the program's mission.

APHIS-WS has made modifications to management devices through research and development which have increased selectivity toward the species being targeted. Research is continuing with the goal of bringing new findings and products into practical use. Until such time as new findings and products are found to be practical, some animal suffering will occur during lethal collection of animal specimens if monitoring and program effectiveness objectives are to be met.

A similar impact is expected with regard to the contingency actions defined previously that involve capture methods, handling, euthanasia, and localized population reduction.

4.1.7.2 Alternative 2: Proposed Action (the Preferred Alternative)

As with Alternative 1, a similar impact is expected with regard to the contingency actions defined previously that involve capture methods, handling, euthanasia, and localized population reduction.

4.1.7.3 Alternative 3: Live-Capture-Vaccinate-Release Alternative

Some persons would view live-capture-vaccinate-release programs as less humane than ORV programs, because large numbers of animals would experience the stress of being caught and handled to administer the vaccine. Others would view them as relatively humane compared to other types of rabies control efforts that involve lethal means to suppress target populations over broad geographic areas. Because it is believed this alternative could be as successful in stopping or preventing the spread of rabies as the proposed action, the amount of animal suffering due to contracting and dying from rabies would probably be similar to the proposed action.

4.1.7.4 Alternative 4: No Animal Surveillance or Monitoring or Lethal Removal Programs Alternative

Under this alternative, no APHIS-WS funds would be used to collect animal specimens or to conduct localized population reduction of target species using live-capture or lethal methods. States could still conduct these activities, but such efforts would probably be accomplished at a lesser scale without APHIS-WS assistance. This alternative would be viewed by some persons as more humane than the proposed action. Animal suffering due to rabies would probably be similar to the proposed action (i.e., greatly reduced). However, more animals are likely to suffer and die of rabies if reduced monitoring/surveillance results in a reduction in the effectiveness of ORV programs (see Section 4.1.7.5) for more detailed discussion).

4.1.7.5 Alternative 5: No Federal Program

Under the no federal program alternative, APHIS-WS would not assist in collecting wild animal specimens for ORV monitoring programs or for local population suppression efforts under contingency plans to address local rabies outbreaks beyond ORV barriers. States would still most likely conduct such programs on their own, although to a lesser degree without APHIS-WS funds and personnel. The primary method that would be used by APHIS-WS to capture raccoons (cage traps) would also most likely be the primary method used by state programs, although possibly to a lesser degree. It is probable that the methods that would be used by APHIS-WS to capture or kill gray fox and coyotes in Texas for rabies monitoring would also be used to a lesser degree without APHIS-WS funds and personnel. Thus, some persons would view this as being a more humane alternative because of the lower intensity of the methods used.

Failure of a successful ORV program would likely result in an increased, but varying, proportion of the raccoon, gray fox, coyote, and other wild mammal species populations succumbing to rabies when exposed to the various specific strains. The symptoms of rabies include insomnia, anxiety, confusion, slight or partial paralysis, excitation, hallucinations, agitation, hypersalivation, difficulty swallowing, and hydrophobia (fear of water) (CDC 2001a). Some persons might argue that dying from rabies, which can take several days once symptoms appear, results in more animal suffering than being captured or killed by monitoring and surveillance activities. In any event, it is almost certain that much larger numbers of animals would succumb to rabies without effective ORV programs than would experience stress and suffering from being captured or killed by monitoring activities. The numbers dying of rabies could increase dramatically as epizootics of specific strains spread across larger areas of the U.S. With this in mind, it would appear that, on balance, the implementation of successful ORV programs that include animal collections for monitoring results in less animal suffering than taking no action.

4.2 CUMULATIVE IMPACTS

No significant cumulative environmental impacts are expected from any alternative, with the possible exception of Alternative 2 - No Action, which might lead to increased human exposures and domestic and wild animal rabies cases across much of the U.S. Although some persons will likely remain opposed to the use of recombinant vaccines or the use of the vaccinia pox virus as a component of ORV, and some will remain opposed to the lethal removal of raccoons, gray fox, or coyotes for monitoring purposes or for

implementation of contingency rabies management plans, the analysis in this EA indicates that ORV use and such lethal removals will not result in significant risk of cumulative adverse impacts on the quality of the human environment.

4.3 SUMMARY OF IMPACTS OF ALTERNATIVES FOR EACH ISSUE

Table 4-12 presents a comparison of the alternatives and environmental consequences (impacts) on each of the issues identified for detailed analysis:

Table 4-12. Issues/Impacts/Alternatives/Comparison

	Alt. 1: Current Action: (provide APHIS-WS funds for ORV and monitoring/ surveillance, potential localized target species population reduction)	**Alt. 2: Proposed Action: (ORV program as described in Alt. 1 with contingency actions that include Alt. 3)**	**Alt. 3: Live Capture/Vaccinate and Release**	**Alt. 4: Provide Funds for ORV without Lethal Animal Collections or Removals**	**Alt. 5: No Federal Program**
Potential for adverse effects on target wildlife species populations.					
• Effects of the ORV V-RG vaccine on raccoons, gray foxes, and coyotes	No probable risk of adverse effects	No probable risk of adverse impacts from V-RG vaccine or injectable vaccines used in TVR activities.	No risk from V-RG vaccine.	No probable risk of adverse impact (same as Alt 1).	No probable risk; states would likely still conduct ORV programs, but probably on a lesser scale without federal assistance
• Effects of monitoring and surveillance and localized population reduction actions on raccoon populations in eastern states.	Very low impact.	Very low impact (similar to Alt. 1 and3).	Very low impact (similar to Alt. 1).	Slightly lower impact than Alt. 1; states would still conduct monitoring and surveillance and contingency actions, but these are likely to be on a lesser scale without federal assistance.	Slightly lower impact than Alt. 1 or 2; states would still conduct monitoring and surveillance and contingency actions, but these are likely to be on a lesser scale without federal assistance.
• Effects of monitoring and surveillance and localized population reduction actions on gray fox populations in Texas.	Low impact.	Low impact (Similar to Alt.1).	Low impact (similar to Alt. 1).	Lower impact than Alt. 1; the state would still conduct monitoring and surveillance and contingency actions, but these are likely to be on a lesser scale without federal assistance.	Slightly lower impact than Alt. 1or 2; the state would still conduct monitoring and surveillance and contingency actions, but these are likely to be on a lesser scale without federal assistance.
• Effects of monitoring	Low impact.	Low impact (Similar to Alt 1	Low impact (similar	Lower impact than Alt. 1; the state	Slightly lower impact than Alt. 1

Table 4-12. Issues/Impacts/Alternatives/Comparison

and surveillance and localized population reduction actions on coyote populations in Texas.		and 3).	to Alt. 1).	would still conduct monitoring and surveillance and contingency actions, but these are likely to be on a lesser scale without federal assistance.	or 2; the state would still conduct monitoring and surveillance and contingency actions, but these are likely to be on a lesser scale without federal assistance.
• Effects on non-ORV target species.	Low impact.	Low impact (similar to Alt 1 and 3.	Low impact (similar to Alt. 1)	Lower impact than Alt. 1; the state would still conduct monitoring and surveillance and contingency actions, but these are likely to be on a lesser scale without federal assistance.	Slightly lower impact than Alt. 1 or 2; the state would still conduct monitoring and surveillance and contingency actions, but these are likely to be on a lesser scale without federal assistance
Potential for adverse effects on nontarget wildlife species, including threatened or endangered species.					
• Effects of the RABORAL V-RG® vaccine on nontarget wildlife including threatened or endangered species.	No effect on T&E species; No probable risk of adverse effects on other nontarget species.	No effect on T&E species; No probable risk of adverse effects on other nontarget species.	No effect on T&E species; no risk of adverse effect on other species from ORV vaccine.	No effect on T&E species; No probable risk of adverse effects on other nontarget species (Same as Alt. 1); but greater risk of adverse effects on these species from rabies if reduced monitoring and surveillance reduces effectiveness of ORV programs.	No probable risk of adverse effects from ORV vaccine; but greater risk of adverse effects on these species from rabies.
• Effects of capture/removal methods (used in monitoring, surveillance, and localized population reduction) on nontarget species, including threatened or endangered species.	No effect on T&E species; Very low risk of adverse effects on other nontarget species.	No effect on T&E species; Very low risk of adverse effects on other nontarget species.	Less impact than Alt. 1.	Less impact than Alt. 1; states would still conduct monitoring and surveillance and contingency actions, but these are likely to be on a lesser scale without federal assistance.	Probably slightly less impact than Alt. 1 or 2.
Potential for adverse effects on people, pets, and livestock that are exposed to or consume the vaccine laden baits.					
• Potential to cause rabies	No probable risk.	No probable risk.	No probable risk.	No probable risk from ORV use;	No probable risk from ORV use by

Table 4-12. Issues/Impacts/Alternatives/Comparison

in humans.				higher risk of human rabies cases if reduced monitoring and surveillance reduces effectiveness of ORV programs.	states. Higher risk of human rabies cases if states are unable to stop the spread of rabies without federal assistance.
• Potential for vaccinia virus to cause disease in humans	Possible but risk is low; risk of significant adverse effects on individuals that experience vaccinia infections also is low.	Possible but risk is low; risk of significant adverse effects on individuals that experience vaccinia infections also is low.	No risk.	Possible but risk is low; risk of significant adverse effects on individuals that experience vaccinia infections also is low (same as Alt. 1).	Slightly lower risk than Alt. 1or 2; states would likely still conduct ORV programs, but probably on a lesser scale without federal assistance
• Potential to cause cancer (oncogenicity).	No probable risk.	No probable risk.	No probable risk.	No probable risk.	No probable risk.
• Potential for adverse effects on pet dogs or other domestic animals that might consume the baits.	Low risk; Possible benefit from improving immunity to rabies.	Low risk; Possible benefit from improving immunity to rabies.	No risk of adverse effects from consuming ORV baits.	Low risk (similar risk as Alt. 1); increased risk of rabies for unvaccinated animals if reduced monitoring and surveillance reduces effectiveness of ORV programs.	Low risk; states would likely still conduct ORV programs. Increased risk of rabies for unvaccinated animals without federal assistance.
Potential for the recombined V-RG virus to "revert to virulence" or recombine with other viruses and result in a virus that could cause disease in humans or animals.					
• Potential for the recombined V-RG virus to "revert to virulence" and result in a virus that could cause disease in humans or animals.	Very low risk.	Very low risk.	No risk.	Low risk (similar risk as Alt. 1).	Less risk than Alt. 1 or 2; states would likely still conduct ORV programs.
• Potential for the V-RG virus to recombine with other viruses in the wild to form new viruses that could cause disease	Very low risk.	Very low risk.	No risk.	Low risk (similar risk as Alt. 1).	Less risk than Alt. 1 or 2; states would likely still conduct ORV programs.

Table 4-12. Issues/Impacts/Alternatives/Comparison

in humans or animals.					
Potential for aerially dropped baits to strike and injure people or domestic animals.	Low risk.	Low risk.	No risk.	Low risk (similar risk as Alt. 1).	Less risk than Alt. 1or 2; states would likely still conduct ORV programs.
Cost of the program in comparison to perceived benefits.	Expected benefits exceed costs of program.	Expected benefits exceed costs of program.	Expected benefits unlikely to exceed costs of program.	Expected benefits exceed costs of program (similar to Alt. 1); benefits may not exceed costs if reduced monitoring and surveillance reduces effectiveness of ORV programs.	Cost of adverse effects from rabies spread would be much greater than cost savings from not having federal assistance.
Humaneness of methods used to collect wild animal specimens critical for timely program evaluation or to reduce local populations of target species under state contingency plans	Capture and handling of raccoons would be viewed by some persons as inhumane. Methods viewed as inhumane by some persons would be used to take gray fox and coyotes in Arizona, New Mexico, and Texas, but many animals saved from suffering and death due to rabies.	Capture and handling of raccoons would be viewed by some persons as inhumane. Methods viewed as inhumane by some persons would be used to take gray fox and coyotes in Arizona, New Mexico, and Texas, but many animals saved from suffering and death due to rabies.	Capture and handling of target species would be viewed by some persons as inhumane. Fewer gray fox and coyotes would be taken in Arizona, New Mexico, and Texas using lethal methods, however, so this alternative would be viewed as more humane than Alt. 1.	This Alt. would be viewed as more humane than Alt. 1; states likely to still conduct monitoring and surveillance and contingency plan implementation, but at a smaller scale without federal assistance; more animals likely to die of rabies if reduced monitoring and surveillance reduces effectiveness of ORV programs.	Probably less impact on this issue than Alt. 1 or 2; states likely to still conduct ORV programs with monitoring and surveillance and contingency plan implementation, but at a smaller scale without federal assistance; more animals likely to die of rabies if lack of federal assistance reduces effectiveness of ORV programs.

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APPENDIX C
SPECIES LISTED AS THREATENED OR ENDANGERED UNDER THE ENDANGERED SPECIES ACT

Information obtained from http://ecos.fws.gov/tess_public/StateListing.do?state=all on March 2009.

Alabama -- 117 listings

Animals – 99

Status	Listing
E	Acornshell, southern (*Epioblasma othcaloogensis*)
T	Bankclimber, purple (mussel) (*Elliptoideus sloatianus)*
E	Bat, gray (*Myotis grisescens*)
E	Bat, Indiana (*Myotis sodalis*)
E	Bean, Cumberland (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Villosa trabalis)*
XN	Bean, Cumberland (pearlymussel) AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Villosa trabalis)*
E	Beetle, American burying (*Nicrophorus americanus)*
E	Blossum, tubercled (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Epioblasma torulsa torulosa)*
XN	Blossum, tubercled (pearlymussel) AL; Free-Flowing Reaches of the Tennessee River below the Wilson dam, Colbert and Lauderdale Counties (*Epioblasma torulsa torulosa*)
E	Blossum, turgid (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Epioblasma turgidula)*
XN	Blossom, turgid (pearlymussel) AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Epioblasma turgidula*)
E	Blossum, yellow (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Epioblasma florentina florentina)*
XN	Blossom, yellow (pearlymussel) AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Epioblasma florentina florentina*)
E	Campeloma, slender (*Campeloma decampi*)
E	Catspaw (=purple cat's paw pearlymussel) Entire Range; Except where listed as Experimental Populations (*Epioblasma obliquata obliquata*)
XN	Catspaw (=purple cat's paw pearlymussel) AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Epioblasma obliquata obliquata*)
E	Cavefish, Alabama (*Speoplatyrhinus poulsoni*)
T	Chub, spotfin Entire (*Cyprinella monacha*)
E	Clubshell Enitre Range; Except where listed as Experimental Popualtions (*Pleurobema clava*)
XN	Clubshell AL; Free-Flowing Reaches of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (Pleurobema clava)
E	Clubshell, black (*Pleurobema curtum*)
E	Clubshell, ovate (*Pleurobema perovatum*)
E	Clubshell, southern (*Pleurobema decisum*)
E	Combshell, Cumberlandian Entire Range; Except where listed as Experimental Populations (*Epioblasma brevidens*)
XN	Combshell, Cumberlandian AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Epioblasma brevidens*)
E	Combshell, southern (*Epioblasma penita*)
E	Combshell, upland (*Epioblasma metastriata*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Darter, amber (*Percina antesella*)
E	Darter, boulder (*Etheostoma wapiti*)
T	Darter, goldline (*Percina aurolineata*)
T	Darter, slackwater (*Etheostoma boschungi*)
T	Darter, snail (*Percina tanasi*)
E	Darter, vermilion (*Etheostoma chermocki*)
E	Darter, watercress (*Etheostoma nuchale*)
T	Elimia, lacy (snail) (*Elimia crenatella*)
E	Fanshell (*Cyprogenia stegaria*)
E	Frog, Mississippi gopher Whereever found west of Mobile and Tombigbee Rivers in AL, MS, and LA (*Rana captio sevosa)*
T	Heelsplitter, Alabama (=inflated) (*Potamilus inflatus*)
E	Kidneyshell, triangular (*Ptychobranchus greeni*)
E	Lampmussel, Alabama Entire Range; Except where listed as Experimental Populations (*Lampsilis virescens*)
XN	Lampmussel, Alabama AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Lampsilis virescens*)
E	Lilliput, pale (pearlymussel) (*Toxolasma cylindrellus*)
E	Lioplax, cylindrical (snail) (*Lioplax cyclostomaformis*)
E	Mapleleaf, winged Entire, except where listed as experimental populations (*Quadrula fragosa*)

XN	Mapleleaf, winged (mussel) AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Quadrula fragosa*)
T	Moccasinshell, Alabama (*Medionidus acutissimus*)
E	Monkeyface, Cumberland (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Quadrula intermedia*)
XN	Monkeyface, Cumberland (pearlymussel) AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Quadrula intermedia*)
E	Mouse, Alabama beach (*Peromyscus polionotus ammobates*)
E	Mouse, Perdido Key beach (*Peromyscus polionotus trissyllepsis*)
T	Mucket, orangenacre (*Lampsilis perovalis*)
E	Mucket, pink (pearlymussel) (*Lampsilis abrupta*)
E	Mussel, oyster Entire Range; Except where listed as Experimental Populations (*Epioblasma capsaeformis*)
XN	Mussel, oyster AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Epioblasma capsaeformis*)
E	Mussel, scaleshell (*LEptodea leptodon*)
E	Panther, Florida (*Puma (=Felis) concolor coryi*)
E	Pearlymussel, cracking Entire Range; Except where listed as Experimental Populations (*Hemistena lata*)
XN	Pearlymussel, cracking AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Hemistena lata*)
XN	Pearlymussel, dromedary AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Dromus dromas*)
E	Pearlymussel, littewing (*Pegias fibula*)
E	Pebblesnail, flat (*Lepyrium showalteri*)
E	Pelican, brown except U.S. Atlantic coast, FL, Al (*Pelecanus occidentalis*)
E	Pigtoe, dark (*Pleurobema furvum*)
E	Pigtoe, finerayed Entire Range; Except where listed as Experimental Populations (*Fusconaia cuneolus*)
XN	Pigtoe, finerayed AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Fusconaia cuneolus*)
E	Pigtoe, flat (*Pleurobema marshalli*)
E	Pigtoe, heavy (*Pleurobema taitianum*)
E	Pigtail, oval (*Pleurobema pyriforme*)
E	Pigtoe, rough (*Pleurobema plenum*)
E	Pigtoe, shiny Entire Range; Except where listed as Experimental Populations (*Fusconaia cor*)
XN	Pigtoe, shiny AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Fusconaia cor*)
E	Pigtoe, southern (*Pleurobema georgianum*)
E	Pimpleback, orangefoot (pearlymussel) (*Plethobasus cooperianus*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
T	Pocketbook, finelined (*Lampsilis altilis*)
E	Pocketbook, shinyrayed (*Lampsilis subangulata*)
E	Riffleshell, tan (*Epioblasma florentina walkeri (=E. walkeri)*)
E	Ring pink (mussel) (*Obovaria retusa*)
E	Riversnail, Anthony's Entire Range; Except where listed as Experimental Populations (*Athearnia anthonyi*)
XN	Riversnail, Anthony's AL; Free-Flowing Reach of the Tennessee River below the Wilson Dam, Colbert and Lauderdale Counties, AL (*Athearnia anthonyi*)
T	Rocksnail, painted (*Leptoxis taeniata*)
E	Rocksnail, plicate (*Leptoxis plicata*)
T	Rocksnail, round (*Leptoxis ampla*)
T	Salamander, frosted flatwoods (*Ambystoma cingulatum*)
T	Salamander, Red Hills (*Phaeognathus hubrichti*)
T	Sculpin, pygmy (*Cottus paulus (=pygmaeus)*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
T	Shiner, blue (*Cyprinella caerulea*)
E	Shiner, Cahaba (*Notropis cahabae*)
E	Shiner, palezone (*Notropis albizonatus*)
E	Shrimp, Alabama cave (*Palaemonias alabamae*)
T	Slabshell, Chipola (*Elliptio chipolaensis*)
E	Snail, armored (*Pyrgulopsis (=Marstonia) pachyta*)
E	Snail, tulotoma (*Tulotoma magnifica*)
T	Snake, eastern indigo (*Drymarchon corais couperi*)
E	Stirrupshell (*Quadrula stapes*)
E	Stork, wood (AL, FL, GA, SC) (*Mycteria americana*)
E	Sturgeon, Alabama (*Scaphirhynchus suttkusi*)
T	Sturgeon, gulf (*Acipenser oxyrinchus desotoi*)
T	Tortoise, gopher (W of of Mobile/Tombigbee Rs.) (*Gopherus polyphemus*)
E	Turtle, Alabama red-belly (*Pseudemys alabamensis*)

T	Turtle, flattened musk (species range clarified) (*Sternotherus depressus*)
E	Wartyback, white (pearlymussel) (*Plethobasus cicatricosus*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico (*Canis lupus*)
E	Woodpecker, red-cockaded (*Picoides borealis*)

Plants -- 18

Status	**Listing**
T	Amphianthus, little (*Amphianthus pusillus*)
T	Potato-bean, Price's (*Apios priceana*)
T	Fern, American hart's-tongue (*Asplenium scolopendrium* var. *americanum*)
E	Leather flower, Morefield's (*Clematis morefieldii*)
E	Leather flower, Alabama (*Clematis socialis*)
E	Prairie-clover, leafy (*Dalea foliosa*)
T	Bladderpod, lyrate (*Lesquerella lyrata*)
T	Button, Mohr's Barbara (*Marshallia mohrii*)
E	Harperella (*Ptilimnium nodosum*)
T	Water-plantain, Kral's (*Sagittaria secundifolia*)
E	Pitcher-plant, green (*Sarracenia oreophila*)
E	Pitcher-plant, Alabama canebrake (*Sarracenia rubra alabamensis*)
E	Chaffseed, American (*Schwalbea americana*)
E	Pinkroot, gentian (*Spigelia gentianoides*)
T	Fern, Alabama streak-sorus (*Thelypteris pilosa* var. *alabamensis*)
E	Trillium, relict (*Trillium reliquum*)
E	Grass, Tennessee yellow-eyed (*Xyris tennesseensis*)
E	Pondberry (*Lindera melissifolia*)

Arizona -- 55 Listings

Animals - 38

Status	**Listing**
E	Ambersnail, Kanab (*Oxyloma haydeni kanabensis*)
E	bat, lesser long-nosed (*Leptonycteris curasoae yerbabuenae*)
T	Bear, grizzly lower 48 States, except where listed as an experimental population or delisted (*Ursus arctos horribilis*)
E	Bobwhite, masked (quail) (*Colinus virginianus ridgwayi*)
T	Catfish, Yaqui (*Ictalurua procei*)
E	Chub, bonytail entire (*Gila elegans*)
E	Chub, Gila (*Gila intermedia*)
E	Chub, humpback entire (*Gila cypha*)
T	Chub, Sonora (*Gila ditaenia*)
E	Chub, Virgin River (*Gila seminude (=robusta)*)
E	Chub, Yaqui (*Gila purpurea*)
E	Condor, California U.S.A only (*Gymnogyps californianus*)
E	Curlew, Eskimo (*Numeniu borealis*)
T	Eagle, bald Sonoran Desert DPS: Arizona: (1) Yavapai, northern Mexico. Gila, Graham, Pinal, amd Maricopa, Counties; and (2) Southern Mohave County (that portion south and east of the center of Interstate Highway 40 and east of Arizona Highway 95), eastern laPaz County (that portion east of the centerline of U.S. and Arizona Highways 95), and north of the centerline of Interstate Highway 8) (*Haliaeetus leucocephalus*)
E	Falcon, northern aplomado (*Falco femoralis septntrionalis*)
E	Ferret, black-footed entire population, except where EXPN (*Mustela nigripes*)
XN	Ferret, black-footed U.S.A. (specific portions of AZ, CO, MT, SD, UT, WY) (*Mustela nigripes*)
E	Flycatcher, southwestern willow (*Empidonax traillii extimus*)
T	Frog, Chiricahua leopard (*Rana chiricahuensis*)
E	Jaguar (*Panthera onca*)
E	Jaguarundi, Sinalaon (*Herpailurus (+Felis) yagouroundi tolteca*)
T	Minnow, loach (*Tairoga cobitis*)
E	Ocelt (*Leopardus (=Felis) paradlis*)
T	Owl, Mexican spotted (*Strix occidentalis lucida*)
E	Pronghorn, Sonoran (*Antilocara americana sonoriensis*)
E	Pupfish, desert (*Cyprinodon macularius*)
E	Rail, Yuma clapper U.S.A. only (*Rallus longirostris yumanensis*)
T	Rattlesnake, New Mexican ridge-nosed (*Crotalus willardi obscurus*)
E	Salamander, Sonora tiger (*Ambystoma tigrinum stebbinsi*)
T	Shiner, beautiful (*Cyprinella Formosa*)
T	Spikedace (*Meda fulgida*)
T	Spinedace, Little Colorado (*Lepidomeda vittata*)
E	Squirrel, Mount Graham red (*Tamiasciurus hudsonicus grahamenisi*)
E	Sucker, razorback entire (*Xyrauchen texanus*)
E	Topminnow, Gila (incl. Yaqui) U.S.A only (*Poeciliopsis occidentalis*)
T	Trout, Apache (*Oncorhynchus apache*)
T	Trout, Gila (*Oncorhynchus gilae*)

E Vole, Hualapai Mexican (*Microtus mexicanus hualpaiensis*)
E Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico (*Canus lupus*)
XN Wolf, gray Mexican gray wolf, EXPN population U.S.A. (portions of AZ, NM, TX) (*Canus lupus*)

Plants -- 17

Status	Listing
E	Blue-star, Kearney's (*Amsonia kearneyana*)
E	Cactus, Arizona hedgehog (*Echinocereus triglochidiatus var. arizonicus*)
E	Cactus, Brady pincushion (*Pediocactus bradyi*)
T	Cactus, Cochise pincushion (*Coryphantha robbinsorum*)
E	Cactus, Nichol's Turk's head (*Echinocactus horizonthalionus var. nicholii*)
E	Cactus, Peebles Navajo (*Pediocactus peeblesianus peeblesianus*)
E	Cactus, Pima pineapple (*Coryphantha scheeri var. rabustispina*)
T	Cactus, Siler pincushion (*Pediocactus (=Echinocactus, =Utahia) sileri*)
E	Cliff-rose, Arizona (*Purshia (=Cowania) subintegra*)
T	Cycladeni, Jones (*Cycladeni jonesii (=humilis)*)
T	Groundsel, San Francisco Peaks (*Sencio franciscanus*)
E	Ladies'-tresses, Canelo Hills (*Spiranthus delitescens*)
E	Milk-vetch, Sentry (*Astragalus cremnophylax var. cremnophylax*)
T	Milkweed, Welsh's (*Asclepias welshii*)
T	Sedge, Navajo (*Carex specuicola*)
E	Water-umbel, Huachuca (*Lilaeopsis schaffneriana var. recurva*)

Connecticut -- 21 listings

Animals – 18

Status	Listing
E	Beetle, American burying (*Nicrophorus americanus*)
E	Curlew, Eskimo (*Numenius borealis*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
E	Tern, roseate (northeast U.S. nesting pop.) (*Sterna dougallii dougallii*)
T	Tiger beetle, northeastern beach (*Cicindela dorsalis dorsalis*)
T	Tiger beetle, Puritan (*Cicindela puritana*)
T	Turtle, bog (=Muhlenberg) (northern) (*Clemmys muhlenbergii*)
E	Wedgemussel, dwarf (*Alasmidonta heterodon*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, right (*Balaena glacialis (incl. australis)*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canus lupus*)

Plants -- 3

Status	Listing
E	Chaffseed, American (*Schwalbea Americana*)
E	Gerardia, sandplain (*Agalinis acuta*)
T	Pogonia, small whorled (*Isotria medeoloides*)

Delaware -- 23 listings

Animals – 17

Status	Listing
E	Beetle, American burying (*Nicrophorus americanus*)
E	Curlew, Eskimo (*Numenius borealis*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
E	Squirrel, Delmarva Peninsula fox (except Sussex Co., DE) (*Sciurus niger cinereus*)
XN	Squirrel, Delmarva Peninsula fox [XN] (*Sciurus niger cinereus*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
T	Turtle, bog (=Muhlenberg) (northern) (*Clemmys muhlenbergii*)
E	Wedgemussel, dwarf (*Alasmidonta heterodon*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis)*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 6

Status	Listing
T	Amaranth, seabeach (*Amaranthus pumilus*)
E	Chaffseed, American (*Schwalbea Americana)*
T	Pink, swamp (*Helonias bullata*)
T	Joint-vetch, sensitive (*Aeschnomene virginica*)
T	Pogonia, small whorled (*Isotria medeoloides*)
E	Dropwort, Canby's (*Oxypolis canbyi*)

District of Columbia -- 7 listings

Animals – 6

Status	Listing
E	Amphipod, Hay's Spring (*Stygobromus hayi*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Curlew, Eskimo (*Numensius borealis*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Wedgemussel, dwarf (*Alasmidonta heterodon*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico (*Canis lupus*)

Plants – 1

T	Pogonia, small whorled (*Isotria medeoloides*)

Florida -- 116 listings

Animals – 61

Status	Listing
T(S/A)	Alligator, American (*Alligator mississippiensis*)
T	Bankclimber, purple (mussel) (*Elliptoideus sloatianus*)
E	Bat, gray (*Myotis grisescens*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Butterfly, Schaus swallowtail (*Heraclides aristodemus ponceanus*)
T	Caracara, Audubon's crested (FL pop.) (*Polyborus plancus audubonii*)
XN	Crane, whooping U.S.A. (CO, ID, FL, NM, UT, and the western half of Wyoming) (*Grus americana*)
T	Crocodile, American FL pop. (*Crocodylus acutus*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Darter, Okaloosa (*Etheostoma okaloosae*)
E	Deer, key (*Odocoileus virginianus clavium*)
T	Jay, Florida scrub (*Aphelocoma coerulescens*)
E	Kite, Everglade snail (FL pop.) (*Rostrhamus sociabilis plumbeus*)
E	Manatee, West Indian (*Trichechus manatus*)
E	Moccasinshell, Gulf (*Medionidus penicillatus*)
E	Moccasinshell, Ochlockonee (*Medionidus simpsonianus*)
E	Mouse, Anastasia Island beach (*Peromyscus polionotus phasma*)
E	Mouse, Choctawhatchee beach (*Peromyscus polionotus allophrys*)
E	Mouse, Key Largo cotton (*Peromyscus gossypinus allapaticola*)
E	Mouse, Perdido Key beach (*Peromyscus polionotus trissyllepsis*)
T	Mouse, southeastern beach (*Peromyscus polionotus niveiventris*)
E	Mouse, St. Andrew beach (*Peromyscus polionotus peninsularis*)
E	Panther, Florida (*Puma (=Felis) concolor coryi*)
E	Pelican, brown except U.S. Atlantic coast, FL, Al (*Pelecanus occidentalis*)
E	Pigtoe, oval (*Pleurobema pyriforme*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Pocketbook, shinyrayed (*Lampsilis subangulata*)
T(S/A)	Puma (=mountain lion) (FL) (*Puma (=Felis) concolor (all subsp. except coryi)*)
E	Rabbit, Lower Keys marsh (*Sylvilagus palustris hefneri*)
E	Rice rat (lower FL Keys) (*Oryzomys palustris natator*)
T	Salamander, frosted flatwoods (*Ambystoma cingulatum*)
E	Sawfish, smalltooth (*Pristis pectinata*)
E	Sea turtle, green (FL, Mexico nesting pops.) (*Chelonia mydas*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
E	Seal, Caribbean monk (*Monachus tropicalis*)
T	Shrimp, Squirrel Chimney Cave (*Palaemonetes cummingi*)
T	Skink, bluetail mole (*Eumeces egregius lividus*)
T	Skink, sand (*Neoseps reynoldsi*)
T	Slabshell, Chipola (*Elliptio chipolaensis*)
T	Snail, Stock Island tree (*Orthalicus reses (not incl. nesodryas)*)
T	Snake, Atlantic salt marsh (*Nerodia clarkii taeniata*)
T	Snake, eastern indigo (*Drymarchon corais couperi*)

E	Sparrow, Cape Sable seaside (*Ammodramus maritimus mirabilis*)
E	Sparrow, Florida grasshopper (*Ammodramus savannarum floridanus*)
E	Stork, wood (AL, FL, GA, SC) (*Mycteria americana*)
T	Sturgeon, gulf (*Acipenser oxyrinchus desotoi*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
T	Tern, roseate (Western Hemisphere except NE U.S.) (*Sterna dougallii dougallii*)
E	Three-ridge, fat (mussel) (*Amblema neislerii*)
E	Vole, Florida salt marsh (*Microtus pennsylvanicus dukecampbelli*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis)*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico (*Canis lupus*)
E	Wolf, red (except where XN) (*Canis rufus*)
E	Woodpecker, red-cockaded (*Picoides borealis*)
E	Woodrat, Key Largo (*Neotoma floridana smalli*)

Plants -- 55

Status	**Listing**
E	Aster, Florida golden (*Chrysopsis floridana*)
E	Beargrass, Britton's (*Nolina brittoniana*)
E	Beauty, Harper's (*Harperocallis flava*)
E	Bellflower, Brooksville (*Campanula robinsiae*)
T	Birds-in-a-nest, white (*Macbridea alba*)
E	Blazingstar, scrub (*Liatris ohlingerae*)
T	Bonamia, Florida (*Bonamia grandiflora*)
T	Buckwheat, scrub (*Eriogonum longifolium* var. *gnaphalifolium*)
T	Butterwort, Godfrey's (*Pinguicula ionantha*)
E	Cactus, Key tree (*Pilosocereus robinii*)
E	Campion, fringed (*Silene polypetala*)
E	Chaffseed, American (*Schwalbea americana*)
E	Cladonia, Florida perforate (*Cladonia perforata*)
E	Fringe-tree, pygmy (*Chionanthus pygmaeus*)
T	Gooseberry, Miccosukee (*Ribes echinellum*)
E	Gourd, Okeechobee (*Cucurbita okeechobeensis* ssp. *okeechobeensis*)
E	Harebells, Avon Park (*Crotalaria avonensis*)
E	Hypericum, highlands scrub (*Hypericum cumulicola*)
E	Jacquemontia, beach (*Jacquemontia reclinata*)
E	Lead-plant, Crenulate (*Amorpha crenulata*)
E	Lupine, scrub (*Lupinus aridorum*)
E	Meadowrue, Cooley's (*Thalictrum cooleyi*)
E	Milkpea, Small's (*Galactia smallii*)
E	Mint, Garrett's (*Dicerandra christmanii*)
E	Mint, longspurred (*Dicerandra cornutissima*)
E	Mint, scrub (*Dicerandra frutescens*)
E	Mint, Lakela's (*Dicerandra immaculata*)
E	Mustard, Carter's (*Warea carteri*)
E	Pawpaw, beautiful (*Deeringothamnus pulchellus*)
E	Pawpaw, four-petal (*Asimina tetramera*)
E	Pawpaw, Rugel's (*Deeringothamnus rugelii*)
T	Pigeon wings (*Clitoria fragrans*)
E	Pinkroot, gentian (*Spigelia gentianoides*)
E	Plum, scrub (*Prunus geniculata*)
E	Polygala, Lewton's (*Polygala lewtonii*)
E	Polygala, tiny (*Polygala smallii*)
E	Pondberry (*Lindera melissifolia*)
E	Prickly-apple, fragrant (*Cereus eriophorus* var. *fragrans*)
E	Rhododendron, Chapman (*Rhododendron chapmanii*)
E	Rosemary, Apalachicola (*Conradina glabra*)
E	Rosemary, Etonia (*Conradina etonia*)
E	Rosemary, short-leaved (*Conradina brevifolia*)
E	Sandlace (*Polygonella myriophylla*)
T	Seagrass, Johnson's (*Halophila johnsonii*)
T	Skullcap, Florida (*Scutellaria floridana*)
E	Spurge, deltoid (*Chamaesyce deltoidea* ssp. *deltoidea*)
T	Spurge, Garber's (*Chamaesyce garberi*)
T	Spurge, telephus (*Euphorbia telephioides*)
E	Snakeroot (*Eryngium cuneifolium*)
E	Torreya, Florida (*Torreya taxifolia*)
E	Warea, wide-leaf (*Warea amplexifolia*)
E	Water-willow, Cooley's (*Justicia cooleyi*)
T	Whitlow-wort, papery (*Paronychia chartacea*)

E	Wireweed (*Polygonella basiramia*)
E	Ziziphus, Florida (*Ziziphus celata*)

Georgia -- 74 listings

Animals – 52

Status	Listing
E	Acornshell, southern (*Epioblasma othcaloogensis*)
T(S/A)	Alligator, American (*Alligator mississippiensis*)
T	Bankclimber, purple (mussel) (*Elliptoideus sloatianus*)
E	Bat, gray (*Myotis grisescens*)
E	Bat, Indiana (*Myotis sodalis*)
E	Beetle, American burying (*Nicrophorus americanus*)
T	Chub, spotfin Entire (*Erimonax monachus*)
E	Clubshell, ovate (*Pleurobema perovatum*)
E	Clubshell, southern (*Pleurobema decisum*)
E	Combshell, upland (*Epioblasma metastriata*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Darter, amber (*Percina antesella*)
T	Darter, Cherokee (*Etheostoma scotti*)
E	Darter, Etowah (*Etheostoma etowahae*)
T	Darter, goldline (*Percina aurolineata*)
T	Darter, snail (*Percina tanasi*)
E	Kidneyshell, triangular (*Ptychobranchus greeni*)
E	Lioplax, cylindrical (snail) (*Loiplax cyclostomaformis*)
E	Logperch, Conasauga (*Percina jenkinsi*)
E	Manatee, West Indian (*Trichechus manatus*)
T	Moccasinshell, Alabama (*Medionidus acutissimus*)
E	Moccasinshell, Coosa (*Medionidus parvulus*)
E	Moccasinshell, Gulf (*Medionidus penicillatus*)
E	Moccasinshell, Ochlockonee (*Medionidus simpsonianus*)
E	Mussel, oyster Entire Range; Except where listed as EXPN populations (*Epioblasma capsaeformis*)
E	Panther, Florida (*Puma (=Felis) concolor coryi*)
E	Pelican, brown except U.S. Atlantic coast, FL, AL (*Pelecanus occidentalis*)
E	Pigtoe, oval (*Pleurobema pyriforme*)
E	Pigtoe, southern (*Pleurobema georgianum*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
T	Pocketbook, finelined (*Lampsilis altilis*)
E	Pocketbook, shinyrayed (*Lampsilis subangulata*)
E	Riversnail, Anthony's Entire Range; Except where listed as EXPN (*Athearnia anthonyi*)
T	Salamander, flatwoods (*Ambystoma cingulatum*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
T	Shiner, blue (*Cyprinella caerulea*)
T	Snake, eastern indigo (*Drymarchon corais couperi*)
E	Stork, wood (AL, FL, GA, SC) (*Mycteria americana*)
T	Sturgeon, gulf (*Acipenser oxyrinchus desotoi*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
T	Tern, roseate (Western Hemisphere except NE U.S.) (*Sterna dougallii dougallii*)
E	Three-ridge fat (mussel) (*Amblema neislerii*)
T(S/A)	Turtle, bog (=Muhlenberg) (southern) (*Clemmys muhlenbergii*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis)*)
E	Woodpecker, red-cockaded (*Picoides borealis*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico (*Canis lupus*)

Plants -- 22

Status	Listing
T	Amphianthus, little (*Amphianthus pusillus*)
E	Rattleweed, hairy (*Baptisia arachnifera*)
E	Coneflower, smooth (*Echinacea laevigata*)
T	Pink, swamp (*Helonias bullata*)
E	Quillwort, black spored (*Isoetes melanospora*)
E	Quillwort, mat-forming (*Isoetes tegetiformans*)
T	Pogonia, small whorled (*Isotria medeoloides*)
E	Pondberry (*Lindera melissifolia*)

T	Button, Mohr's Barbara (*Marshallia mohrii*)
E	Dropwort, Canby's (*Oxypolis canbyi*)
E	Harperella (*Ptilimnium nodosum*)
E	Sumac, Michaux's (*Rhus michauxii*)
T	Water-plantain, Kral's (*Sagittaria secundifolia*)
E	Pitcher-plant, green (*Sarracenia oreophila*)
E	Chaffseed, American (*Schwalbea americana*)
T	Skullcap, large-flowered (*Scutellaria montana*)
E	Campion, fringed (*Silene polypetala*)
T	Spiraea, Virginia (*Spiraea virginiana*)
E	Torreya, Florida (*Torreya taxifolia*)
E	Trillium, persistent (*Trillium persistens*)
E	Trillium, relict (*Trillium reliquum*)
E	Grass, Tennessee yellow-eyed (*Xyris tennesseensis*)

Indiana -- 31 listings

Animals – 27

Status	**Listing**
E	Bat, gray (*Myotis grisescens*)
E	Bat, Indiana (*Myotis sodalis*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Butterfly, Karner blue (*Lycaeides melissa samuelis*)
E	Butterfly, Mitchell's satyr (*Neonympha mitchellii mitchellii*)
E	Catspaw (=purple cat's paw pearlymussel) Entire Range; Except where listed as EXPN (*Epioblasma obliquata obliquata*)
E	Catspaw, white (pearlymussel) (*Epioblasma obliquata perobliqua*)
E	Clubshell Entire Range; Except where listed as Experimental Populations (*Pleurobema clava*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Dragonfly, Hine's emerald (*Somatochlora hineana*)
E	Fanshell (*Cyprogenia stegaria*)
E	Mapleleaf, winged Entire; except where listed as EXPN (*Quadrula fragosa*)
E	Mucket, pink (pearlymussel) (*Lampsilis abrupta*)
E	Mussel, scaleshell (*leptodea leptodon*)
E	Pearlymussel, cracking Entire Range; Except where listed as Experimental Populations (*Hemistena lata*)
E	Pigtoe, rough (*Pleurobema plenum*)
E	Pimpleback, orangefoot (pearlymussel) (*Plethobasus cooperianus*)
E	Plover, piping (Great Lakes watershed) (*Charadrius melodus*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Pocketbook, fat (*Potamilus capax*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Riffleshell, northern (*Epioblasma torulosa rangiana*)
E	Ring pink (mussel) (*Obovaria retusa*)
T	Snake, copperbelly water (MI, OH, IN N of 400 N. Lat.) (*Nerodia erythrogaster neglecta*)
E	Tern, least (interior pop.) (*Sterna antillarum*)
E	Wartyback, white (pearlymussel) (*Plethobasus cicatricosus*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 4

Status	**Listing**
T	Milkweed, Mead's (*Asclepias meadii*)
T	Thistle, Pitcher's (*Cirsium pitcheri*)
E	Clover, running buffalo (*Trifolium stoloniferum*)
T	Orchid, eastern prairie fringed (*Platanthera leucophaea*)

Kentucky -- 41listings

Animals -- 33

Status	**Listing**
E	Bat, gray (*Myotis grisescens*)
E	Bat, Indiana (*Myotis sodalis*)
E	Bat, Virginia big-eared (*Corynorhinus (=Plecotus) townsendii virginianus*)
E	Bean, Cumberland (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Villosa trabalis*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Catspaw (=purple cat's paw pearlymussel) Entire Range; Except where listed as Experimental Populations (*Epioblasma obliquata obliquata*)
E	Clubshell Entire Range; Except where listed as Experimental Populations (*Pleurobema clava*)
E	Combshell, Cumberlandian Entire Range; Except where listed as Experimental Populations (*Epioblasma brevidens*)
E	Curlew, Eskimo (*Numenius borealis*)
T	Dace, blackside (*Phoxinus cumberlandensis*)
E	Darter, relict (*Etheostoma chienense*)
E	Elktoe, Cumberland (*Alasmidonta atropurpurea*)
E	Fanshell (*Cyprogenia stegaria*)
E	Mucket, pink (pearlymussel) (*Lampsilis abrupta*)

E Mussel, oyster Entire Range; Except where listed as Experimental Populations (*Epioblasma capsaeformis*)
E Mussel, scaleshell (*Leptodea leptodon*)
E Pearlymussel, cracking Entire Range; Except where listed as Experimental Populations (*Hemistena lata*)
E Pearlymussel, dromedary Entire Range; Except where listed as Experimental Populations (*Dromus dromas*)
E Pearlymussel, littlewing (*Pegias fabula*)
E Pigtoe, rough (*Pleurobema plenum*)
E Pimpleback, orangefoot (pearlymussel) (*Plethobasus cooperianus*)
T Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E Pocketbook, fat (*Potamilus capax*)
E Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E Riffleshell, northern (*Epioblasma torulosa rangiana*)
E Riffleshell, tan (*Epioblasma florentina walkeri (=E. walkeri)*)
E Ring pink (mussel) (*Obovaria retusa*)
E Shiner, palezone (*Notropis albizonatus*)
E Shrimp, Kentucky cave (*Palaemonias ganteri*)
E Sturgeon, pallid (*Scaphirhynchus albus*)
E Tern, least (interior pop.) (*Sterna antillarum*)
E Wartyback, white (pearlymussel) (*Plethobasus cicatricosus*)
E Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 8

Status	**Listing**
T	Potato-bean, Price's (*Apios priceana*)
E	Rock-cress, Braun's (*Arabis perstellata*)
E	Sandwort, Cumberland (*Arenaria cumberlandensis*)
T	Rosemary, Cumberland (*Conradina verticillata*)
T	Goldenrod, white-haired (*Solidago albopilosa*)
E	Goldenrod, Short's (*Solidago shortii*)
T	Spiraea, Virginia (*Spiraea virginiana*)
E	Clover, running buffalo (*Trifolium stoloniferum*)

Louisiana -- 32 listings

Animals –28

Status	**Listing**
T(S/A)	Alligator, American (*Alligator mississippiensis*)
T(S/A)	Bear, American black (County range of LA b.bear) (*Ursus americanus*)
T	Bear, Louisiana black (*Ursus americanus luteolus*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Frog, Mississippi gopher Wherever found west of Mobile and Tombogbee Rivers in AL, MS, and LA (*Rana captio sevosa*)
T	Heelsplitter, Alabama (=inflated) (*Potamilus inflatus*)
E	Jaguar (*Panthera onca*)
E	Mucket, pink (pearlymussel) (*Lampsilis abrupta*)
E	Panther, Florida (*Puma (=Felis) concolor coryi*)
T	Pearlshell, Louisiana (*Margaritifera hembeli*)
E	Pelican, brown (except U.S. Atlantic coast, FL, AL) (*Pelecanus occidentalis*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
T	Sturgeon, gulf (*Acipenser oxyrinchus desotoi*)
E	Sturgeon, pallid (*Scaphirhynchus albus*)
E	Tern, least (interior pop.) (*Sterna antillarum*)
T	Tortoise, gopher (W of of Mobile/Tombigbee Rs.) (*Gopherus polyphemus*)
T	Turtle, ringed map (*Graptemys oculifera*)
E	Vireo, black-capped (*Vireo atricapilla*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)
E	Woodpecker, red-cockaded (*Picoides borealis*)

Plants --4

Status	**Listing**
T	*Geocarpon minimum* (No common name)
E	Quillwort, Louisiana (*Isoetes louisianensis*)
E	Chaffseed, American (*Schwalbea americana*)
E	Pondberry (*Lindera melissifolia*)

Maine -- 16 listings

Animals – 13

Status	Listing
E	Beetle, American burying (*Nicrophorus americanus*)
E	Curlew, Eskimo (*Numenius borealis*)
T	Lynx, Canada (*Lynx canadensis*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Salmon, Atlantic Gulf of Maine Atlantic Salmon DPS (*Salmo salar*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
E	Tern, roseate (northeast U.S. nesting pop.) (*Sterna dougallii dougallii*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis)*)
T	Wolf, gray Eastern Distinct Population Segment (*Canis lupus*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 3

Status	Listing
T	Pogonia, small whorled (*Isotria medeoloides*)
E	Lousewort, Furbish (*Pedicularis furbishiae*)
T	Orchid, eastern prairie fringed (*Platanthera leucophaea*)

Maryland -- 31 listings

Animals –21

Status	Listing
E	Bat, Indiana (*Myotis sodalis*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Darter, Maryland (*Etheostoma sellare*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
E	Squirrel, Delmarva Peninsula fox (except Sussex Co., DE) (*Sciurus niger cinereus*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
T	Tiger beetle, northeastern beach (*Cicindela dorsalis dorsalis*)
T	Tiger beetle, Puritan (*Cicindela puritana*)
T	Turtle, bog (=Muhlenberg) (northern) (*Clemmys muhlenbergii*)
E	Wedgemussel, dwarf (*Alasmidonta heterodon*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis)*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants – 10

Status	Listing
T	Joint-vetch, sensitive (*Aeschynomene virginica*)
E	Gerardia, sandplain (*Agalinis acuta*)
T	Amaranth, seabeach (*Amaranthus pumilus*)
T	Pink, swamp (*Helonias bullata*)
E	Dropwort, Canby's (*Oxypolis canbyi*)
E	Harperella (*Ptilimnium nodosum*)
E	Bulrush, Northeastern (*Scirpus ancistrochaetus*)
E	Chaffsee, American (*Schwalbea Americana*)
E	Coneflower, smooth (*Echinacea laevigata*)
T	Pogonia, small whorled (*Isotria medeoloides*)

Massachusetts -- 27 listings

Animals – 22

Status	Listing
E	Beetle, American burying (*Nicrophorus americanus*)
E	Butterfy, Karner blue (*Lycaeides melissa samuelis*)
E	Curlew, Eskimo (*Numenius borealis*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Plymouth Red-Bellied Turtle (*Pseudemys rubriventris bangsi*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)

T	Sea turtle, loggerhead (*Caretta caretta*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
E	Tern, roseate (northeast U.S. nesting pop.) (*Sterna dougallii dougallii*)
T	Tiger beetle, northeastern beach (*Cicindela dorsalis dorsalis*)
T	Tiger beetle, Puritan (*Cicindela puritana*)
T	Turtle, bog (=Muhlenberg) (northern) (*Clemmys muhlenbergii*)
E	Wedgemussel, dwarf (*Alasmidonta heterodon*)
E	Whale, blue (*Balaenoptera musculus*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis)*)
E	Whale, Sei (*Balaenoptera borealis*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 5

Status	**Listing**
T	Amaranth, seabeach (*Amaranthus pumilus*)
E	Bulrush, Northeastern (*Scirpus ancistrochaetus*)
E	Chaffseed, American (*Schwalbea Americana*)
E	Gerardia, sandplain (*Agalinis acuta*)
T	Pogonia, small whorled (*Isotria medeoloides*)

Michigan -- 25 listings

Animals – 16

Status	**Listing**
E	Bat, Indiana (*Myotis sodalis*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Beetle, Hungerford's crawling water (*Brychius hungerfordi*)
E	Butterfly, Karner blue (*Lycaeides melissa samuelis*)
E	Butterfly, Mitchell's satyr (*Neonympha mitchellii mitchellii*)
E	Catspaw, white (pearlymussel) (*Epioblasma obliquata perobliqua*)
E	Clubshell Entire Range; Except where listed as Experimental Populations (*Pleurobema clava*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Plover, piping (Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Riffleshell, northern (*Epioblasma torulosa rangiana*)
T	Snake, copperbelly water (MI, OH, IN N of 400 N. Lat.) (*Nerodia erythrogaster neglecta*)
E	Warbler (=wood), Kirtland's (*Dendroica kirtlandii*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)
E	Wolf, gray Western Great Lakes DPS (*Canis lupus*)

Plants -- 9

Status	**Listing**
E	Chaffseed, American (*Schwalbea Americana*)
T	Daisy, lakeside (*Hymenoxys herbacea*)
T	Fern, American hart's-tongue (*Asplenium scolopendrium* var. *americanum*)
T	Goldenrod, Houghton's (*Solidago houghtonii*)
T	Iris, dwarf lake (*Iris lacustris*)
E	Monkey-flower, Michigan (*Mimulus glabratus* var. *michiganensis*)
T	Orchid, eastern prairie fringed (*Platanthera leucophaea*)
T	Pogonia, small whorled (*Isotria medeoloides*)
T	Thistle, Pitcher's (*Cirsium pitcheri*)

Mississippi -- 42 listings

Animals -- 38

Status	**Listing**
T(S/A)	Alligator, American (*Alligator mississippiensis*)
E	Bat, Indiana (*Myotis sodalis*)
T(S/A)	Bear, American black (County range of LA b.bear) (*Ursus americanus*)
T	Bear, Louisiana black (*Ursus americanus luteolus*)
E	Clubshell, black (*Pleurobema curtum*)
E	Clubshell, ovate (*Pleurobema perovatum*)
E	Clubshell, southern (*Pleurobema decisum)*
E	Combshell, Cumberlandian Entire Range; Except where listed as EXPN (*Epioblasma brevidens*)
E	Combshell, southern (*Epioblasma penita*)
E	Crane, Mississippi sandhill (*Grus canadensis pulla*)
T	Darter, bayou (*Etheostoma rubrum*)
T	Eagle, bald (lower 48 States) (*Haliaeetus leucocephalus*)
E	Frog, Mississippi gopher Wherever found west of Mobile and Tombigbee Rivers in AL, MS, and LA. (*Rana capito sevosa*)
T	Hellsplitter, Alabama (=inflated) (*Potamilus inflatus*)
T	Moccasinshell, Alabama (*Medionidus acutissimus*)
T	Mucket, orangenacre (*Lampsilis perovalis*)

E Panther, Florida (*Puma (=Felis) concolor coryi*)
E Pelican, brown (except U.S. Atlantic coast, FL, AL) (*Pelecanus occidentalis*)
E Pigtoe, flat (*Pleurobema marshalli*)
E Pigtoe, heavy (*Pleurobema taitianum*)
T Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E Pocketbook, fat (*Potamilus capax*)
T Sea turtle, green (except where endangered) (*Chelonia mydas*)
E Sea turtle, hawksbill (*Eretmochelys imbricata*)
E Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E Sea turtle, leatherback (*Dermochelys coriacea*)
T Sea turtle, loggerhead (*Caretta caretta*)
E Stirrupshell (*Quadrula stapes*)
E Sturgeon, Alabama (*Scaphirhynchus suttkusi*)
T Sturgeon, gulf (*Acipenser oxyrinchus desotoi*)
E Sturgeon, pallid (*Scaphirhynchus albus*)
E Tern, least (interior pop.) (*Sterna antillarum*)
T Turtle, ringed map (*Graptemys oculifera*)
T Turtle, yellow-blotched map (*Graptemys flavimaculata*)
E Whale, finback (*Balaenoptera physalus*)
E Whale, humpback (*Megaptera novaeangliae*)
E Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)
E Woodpecker, red-cockaded (*Picoides borealis*)

Plants -- 4
Status Listing
E Chaffseed, American (*Schwalbea americana*)
E Pondberry (*Lindera melissifolia*)
T Potato-bean, Price's (*Apios priceana*)
E Quillwort, Louisiana (*Isoetes louisianensis*)

New Hampshire -- 14 listings

Animals –11

Status	Listing
E	Beetle, American burying (*Nicrophorus americanus*)
E	Butterfly, Karner blue (*Lycaeides melissa samuelis*)
E	Curlew, Eskimo (*Numenius borealis*)
T	Lynx, Canada (*Lynx canadensis*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Tiger beetle, Puritan (*Cicindela puritana*)
E	Wedgemussel, dwarf (*Alasmidonta heterodon*)
E	Whale, finback (*Balaenoptera physalus*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 3

Status	Listing
E	Bulrush, Northeastern (*Scirpus ancistrochaetus*)
E	Milk-vetch, Jesup's (*Astragalus robbinsii* var. *jesupi*)
T	Pogonia, small whorled (*Isotria medeoloides*)

New Jersey -- 26 listings

Animals -- 19

Status	Listing
E	Bat, Indiana (*Myotis sodalis*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Butterfly, Mitchell's satyr (*Neonympha mitchellii mitchellii*)
E	Curlew, Eskimo (*Numenius borealis*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
E	Tern, roseate (northeast U.S. nesting pop.) (*Sterna dougallii dougallii*)
T	Tiger beetle, northeastern beach (*Cicindela dorsalis dorsalis*)
T	Turtle, bog (=Muhlenberg) (northern) (*Clemmys muhlenbergii*)
E	Wedgemussel, dwarf (*Alasmidonta heterodon*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)

E Whale, right (*Balaena glacialis (incl. australis)*)
E Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 7

Status	**Listing**
T	Amaranth, seabeach (*Amaranthus pumilus*)
T	Beaked-rush, Knieskern's (*Rhynchospora knieskernii*)
E	Chaffseed, American (*Schwalbea americana*)
T	Joint-vetch, sensitive (*Aeschynomene virginica*)
T	Orchid, eastern prairie fringed (*Platanthera leucophaea*)
T	Pink, swamp (*Helonias bullata*)
T	Pogonia, small whorled (*Isotria medeoloides*)

New Mexico -- 45 listings

Animals -- 32

Status	**Listing**
E	Amphipod, Noel's (*Gammarus desperatus*)
E	Bat, lesser long-nosed (*Leptonycteris curasoae yerbabuenae*)
E	Bat, Mexican long-nosed (*Leptonycteris nivalis*)
T	Bear, grizzly lower 48 States, except where listed as EXPN or delisted (*Ursus arctos horribils*)
T	Chub, Chihuahua (*Gila nigrescens*)
E	Chub, Gila (*Gila intermedia*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Falcon, northern aplomado (*Falco femoralis septentrionalis*)
E	Flycatcher, southwestern willow (*Empidonax traillii extimus*)
T	Frog, Chiricahua leopard (*Rana chiricahuensis*)
E	Gambusi, Peco (*Gambusia nobilis*)
E	Isopod, Socorro (*Thermosphaeroma thermophilus*)
E	Jaguar (*Panthera onca*)
T	Minnow, loach (*Tiaroga cobitis*)
E	Minnow, Rio Grande silvery (*Hybognathus amarus*)
T	Owl, Mexican spotted (*Strix occidentalis lucida*)
E	Pikeminnow (=squawfish), Colorado except Salt and Verde R. drainages, AZ (*ptychocheilus lucius*)
T	Rattlesnake, New Mexico ridge-nosed (*Crotalus willardi obscurus*)
T	Shiner, Arkansas River Arkansas R. Basin (*Notropis girardi*)
T	Shiner, beautiful (*Cyprinella Formosa*)
T	Shiner, Pecos bluntnose (*Notropis simus pecosensis*)
E	Snail, Pecos assiminea (*Assininea pecos*)
T	Spikedace (*Meda fulgida*)
E	Springsnail, Alamosa (*Rtyonia alamosae*)
E	Springtail, Koster's (*Juturnia kosteri*)
E	Springtail, Roswell (*Pyrgulopsis roswellensis*)
E	Springtail, Socorro (*Pyrgulopsis neomexicana*)
E	Sucker, razorback entire (*Xyraauchen texanus*)
E	Tern, least interior pop. (*Sterna antillarum*)
E	Topminnow, Gila (incl. Yqui) U.S.A only (*Poeciliopsis occidentalis*)
T	Trout, Gila (*Oncorhynchus gilae*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 13

Status	**Listing**
E	Cactus, Knowlton (*Pediocactus knowltonii*)
E	Cactus, Kuenzler hedgehog (*Echinocereus fendleri var. kuenzleri*)
T	Cactus, Lee pincushion (*Coryphantha sneedii var. leei*)
T	Cactus Mesa Verde (*Sclerocactus mesae-verdae*)
E	Cactus Sneed pincushion (*coryphantha sneedii var. sneedii*)
T	Fleabane, Zuni (*Erigeron rhizomatus*)
E	Ipomopsis, Holy Ghost (*Ipomopsis sanct-spiritus*)
E	Milk-vetch, Mancos (*Astragalus humillimus*)
E	Pennyroyal, Todsen's (*Hedeoma todsenii*)
E	Poppy, Sacramento prickly (=puzzle, =paradox) *(Helianthus paradoxus*)
T	Thistle, Sacramento Mountains (*Cirsium vinaceum*)
T	Wild-buckweat, gypsum (*Eriogonum gypsophilum*)

New York -- 33listings

Animals – 23

Status	**Listing**
E	Bat, Indiana (*Myotis sodalis*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Butterfly, Karner blue (*Lycaeides melissa samuelis*)
E	Curlew, Eskimo (*Numenius borealis*)

T	Lynx, Canada (*Lynx canadensis*)
E	Plover, piping (Great Lakes watershed) (*Charadrius melodus*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
T	Snail, Chittenango ovate amber (*Succinea chittenangoensis*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
E	Tern, roseate (northeast U.S. nesting pop.) (*Sterna dougallii dougallii*)
T	Tiger beetle, northeastern beach (*Cicindela dorsalis dorsalis*)
T	Turtle, bog (=Muhlenberg) (northern) (*Clemmys muhlenbergii*)
E	Wedgemussel, dwarf (*Alasmidonta heterodon*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis)*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 10

Status	**Listing**
T	Amaranth, seabeach (*Amaranthus pumilus*)
E	Bulrush, Northeastern (*Scirpus ancistrochaetus*)
E	Caffseed, American (*Schwalbea Americana*)
T	Fern, American hart's-tongue (*Asplenium scolopendrium* var. *americanum*)
E	Gerardia, sandplain (*Agalinis acuta*)
T	Monkshood, northern wild (*Aconitum noveboracense*)
T	Orchid, eastern prairie fringed (*Plarantha leucophaea*)
T	Pink, swamp (*Helonias bullata*)
T	Pogonia, small whorled (*Isotrai medeoloides*)
T	Roseroot, Leedy's (*Sedum integrifolium* ssp. *leedyi*)

North Carolina -- 67 listings

Animals -- 40

Status	**Listing**
T(S/A)	Alligator, American (*Alligator mississippiensis*)
E	Bat, Indiana (*Myotis sodalis*)
E	Bat, Virginia big-eared (*Corynorhinus (=Plecotus) townsendii virginianus*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Butterfly, Saint Francis' satyr (*Neonympha mitchellii francisci*)
E	Cahow (*Pterodroma cahow*)
T	Chub, spotfin Entire (*Cyprinella monacha*)
E	Elktoe, Appalachian (*Alasmidonta raveneliana*)
E	Heelsplitter, Carolina (*Lasmigona decorata*)
E	Mussel, oyster Entire Range; Except where listed as Experimental Populations (*Epioblasma capsaeformis*)
E	Pearlymussel, littlewing (*Pegias fabula*)
E	Pelican, brown except U.S. Atlantic coast, FL, AL (*Pelecanus occidentalis*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Riffleshell, tan (*Epioblasma florentina walkeri (=E. walkeri)*)
E	Sawfish, smalltooth (*Pristis pectinata*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
E	Shiner, Cape Fear (*Notropis mekistocholas*)
T	Silverside, Waccamaw (*Menidia extensa*)
T	Snail, noonday (*Mesodon clarki nantahala*)
E	Spider, spruce-fir moss (*Microhexura montivaga*)
E	Spinymussel, Tar River (*Elliptio steinstansana*)
E	Squirrel, Carolina northern flying (*Glaucomys sabrinus coloratus*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
E	Tern, roseate (northeast U.S. nesting pop.) (*Sterna dougallii dougallii*)
T(S/A)	Turtle, bog (=Muhlenberg) (southern) (*Clemmys muhlenbergii*)
E	Wedgemussel, dwarf (*Alasmidonta heterodon*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis)*)

E	Whale, sperm (*Physeter catodon (=macrocephalus)*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)
E	Wolf, red (except where XN) (*Canis rufus*)
XN	Wolf, red [XN] (*Canis rufus*)
E	Woodpecker, red-cockaded (*Picoides borealis*)

Plants -- 27

Status	**Listing**
T	Joint-vetch, sensitive (*Aeschynomene virginica*)
T	Amaranth, seabeach (*Amaranthus pumilus*)
E	Bittercress, small-anthered (*Cardamine micranthera*)
E	Sedge, golden (*Carex lutea*)
E	Coneflower, smooth (*Echinacea laevigata*)
E	Avens, spreading (*Geum radiatum*)
E	Lichen, rock gnome (*Gymnoderma lineare*)
E	Bluet, Roan Mountain (*Hedyotis purpurea* var. *montana*)
E	Sunflower, Schweinitz's (*Helianthus schweinitzii*)
T	Pink, swamp (*Helonias bullata*)
T	Heartleaf, dwarf-flowered (*Hexastylis naniflora*)
T	Heather, mountain golden (*Hudsonia montana*)
T	Pogonia, small whorled (*Isotria medeoloides*)
T	Blazingstar, Heller's (*Liatris helleri*)
E	Pondberry (*Lindera melissifolia*)
E	Loosestrife, rough-leaved (*Lysimachia asperulaefolia*)
E	Dropwort, Canby's (*Oxypolis canbyi*)
E	Harperella (*Ptilimnium nodosum*)
E	Sumac, Michaux's (*Rhus michauxii*)
E	Arrowhead, bunched (*Sagittaria fasciculata*)
E	Pitcher-plant, green (*Sarracenia oreophila*)
E	Pitcher-plant, mountain sweet (*Sarracenia rubra* ssp. *jonesii*)
E	Chaffseed, American (*Schwalbea americana*)
E	Irisette, white (*Sisyrinchium dichotomum*)
T	Goldenrod, Blue Ridge (*Solidago spithamaea*)
T	Spiraea, Virginia (*Spiraea virginiana*)
E	Meadowrue, Cooley's (*Thalictrum cooleyi*)

Ohio -- 30 listings

Animals – 25

Status	**Listing**
E	Bat, Indiana (*Myotis sodalis*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Butterfly, Karner blue (*Lycaeides melissa samuelis*)
E	Catspaw (=purple cat's paw pearlymussel) Entire Range; Except where listed as Experimental Populations (*Epioblasma obliquata obliquata*)
E	Catspaw, white (pearlymussel) (*Epioblasma obliquata perobliqua*)
E	Clubshell Entire Range; Except where listed as Experimental Populations (*Pleurobema clava*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Dragonfly, Hine's emerald (*Somatochlora hineana*)
E	Fanshell (*Cyprogenia stegaria*)
E	Madtom, Scioto (*Noturus trautmani*)
E	Mapleleaf, winged Entire; except where listed as EXPN (*Quadrula fragosa*)
E	Mucket, pink (pearlymussel) (*Lampsilis abrupta*)
E	Mussel, scaleshell (*Leptodea leptodon*)
E	Pearlymussel, cracking Enire Ranges; except where listed as EXPN (*Hemistena lata*)
E	Pimpleback, orangefoot (pearlymussel) (*Plethobasus cooperianus*)
E	Plover, piping (Great Lakes watershed) (*Charadrius melodus*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Pocketbook, fat (*Potamilus capax*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Riffleshell, northern (*Epioblasma torulosa rangiana*)
E	Ring pink (mussel) (*Obovaria retusa*)
T	Snake, copperbelly water (MI, OH, IN N of 400 N. Lat.) (*Nerodia erythrogaster neglecta*)
T	Snake, Lake Erie water (subspecies range clarified) (*Nerodia sipedon insularum*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)
E	Wolf, gray Western Great Lakes DPS (*Canis lupus*)

Plants -- 5

Status	**Listing**
T	Monkshood, northern wild (*Aconitum noveboracense*)
T	Daisy, lakeside (*Hymenoxys herbacea*)
T	Orchid, eastern prairie fringed (*Platanthera leucophaea*)

T	Spiraea, Virginia (*Spiraea virginiana*)
E	Clover, running buffalo (*Trifolium stoloniferum*)

Pennsylvania -- 24 listings

Animals – 18

Status	Listing
E	Bat, Indiana (*Myotis sodalis*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Butterfly, Karner blue (*Lycaeides melissa samuelis*)
E	Clubshell Entire Range; Except where listed as Experimental Populations (*Pleurobema clava*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Fanshell (*Cyprogenia stegaria*)
E	Mucket, pink (pearlymussel) (*Lampsilis abrupta*)
E	Pigtoe, rough (*Pleurobema plenum*)
E	Pimpleback, orangefoot (pearlymussel) (*Plethobasus cooperianus*)
E	Plover, piping (Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Riffleshell, northern (*Epioblasma torulosa rangiana*)
E	Ring pink (mussel) (*Obovaria retusa*)
E	Squirrel, Delmarva Peninsula fox Entire, except Sussex Co., DE (*Sciurus niger cinereus*)
T	Tiger beetle, northeastern beach (*Cicindela dorsalis dorsalis*)
T	Turtle, bog (=Muhlenberg) (northern) (*Clemmys muhlenbergii*)
E	Wedgemussel, dwarf (*Alasmidonta heterodon*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 6

Status	Listing
E	Coneflower, smooth (*Echinacae laevigata*)
T	Joint-vetch, sensitive (*Aeschynomene virginica*)
T	Orchid, eastern prairie fringed (*Platanthera leucophaea*)
T	Pogonia, small whorled (*Isotria medeoloides*)
E	Bulrush, Northeastern (*Scirpus ancistrochaetus*)
T	Spiraea, Virginia (*Spiraea virginiana*)

Rhode Island -- 18 listings

Animals – 15

Status	Listing
E	Beetle, American burying (*Nicrophorus americanus*)
E	Curlew, Eskimo (*Numenius borealis*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
E	Tern, roseate (northeast U.S. nesting pop.) (*Sterna dougallii dougallii*)
T	Tiger beetle, northeastern beach (*Cicindela dorsalis dorsalis*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis)*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 3

Status	Listing
T	Amaranth, seabeach (*Amaranthus pumilus*)
E	Gerardia, sandplain (*Agalinis acuta*)
T	Pogonia, small whorled (*Isotria medeoloides*)

South Carolina -- 45 listings

Animals -- 26

Status	Listing
T(S/A)	Alligator, American (*Alligator mississippiensis*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Heelsplitter, Carolina (*Lasmigona decorata*)
E	Panther, Florida (*Puma (=Felis) concolr coryi*)
E	Pelican, brown except U.S. Atlantic coast, FL, AL (*Pelecanus occidentalis*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)

T	Salamander, flatwoods frosted (*Ambystoma cingulatum*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
T	Snake, eastern indigo (*Drymarchon corais couperi*)
E	Stork, wood (AL, FL, GA, SC) (*Mycteria americana*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
T	Tern, roseate (Western Hemisphere except NE U.S.) (*Sterna dougallii dougallii*)
T(S/A)	Turtle, bog (=Muhlenberg) (southern) (*Clemmys muhlenbergii*)
E	Warbler (=wood), Bachman's (*Vermivora bachmanii*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis)*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)
E	Wolf, red (except where XN) (*Canis rufus*)
E	Woodpecker, red-cockaded (*Picoides borealis*)

Plants -- 19

Status	**Listing**
T	Amaranth, seabeach (*Amaranthus pumilus*)
T	Amphianthus, little (*Amphianthus pusillus*)
E	Coneflower, smooth (*Echinacea laevigata*)
E	Sunflower, Schweinitz's (*Helianthus schweinitzii*)
T	Pink, swamp (*Helonias bullata*)
T	Heartleaf, dwarf-flowered (*Hexastylis naniflora*)
E	Quillwort, black spored (*Isoetes melanospora*)
T	Pogonia, small whorled (*Isotria medeoloides*)
E	Pondberry (*Lindera melissifolia*)
E	Loosestrife, rough-leaved (*Lysimachia asperulaefolia*)
E	Dropwort, Canby's (*Oxypolis canbyi*)
E	Harperella (*Ptilimnium nodosum*)
E	Sumac, Michaux's (*Rhus michauxii*)
T	Gooseberry, Miccosukee (*Ribes echinellum*)
E	Arrowhead, bunched (*Sagittaria fasciculata*)
E	Pitcher-plant, mountain sweet (*Sarracenia rubra* ssp. *jonesii*)
E	Chaffseed, American (*Schwalbea americana*)
E	Trillium, persistent (*Trillium persistens*)
E	Trillium, relict (*Trillium reliquum*)

Tennessee -- 95 listings

Animals – 75

Status	**Listing**
E	Acornshell, southern (*Epioblasma othcaloogensis*)
E	Bat, gray (*Myotis grisescens*)
E	Bat, Indiana (*Myotis sodalis*)
E	Bean, Cumberland (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Villosa trabalis*)
XN	Bean, Cumberland (pearlymussel) U.S.A (TN – specified portions of the French Broad and Holston Rivers)
E	Bean, purple (*Villosa perpurpurea*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Blossom, green (pearlymussel) (*Epioblasma torulosa gubernaculum*)
E	Blossom, turgid (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Epioblasma turgidula*)
E	Blossom, yellow (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Epioblasma florentina florentina*)
E	Catspaw (=purple cat's paw pearlymussel) Entire Range; Except where listed as Experimental Populations (*Epioblasma obliquata obliquata*)
T	Chub, slender (*Erimystax cahni*)
T	Chub, spotfin Entire (*Cyprinella monacha*)
E	Clubshell Enitre Range; Except where listed as EXPN (*Pleurobema clava*)
E	Clubshell, ovate (*Pleurobema perovatum*)
E	Clubshell, southern (*Pleurobema decisum*)
E	Combshell, Cumberlandian Entire Range; Except where listed as Experimental Populations (*Epioblasma brevidens*)
XN	Combshell, Cumberlandian U.S.A. (TN – specified portions of the French Broad and Holston Rivers)
E	Combshell, upland (*Epioblasma metastriata*)
E	Crayfish, Nashville (*Orconectes shoupi*)
E	Curlew, Eskimo (*Numenius borealis*)
T	Dace, blackside (*Phoxinus cumberlandensis*)
E	Darter, amber (*Percina antesella*)
E	Darter, bluemask (=jewel) (*Etheostoma /*)

E	Darter, boulder (*Etheostoma wapiti*)
E	Darter, duskytail Entire (*Etheostoma percnurum*)
T	Darter, goldline (*Percina aurolineata*)
T	Darter, slackwater (*Etheostoma boschungi*)
T	Darter, snail (*Percina tanasi*)
E	Elktoe, Appalachian (*Alasmidonta raveneliana*)
E	Elktoe, Cumberland (*Alasmidonta atropurpurea*)
E	Fanshell (*Cyprogenia stegaria*)
E	Kidneyshell, triangular (*Ptychobranchus greeni*)
E	Lampmussel, Alabama Entire Range; Except where listed as Experimental Populations (*Lampsilis virescens*)
E	Lilliput, pale (pearlymussel) (*Toxolasma cylindrellus*)
E	Logperch, Conasauga *Percina jenkinsi*)
E	Madtom, pygmy (*Noturus stanauli*)
E	Madtom, smoky Entire (*Noturus baileyi*)
T	Madtom, yellowfin (except where XN) (*Noturus flavipinnis*)
XN	Madtom, yellowfin U.S.A. (TN – specified portions of the French Broad and Holston Rivers); Tellico River, TN (*Noturus flavipinnis*)
E	Marstonia, royal (snail) (*Pyrgulopsis ogmorhaphe*)
E	Moccasinshell, Coosa (*Medionidus parvulus*)
E	Monkeyface, Appalachian (pearlymussel) (*Quadrula sparsa*)
E	Monkeyface, Cumberland (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Quadrula intermedia*)
XN	Monkeyface, Cumberland (pearlymussel) U.S.A. (TN – specified portions of the Fench Broad and Holston Rivers) (*Quadrula intermedia*)
E	Mucket, pink (pearlymussel) (*Lampsilis abrupta*)
E	Mussel, oyster Entire Range; Except where listed as Experimental Populations (*Epioblasma capsaeformis*)
E	Panther, Florida (*Puma (=Felis) concolr coryi*)
E	Pearlymussel, birdwing Entire Range; Except where listed as Experimental Populations (*Conradilla caelata*)
E	Pearlymussel, cracking Entire Range; Except where listed as Experimental Populations (*Hemistena lata*)
E	Pearlymussel, dromedary Entire Range; Except where listed as Experimental Populations (*Dromus dromas*)
E	Pearlymussel, littlewing (*Pegias fabula*)
E	Pigtoe, Cumberland (*Pleurobema gibberum*)
E	Pigtoe, finerayed Entire Range; Except where listed as Experimental Populations (*Fusconaia cuneolus*)
XN	Pigtoe, finerayed U.S.A. (TN – specified portions of the Fench Broad and Holston Rivers) (*Fusconaia cuneolus*)
E	Pigtoe, rough (*Pleurobema plenum*)
E	Pigtoe, shiny Entire Range; Except where listed as Experimental Populations (*Fusconaia cor*)
XN	Pigtoe, shiny U.S.A. (TN – specified portions of the Fench Broad and Holston Rivers) (*Fusconaia cor*)
E	Pigtoe, southern (*Pleurobema georgianum*)
E	Pimpleback, orangefoot (pearlymussel) (*Plethobasus cooperianus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Rabbitsfoot, rough (*Quadrula cylindrica strigillata*)
E	Riffleshell, tan (*Epioblasma florentina walkeri (=E. walkeri)*)
E	Ring pink (mussel) (*Obovaria retusa*)
E	Riversnail, Anthony's Entire Range; Except where listed as Experimental Populations (*Athearnia anthonyi*)
XN	Riversnail, Anthony's AL U.S.A. (TN – specified portions of the Fench Broad and Holston Rivers) (*Athearnia anthonyi*)
T	Shiner, blue (*Cyprinella caerulea*)
T	Snail, painted snake coiled forest (*Anguispira picta*)
E	Spider, spruce-fir moss (*Microhexura montivaga*)
E	Squirrel, Carolina northern flying (*Glaucomys sabrinus coloratus*)
E	Sturgeon, pallid (*Scaphirhynchus albus*)
E	Tern, least (interior pop.) (*Sterna antillarum*)
E	Wartyback, white (pearlymussel) (*Plethobasus cicatricosus*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)
XN	Wolf, red [XN] (*Canis rufus*)

Plants -- 20

Status	**Listing**
T	Potato-bean, Price's (*Apios priceana*)
E	Rock-cress, Braun's (*Arabis perstellata*)
E	Sandwort, Cumberland (*Arenaria cumberlandensis*)
T	Fern, American hart's-tongue (*Asplenium scolopendrium* var. *americanum*)
E	Ground-plum, Guthrie's (=Pyne's) (*Astragalus bibullatus*)
T	Rosemary, Cumberland (*Conradina verticillata*)
E	Prairie-clover, leafy (*Dalea foliosa*)
E	Coneflower, Tennessee purple (*Echinacea tennesseensis*)
E	Avens, spreading (*Geum radiatum*)
E	Lichen, rock gnome (*Gymnoderma lineare*)
E	Bluet, Roan Mountain (*Hedyotis purpurea* var. *montana*)
T	Pogonia, small whorled (*Isotria medeoloides*)
E	Bladderpod, Spring Creek (*Lesquerella perforata*)
E	Aster, Ruth's golden (*Pityopsis ruthii*)

E	Pitcher-plant, green (*Sarracenia oreophila*)
T	Skullcap, large-flowered (*Scutellaria montana*)
T	Goldenrod, Blue Ridge (*Solidago spithamaea*)
T	Spiraea, Virginia (*Spiraea virginiana*)
E	Grass, Tennessee yellow-eyed (*Xyris tennesseensis*)
E	Chaffseed, American (*Schwalbea americana*)

Texas -- 96 listings

Animals – 68

Status	**Listing**
T(S/A)	Alligator, American (*Alligator mississippiensis*)
E	Amphipod, Peck's cave (*Stygobromus (=Stygonectes) pecki*)
E	Bat, Mexican long-nosed (*Leptonycteris nivalis*)
T(S/A)	Bear, American black (County range of LA b.bear) (*Ursus americanus*)
T	Bear, Louisiana black (*Ursus americanus luteolus*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Beetle, Coffin Cave mold (*Batrisodes texanus*)
E	Beetle, Comal Springs dryopid (*Stygoparnus comalensis*)
E	Beetle, Comal Springs riffle (*Heterelmis comalensis*)
E	Beetle, Helotes mold (*Batrisodes venyivi*)
E	Beetle, Kretschmarr Cave mold (*Texamaurops reddelli*)
E	Beetle, Tooth Cave ground (*Rhadine persephone*)
E	Crane, whooping (except where XN) (*Grus americana*)
E	Curlew, Eskimo (*Numenius borealis*)
E	Darter, fountain (*Etheostoma fonticola*)
E	Falcon, northern aplomado (*Falco femoralis septentrionalis*)
E	Flycatcher, southwestern willow (*Empidonax traillii extimus*)
E	Gambusia, Big Bend (*Gambusia gaigei*)
E	Gambusia, Clear Creek (*Gambusia heterochir*)
E	Gambusia, Pecos (*Gambusia nobilis*)
E	Gambusia, San Marcos (*Gambusia georgei*)
E	Ground beetle, [unnamed] (*Rhadine exilis*)
E	Ground beetle, [unnamed] (*Rhadine infernalis*)
E	Harvestman, Bee Creek Cave (*Texella reddelli*)
E	Harvestman, Bone Cave (*Texella reyesi*)
E	Harvestman, Cokendolpher Cave (*Texella cokendolpheri*)
E	Jaguar (*Panthera onca*)
E	Jaguarundi, Gulf Coast (*Herpailurus (=Felis) yagouaroundi cacomitli*)
E	Manatee, West Indian (*Trichechus manatus*)
E	Margay Mexico southward (*Leoparus (=Felis) weidii*)
E	Meshweaver, Braken Bat Cave (*Cicurina venii*)
E	Meshweaver, Government Canyon Bat Cave (*Cicurina vespera*)
E	Meshweaver, Madla's Cave (*Cicurina madla*)
E	Meshweaver, Robber Baron Cave (*Cicurina baronia*)
T	Minnow, Devils River (*Dionda diaboli*)
E	Minnow, Rio Grande silvery (*Hybognathus amarus*)
E	Ocelot (*Leopardus (=Felis) pardalis*)
T	Owl, Mexican spotted (*Strix occidentalis lucida*)
E	Pelican, brown (except U.S. Atlantic coast, FL, AL) (*Pelecanus occidentalis*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Prairie-chicken, Attwater's greater (*Tympanuchus cupido attwateri*)
E	Pseudoscorpion, Tooth Cave (*Tartarocreagris texana*)
E	Pupfish, Comanche Springs (*Cyprinodon elegans*)
E	Pupfish, Leon Springs (*Cyprinodon bovinus*)
E	Salamander, Barton Springs (*Eurycea sosorum*)
T	Salamander, San Marcos (*Eurycea nana*)
E	Salamander, Texas blind (*Typhlomolge rathbuni*)
E	Sawfish, smalltooth (*Pristis pectinata*)
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
T	Shiner, Arkansas River (Arkansas R. Basin) (*Notropis girardi*)
E	Snail, Pecos assiminea (*Assiminea pecos*)
T	Snake, Concho water (*Nerodia paucimaculata*)
E	Spider, Government Canyon Bat Cave (*Neoleptoneta microps*)
E	Spider, Tooth Cave (*Neoleptoneta myopica*)
E	Tern, least (interior pop.) (*Sterna antillarum*)
E	Toad, Houston (*Bufo houstonensis*)
E	Vireo, black-capped (*Vireo atricapilla*)

E	Warbler (=wood), golden-cheeked (*Dendroica chrysoparia*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)
XN	Wolf, gray Mexican gray wolf, EXPN population (*Canis lupus*)
E	Wolf, red (except where XN) (*Canis rufus*)

E	Woodpecker, red-cockaded (*Picoides borealis*)

Plants -- 28

Status	**Listing**
E	Sand-verbena, large-fruited (*Abronia macrocarpa*)
E	Ambrosia, south Texas (*Ambrosia cheiranthifolia*)
E	Cactus, Tobusch fishhook (*ncistrocactus tobuschii*)
E	Cactus, star (*Astrophytum asterias*)
E	Ayenia, Texas (*Ayenia limitaris*)
E	Poppy-mallow, Texas (*Callirhoe scabriuscula*)
E	Cactus, Nellie cory (*Coryphantha minima*)
T	Cory cactus, bunched (*Coryphantha ramillosa*)
E	Cactus, Sneed pincushion (*Coryphantha sneedii* var. *sneedii*)
E	Cat's-eye, Terlingua Creek (*Cryptantha crassipes*)
T	Cactus, Chisos Mountain hedgehog (*Echinocereus chisoensis* var. *chisoensis*)
E	Cactus, black lace (*Echinocereus reichenbachii* var. *albertii*)
E	Pitaya, Davis' green (*Echinocereus viridiflorus* var. *davisii*)
T	Cactus, Lloyd's Mariposa (*Echinomastus mariposensis*)
E	Frankenia, Johnston's (*Frankenia johnstonii*)
T	Sunflower, Pecos (=puzzle, =paradox) (*Helianthus paradoxus*)
E	Rush-pea, slender (*Hoffmannseggia tenella*)
E	Dawn-flower, Texas prairie (*Hymenoxys texana*)
E	Bladderpod, white (*Lesquerella pallida*)
E	Bladderpod, Zapata (*Lesquerella thamnophila*)
E	Manioc, Walker's (*Manihot walkerae*)
E	Phlox, Texas trailing (*Phlox nivalis* ssp. *texensis*)
E	Pondweed, Little Aguja (=Creek) (*Potamogeton clystocarpus*)
T	Oak, Hinckley (*Quercus hinckleyi*)
E	Ladies'-tresses, Navasota (*Spiranthes parksii*)
E	Snowbells, Texas (*Styrax texanus*)
E	Dogweed, ashy (*Thymophylla tephroleuca*)
E	Wild-rice, Texas (*Zizania texana*)

Vermont -- 11 listings

Animals – 8

Status	**Listing**
E	Bat, Indiana (*Myotis sodalis*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Curlew, Eskimo (*Numenius borealis*)
T	Lynx, Canada (*Lynx canadensis*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
T	Tiger beetle, Puritan (*Cicindela puritana*)
E	Wedgemussel, dwarf (*Alasmidonta heterodon*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants --3

Status	**Listing**
E	Milk-vetch, Jesup's (*Astragalus robbinsii* var. *jesupi*)
E	Bulrush, Northeastern (*Scirpus ancistrochaetus*)
T	Pogonia, small whorled (*Isotrai medeoloides*)

Virginia -- 67 listings

Animals -- 52

Status	**Listing**
E	Bat, gray (*Myotis grisescens*)
E	Bat, Indiana (*Myotis sodalis*)
E	Bat, Virginia big-eared (*Corynorhinus (=Plecotus) townsendii virginianus*)
E	Bean, Cumberland (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Villosa trabalis*)
E	Bean, purple (*Villosa perpurpurea*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Blossom, green (pearlymussel) (*Epioblasma torulosa gubernaculum*)
T	Chub, slender (*Erimystax cahni*)
T	Chub, spotfin Entire (*Cyprinella monacha*)
E	Combshell, Cumberlandian Entire Range; Except where listed as Experimental Populations (*Epioblasma brevidens*)

E Curlew, Eskimo (*Numenius borealis*)
E Darter, duskytail Entire (*Etheostoma percnurum*)
E Fanshell (*Cyprogenia stegaria*)
E Isopod, Lee County cave (*Lirceus usdagalun*)
T Isopod, Madison Cave (*Antrolana lira*)
E Logperch, Roanoke (*Percina rex*)
XN Madtom, yellowfin Holston River, VA, TN (*Noturus flavipinnis*)
T Madtom, yellowfin (except where XN) (*Noturus flavipinnis*)
E Monkeyface, Appalachian (pearlymussel) (*Quadrula sparsa*)
E Monkeyface, Cumberland (pearlymussel) Entire Range; Except where listed as Experimental Populations (*Quadrula intermedia*)
E Mucket, pink (pearlymussel) (*Lampsilis abrupta*)
E Mussel, oyster Entire Range; Except where listed as Experimental Populations (*Epioblasma capsaeformis*)
E Pearlymussel, birdwing Entire Range; Except where listed as Experimental Populations (*Conradilla caelata*)
E Pearlymussel, cracking Entire Range; Except where listed as Experimental Populations (*Hemistena lata*)
E Pearlymussel, dromedary Entire Range; Except where listed as Experimental Populations (*Dromus dromas*)
E Pearlymussel, littlewing (*Pegias fabula*)
E Pigtoe, finerayed Entire Range; Except where listed as Experimental Populations (*Fusconaia cuneolus*)
E Pigtoe, rough (*Pleurobema plenum*)
E Pigtoe, shiny Entire Range; Except where listed as Experimental Populations (*Fusconaia cor*)
T Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E Rabbitsfoot, rough (*Quadrula cylindrica strigillata*)
E Riffleshell, tan (*Epioblasma florentina walkeri (=E. walkeri)*)
E Salamander, Shenandoah (*Plethodon shenandoah*)
T Sea turtle, green (except where endangered) (*Chelonia mydas*)
E Sea turtle, hawksbill (*Eretmochelys imbricata*)
E Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E Sea turtle, leatherback (*Dermochelys coriacea*)
T Sea turtle, loggerhead (*Caretta caretta*)
E Snail, Virginia fringed mountain (*Polygyriscus virginianus*)
E Spinymussel, James (*Pleurobema collina*)
E Squirrel, Delmarva Peninsula fox (except Sussex Co., DE) (*Sciurus niger cinereus*)
E Sturgeon, shortnose (*Acipenser brevirostrum*)
E Tern, roseate (northeast U.S. nesting pop.) (*Sterna dougallii dougallii*)
T Tiger beetle, northeastern beach (*Cicindela dorsalis dorsalis*)
T(S/A) Turtle, bog (=Muhlenberg) (southern) (*Clemmys muhlenbergii*)
E Wedgemussel, dwarf (*Alasmidonta heterodon*)
E Whale, finback (*Balaenoptera physalus*)
E Whale, humpback (*Megaptera novaeangliae*)
E Whale, right (*Balaena glacialis (incl. australis)*)
E Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)
E Woodpecker, red-cockaded (*Picoides borealis*)

Plants -- 15

Status	**Listing**
T	Joint-vetch, sensitive (*Aeschynomene virginica*)
T	Amaranth, seabeach (*Amaranthus pumilus*)
E	Rock-cress, shale barren (*Arabis serotina*)
T	Birch, Virginia round-leaf (*Betula uber*)
E	Bittercress, small-anthered (*Cardamine micranthera*)
E	Coneflower, smooth (*Echinacea laevigata*)
T	Sneezeweed, Virginia (*Helenium virginicum*)
T	Pink, swamp (*Helonias bullata*)
E	Mallow, Peter's Mountain (*Iliamna corei*)
T	Pogonia, small whorled (*Isotria medeoloides*)
T	Orchid, eastern prairie fringed (*Platanthera leucophaea*)
E	Sumac, Michaux's (*Rhus michauxii*)
E	Bulrush, Northeastern (*Scirpus ancistrochaetus*)
T	Spiraea, Virginia (*Spiraea virginiana*)
E	Chaffseed, American (*Schwalbea Americana*)

West Virginia -- 22 listings

Animals – 16

Status	**Listing**
E	Bat, gray (*Myotis grisescens*)
E	Bat, Indiana (*Myotis sodalis*)
E	Bat, Virginia big-eared (*Corynorhinus (=Plecotus) townsendii virginianus*)
E	Beetle, American burying (*Nicrophorus americanus*)
E	Clubshell Entire Range; Except where listed as Experimental Populations (*Pleurobema clava*)
E	Curlew, Eskimo (*Numenius borealis*)

E	Fanshell (*Cyprogenia stegaria*)
E	Isopod, Lee County cave (*Lirceus usdagalun*)
E	Mucket, pink (pearlymussel) (*Lampsilis abrupta*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
E	Riffleshell, northern (*Epioblasma torulosa rangiana*)
E	Ring pink (mussel) (*Obovaria retusa*)
T	Salamander, Cheat Mountain (*Plethodon nettingi*)
T	Snail, flat-spired three-toothed (*Triodopsis platysayoides*)
E	Spinymussel, James (*Pleurobema collina*)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (*Canis lupus*)

Plants -- 6

Status	**Listing**
E	Rock-cress, shale barren (*Arabis serotina*)
T	Pogonia, small whorled (*Isotria medeoloides*)
E	Harperella (*Ptilimnium nodosum*)
E	Bulrush, Northeastern (*Scirpus ancistrochaetus*)
T	Spiraea, Virginia (*Spiraea virginiana*)
E	Clover, running buffalo (*Trifolium stoloniferum*)

APPENDIX D
SUMMARY OF SPECIES LISTED AS THREATENED, ENDANGERED, OR SPECIAL STATUS UNDER STATE LAWS IN STATES PROPOSED FOR APHIS-WS CONTINUED OR EXPANDED INVOLVEMENT IN ORAL RABIES VACCINATION PROGRAMS

Number of State Listed Species by Category
(Species for which concerns about ORV programs might be raised are identified and shown in bold)
Information obtained from http://www.fws.gov/office/statelinks.html on March 2009.

State	Mammals	Birds	Reptiles	Amphibians	Fish	Invertebrates	Plants
Alabama	9NG **long-tailed weasel**	19NG	14NG	8NG	30NG	32E, 10T	11E, 7T
Arizona	28WSC **Mexican gray wolf, Intermountain gray wolf, Black-tailed prairie dog, Ocelot, Southwestern river otter, Black-footed ferret, Jaguar, Mt. Graham red squirrel, Grizzly bear**	55WSC	14WSC	11WSC	27WSC	0WSC	143SR, 43HS, 3HR
Connecticut	2E, 9SC **gray wolf, eastern puma**	21E, 9T, 20SC	4E, 3T, 4SC	1E, 3T, 3SC	3E, 2T, 2SC	17E, 24T, 128SC	119E, 38T, 186SC
Delaware	1E **Delmarva fox squirrel**	24E	6E	2E	1E	15E	
Florida	20E, 4T, 6SSC **Florida black bear, Everglades mink, Florida panther, Sherman's fox squirrel, Lower Keys marsh rabbit, Big Cypress fox squirrel**	8E, 9T, 18SSC	6E, 11T, 7SSC	5 SSC	3E, 2T, 10 SSC	4E, 4SSC	335E, 67T
Georgia	7E, 1T, 1R **eastern puma, Florida panther, round-tailed muskrat**	5E, 4T, 11R	5E, 6T, 3R, 2U	5T, 4R	32E, 18T, 17R, 2U	28E, 19T, 4R	56E, 462T, 32R, 4U
Indiana	7E, 15SC **American badger, bobcat, northern river otter, least weasel**	27E, 20SC	15E, 4SC	5E, 6SC	10E, 15SC	15E, 11SC	210E, 90T, 107R

Kentucky	5E, 3T, 3SC **American black bear, eastern spotted skunk, least weasel**	13E, 12T, 12SC	2E, 8T, 7SC	2E, 1T, 8SC	28E, 11T, 09SC	27E, 5T, 2SC	156E, 117T, 58SC
Louisiana	6E, 1 T **Louisiana black bear, Florida panther, red wolf**	9E, 2T	3E, 4T,	0	1E, 1T,	2E, 1T	0
Maine	1E **New England cottontail**	10E, 11T	3E, 1T	0	1E, 1T	7E,10T	88E, 98T, 105SC
Maryland	12E, 6I **North American porcupine, bobcat, least weasel, Delmarva fox squirrel, New England cottontail**	16E, 4T, 7I	7E, 3T, 1I	6E, 3T, 1I	7E, 6T, 3I	39E, 6T, 9I	272E, 74T
Massachusetts	7E, 4SC	12E, 6T, 10SC	8E, 5T, 2SC	2T, 2SC	4E, 2T, 4SC	28E, 26T, 53SC	154E, 54T, 42SC
Michigan	4E, 2T, 4SC **eastern puma, Canada lynx, gray wolf**	8E, 13T, 21SC	2E, 2T, 6SC	1E, 1T, 2SC	8E, 7T, 11SC	19E, 15T, 110SC	31E, 210T, 110SC
Mississippi	6E **American black bear, Louisiana black bear, Florida panther**	11E	14E	5E	15E	24E	4E
New Hampshire	4E, 1T **Canada lynx, American marten, New England cottontail, Gray wolf**	8E, 7T	3E, 2T	1E	1T	9E, 2T	282E, 98T,
New Jersey	9E **bobcat**	17E, 16T	8E, 3T	3E, 3T	1E	9E, 8T	339E
New Mexico	7E, T9, 44S, R2 **Jaguar, Ocelot, American marten, White-sided jack rabbit, Mexican gray wolf, Black-tailed prairie dog, White-nosed coati, Red fox, Swift fox, Yellow-bellied marmot,**	12E, 21T, 9S	7E, 8T, 6S	4E, 2T, 2S	13E, 11T, 8S	12E, 15T, 4S	46E

	Mink, Pecos River muskrat, White-tailed jackrabbit, Ringtail, Hog-nosed skunk, Hooded skunk, Western spotted skunk, Red squirrel						
New York	10E, 1T, 3SC **Canada lynx, New England cottontail, gray wolf, eastern puma**	10E, 10T, 19SC	7E, 5T, 6SC	2E, 7SC	8E, 11T, 5SC	16E, 8T, 18SC	359E, 152T, 83SC
North Carolina	6E, 2T, 13SC **eastern puma, Carolina northern flying squirrel**	9E, 4T, 23SC	5E, 4T, 11SC	1E, 4T, 12SC	11E, 16T, 28SC	26E, 21T, 24SC	78E, 39T, 19SC
Ohio	5E, 8SC **bobcat, snowshoe hare, American black bear, ermine, American badger**	16E, 11T, 13SC, 31SI	5E, 1T, 2SC	5E, 1T, 1 SC	23E, 13T, 11SC	71E, 28T, 52SC, 11SI	253E, 162T
Pennsylvania	3E, 3T **Delmarva fox squirrel**	15E, 3T	3E, 1T	4E, 1T	32E, 15T	2SC	276E, 78T
Rhode Island	1T, 4C **Bobcat, New England cottontail**	8E, 5T, 33C	1E, 5C	1E, 2C	1T	2E, 9T, 44C	50E, 56T, 132C
South Carolina	3E, 1T, 24SC **American black bear, eastern fox squirrel, New England cottontail, eastern spotted skunk, swamp rabbit**	6E, 2T, 11SC	1E, 4T, 12SC	3E, 3T, 13SC	1E, 1T, 8SC	1E, 16SC	14E, 6T, 400SC
Tennessee	3E, 14SM **Carolina northern flying squirrel**	4E, 4T, 21SM	3T, 4SM	1T, 10SM	20E, 17T, 40SM	51E, 4T, 1SM	196E, 133T, 186S
Texas	12E, 20T **ocelot, jaguarondi, jaguar, gray wolf, red wolf, Louisiana black bear, black bear, white-nosed coati, black-footed ferret, margay**	13E, 21T	3E, 21T	3E, 10T	8E, 22T	1E	23E, 5T

Vermont	4E, 1T, **Canada lynx, eastern cougar, American marten, New England cottontail**	8E, 1T	3E, 3T	1E	4E, 2T	8E, 6T	62E, 91T
Virginia	19E, 1T, 3SC **Delmarva fox squirrel, eastern puma, gray wolf, snowshoe hare, Virginia northern flying squirrel, marsh rabbit, northern river otter**	6E, 8T, 31SC	6E, 4T, 1SC	2E, 2T, 9SC	7E, 14T, 17SC	43E, 15T, 18SC	56E, 28T, 11SC
West Virginia	6S1, 11S2, 5S3 **West Virginia northern flying squirrel, eastern spotted skunk, Appalachian cottontail**	28S1, 15S2, 15S3	3S1, 9S2, 6S3	6S1, 7S2, 5S3	26S1, 26S2, 20S3	173S1, 80S2, 26S3	267S1, 136S2, 27S3

C=Candidate Species for Listing as Threatened or Endangered; NG=Nongame Species Regulation; ISP=Invertebrate Species Regulation; SSC or SC=Species of Concern or Special Concern; SI="Special Interest" Species; PEx=Possibly Extirpated; E=State Endangered; T=State Threatened; SM=Species in Need of Management; I=In need of Conservation; R=Rare; U=Unusual; S1, S2, or S3=WV designations for levels of concern.

State	T&E Protections under State Law
Alabama	no state threatened or endangered status; certain listed "nongame" species given special protection against "take"; "take" not specifically defined
Arizona	"Endangered wildlife" means any crustacean, mollusk, fish, amphibian, reptile, bird, or mammal that is listed by the Department as a species of *Wildlife of Special Concern in Arizona*, or by the U.S. Fish and Wildlife Service as endangered or threatened, or which is a candidate for such status. Arizona Revised Statutes 17-314. <u>Civil liability for illegally taking or wounding wildlife; recovery of damages:</u> A. The commission or any officer charged with enforcement of the laws relating to game and fish, if so directed by the commission, may bring a civil action in the name of the state against any person unlawfully taking, wounding or killing, or unlawfully in possession of, any of the following wildlife, or part thereof, and seek to recover the following minimum sums as damage: …6. For each trophy or endangered species animal - $8,000.00 (from Arizona State Legislature 2007)
Connecticut	it is unlawful for (1) any person to willfully take any endangered or threatened species on or from public property, waters of the state, or property of another without the written permission of the owner on whose property the species occurs; (2) any person, including the

	owner of the land on which an endangered or threatened species occurs, to willfully take an endangered or threatened species for the purpose of selling, offering for sale, transporting for commercial gain or exporting such specimen; (3) any state agency to destroy or adversely modify essential habitat designated pursuant to section 26-306, so as to reduce the viability of the habitat to support endangered or threatened species or so as to kill, injure, or appreciably reduce the likelihood of survival of the species.
Delaware	the Division may designate species of fish and wildlife that are seriously threatened with extinction as endangered species
Florida	unlawful to “capture” endangered or to “take” threatened species without permit.
Georgia	species are listed as endangered, threatened, rare or unusual and are given this status under the Georgia Endangered wildlife Act of 1973.
Indiana	vertebrates, mollusks, and crustaceans classified as endangered in Indiana are protected from taking pursuant to the Nongame and Endangered Species Act of 1973 and Fish and Wildlife Administrative Rules
Kentucky	state laws define “take” for state-listed endangered species similar to ESA; state threatened, species of concern, and historical biota have no special additional protection
Louisiana	the state should assist in the protection of species of wildlife which are determined to be "threatened" or "endangered" elsewhere pursuant to the Federal Endangered Species Act, as concurred by the Louisiana Wildlife and Fisheries Commission, by prohibiting the taking, possession, transportation, exportation from the state, processing, sale or offer for sale or shipment within this state of such endangered species, or by carefully regulating such activities with regard to such species
Maine	unlawful to “hunt, take or trap” any endangered or threatened species without a permit issued for specific action by the commissioner or the state of Maine
Maryland	state law defines “take” similar to ESA; endangered and threatened categories have protections against “take”
Massachusetts	“take” defined similar to ESA; threatened, endangered, and “special concern” categories have equal protections against “take”
Michigan	a person shall not take, possess, transport, import, export, process, sell, offer for sale, buy, or offer to buy, and a common or contract carrier shall not transport or receive for shipment, any species of fish, plants, or wildlife on the following lists: (a) The list of fish, plants, and wildlife indigenous to the state determined to be endangered or threatened within the state pursuant to section 36503 or subsection (3). (b) The United States list of endangered or threatened native fish and wildlife. (c) The United States list of endangered or threatened plants. (d) The United States list of endangered or threatened foreign fish and wildlife
Mississippi	All birds of prey (eagles, hawks, osprey, owls, kites and vultures) and other nongame birds are protected and may not be hunted, molested, bought or sold. English sparrows, starlings, blackbirds and crows may be taken according to regulations. The following endangered species are also protected: black bear, Florida panther, gray bat, Indiana bat, all sea turtles, gopher tortoise, sawback turtles (black-knobbed, ringed, yellow-blotched), black pine snake, eastern indigo snake, rainbow snake, and the southern hognose snake
New Hampshire	With respect to any endangered or threatened species, it is unlawful to: (a) Export any such species from this state; (b) Take any such species within this state; (c) Possess, process, sell or offer for sale, deliver, carry, transport or ship, by any means whatsoever, any such species; (d) Violate any rule adopted under this chapter pertaining to the conservation of

	such species of wildlife listed pursuant to RSA 212-A:6, IV
New Jersey	unlawful to "take" any endangered species of fish or wildlife; "take" defined similar to ESA; no exemptions or permits to allow for incidental take
New Mexico	New Mexico Statutes. Title 19, Chapter 33. Endangered and Threatened Wildlife. The state legislature declares that: species and subspecies of wildlife indigenous to the state found to be endangered should be managed and, to the extent possible, enhanced in number within the carrying capacity of the habitat; the state should assist in the management of wildlife deemed to be endangered elsewhere by prohibiting the taking, possession, transportation, exportation, processing, sale or offering for sale or shipment within this state wildlife listed on the U.S. lists of endangered fish and wildlife, unless such actions will assist in preserving or propagating the species or subspecies… Endangered and threatened animals are protected under sections 17-2-37 through 17-2-46, Wildlife Conservation Act…It is unlawful to take, possess, transport, export, process, sell or ship species or subspecies of wildlife on the New Mexico Endangered Species list or the U.S. lists of endangered native and foreign fish and wildlife to the extent that such lists have been adopted by Commission regulation. Transport through the state is allowed under valid federal and state permits (17-2-41). (from NMDGF 2007)
New York	endangered and threatened categories have protections against "take"; "special concern" category has no special additional protection
North Carolina	unlawful to take or possess any endangered, threatened, or special concern species at any time without the appropriate permit
Ohio	unlawful to "take" any endangered species of fish or wildlife; "take" not specifically defined; no exemptions or permits to allow for incidental take; no special protections for "threatened" or "special interest" species; APHIS-WS advised to just release any state listed species if captured or to report accidental mortality
Pennsylvania	endangered and threatened categories have protections against "take"
Rhode Island	no person shall buy, sell, offer for sale, store, transport, import, export, or otherwise traffic in any animal or plant or any part of any animal or plant whether living, dead, processed, manufactured, preserved, or raw if the animal or plant has been declared to be an endangered species by either the United States secretaries of the interior or commerce or the director of the Rhode Island department of environmental management; exception is for purposes of scientific research or educational display either of which must be done by or under the formal supervision of a legitimate college or university and then only upon the issuance of a special permit for each individual excepted species
South Carolina	unlawful to take, possess, transport, export, process, sell or ship wildlife in need of management except as otherwise provided
Tennessee	unlawful to take, possess, transport, export or ship any endangered or threatened species without permit; regulations allow provisions for "take" to alleviate damage and to protect human health and safety
Texas	unlawful to "take" any endangered or threatened species without the issuance of a permit; "take" not specifically defined; state law includes all federally listed species as state listed
Vermont	unlawful to "take" any endangered or threatened species without the issuance of a permit; "take" not specifically defined; state law includes all federally listed species as state listed
Virginia	unlawful to "take" any endangered or threatened species of fish or wildlife; "take" defined same as federal ESA; no exemptions or permits to allow for incidental take

West Virginia	only lists federal T&E species as having protections; “Species of Concern” are listed, but have no legal status other than those that are already federally listed

APPENDIX E
APPENIDX E ECOREGION DESIGNATIONS WITHIN STATES AFFECTED BY APHIS-WS CONTINUED OR EXPANDED INVOLVEMENT INRABIES ORAL VACCINATION PROGRAMS

Ecoregions are ecosystems of regional extent as defined by Bailey (1995). An "X" means the state contains the ecosystem/ecoregion described in the key below. The reader is referred to Bailey (1995) for more detailed descriptions of each ecoregion and the climate, soils, vegetation, and animal life that occur there.

	212	M212	221	222	M221	231	232	234	255	313	M313	315	321	322	331	M331	411
Maine	X	X	X														
New Hampshire		X	X														
Vermont	X	X															
Massachusetts		X	X														
Connecticut		X	X														
Rhode Island			X														
New York	X	X	X	X													
Pennsylvania	X		X		X												
Ohio			X	X													
Michigan	X			X													
Indiana				X													
New Jersey			X														
Maryland			X		X	X	X										
Delaware							X										
West Virginia			X		X												
Virginia					X	X	X										
Kentucky			X	X	X			X									
Tennessee			X	X	X	X		X									
North Carolina					X	X	X										
South Carolina					X	X	X										
Georgia					X	X	X										
Alabama						X	X										
Florida							X										X
Mississippi						X	X	X									
Louisiana						X	X	X									
Texas						X	X		X			X	X				
New Mexico										X	X	X	X		X	X	
Arizona										X	X		X	X			

Key to Ecoregion Designations (adapted from descriptions by Bailey 1995):

Numbers in the 200 series are within the "Humid Temperate Domain":

212 Laurentian Mixed Forest Province - lower elevation areas (sea level to 2,400 ft.); flat to rolling hills in relief; moderately long and severe winters; average annual precipitation is moderate, ranging from 24 to 45 in.; native vegetation types are transitional between spruce-fir coniferous boreal forest and broadleaf deciduous forest zones and are characterized by mixed stands of coniferous (mainly pine) species and a few deciduous species (mainly yellow birch, sugar maple, and American beech).

M212 Adirondack-New England Mixed Forest-Coniferous Forest-Alpine Meadow Province - mountainous region with elevations between 500 and 4,000 ft.; warm summers and sometimes cold winters; annual precipitation averages 35 in. and average annual snowfall is more than 100 in.; native vegetation types transitional between boreal spruce-fir coniferous forest to the north and deciduous forest to the south; valleys contain hardwood forest (sugar maple, yellow birch, beech, hemlock); lower mountain slopes are characterized by mixed forest of spruce, fir, maple, beech, and birch; higher elevations are dominated by fir and spruce.

221 Eastern Broadleaf Forest (Oceanic) Province - diverse topography; elevations from 1,000 to 3,000 ft.; cold winters and warm summers; year-round precipitation averaging 35 to 60 in.; native vegetation characterized by temperate deciduous forest dominated by tall broadleaf trees that provide a dense, continuous canopy in summer and shed their leaves in winter; dominant deciduous species include

American beech, yellow-poplar, basswoods, sugar maple, buckeye, red oak, white oak, hemlock; includes areas of pine-oak forest ("Pine Barrens").

222 Eastern Broadleaf Forest (Continental) Province - flat to rolling to moderate in relief; elevations from 80 to 1,650 ft.; hot summers; precipitation varies from 20 to 50 in. mostly occurring during the growing season; native vegetation dominated by broadleaf deciduous forest with oak and hickory tree species more abundant than in other provinces; gradually turns to prairie towards the Midwest, forming a mosaic pattern with prairie.

M221 Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province - low mountains at elevations ranging from 300 to 6,700 ft.; distinct summers and winters; average annual precipitation varies from 35 in. in the valleys to up to 80 in. on the highest peaks; native vegetation characterized by mixed oak-pine forest, dominated by the white and black oak groups at lower levels; northeastern hardwood forest at mid elevation levels; and spruce-fir forest and meadows on the highest peaks.

231 Southeastern Mixed Forest Province - comprised of the Piedmont and irregular Gulf Coastal Plains with elevations from 100 to 1,000 ft. and flat to gentle sloping relief; mild winters and hot, humid summers; rain falls throughout the year, with an average of 40 to 60 in. annually; native vegetation comprised of broadleaf deciduous (oak, hickory, sweetgum, red maple, winged elm) and needleleaf evergreen trees (mostly loblolly pine, shortleaf pine, other southern yellow pine species).

232 Outer Coastal Plain Mixed Forest Province - flat and irregular Atlantic and Gulf Coastal Plains areas; flat to gentle sloping to gentle rolling in relief; temperatures relatively steady across seasons; rain falls throughout the year, with an average of 40 to 60 in. annually; native vegetation comprised of temperate rainforest characterized by evergreen oaks and members of the laurel and magnolia families, with coastal marshes and interior swamps dominated by gum and cypress tree species; most upland areas covered by subclimax pine forest.

234 Lower Mississippi Riverine Forest Province - flat to gently sloping broad floodplain and low terraces made up of alluvium and loess; from near sea level in the south, altitude increases gradually to about 660 ft. in the north; land of oxbow lakes and swamps are significant in the extreme southern portion of the province; warm winters and hot summers; rain falls throughout the year, with an average of 55 in. annually; temperature and precipitation decrease heading north; native vegetation comprised of bottom-land deciduous forest, with ash, elm, cottonwood, sugarberry, sweetgum, water tupelo, oak, bald cypress, and vines significant along water courses.

255 Prairie Parkland (Subtropical) Province - gently rolling to flat plains, many of them part of the Gulf Coastal Plain; elevations range from sea level to 1,300 ft.; streams and rivers are sluggish; numerous wetland areas along the coast; warm winters and hot summers; rain falls throughout the year, between 35 and 55 in.; hurricanes are frequent in autumn; vegetation consists of prairies and savannas with medium-to-tall grasses and few hardy tree species.

Numbers in the 300 series are within the "Dry Domain":

313 Colorado Plateau Semidesert Province - tablelands with moderate to considerable relief; elevations of the plateau tops range from 5,000 to 7,000 ft., with local relief ranging from 500 to more than 3,000 ft. in some of the deeper canyons; volcanic mountains rise 1,000 to 3,000 ft. above the plateau surface; stream valleys are narrow and widely spaced; climate is characterized by cold winters and hot summer days with cool nights; average annual precipitation is about 20 in.; vegetational zones are conspicuous, but lack uniformity; the lowest zone includes arid grasslands with xeric shrubs, cactus, and yucca; the woodland zone is extensive and dominated by open stands of pinyon pine and juniper; the montane zone extends over the high plateaus and includes ponderosa pine; the subalpine zone includes Engelman spruce and fir.

M313 Arizona-New Mexico Mountains Semidesert-Open Woodland-Coniferous Forest-Alpine Meadow Province - mostly steep foothills and mountains; elevations range from 4,500 to 10,000 ft., with some mountain peaks reaching 12,600 ft.; average annual precipitation ranges from 10 to 35 in.; foothill zone is characterized by mixed grasses, chaparral brush, oak-juniper woodland, and pinyon-juniper woodland; open forests of ponderosa pine are found at 7,000 ft., Douglas-fir and aspen at 8,000 ft., Engelmann spruce and corkbark fir at 9,000 ft., and an alpine belt covers small areas above 11,000 ft.

315 Southwest Plateau and Plains Dry Steppe and Shrub Province - generally flat to rolling plains and plateaus with elevations ranging from sea level to 6,500 ft.; semiarid climate; long, hot summers and short, mild winters; 10 to 30 in. annual precipitation; native vegetation characterized by arid grasslands in which shrubs and low trees grow singly or in bunches; dominant grass species include blue grama, buffalo grass, with mesquite, oak, and juniper typically the dominant shrub and tree species.

321 Chihuahuan Desert Province - mostly desert with undulating plains with elevations near 4,000 ft.; long, hot summers and short winters; annual precipitation averages 8 in.; native vegetation mostly dominated by thorny shrubs, in many places associated with short grass such as grama; shrubs and trees include mesquite, creosote bush, yucca, and occasional scattered juniper and pinyon.

322 American Semidesert and Desert Province - extensive, gently undulating plains from which isolated low, rocky mountains and buttes rise abruptly; elevations range from 280 ft. below sea level to 4,000. in valleys and basins with some mountain ranges reaching as high as 11,000 ft.; summers are long and hot and winters are moderate with occasional frosts; average annual precipitation is 2 to 10 in. vegetation is very sparse, with bare ground between individual plants; cacti and thorny shrubs are conspicuous, but many thornless shrubs and herbs are also present; such plants include the creosote bush, cholla, mesquite, paloverde, ocotillo, saguaro, bitterbrush, and saltbush.

331 Great Plains-Palouse Dry Steppe Province - rolling plains and tablelands of moderate relief (1,200 to 6,000 ft.); region lies in the rain shadow east of the Rocky Mountains and climate is semiarid; winters are cold and dry and summers are warm to hot; precipitation ranges from 10 to 25 in.; steppe, sometimes called shortgrass prairie, is a formation of short grasses, such as buffalo grass, grama, and wheatgrass, usually bunched and sparsely distributed with scattered trees and shrubs, such as sagebrush.

M331 Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province - Rocky Mountains are rugged glaciated mountains as high as 14,000 ft.; climate is a temperate semiarid steppe regime; climate is influenced by the prevailing west winds and the north-south orientation of the mountain ranges; bases of mountains receive only 10 to 20 in. of rainfall per year and higher elevations receive up to 40 in.; pronounced vegetational zonation, controlled by altitude, latitude, prevailing winds, and slope exposure; the uppermost alpine zone is characterized by alpine tundra and the absence of trees; subalpine zone below is dominated by Engelmann spruce and subalpine fir; the montane zone includes ponderosa pine and Douglas-fir; the foothill zone is characterized by dry rocky slopes with mountain-mahogany and scrub oak.

Numbers in the 400 series are within the “Humid Tropical Domain”:

411 Everglades Province - extensive low elevation (sea level to about 25 ft.) consisting primarily of large areas of swamps and marshes; hot summers and warm winters; average of 50 to 65 in. annual rainfall; native vegetation consists of tropical moist hardwood forest dominated by cypress trees and mangroves along the eastern and southern coasts; much open marsh characterized by grasses, reeds, sedges, and other aquatic herbaceous plants; some areas with dense stands of sawgrass and three-awn grasses.

APPENDIX F
AMERICAN INDIAN TRIBES LOCATED IN STATES THAT MAY BE AFFECTED BY APHIS-WS CONTINUED OR EXPANDED INVOLVEMENT IN ORV PROGRAMS

FEDERALLY RECOGNIZED TRIBES
(74 FR 40218-40223, August 11, 2009)

Ak-Chin Indian Community (AZ)

Alabama-Coushatta Tribe (TX)

Aroostook Band of Micmacs (ME)

Bay Mills Indian Community (MI)

Catawba Indian Tribe (SC)

Cayuga Nation of Nations (NY)

Chitimacha Indian Tribe (LA)

Cocopah Tribe (AZ)

Colorado River Indian Tribes (AZ)

Coushatta Indian Tribe (LA)

Eastern Band of Cherokee Indians (NC)

Fort McDowell Yavapai Nation (AZ)

Fort Mojave Indian Tribe (AZ)

Gila River Indian Community (AZ)

Grand Traverse Band of Ottawa and Chippewa Indians (MI)

Hannahville Indian Community (MI)

Havasupai Tribe (AZ)

Hopi Tribe (AZ)

Houlton Band of Maliseet Indians (ME)

Hualapai Indian Tribe (AZ)

Jena Band of Choctaw Indians (LA)

Jicarilla Apache Nation (NM)

Kaibab Band of Paiute Indians (AZ)

Keweenaw Bay Indian Community (MI)

Kickapoo Traditional Tribe (TX)

Lac Vieux Desert Band of Lake Superior Chippewa (MI)

Little River Band of Ottawa Indians (MI)

Little Traverse Bay Bands of Odawa Indians (MI)
Mashantucket Pequot Tribal Nation (CT)

Match-e-be-nash-she-wish Band of Pottawatomi Indians (MI)

Mashpee Wampanoag Tribe (MA)

Mescalero Apache Tribe (NM)

Miccosukee Indian Tribe (FL)

Mississippi Band of Choctaw Indians (MS)

Mohegan Indian Tribe (CT)

Narragansett Indian Tribe (RI)

Navajo Nation (AZ)

Navajo Nation (NM)

Nottawaseppi Huron Band of the Potawatomi (MI)

Ohkay Owingeh (NM)

Oneida Indian Nation (NY)

Onondaga Indian Nation (NY)

Pascua Yaqui Tribe (AZ)

Passamaquoddy Tribe (ME)

Penobscot Indian Nation (ME)

Poarch Band of Creek Indians (AL)

Pokagon Band of Potawatomi Indians (MI)

Pueblo of Acoma (NM)

Pueblo of Cochiti (NM)

Pueblo of Isleta (NM)

Pueblo of Jemez (NM)

Pueblo of Laguna (NM)

Pueblo of Nambe (NM)

Pueblo of Picuris (NM)

Pueblo of Pojoaque (NM)

Pueblo of San Felipe (NM)

Pueblo of San Ildefonso (NM)

Pueblo of Sandia (NM)

Pueblo of Santa Ana (NM)
Pueblo of Santa Clara (NM)

Pueblo of Santo Domingo (NM)

Pueblo of Taos (NM)

Pueblo of Tesuque (NM)

Pueblo of Zia (NM)

Quechan Tribe of the Fort Yuma Indian Reservation (AZ)

Saginaw Chippewa Indian Tribe (MI)

Salt River Pima-Maricopa Indian Community (AZ)

San Carlos Apache Tribe (AZ)

San Juan Southern Paiute Tribe (AZ)

Sault Ste. Marie Tribe of Chippewa Indians (MI)

Seminole Tribe (FL)

Seneca Nation of Indians (NY)

St. Regis Mohawk Tribe (NY)

Tohono O'odham Nation (AZ)

Tonawanda Band of Seneca (NY)

Tonto Apache Tribe (AZ)

Tunica – Biloxi Tribe (LA)

Tuscarora Nation (NY)

Ute Mountain Tribe of the Ute Mountain Reservation (NM)

Wampanoag Tribe of Gay Head (Aquinnah) (MA)

White Mountain Apache Tribe (AZ)

Yavapai-Apache Nation (AZ)

Yavapai-Prescott Indian Tribe (AZ)

Ysleta del Sur Pueblo (TX)

Zuni Tribe of the Zuni Reservation (NM)

STATE RECOGNIZED TRIBES (NCSL 2009)

Abenaki People (VT)

Adai Caddo Tribe (LA)

Bayou LaFourche Band of the Biloxi Chitimacha Confederation of Muskegee ("BCCM") (LA)

Beaver Creek Indians (SC)

Pee Dee Indian Nation of Upper South Carolina (SC)

Burt Lake Band of Ottawa and Chippewa Indians (MI)

Chaloklowa Indian People (state recognized group) (SC)

Chappaquiddick Wampanoag (MA)

Chaubunagungamang Band / Nipmuc Tribal Council (MA)

Cherokee of Georgia Tribal Council (GA)

Cherokees of SE Alabama

Cherokee Tribe of Northeast Alabama

Cher-O-Creek Intra Tribal National (AL)

Chickahominy Tribe (VA)

Choctaw Apache of Ebarb (LA)

Clifton Choctaw (LA)

Coharie Intra-Tribal Council (NC)

Eastern Chickahominy (VA)

Echota Cherokee of Alabama

Edisto Indian Organization (state Indian organization) (SC)

Four Winds Tribe Louisiana Cherokee Confederacy (LA)

Georgia Tribe of Eastern Cherokee (GA)

Golden Hill Paugussett Tribe (CT)

Grand Caillou/Dulac Band of the BCCM (LA)

Grand River Band of Ottawa Indians (MI)

Gun Lake Village Band of Grand Lake Ottawa Indians (MI)

Haliwa-Saponi Tribe, Inc. (NC)

Hassanamisco Nipmuc (MA)

Herring Pond Wampanoag Tribe (MA)

Isle de Jean Charles Band of the BCCM (LA)

Kokenescv Natchez Tribe (GA)

Langley Band of Chickamogee Cherokee Indians (AL)

Lower Muscogee Creek Tribe (GA)

Lumbee Tribal Council (NC)

Machis Lower Creek Indian (AL)

Mattiponi Indian Nation (VA)

Meherrin Indian Tribe (NC)

Monacan Indian Tribe (VA)

Mowa Band of Choctaws (AL)

Nansemond Indian Tribal Association (VA)

Nanticoke Indian (DE)

Nanticoke Lenni-Lenape (NJ)

Occanecchi Band of the Saponi Nation (NC)

Oklevuaha Band of Yamassee Seminole (FL)

Pamunkey Nation (VA)

Paucatuck Eastern Pequot (CT)

Piqua Shawnee Tribe (AL)

Pocasset Wampanoag Tribe (MA)

Point au Chien Indian Tribe (LA)

Poospatuck Indain Nation (NY)

Powhatan Renape Nation (NJ)

Ramapough Mountain Indians (NJ)

Santee Indian Organization (SC)

Sappony (NC)

Schaghticoke Indian Tribe (CT)

Seaconke Wampanoag Tribe (MA)

Shinnecock Tribe (NY)

Star Clan of Muskogee Creeks of Pike County (AL)

Swan Creek Black River Confederated Ojibwa Tribe (MI)

United Cherokee ani-Yun-Wiya Nation (AL)

United Houma Nation (LA)

United Rappahannock Tribe (VA)

United Remnant Band Shawnee Nation (OH)

Unkechaug Indian Nation of Poospatuck Indians (NY)

Upper Mataponi Tribe (VA)

Waccamaw Indian People (SC)

Waccamaw-Siouan Development (NC)

Wyandot of Anderdon Nation (MI)

APPENDIX G
USDA-AGRICULTURAL MARKETING SERVICE-NATIONAL ORGANICS PROGRAM RULE ON ORV BAIT DISTRIBUTION ON ORGANIC FARMS

United States Department of Agriculture
Agricultural Marketing Service
STOP 0268 – Room 4008-S
1400 Independence Avenue, SW.
Washington, D.C. 20250-0200

April 15, 2003

Ms. Wendy Servoss
Environmental Coordinator
USDA-APHIS-WS
6213-E Angus Drive
Raleigh, North Carolina 27617

Dear Ms. Servoss:

This is in response to your request that the National Organic Program (NOP) rule on whether the U.S. Department of Agriculture's (USDA), Animal and Plant Health Inspection Service, Wildlife Services (APHIS-WS) Oral Rabies Vaccination (ORV) Program will have an adverse affect on organic crop and livestock operations.

We understand the ORV Program to be an emergency disease treatment for the control of rabies. As such the program is addressed under NOP section 205.672, Emergency pest or disease treatment. We further understand that APHIS-WS will typically hand bait in highly populated urban areas and will typically aerially distribute the baits in other areas at the rate of approximately 75 baits per square kilometer.

We have determined that the placement of ORV bait blocks, consisting of a genetically engineered vaccine imbedded in fishmeal bound by a polymer binding agent, on an organic operation will not have an adverse impact on that organic operation. This determination is applicable to ground and aerial distribution of ORV baits. The basis of this determination is that the vaccine is not expected to contact organic crops or to be consumed by organic livestock.

In the unlikely event that a bait block breaks and exposes a plant(s) to the vaccine, the organic producer can remove the affected plant(s) with no adverse effect on the operation's certification. This would comply with section 205.672(a). The organic status of animals feeding on the ORV bait block and not penetrating the vaccine will not be adversely affected. In the unlikely event that an animal consumes the vaccine within the ORV bait block that animal will lose organic status as provided in NOP section 205.672(b).

After reviewing documents provided by APHIS-WS, we believe there is little chance that an organic animal will consume the vaccine within an ORV bait block regardless of whether the baits are hand or aerially distributed. To further reduce the chances of livestock consumption, baits

distributed by hand should be placed outside of areas containing livestock. When baits are aerially distributed livestock producers can reduce the chances of livestock consumption by relocating any bait found within an area containing livestock to a point outside of that area.

Thank you for your interest in the NOP. If we can be of further assistance we can be reached at 202-720-3252.

Sincerely,

Richard H. Mathews
Program Manager
National Organic Program

APPENDIX H
STATUTES REGARDING RABIES MANAGEMENT

States to be included in the expanding program:

Arizona

Arizona Revised Statutes

11-1014. Biting animals; reporting; handling and destruction.

A. An unvaccinated dog or cat that bites any person shall be confined and quarantined in a county pound or, on request of and at the expense of the owner, at a veterinary hospital for a period of not less than ten days. The quarantine period shall start on the day of the bite incident. If the day of the bite is not known, the quarantine period shall start on the first day of impoundment. A dog properly vaccinated pursuant to this article that bites any person may be confined and quarantined at the home of the owner or wherever the dog is harbored and maintained with the consent of and in a manner prescribed by the county enforcement agent.

B. Any domestic animal, other than a dog, a cat or a caged or pet rodent or rabbit, that bites any person shall be confined and quarantined in a county pound or, on the request and at the expense of the owner, at a veterinary hospital for a period of not less than fourteen days. Livestock shall be confined and quarantined for the fourteen-day period in a manner regulated by the Arizona department of agriculture. Caged or pet rodents or rabbits shall not be quarantined or laboratory tested.

C. With the exception of a wild rodent or rabbit, any wild animal that bites any person or directly exposes any person to its saliva may be killed and submitted to the county enforcement agent or the agent's deputies for transport to an appropriate diagnostic laboratory. A wild rodent or rabbit may be submitted for laboratory testing if the animal has bitten a person and either the animal's health or behavior indicates that the animal may have rabies or the bite occurred in an area that contains a rabies epizootic, as determined by the department of health services.

D. Whenever an animal bites any person, the incident shall be reported to the county enforcement agent immediately by any person having direct knowledge.

E. The county enforcement agent may destroy any animal confined and quarantined pursuant to this section before the termination of the minimum confinement period for laboratory examination for rabies if:

1. The animal shows clear clinical signs of rabies.
2. The animal's owner consents to its destruction.

F. Any animal subject to licensing under this article found without a tag identifying its owner shall be deemed unowned.

G. The county enforcement agent shall destroy a vicious animal by order of a justice of the peace or a city magistrate. A justice of the peace or city magistrate may issue an order to destroy a vicious animal after notice to the owner, if any, and the person who was bitten, and a hearing. The justice of the peace or city magistrate may impose additional procedures and processes to protect all parties in the interest of justice and any decision by the justice of the peace or magistrate may be appealed to the superior court.

H. The owner of a vicious animal shall be responsible for any fees incurred by the enforcement agent for the impounding, sheltering and disposing of the vicious animal.

11-1005. Powers and duties of Board of Supervisors.

A. Each county Board of Supervisors may:

1. Designate or employ a county enforcement agent. If such designation or employment is not made, the county sheriff shall be the county enforcement agent, but nothing in this article shall be deemed to prevent the county board of supervisors from designating or employing a county enforcement agent at any time it is deemed necessary or advisable.
3. Contract with any city or town to enforce the provisions of any ordinance enacted by such city or town for the control of dogs.
4. For the unincorporated areas of the county, by ordinance, regulate, restrain and prohibit the running at large of dogs, except dogs used for control of livestock or while being used or trained for hunting.

D. The county board of supervisors shall be responsible for declaring a rabies quarantine area within its jurisdiction on a recommendation of the county board of health or the local health department. If a rabies quarantine area is declared, the county board of supervisors shall meet with the county board of health and the county enforcement agent and institute an emergency program for the control of rabies within that area provided that any regulations restricting or involving the movement of livestock within that area shall be developed by the state veterinarian.

11-1011. Rabies control fund.
A. The board of supervisors shall transmit the monies collected under the provisions of this article to the county treasurer for deposit in a special fund to be known as the rabies control fund to be used for the enforcement of the provisions of this article and the regulations promulgated thereunder. The county treasurer shall maintain the fund.

11-1002. Powers and duties of the state veterinarian and the Arizona Department of Agriculture.
A. The state veterinarian shall designate the type or types of anti-rabies vaccines that may be used for vaccination of animals, the period of time between vaccination and revaccination and the dosage and method of administration of the vaccine.
B. The Arizona Department of Agriculture shall regulate the handling and disposition of animals classed as livestock that have been bitten by a rabid or suspected rabid animal or are showing symptoms suggestive of rabies.

11-1003. Powers and duties of Department of Health Services.
A. The Department of Health Services shall regulate the handling and disposition of animals other than livestock that have been bitten by a rabid or suspected rabid animal or are showing symptoms suggestive of rabies.
B. The Department of Health Services may require the county enforcement agent to submit a record of all dog licenses issued and in addition any information deemed necessary to aid in the control of rabies.

11-1010. Anti-rabies vaccination; vaccination and license stations.
A. …No dog shall be licensed unless it is vaccinated in accordance with the provisions of this article and the regulations promulgated pursuant to this article.
B. A dog vaccinated in any other state prior to entry into Arizona may be licensed in Arizona provided that, at the time of licensing, the owner of the dog presents a vaccination certificate, signed by a veterinarian licensed to practice in that state or a veterinarian employed by a governmental agency in that state, stating the owner's name and address, and giving the dog's description, date of vaccination and type, manufacturer and serial number of the vaccine used. The vaccination must be in conformity with the provisions of this article and the regulations promulgated pursuant to this article.
C. The county enforcement agent shall make provisions for vaccination clinics as deemed necessary. The vaccination shall be performed by a veterinarian.

11-1008. License fees for dogs; issuance of dog tags; classification.
A. The Board of Supervisors of each county may set a license fee which shall be paid for each dog three months of age or over that is kept, harbored or maintained within the boundaries of the state for at least thirty consecutive days of each calendar year. License fees shall become payable at the discretion of the board of supervisors of each county. The licensing period shall not exceed the period of time for revaccination as designated by the state veterinarian.
B. If the board of supervisors adopts a license fee, the board shall provide durable dog tags. Each dog licensed under the terms of this article shall receive, at the time of licensing, such a tag on which shall be inscribed the name of the county, the number of the license, and the year in which it expires. The tag shall be attached to a collar or harness which shall be worn by the dog at all times, except as otherwise provided in this article.
C. The board of supervisors may set license fees that are lower for dogs permanently incapable of procreation.
D. All fees and penalties shall be deposited in the rabies control fund pursuant to section 11-1011.

11-1012. Dogs not permitted at large; wearing licenses.
A. Neither a female dog during her breeding or mating season nor a vicious dog shall be permitted at large.
B. In a rabies quarantine area, no dogs shall be permitted at large. Each dog shall be confined within an enclosure on the owner's property, secured so that the dog is confined entirely to the owner's property, or on a leash not to exceed six feet in length and directly under the owner's control when not on the owner's property.
C. Any dog over the age of three months running at large shall wear a collar or harness to which is attached a valid license tag. Dogs that are used for control of livestock, being used or trained for hunting or dogs, being exhibited or trained at a kennel club event or engaged in races approved by the Arizona racing commission, and while the dogs are being transported to and from such events, need not wear a collar or harness with a valid license attached provided that they are properly vaccinated, licensed and controlled.
D. No person in charge of any dog shall permit such dog in a public park or upon any public school property unless the dog is physically restrained by a leash, enclosed in a car, cage or similar enclosure or being exhibited or trained at a recognized kennel club event, public school or park sponsored event.

9-499.04. Animal control officers; appointment; authority; powers and duties.
A. Any city and town may by ordinance provide for the appointment of animal control officers who may commence an action or proceeding before a court for any violation of a state statute or local ordinance relating to rabies and animal control which occurs within the jurisdiction of the city or town.
B. An animal control officer appointed pursuant to subsection A shall:
1. Be unarmed during the course of duties except that a small caliber firearm may be available to be used in controlling vicious animals or in dispatching of a wounded animal.

New Mexico
New Mexico Administrative Code
New Mexico Department of Game and Fish
17-1-14. General powers and duties of state game commission; game protection fund.
B. The state game commission shall have authority to:
(15) Adopt rules to control, eradicate or prevent the spread of a contagious disease, pest or parasite, including chronic wasting disease, to or among game animals. The rules shall include provisions for:
(a) Notification to the department of game and fish of the diagnosis or suspected presence of a contagious disease;
(b) Examination by the state veterinarian or his designee of suspected infected game animals;
(c) Quarantine, treatment or destruction of an infected game animal;
(d) Disinfection and isolation of a licensed private park where an infected game animal has been; and
(e) Indemnification and destruction of a protected game animal;
C. The director of the department of game and fish shall exercise all the powers and duties conferred upon the state game and fish warden by all previous statutes now in force not in conflict with Chapter 17 NMSA 1978.

New Mexico Livestock Board
77-2-7 Additional powers of the board.
In addition to the powers transferred from the cattle and sheep sanitary boards, the board may:
A. Exercise general regulatory supervision over the livestock industry of this state in order to protect the industry from theft and diseases and in order to protect the public from diseased or unwholesome meat or meat products;
D. Employ livestock inspectors and brand inspectors and other personnel necessary to carry out the purposes of The Livestock Code. All livestock inspectors appointed by the board shall have the same powers as any other peace officer in the enforcement of that code;
E. Appoint a state veterinarian and subordinate veterinarians as are necessary to carry out the duties of the board;
H. Establish quarantine, provide its boundaries and give notice of the quarantine and do all other things necessary to effect the object of the quarantine and to protect the livestock industry of this state from disease and prevent the spread of disease;
I. Adopt and promulgate rules for meat inspection, including the slaughter and disposition of the carcasses of livestock affected with diseases when the action appears necessary to prevent the spread of any contagion or infection among livestock;
J. Adopt and promulgate rules governing the importation, manufacture, sale, distribution or use within the state of serums, vaccine and other biologicals intended for diagnostic or therapeutic uses with livestock and regulate the importation, manufacture or use of virulent blood or living virus of any diseases affecting livestock;
L. Consider the views of the livestock industry in the administration of The Livestock Code;
M. Adopt and promulgate rules to otherwise carry out the purposes of The Livestock Code;

77-3-13. Dangerous epidemics; emergency rules; imports prohibited; penalty.
A. When the board or any of its authorized representatives finds that a disease, the nature of which is known to be fatal or highly injurious to livestock, pigeons or fowl of any kind, has become epidemic or exists in a locality in a country, state or territory beyond the limits of this state, the board shall immediately adopt and promulgate emergency rules to prohibit the importation into this state of any animals, including livestock, subject to the disease that may be so reported.
B. The board shall specify such restrictions and safeguards as it deems proper and shall specify for the protection of livestock in this state and may also prohibit the importation into this state of any hoofs, hides, skins or meat of any animals or any hay, straw fodder, cottonseed or other products or material calculated to carry the infection of such disease.

C. Emergency rules may be adopted and promulgated without the notice and hearing required of other rules and shall take effect immediately. If the board contemplates that an emergency rule will be in effect for longer than ninety days, it shall give notice and hold a hearing to adopt the emergency rule as a rule.

New Mexico Department of Health
24-1-3. Powers and authority of department.
The department has authority to:
A. Receive such grants, subsidies, donations, allotments or bequests as may be offered to the state by the federal government or any department thereof or by any public or private foundation or individuals;
B. Supervise the health and hygiene of the people of the state;
C. Investigate, control and abate the causes of disease, especially epidemics, sources of mortality and other conditions of public health;
D. Establish, maintain and enforce isolation and quarantine;
E. Close any public place and forbid gatherings of people when necessary for the protection of the public health;
H. Provide educational programs and disseminate information on public health;
I. Maintain and enforce rules for the licensure of health facilities;
J. Bring action in court for the enforcement of health laws and rules and orders issued by the department;
K. Enter into agreements with other states to carry out the powers and duties of the department;
L. Cooperate and enter into contracts or agreements with the federal government or any other person to carry out the powers and duties of the department;
M. Maintain and enforce rules for the control of communicable diseases deemed to be dangerous to public health;
N. Maintain and enforce rules for immunization against diseases deemed to be dangerous to the public health;

States included under the continuing program:
Alabama
Alabama Department of Agriculture and Industries (Alabama Administrative Code: Sec. 2-15-152). The Alabama Department of Agriculture and Industries is authorized to cooperate with federal agencies in control of contagious and infectious diseases.

Alabama Board of Health (Alabama Administrative Code: §22-2-2(2)). The Alabama Board of Health is authorized to investigate causes, modes or propagation and means of prevention of diseases.

Connecticut
Connecticut Department of Agriculture (General Statutes of Connecticut: Title 22, Chapters 433, 435, and 436a regarding Agriculture and Domestic Animals). The Connecticut Department of Agriculture's mission is to foster a healthy economic, environmental and social climate for agriculture by developing, promoting and regulating agricultural businesses; protecting agricultural and aquacultural resources; enforcing laws pertaining to domestic animals; and promoting an understanding among the state's citizens of the diversity of Connecticut agriculture, its cultural heritage and its contribution to the state's economy.

Connecticut Department of Environmental Protection (General Statutes of Connecticut: Title 26, Chapter 490 - Fisheries and Game). The Connecticut Department of Environmental Protection's mission is to conserve, improve and protect the natural resources and environment of the State of Connecticut in such a manner as to encourage the social and economic development of Connecticut while preserving the natural environment and the life forms it supports in a delicate, interrelated and complex balance, to the end that the state may fulfill its responsibility as trustee of the environment for present and future generations.

Delaware
Delaware Department of Natural Resources and Environmental Control (Delaware Code: Title 3, Ch. 82). The Delaware Department of Natural Resources and Environmental Control is authorized to protect and manage the state's vital natural resources, protect public health and safety, provide quality outdoor recreation and to serve and educate the citizens of the First State about the wise use, conservation and enhancement of Delaware's environment.

Delaware Department of Agriculture (Delaware Code: Title 3, Ch. 82). The Delaware Department of Agriculture's mission is to sustain and promote the viability of food, fiber, and agricultural industries in Delaware through quality services that protect and enhance the environment, health, and welfare of the general public.

Delaware Division of Public Health (Delaware Code: Title 3, Ch. 82). The Delaware Division of Public Health is authorized to protect and enhance the health of the people of Delaware by: Working together with others; Addressing issues that affect the health of Delawareans; Keeping track of the state's health; Promoting positive lifestyles; Responding to critical health issues and disasters; and Promoting the availability of health services. This responsibility includes managing rabies. Delaware's Rabies program began in 1988 to assist residents in coping with the increasing number of rabid raccoons and other rabid animals in New Castle County. As the raccoon rabies epidemic spread into Kent and Sussex Counties, the program adjusted to meet the needs of citizens throughout the state.

Florida

Florida Department of Agriculture and Consumer Services – Division of Animal Industry (Florida Administrative Code: Chapter 5). The Florida Department of Agriculture and Consumer Services is authorized to safeguard the public and support Florida's agricultural economy. The Division of Animal Industry is responsible for preventing, controlling and eradicating certain infectious or communicable diseases of livestock and other domestic animals.

Florida Department of Health (Florida Administrative Code: Chapter 64). The Florida Department of Health is authorized to promote and protect the health and safety of all people in Florida through the delivery of quality public health services and promotion of health care standards.

Georgia

Georgia Department of Natural Resources (Official Code of Georgia Annotated: Title 12 - Conservation and Natural Resources and Title 27 - Game and Fish). The Georgia Department of Natural Resources is authorized to sustain, enhance, protect, and conserve Georgia's natural, historic, and cultural resources for present and future generations, while recognizing the importance of promoting the development of commerce and industry that utilize sound environmental practices.

Georgia Department of Agriculture (Official Code of Georgia Annotated: 4-9-1 through 4-9-9). The Georgia Department of Agriculture is authorized to ensure an abundance of safe food and fiber for Georgia, America and the world.

Georgia Department of Human Resources, Division of Public Health (Official Code of Georgia Annotated: Title 31, Chapter 19, Section 2). The Georgia Department of Human Resources issued a Declaration to Protect the Public Health in October 1, 2003 to control the spread of the raccoon strain of the rabies virus in four counties within the Northwest Georgia Health District.

Indiana

Indiana Department of Natural Resources – Division of Fish and Wildlife (Indiana Administrative Code: Title 14, Article 22, Chapter 2, Section 3). The Indiana Division of Fish and Wildlife "shall . . .provide for the protection, reproduction, care, management, survival and regulation of wild animal populations regardless of whether the wild animals are present on public or private property. . . and organize and pursue a program of research and management of wild animals that will serve the best interests of the resources and the people of Indiana."

Indiana Board of Animal Health (Indiana Administrative Code: Title 345). The Indiana Board of Animal Health mission involves "…the protection of public health by preventing and controlling the spread of animal diseases, such as rabies, which pose a threat to people." Pertinent sections of the law include the establishment of a rabies control program (345 IAC 1-5-3a) and the translocation of animals across state lines (345 IAC 1-3-2c).

Indiana State Department of Health (Indiana Administrative Code: Title 410). The Indiana State Department of Health "serves to promote, protect and provide for the public health of the people in Indiana." A pertinent section of the law includes control measures for the reporting of animal bites, including the administering of post-exposure rabies prophylaxis to a bite victim. Any person bitten or scratched by a wild carnivorous mammal or bat not available for rabies testing should be regarded as having been potentially exposed to rabies (410 IAC 1-2.3-52).

Reporting and Investigation of Animal Bites [410 IAC 1-2.1-6(c)] Reporting, investigation, quarantine, wild animals and submitting animal heads.
(1) Reporting: Every case of a human bitten by a domestic or wild animal shall be reported promptly to the local health officer having jurisdiction. If a physician is in attendance, it shall be reported by such physician. If no physician is in attendance and the person bitten is a child, it shall be the duty of the parent or the guardian to make such a report immediately. If the person bitten is an adult, such person shall make the report or, if or, if incapacitated, it shall be reported by whomever is caring for the person bitten. It shall be the duty of the local health officer to report directly to the State Board of Health on the prescribed form the information concerning the bite.

(2) Investigation: Each reported bite shall be investigated immediately by the local health officer or his designee.

(3) Quarantine and/or laboratory examination: Any domestic animal which has bitten a person or is suspected or being rabid shall be confined and held in observation for the period specified in IAC 15-2.1-6-11 (not less than 10 days) or filled at once for laboratory examination. The head of any animal that dies during the period of observation or is killed subsequent to having bitten a person or another animal and is suspected of being rabid shall be removed, packed in an iced container and forwarded immediately to the laboratory of the State Board of Health for examination. Any wild animal that has bitten a human or domestic animal or is suspected of being rabid shall not be placed under observation, but shall be killed at once and the head submitted to the laboratory of the State Department of Health. (Rodents and lagomorphs are seldom rabid in the United States; these animals should be submitted for laboratory examination only under exceptional circumstances such as an unprovoked attack.)

(4) Responsibility for submitting animal heads: The animal's owner shall be responsible for submitting the animal's head to the State Department of Health for rabies examination; in the case of an unowned animal or an animal whose owner cannot be found, the local health, department shall assume this responsibility.

Kentucky

Kentucky Cabinet for Health and Family Services (Kentucky Revised Statutes: 258). The Kentucky Department for Public Health, within the Cabinet for Health and Family Services, coordinates a diverse group of programs that impact the health of all Kentuckians, including public health emergency preparedness, maternal and child health, chronic disease, nutrition and wellness, environmental health, epidemiology, the state public health laboratory, and working with the state's network of local health departments. The Rabies Program in the Division of Epidemiology and Health Planning works to control rabies and prevent human infection, consult on the needs of pre-exposure and post-exposure treatment and train local health department environmental personnel on animal quarantine procedures. Rabies control is provided by law in Kentucky Revised Statutes 258.005-258.990 and under the state Communicable Disease Regulation 902 Kentucky Administrative Regulations 2:070.

Kentucky Department of Agriculture - Office of the State Veterinarian (Kentucky Revised Statutes: 257-259. 302 Kentucky Administrative Regulations: Chapter 20). The Kentucky Department of Agriculture - Office of the State Veterinarian's mission is the control and eradication of infectious and communicable animal diseases.

Louisiana

Louisiana Department of Health and Hospitals (Louisiana Revised Statutes: Title 51 State Sanitary Code, Part III, Chapter 1 - The Control of Rabies). The mission of the Louisiana Department of Health and Hospitals is to protect and promote health and to ensure access to medical, preventive, and rehabilitative services for all citizens of the State of Louisiana.

Maine

Maine Department of Human Services - Maine State Health and Environmental Testing Laboratory/Epidemiology Program (22 Maine Revised Statutes Annotated: Subtitle 2, Part 2, Chapter 157-A, Section 565). The Maine State Health and Environmental Testing Laboratory/Epidemiology Program are authorized to offer the direct fluorescent antibody for the rapid and accurate diagnosis of rabies in a suspect animal using brain tissue. The diagnosis of the presence or absence of rabies can be used as a guide for medical recommendations for humans or domestic animals who are at risk of exposure.

Maine Department of Inland Fisheries and Wildlife (22 Maine Revised Statutes Annotated: Subtitle 2, Part 3, Chapter 251, Section 1313). The Maine Department of Inland Fisheries and Wildlife is authorized to provide for or pay all necessary costs for transportation and euthanasia of an undomesticated animal suspected of having rabies.

Maine State Department of Agriculture (7 Maine Revised Statutes Annotated: part 1, Chapter 1, Section 1-B). The Maine State Department of Agriculture has the authority to implement the rules and regulations for rabies throughout Maine. State veterinarians dispense the rabies vaccination to livestock, enforce quarantines, and regulate animal transportation in and out of Maine's borders.

Maryland

Maryland Department of Health and Mental Hygiene (Maryland Code: Title 18, Subtitle 3, §18-313). The Maryland Department of Health and Mental Hygiene shall provide a statewide system to: 1) control rabies; 2) to grant authority to the public health veterinarian and the local health officer in matters pertaining to the disposition of animals that bite or otherwise expose rabies to an individual; 3) to assist local political subdivisions regarding the laboratory testing of rabid animals; 4) to treat each individual who is exposed or suspected of having been exposed to rabies; 5) to distribute the biological products that are needed to prevent and treat rabies.

Maryland Department of Natural Resources (Maryland Code: Title 10, Subtitle 2, §10-202). The Maryland Department of Natural Resources is responsible for conservation and management of wildlife and wildlife resources of the state.

Massachusetts

Massachusetts Department of Public Health (Massachusetts Code: 105). The Massachusetts Department of Public Health is dedicated to protecting, preserving, and improving the health of all the Commonwealth's residents.

Massachusetts Department of Fish and Game, Division of Fisheries and Wildlife (Massachusetts Code: 321). The Massachusetts Division of Fisheries and Wildlife works to protect the public & wildlife by: 1)monitoring outbreaks of wildlife disease; 2) sharing information with humane and animal health authorities; 3) prohibiting possession of wildlife as pets; 4) regulating wildlife populations through harvest of animals by licensed hunters and trappers; 5) prohibiting the importation or relocation of wildlife; and 6) increasing public awareness of wildlife through education.

Massachusetts Department of Agricultural Resources (Massachusetts Code: 330). The Massachusetts Department of Agricultural Resources deals with the prevention and the spread of rabies in humans and domestic animals.

Michigan

Michigan Department of Community Health. The Michigan Department of Community Health "strives for a healthier Michigan. To that end, the department will: 1) Promote access to the broadest possible range of quality services and supports; 2) Take steps to prevent disease, promote wellness and improve quality of life; and 3) Strive for the delivery of those services and supports in a fiscally prudent manner."

Michigan Department of Natural Resources. The Michigan Department of Natural Resources is "responsible for the stewardship of Michigan's natural resources and for the provision of outdoor recreational opportunities…" One of many goals involves managing disease and invasive species occurrence. Michigan's natural resources are under constant threat from diseases and the introduction of exotic species not indigenous to the area. These threats pose a significant threat to precious natural resources as well as vital segments of the State's economy such as hunting and fishing, agriculture and tourism. A system of monitoring and response must be implemented to deal with such threats as they develop in order to minimize their impact.

Michigan Department of Agriculture. The Michigan Department of Agriculture's mission is "to serve, promote, and protect the food, agriculture and economic interests of the people of the state of Michigan."

Mississippi

Mississippi State Department of Health (Mississippi Statutes: 41-53 and 41-3. Mississippi Regulations Section XVII: Specific Disease Control Measures, Section 12 - Rabies). The mission of the Mississippi State Department of Health is to promote and protect the health of all Mississippians.

Mississippi Department of Agriculture and Commerce - Board of Animal Health (Rules of the Mississippi Board of Animal Health Subpart 2: Administrative Rules, Chapter 18 - Animal Rabies Control. Mississippi Regulations Section XVII: Specific Disease Control Measures, Section 12 - Rabies). The Board of Animal Health was given plenary power to deal with all contagious and infectious diseases of animals as in the opinion of the board may be prevented, controlled, or eradicated, and with full power to make, promulgate, and enforce such rules and regulations as may be necessary to control, eradicate and prevent those diseases.

New Hampshire

New Hampshire Department of Health and Human Services (New Hampshire Revised Statutes Annotated: Title X, Chapter 125, Section 125:9:II). The New Hampshire Department of Health and Human Services is authorized to make investigations and inquiries concerning the causes of epidemics and other diseases, the sources of morbidity and mortality, and the effects of localities, employments, conditions, circumstances, and the environment on the public health. Investigations also include an extended rabies surveillance effort which shall be conducted with assistance from the New Hampshire Department of Agriculture, Markets, and Food; and New Hampshire Fish and Game Department.

New Hampshire Department of Agriculture, Markets, and Food (New Hampshire Revised Statutes Annotated: Title XL, Chapter 436-A, Section 436-A:1). The state veterinarian within the New Hampshire Department of Agriculture, Markets, and Food may authorize the application of vaccines and treatments for zoonotic diseases to wildlife within the state through baiting or other methods.

New Hampshire Fish and Game Department (New Hampshire Revised Statutes Annotated: Title XVIII, Chapter 206, Section 206:10:I). The New Hampshire Fish and Game Department is charged with protecting, propagating and preserving the fish, game and wildlife resources of New Hampshire and protecting and conserving nongame birds of New Hampshire.

New Jersey

New Jersey Department of Environmental Protection - Division of Fish and Wildlife. The mission of the New Jersey Department of Environmental Protection, Division of Fish and Wildlife is to protect and manage New Jersey's fish and wildlife to maximize their long-term biological, recreational, and economic values for New Jersey's residents.

New Jersey Department of Agriculture. The mission of the New Jersey Department of Agriculture is to develop, promote, conserve, and support the agriculture and agribusiness industry of the state and those natural and renewable resources that are associated with agriculture and other open lands for the benefit of all its citizens.

New Jersey Department of Health and Senior Services. The New Jersey Department of Health and Senior Services provides guidance on public health related issues and potential health problems associated with wildlife.

New York

New York State Agriculture and Markets (New York Legislative Authorization Code: Chapter 69, Article 5, Section 73b). The New York State Department of Agriculture and Markets is authorized to establish a New York State Veterinary Diagnostic Laboratory (Cornell University works under this law during ORV program participation) which is authorized to respond to disease outbreaks in animals; establish diagnostic testing capabilities to establish heard health status and evaluation of disease programs; support disease surveillance and monitoring programs of domestic, zoo, and wild animals; support veterinarians by analyzing and interpreting samples obtained from clinical cases; and evaluate, adjust, and improve New York's ability to recognize diseases that impact animal populations. **(New York Legislative Authorization Code: Chapter 69, Article 5, Section 72).** The New York State Department of Agriculture and Markets is authorized to investigate, suppress, or eradicate infectious or communicable disease affecting domestic animals or carried by domestic animals and affecting humans. Measures shall be taken to prevent such disease from being brought into the state or suppress or prevent the disease from spreading within the state.

New York Department of Environmental Conservation (New York Legislative Authorization Code: Chapter 43-B, Article 11, Title 3, Section 11-0325 and 11-0525). The New York Department of Environmental Conservation is authorized to undertake fish or wildlife control measures to eliminate, reduce, or confine a disease which endangers the health and welfare of fish or wildlife populations. The New York Department of Environmental Conservation is directed to undertake through the use of professional trappers or by other means wildlife control measures when rabies is certified to exist in an area of the state in attempt to eliminate, reduce, or confine the disease.

New York State Department of Health (New York Legislative Authorization Code: Chapter 45, Article 2, Section 201). The New York State Department of Health is directed to supervise the reporting and control of disease and promote education in the prevention and control of disease.

North Carolina

North Carolina Wildlife Resources Commission (North Carolina General Statutes: 113-131). The North Carolina Wildlife Resource Commission is charged with the stewardship of wildlife resources.

North Carolina Department of Agriculture and Consumer Services (North Carolina General Statutes: 113-3). The North Carolina Department of Agriculture focuses of providing animal disease programs designed to control and eliminate animal diseases and ensure general animal health.

North Carolina Department of Environment and Natural Resources (North Carolina General Statutes: 113-3). The North Carolina Department of Environment and Natural Resources is the lead stewardship agency for the preservation and protection of North Carolina's outstanding natural resources.

North Carolina Department of Health and Human Services (North Carolina General Statutes: 130A-1.1). The North Carolina Department of Health and Human Services is authorized to provide efficient services that enhance the quality of life of North Carolina individuals and families so that they have opportunities for healthier and safer lives resulting ultimately in the achievement of economic and personal independence.

Ohio

Ohio Department of Health (Ohio Administrative Code: Chapter 3701 - Zoonotic Diseases and Animal Bites). The Ohio Department of Health Rabies Program conducts rabies prevention activities to protect Ohio residents from the spread of wildlife rabies to people, pets, and other animals. Bat, raccoon, skunk, other wild animal and domestic animal rabies cases are reviewed to determine any necessary control initiatives.

Ohio Department of Natural Resources – Division of Wildlife (Ohio Administrative Code: Chapter 1501:31). The Ohio Department of Natural Resources is "dedicated to conserving and improving the fish and wildlife resources and their habitats, and promoting their use and appreciation by the public so that these resources continue to enhance the quality of life for all Ohioans."

Ohio Department of Agriculture (Ohio Administrative Code: Chapter 901). The Ohio Department of Agriculture's mission is "to provide regulatory protection to producers, agribusinesses and the consuming public; to promote Ohio agricultural products in domestic and international markets; and to educate the citizens of Ohio about our agricultural industry."

Pennsylvania

Pennsylvania Game Commission (Law 322 (a) Title 34). The Pennsylvania Game Commission is charged to protect, propagate, manage, and preserve the game or wildlife of this Commonwealth and to enforce, by proper actions and proceedings, the law of this Commonwealth relating thereto.

Pennsylvania Department of Agriculture (Pennsylvania Agriculture Code: Chapter 23, Section 2327 (d)). The Pennsylvania Department of Agriculture is authorized to solicit assistance from and provide assistance to federal and other state agencies, local governments and private entities in monitoring wild animals in this Commonwealth to determine the presence of dangerous transmissible diseases.

Pennsylvania Department of Health (Pennsylvania Administrative Code: Chapter 532, Section 2102 (a)). The Pennsylvania Department of Health is authorized to protect the health of the people of this Commonwealth and to determine and employ the most efficient and practical means for the prevention and suppression of disease.

Rhode Island

Rhode Island Department of Environmental Management - Division of Agriculture - Animal Health Unit (Rhode Island General Laws: Chapter 4-13). The Animal Health Unit enforces state laws and regulations, controls the spread of diseases that impact the livestock industry and also diseases, such as rabies, that can spread from animals to people. The rabies program has become critical now that this disease is established in the state's raccoon population. Only an intensive rabies-control program will prevent this disease from spreading to domestic animals and then to people. The Department of Environmental Management's veterinarian plays a key role in this program.

Rhode Island Department of Health (Rhode Island General Laws: Chapter 4-13). The Rhode Island Department of Health's mission is to prevent disease and to protect and promote the health and safety of the people of Rhode Island.

Rhode Island Department of Environmental Management - Division of Fish and Wildlife (Rhode Island General Laws: Chapters 42-35 regarding importation/possession of native wildlife). The Division of Fish and Wildlife protects, restores, and manages the fish and wildlife resources of the state.

Rabies Control Board of Rhode Island (Rhode Island General Laws: Chapter 4-13). The Rabies Control Board adopted rules and regulations pursuant to the authority provided under Rhode Island General Laws 4-13- 1.3 et seq. and 42-35 for the purpose of preventing the spread of the contagious disease rabies.

South Carolina

South Carolina Department of Agriculture (South Carolina Code of Laws: Title 47 - Animals, Livestock and Poultry, Chapter 5 - Rabies). The South Carolina Department of Agriculture's mission is to promote and nurture the growth and development of South Carolina's agriculture industry and its related businesses while assuring the safety and security of the buying public.

South Carolina Department of Health and Environmental Control (South Carolina Code of Laws: Title 47 - Animals, Livestock and Poultry, Chapter 5 - Rabies). The South Carolina Department of Health and Environmental Control's mission is to promote and protect the health of the public and the environment.

Department of Natural Resources (South Carolina Code of Laws: Title 50 - Fish, Game and Watercraft, Chapter 11 - Protection of Game, Section 50-11-105 - Wildlife disease control; regulation of wildlife shipments; euthanasia). The Wildlife Section within the Department's Division of Wildlife and Freshwater Fisheries protects, manages and enhances the state's habitats and associated wildlife for the public benefit of present and future generations.

Tennessee

Tennessee Wildlife Resources Agency (Tennessee Code Annotated: Title 70, Chapters 1-8). The Tennessee Wildlife Resources Agency is authorized to protect, propagate, increase, preserve, and conserve the wildlife of this state, and enforce by proper action and proceedings, the existing laws.

Tennessee Department of Health (Tennessee Code Annotated: Title 68, Chapter 8). The Tennessee Department of Health works to promote, protect, and improve the heath and well-being of the people of Tennessee. It provides public health services not available from other sources, such as rabies testing. It also conducts environmental surveys in schools and child care facilities and monitors rabies control.

Tennessee Department of Agriculture (Tennessee Code Annotated: Title 44, Chapters 1-20). The Tennessee Department of Agriculture's mission is to serve the citizens of Tennessee by promoting wise uses of Tennessee's agricultural and forest resources, developing economic opportunities, and ensuring safe and dependable food and fiber.

Texas

Texas Department of State Health Services (Texas Administrative Code: Title 25, Part 1, Chapter 169). The Texas Department of State Health Services is authorized to conduct programs to address wildlife caused disease problems, including the suppression of rabies in wildlife.

Texas Parks and Wildlife Department (Texas Administrative Code: Title 31, Part 2, Chapters 51-69). The Texas Parks and Wildlife Department is authorized to manage and regulate the take of native wildlife and fisheries in the state of Texas, including state listed threatened and endangered species.

Vermont

Vermont Department of Health (Vermont Statutes Annotated: Title 18, Chapter 1). The Vermont Department of Health is authorized to promote health and safety, and prevent disease.

Vermont Agency of Agriculture, Food, and Markets (Vermont Statutes Annotated: Title 6, Chapter 102, §1152). The Vermont Agency of Agriculture, Food, and Markets may contract and cooperate with the USDA and other federal agencies or other states for the control and eradication of contagious diseases of animals. (Vermont Statutes Annotated: Title 6; Chapter 102; §1151, "contagious disease" includes rabies).

Vermont Department of Fish and Wildlife (Vermont Statutes Annotated: Title 10, Chapter 103). The Vermont Department of Fish and Wildlife is charged with conservation of fish, wildlife, and plants and their habitats for the people of Vermont.

Virginia

Virginia Department of Health (Code of Virginia: Section 32.1.42). The Virginia Department of Health is authorized to control human disease and diseases in wildlife that threaten public health.

Virginia Department of Game and Inland Fisheries (Code of Virginia: Title 29.1). The Virginia Department of Game and Inland Fisheries is authorized to manage Virginia's wildlife and inland fish to maintain optimum populations of all species to serve the needs of the Commonwealth; to provide opportunity for all to enjoy wildlife, inland fish, boating, and related outdoor recreation; to promote safety for persons and property in connection with boating, hunting, and fishing.

West Virginia

West Virginia Department of Agriculture (West Virginia Code of State Regulations: Section §19-9-2A). The West Virginia Department of Agriculture is charged with prevention, suppression, control, and eradication of any communicable disease of animals or poultry.

West Virginia Department of Health and Human Resources (West Virginia Code of State Regulations: Chapter 16, Section §16-2-11 (a)(1)(iii)). Chapter 16 of the West Virginia Department of Health and Human Resources authorizes the creation of a state public health system, including local boards of health, whose duties include "prevention and control of rabies."

West Virginia Division of Natural Resources (West Virginia Code of State Regulations: Section §20-2-1). The West Virginia Division of Natural Resources is charged with protecting the wildlife resources for the use and enjoyment of all the citizens in West Virginia.

APPENDIX I
NATIONAL FOREST SYSTEM (NFS) LANDS AND ACREAGE[9]
WITHIN CURRENT OR POTENTIAL ORV ZONES
AND
MAPS OF FORESTS

FOREST SERVICE REGION 3 – SOUTHWESTERN REGION

- **AZ**
  Apache National Forest (1,813,601 NFS acres)
  Coconino National Forest (1,856,038 NFS acres)
  Coronado National Forest (1,786,620 NFS acres)
  Kaibab National Forest (1,560,165 NFS acres)
  Prescott National Forest (1,239,775 NFS acres)
  Sitgreaves national Forest (818,749 NFS acres)
  Tonto National Forest (2,872,769 NFS acres)

- **NM**
  Black Kettle National Grassland (31,286 NFS acres)
  Carson National Forest 91,391,674 NFS acres)
  Cibola National Forest (1,631,419 NFS acres)
  Gila National Forest (2,709,005 NFS acres)
  Jemez National Recreation Area (44,670 NFS acres)
  Kiowa National Grassland (136,417 acres)
  Lincoln National Forest (1,103,828 NFS acres)
  McClellan Creek National Grassland 91,449 NFS acres)
  Rita Blanca National Grassland (92,989 NFS acres)
  Santa Fe National Forest (1,566,147 NFS acres)

FOREST SERVICE REGION 8 – SOUTHERN REGION

- **AL**
  Talladega National Forest (389,831 NFS acres)
  Tuskegee National Forest (11,252 NFS acres)
  Conecuh National Forest (83,858 NFS acres)
  William B. Bankhead National Forest (181,033 NFS acres)

- **FL**
  Ocala National Forest (383,584 NFS acres)
  Apalachicola National Forest (565,585 NFS acres)
  Osceola National Forest (162,157 NFS acres)

- **GA**
  Chattahoochee National Forest (748,372 NFS acres)
  Ed Jenkins National Recreation Area (23,166 NFS acres)
  Oconee National Forest (115,225 NFS acres)
  Coosa Bald National Scenic Area (7,100 NFS acres)

- **KY**
  Daniel Boone National Forest (557,789 NFS acres)

[9] Although entire National Forest System acreage is listed, only portions of each National Forest may be baited, depending on the needs of the program over time.

Land Between the Lakes National Recreation Area (170,310 NFS acres)
Jefferson National Forest (720,552 NFS acres)

- **LA**
  Kisatchie National Forest (603,393 NFS acres)

- **MS**
  Bienville National Forest (178,542 NFS acres)
  Delta National Forest (60,215 NFS acres)
  DeSoto National Forest (517,939 NFS acres)
  Holly Springs National Forest (155,661 NFS acres)
  Homochitto National Forest (191,585 NFS acres)
  Tombigee National Forest (66,874 NFS acres)

- **NC**
  Pisgah National Forest (506,785 NFS acres)
  Nantahala National Forest (530,202 NFS acres)
  Croatan National Forest (159,885 NFS acres)
  Uwharrie National Forest (50,174 NFS acres)

- **SC**
  Francis Marion-Sumter National Forests (364,598 NFS acres)

- **TN**
  Cherokee National Forest (636,125 NFS acres)
  Land Between the Lakes National Recreation Area (170,310 NFS acres)

- **TX**
  Angelina National Forest (153,179 NFS acres)
  Davy Crockett National Forest (160,000 NFS acres)
  Sabine national Forest (160,656 NFS acres)
  Sam Houston National Forest (163,037 NFS acres)
  Caddo/LBJ National Grasslands (38,035 NFS acres)

- **VA**
  George Washington National Forest (1,065,232 NFS acres)
  Jefferson National Forest (720,552 NFS acres)
  Mount Rogers National Recreation Area (118,509 NFS acres)
  Mount Pleasant National Scenic Area (7,580 NFS acres)

FOREST SERVICE REGION 9 – EASTERN REGION

- **IN**
  Hoosier National Forest (199,291 NFS acres)

- **ME**
  White Mountain National Forest (746,581 NFS acres)
  White Mountain National Forest Purchase Unit (34,251 NFS acres)

- **MI**
  Hiawatha National Forest (894,652 NFS acres)
  Huron National Forest (437,269 NFS acres)
  Manistee National Forest (538,979 NFS acres)
  Ottawa National Forest (984,290 NFS acres)

Grand Isle National Recreation Area (12,961 NFS acres)

- **NH**
  White Mountain National Forest (746,581 NFS acres)
  White Mountain National Forest Purchase Unit (34,251 NFS acres)

- **NY**
  Finger Lakes National Forest (16, 211 NFS acres)

- **OH**
  Wayne National Forest (232,610 NFS acres)
  Wayne National Forest Purchase Unit (1,027 NFS acres)

- **PA**
  Allegheny National Forest (513,139 NFS acres)
  Allegheny National Recreation Area (23,063 NFS acres)

- **VT**
  Green Mountain National Forest (384,196 NFS acres)
  Moosalamoo National Recreation Area (15,858 NFS acres)
  White Rocks National Recreation Area (36,400 NFS acres)

- **WV**
  George Washington National Forest (1,065,232 NFS acres)
  Jefferson National Forest (720,552 NFS acres)
  Monongahela National Forest (897,892 NFS acres)
  Monongahela National Forest Purchase Unit (5,986 NFS acres)
  Spruce Knob-Seneca Rock National Recreation Area (57,237 NFS acres)

WILDERNESS AREAS WOULD BE EXCLUDED FROM ORV PROGRAM

WILDERNESS AREAS IN FOREST SERVICE REGION 3 – SOUTHWESTERN REGION

- **AZ**

Apache-Sitgreaves National Forest

- Bear Wallow (11,080 NFS acres)
- Blue Range National Primitive Area (173,726 NFS acres)
- Escudilla (5,200 NFS acres)
- Mount Baldy (7,079 NFS acres)

Coconino National Forest

- Fossil Springs (22,149 NFS acres)
- Kachina Peaks (18,616 NFS acres)
- Munds Mountain (24,411 NFS acres)
- Red Rock-Secret Mountain (47,194 NFS acres)
- Strawberry Crater (10,743 NFS acres)
- Sycamore Canyon (55,937
- West Clear Creek (15,238 NFS acres)
- Wet Beaver (6,155 NFS acres)

Coronado National Forest

- Chiricahua (87,700 NFS acres)
- Galiuro (76,317 NFS acres)
- Miller Peak (20,228 NFS acres)
- Mt. Wrightson (25,260 NFS acres)

- Pajarita (7,553 NFS acres)
- Pusch Ridge (56,933 NFS acres)
- Rincon Mountain (38,590 NFS acres)
- Santa Teresa (26,780 NFS acres)

Kaibab National Forest

- Kanab Creek (70,460 NFS acres)
- Kendrick Mountain (6,510 NFS acres)
- Saddle Mountain (40,539 NFS acres)

Prescott National Forest

- Apache Creek (5,666 NFS acres)
- Castle Creek (25,215 NFS acres)
- Cedar Bench (14,950 NFS acres)
- Granite Mountain (9,762 NFS acres)
- Juniper Mesa (7,406 NFS acres)
- Pine Mountain (20,061 NFS acres)
- Woodchute (5,833 NFS acres)

TontoNational Forest

- Four Peaks (61,074 NFS acres)
- Hellsgate (37,440 NFS acres)
- Mazatzal (252,390 NFS acres)
- Salome (18,531 NFS acres)
- Salt River Canyon (32,101 NFS acres)
- Sierra Ancha (20,850 NFS acres)
- Superstition (159,757 NFS acres)

o **NM**

Carson National Forest

- Chama River Canyon (2,900 NFS acres)
- Dome (18,000 NFS acres)
- Latir Peak 920,000 NFS acres)
- Wheeler Peak (18,897 NFS acres)

Cibola National Forest

- Apache Kid (44,626)
- Manzano Mountain (36,875 NFS acres)
- Sandia Mountain (37877 NFS acres)
- Withington 919,000 NFS acres)

Gila National Forest

- Aldo Leopold (202,016 NFS acres)
- Blue Range (29,304 NFS acres)
- Gila (558,014NFS acres)

Lincoln National Forest

- Capitol Mountain (34,658 NFS acres)
- White Mountain (48,266)

Santa Fe National Forest

- Cruces Basin (47,400)
- Pecos (223,333 NFS acres)
- San Pedro Parks (41,132 NFS acres)

WILDERNESS AREAS IN FOREST SERVICE REGION 8 – SOUTHERN REGION

o **AL**

Talladega National Forest

- Cheaha (7,245 NFS acres)

- Dugger Mountain (9,200 NFS acres)

William B. Bankhead National Forest

- Sipsey (24,922 NFS acres)

o **FL**

Apalachicola National Forest

- Bradwell Bay (24,602 NFS acres)
- Mud Swamp/New River (8,090 NFS acres)

Ocala National Forest

- Alexander Springs (7,941 NFS acres)
- Billies Bay (3,092 NFS acres)
- Juniper Prairie (14,277 NFS acres)
- Little Lake George (2,833 NFS acres)

Osceola National Forest

- Big Gum Swamp (13,660 NFS acres)

o **GA**

Chattahoochee National Forest

- Big Frog (89 NFS acres)
- Blood Mountain (7,800 NFS acres)
- Brasstown (12,896 NFS acres)
- Cohutta (35,268 NFS acres)
- Ellicott Rock (2,021 NFS acres)
- Mark Trail (16,400 NFS acres)
- Raven Cliffs (9,115 NFS acres)
- Rich Mountain (9,476 NFS acres)
- Southern Nantahala (11,770 NFS acres)
- Tray Mountain (9,702 NFS acres)

o **KY**

Daniel Boon National Forest

- Beaver Creak (4,753 NFS acres)
- Clifty (12,026 NFS acres)

o **LA**

Kisatchie National Forest

- Kisatchie Hills (8,679 NFS acres)

o **MS**

DeSoto National Forest

- Black Creek (5,052 NFS acres)
- Leaf (994 NFS acres)

o **NC**

Croatan National Forest

- Catfish Lake South (8,530 NFS acres)
- Pocosin (11,709 NFS acres)
- Pond Pine (1,685 NFS acres)
- Sheep Ridge (9,297 NFS acres)

Nantahala National Forest

- Ellicott Rock (3,394 NFS acres)
- Joyce Kilmer-Slickrock (13,562 NFS acres)
- Southern Nantahala (11,703 NFS acres)

Pisgah National Forest

- Linville Gorge (11,786 NFS acres)
- Middle Prong (7,460 NFS acres)
- Shining Rock (18,483 NFS acres)

Uwharrie National Forest

- Birkhead Mountains (5,025 NFS acres)

o **SC**

Francis-Marion National Forest

- Hell Hole Bay (2,125 NFS acres)
- Little Wambaw Swamp (5,047 NFS acres)
- Wambaw Creek (1,825 NFS acres)
- Wambaw Swamp (4,815 NFS acres)

Sumter National Forest

- Ellicott Rock (2,859 NFS acres)

o **TN**

Cherokee National Forest

- Bald River Gorge (3,721 NFS acres)
- Big Frog (7,993 NFS acres)
- Big Laurel Branch (6,332 NFS acres)
- Citico Creek (16,226 NFS acres)
- Cohutta (1,709 NFS acres)
- Gee Creek (2,493 NFS acres)
- Joyce Kilmer-Slickrock (3,832 NFS acres)
- Little Frog Mountain (4,666 NFS acres)
- Pond Mountain (6,890 NFS acres)
- Sampson Mountain (7,991 NFS acres)
- Unaka Mountain (4,496 NFS acres)

o **TX**

Angelina National Forest

- Turkey Hill (5,473 NFS acres)
- Upland Island (13,331 NFS acres)

Davy Crockett National Forest

- Big Slough (3,455 NFS acres)

Sabine National Forest

- Indian Mounds (12,369 NFS acres)

Sam Houston National Forest

- Little Lake Creek (3,855 NFS acres)

o **VA**

George Washington National Forest

- Barbours Creek (4 NFS acres)
- Priest (5,963 NFS acres)
- Ramseys Draft (6,518 NFS acres)
- Rich Hole (6,450 NFS acres)
- Rough Mountain (9,300 NFS acres)
- Saint Mary's (9,835 NFS acres)
- Shawvers Run (101 NFS acres)
- Three Ridges (4,608 NFS acres)

Jefferson National Forest

- Barbours Creek (5,378 NFS acres)
- Beartown (5,609 NFS acres)
- James River Face (8,886 NFS acres)

- Kimberling Creek (5,542 NFS acres)
- Lewis Fork (5,618 NFS acres)
- Little Dry Run (2,858 NFS acres)
- Little Wilson Creek (3,613 NFS acres)
- Mountain Lake (8,314 NFS acres)
- Peters Mountain (3,328 NFS acres)
- Shawvers Run (3,366 NFS acres)
- Thunder Ridge (2,344 NFS acres)

WILDERNESS AREAS IN FOREST SERVICE REGION 9 – EASTERN REGION

o **IN**

Hoosier National Forest

- Charles C. Deam (12,945 NFS acres)

o **ME**

White Mountain National Forest

- Caribou-Speckled Mountain (12,000 NFS acres)

o **MI**

Hiawatha National Forest

- Big Island Lake (5,856 NFS acres)
- Delirium (11,870 NFS acres)
- Horseshoe Bay (3,790 NFS acres)
- Mackinac (12,230 NFS acres)
- Rock River Canyon (4,640 NFS acres)
- Round Island (378 NFS acres)

Ottawa National Forest

- McCormick (16,850 NFS acres)
- Sturgeon River Gorge (14,500 NFS acres)
- Sylvania (18,327 NFS acres)

Manistee National Forest

- Nordhouse Dunes (3,450 NFS acres)

o **NH**

White Mountain National Forest

- Great Gulf (5,552 NFS acres)
- Pemigewasset (45,000 NFS acres)
- Presidential Range-Dry River (27,380 NFS acres)
- Sandwich Range (25,000 NFS acres)

o **PA**

Allegheny National Forest

- Allegheny Islands (368 NFS acres)
- Hickory Creek (8,663 NFS acres)

o **VT**

Green Mountain National Forest

- Big Branch (6,720 NFS acres)
- Breadloaf (21,480 NFS acres)
- Bristol Cliffs (3,738 NFS acres)
- George D. Aiken (5,060 NFS acres)
- Lye Brook (15,503 NFS acres)

- Peru Peak (6,920 NFS acres)

o **WV**

Monongahela National Forest

- Cranberry (35,864 NFS acres)
- Dolly Sods (10,215 NFS acres)
- Laurel Fork North (6,055 NFS acres)
- Laurel Fork South (5,997 NFS acres)
- Otter Creek (20,000 NFS acres)

Jefferson National Forest

- Mountain Lake (2,721 NFS acres)

NATIONAL FOREST MAPS

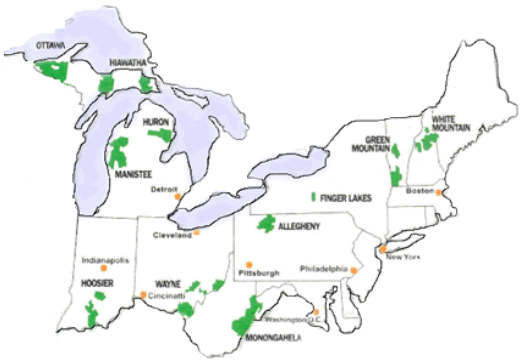
GENERAL

The USFS manages the 193 million acres of the National Forest System in a sustainable manner in collaboration with the American public; interested organizations; private landowners; State, local and tribal governments; federal agencies; and others.

Through the Organic Administration Act of June 4, 1897, (chapter 2, 30 Stat. 34-36) Congress authorized the creation of what is now the National Forest System "to improve and protect" federal forests. To carry out this mission, the USFS has authority "to regulate [the Forests'] occupancy and use and to preserve the forests therein from destruction" (16 U.S.C. 551). The Multiple-Use Sustained-Yield Act of 1960 confirms USFS authority to manage the national forests and grasslands "for outdoor recreation, range, timber, watershed, and wildlife and fish purposes," (16 U.S.C. § 528).

Please see the USFS website, http://www.fs.fed.us/, for detailed descriptions of each National Forest listed in this appendix.

FOREST SERVICE SYSTEM LANDS WITHIN POTENTIAL ORAL RABIES VACCINATION (ORV) ZONES



USFS Region 9 within ORV zone

USFS Region 8 within ORV zone

USFS Region 3 within potential ORV zone

APPENDIX J

BUREAU OF LAND MANAGEMENT (BLM) LANDS AND ACREAGE[10] WITHIN CURRENT OR POTENTIAL ORV ZONES AND MAPS

AZ BLM NATIONAL LANDSCAPE CONSERVATION SYSTEM WILDERNESS AREAS

Aravaipa Canyon Wilderness (19,700 BLM acres)
Arrastra Mountain Wilderness (129,800 BLM acres)
Aubrey Peak Wilderness (15,400 BLM acres)
Baboquivari Peak Wilderness (2,040 BLM acres)
Beaver Dam Mountains Wilderness (15,000 BLM acres
Big Horn Mountains Wilderness (21,000 BLM acres
Cottonwood Point Wilderness (6,860 BLM acres)
Coyote Mountains Wilderness (5,100 BLM acres)
Dos Cabezas Mountains Wilderness (11,700 BLM acres)
Eagletail Mountains Wilderness (97,880 BLM acres)
East Cactus Plain Wilderness (14,630 BLM acres)
Fishhooks Wilderness (10,500 BLM acres)
Gibraltar Mountain Wilderness (18,790 BLM acres)
Grand Wash Cliffs Wilderness (37,030 BLM acres)
Harcuvar Mountains Wilderness (25,050 BLM acres)
Harquahala Mountains Wilderness (22,880 BLM acres)
Hassayampa River Canyon Wilderness (12,300 BLM acres)
Hells Canyon Wilderness (9,311 BLM acres)
Hummingbird Springs Wilderness (31,200 BLM acres)
Mount Logan Wilderness (14,650 BLM acres)
Mount Nutt Wilderness (28,080 BLM acres)
Mount Tipton Wilderness (31,320 BLM acres)
Mount Trumbull Wilderness (7,880 BLM acres)
Mount Wilson Wilderness (23,900 BLM acres)
Muggins Mountain Wilderness (7,711 BLM acres)
Needle's Eye Wilderness (8,760 BLM acres)
New Water Mountains Wilderness (24,600 BLM acres)
North Maricopa Mountains Wilderness (63,200 BLM acres)
North Santa Teresa Wilderness (5,800 BLM acres)
Paiute Wilderness (87,900 BLM acres)
Paria Canyon-Vermilion Cliffs Wilderness (109,400) BLM acres)
Peloncillo Mountains Wilderness (19,440 BLM acres)
Rawhide Mountains Wilderness (38,470 BLM acres)
Redfield Canyon Wilderness 96,600 BLM acres)
Sierra Estrella Wilderness (14,400 BLM acres)
Signal Mountain Wilderness (13,350 BLM acres)
South Maricopa Mountains Wilderness (60,100 BLM acres)
Swansea Wilderness (16,400 BLM acres)
Table Top Wilderness (34,400 BLM acres)
Tres Alamos Wilderness (8,300 BLM acres)
Trigo Mountain Wilderness (30,300 BLM acres)
Upper Burro Creek Wilderness (27,440 BLM acres)

[10] Although entire BLM acreage is listed, only portions of each BLM areat may be baited, depending on the needs of the program over time.

Wabayuma Peak Wilderness (38,944 BLM acres)
Warm Springs Wilderness (112,400 BLM acres)
White Canyon Wilderness (5,790 BLM acres)
Woolsey Peak Wilderness (64,000 BLM acres)

AZ BLM NATIONAL LANDSCAPE CONSERVATION SYSTEM NATIONAL MONUMENTS

Aqua Fria National Monument (70,900 BLM acres)
Grand Canyon-Parashant National Monument (808,727 BLM acres)
Ironwood Forest National Monument (128,398 BLM acres)
Sonoran Desert National Monument (486,600 BLM acres)
Vermillion Cliffs National Monument (279,568 BLM acres)

AZ BLM NATIONAL LANDSCAPE CONSERVATION SYSTEM NATIONAL CONSERVATION AREAS

Gila Box Riparian National Conservation Area (21,767 BLM acres)
Las Cienegas National Conservation Area (41,972 BLM acres)
San Pedro Riparian National Conservation Area (55,495 BLM acres)

NM BLM NATIONAL LANDSCAPE CONSERVATION SYSTEM WILDERNESS AREAS

Bisti/De-Na-Zin Wilderness (38,381 BLM acres)
Cebolla Wilderness (61,500 BLM acres)
Ojito Wilderness (11,183 BLM acres)
Sabinoso Wilderness (16,030 BLM acres)
Salt Creek Wilderness (9,621 BLM acres)
West Malpais Wilderness (39,400 BLM acres)

NM BLM NATIONAL LANDSCAPE CONSERVATION SYSTEM NATIONAL MONUMENTS

Kasha-Katuwe Tent Rocks National Monument (4,645 BLM acres)

NM BLM NATIONAL LANDSCAPE CONSERVATION SYSTEM CONSERVATION AREAS

El Malpais National Conservation Areas (227,100 BLM acres)

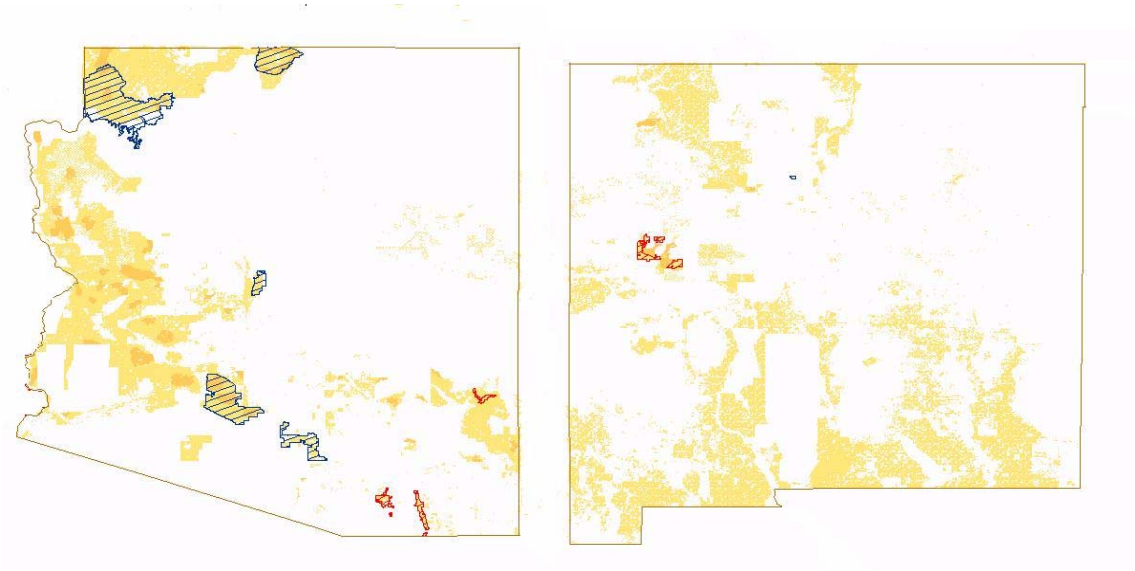
GENERAL

The BLM is responsible for carrying out a variety of programs for the management and conservation of resources on 256 million surface acres, as well as 700 million acres of subsurface mineral estate. These public lands make up 13 percent of the total land surface of the U.S. and more than 40 percent of all land managed by the Federal government. In AZ and NM the BLM manages 12.2 million and 13.4 million surface acres respectively.

The BLM was established in 1946 through the consolidation of General Land Office and the U.S. Grazing Service by the US Reorganization Plan No. 3 or 1946 §403. The functions of the BLM are addressed in the Federal Land Policy and Management Act of 1976 (FLPM) (40 U.S.C. 1701 et seq.) In FLPMA, Congress recognized the value of the remaining public lands by declaring that these lands would remain in the public ownership. Further, the FLPM outlines function of the BLM Directorate, provides for the administration of public lands through the BLM, provides for the management of the public lands on a multiple-use basis, and requires land use planning including public involvement and a continuing inventory of resources.

For more information regarding the BLM or for detailed information regarding the lands describe in this Appendix please visit the BLM website at http://www.blm.gov.

BUREAU OF LAND MANAGEMENT MAPS WITHIN POTENTIAL ORAL RABIES VACCINATION (ORV) ZONES



Arizona BLM lands **New Mexico BLM lands**

APPENDIX K
REGIONAL FORESTER SENSITIVE SPECIES
REGIONS 3, 8, and 9

TABLE 1: REGIONAL FORESTER SENSTIVE SPECIES – REGION 3

National Forest Designations: A-S = Apache-Sitgreaves National Forest (AZ), BK = Black Kettle National Grassland (NM), CAR = Carson National Forest (NM), CIB = Cibola National Forest (NM), COC = Coconino National Forest (AZ), COR = Coronado National Forest (AZ), GIL = Gila National Forest (NM), KAI = Kaibab National Forest (AZ), KRB = Kiowa/Rita Blanca National Grassland (NM), LIN = Lincoln National Forest (NM), PRE = Prescott National Forest (AZ), SFE = Santa Fe National Forest (NM), TON = Tonto National Forest (AZ)

National Forest	Group	Scientific Name	Common Name	G-Rank	Candidate
LIN	Amphibians	*Aneides hardii*	Sacramento Mountains salamander	G3	
SFE	Amphibians	*Plethodon neomexicanus*	Jemez Mountains salamander	G2	
CAR	Amphibians	*Bufo boreas boreas*	Boreal toad	G4	
A-S, COC, PRE, TON, GIL	Amphibians	*Bufo microscaphus*	Arizona toad	G3/G4	
COR, TON	Amphibians	*Eleutherodactylus augusti cactorum*	Western barking frog	G4T3	
A-S, COC, COR, GIL, PRE, TON	Amphibians	*Rana yavapaiensis*	Lowland leopard frog	G4	
COR	Amphibians	*Rana tarahumarae*	Tarahumara frog	G3	
A-S, CAR, COC, KAI, SFE, TON	Amphibians	*Rana pipiens*	Northern leopard frog	G5	
LIN, CIB	Amphibians	*Rana blairi*	Plains leopard frog	G5	
COR	Amphibians	*Rana subaquavocalis*	Ramsey Canyon leopard frog	G1	
COR	Amphibians	*Gastrophryne olivacea*	Great Plains narrow-mouthed toad	G5	
COC, TON	Bird	*Aechmophorus clarkii*	Clark's grebe	G5	
ALL	Bird	*Haliaeetus leucocephalus*	Bald eagle	G5	
COR, GIL	Bird	*Phalacrocorax brasilianus*	Neotropic cormorant	G5	
CIB (BK, KRB)	Bird	*Plegadis chihi*	White-face ibis	G5	
A-S, CIB (KRB), LIN, TON	Bird	*Buteo albonotatus*	Zone-tailed hawk	G4	
A-S, CAR, CIB, COC, COR, GIL, KAI, LIN, PRE, SFE, TON	Bird	*Accipiter gentilis*	Northern goshawk	G5	
COR, GIL, TON	Bird	*Asturina nitida maximus*	Northern gray hawk	G4T4Q	
A-S, COC, COR, GIL, PRE, TON	Bird	*Buteogallus anthracinus*	Common black-hawk	G4G5	
CIB (KRB, BK), LIN	Bird	*Buteo swainsoni*	Swainson's hawk	G5	
CIB (KRB), COC	Bird	*Buteo regalis*	Ferruginous hawk	G4	
A-S, CAR, CIB (except BK), COC, COR, GIL, KAI, LIN, PRE, SFE, TON	Bird	*Falco peregrinus anatum*	American peregrine falcon	G4T3	
CAR, SFE	Bird	*Lagopus leucurus*	White-tailed ptarmigan	G5	
CIB (KRB, BK)	Bird	*Tympanuchus pallidicinctus*	Lesser prairie-chicken	G3	C
COR	Bird	*Meleagris gallopavo mexicana*	Gould's wild turkey	G5T3	
CIB (KRB)	Bird	*Charadrius montanus*	Mountain plover	G2	
CIB, GIL	Bird	*Columbina passerina*	Common ground dove	G5	

National Forest	Group	Scientific Name	Common Name	G-Rank	Candidate
A-S, CAR, CIB (except BK), COC, COR, GIL, PRE, SFE, TON	Bird	*Coccyzus americanus occidentalis*	Western yellow billed cuckoo	G5T3	C
COR	Bird	*Glaucidium brasilianum cactorum*	Cactus ferruginous pygmy owl	G3	
COR	Bird	*Otus trichopsis*	Whiskered screech owl	G5	
A-S, CAR, CIB (KRB, BK), COC, GIL, KAI, LIN, SFE	Bird	*Athene cunicularia hypugaea*	Burrowing owl (Western)	G4T4	
CAR, SFE	Bird	*Aegolius funereus*	Boreal owl	G5	
COR	Bird	*Caprimulgus ridgwayi*	Buff-collared nighjar	G5	
COR	Bird	*Cynanthus latirostris*	Broad billed hummingbird	G4	
CIB, GIL, COR	Bird	*Hylocharis leucotis*	White eared hummingbird	G5	
COR	Bird	*Amazilia violiceps*	Violet-crowned hummingbird	G5	
COR	Bird	*Calothorax lucifer*	Lucifer Hummingbird	G4G5	
GIL	Bird	*Calypte costae*	Costa's Hummingbird	G5	
COR	Bird	*Euptilotis neoxenus*	Eared Quetzal	G3	
GIL	Bird	*Melanerpes uropygialis*	Gila woodpecker	G5	
COR	Bird	*Camptostoma imberbe*	Northern beardless-tyrannulet	G5	
COR	Bird	*Empidonax fulvifrons pygmaeus*	Northern buff breasted flycatcher	G5T5	
COR	Bird	*Tyrannus crassirostris*	Thick-billed kingbird	G5	
CIB (BK, KRB)	Bird	*Lanius ludovicianus*	Loggerhead shrike	G4	
CIB (BK only), GIL, LIN	Bird	*Vireo bellii arizonae*	Arizona bell's vireo	G5T4	
CAR, SFE, CIB, GIL, LIN	Bird	*Vireo vicinior*	Gray vireo	G4	
A-S	Bird	*Dumetella carolinensis*	Gray catbird	G5	
COR	Bird	*Pachyramphus aglaiae*	Rose-throated becard	G4G5	
A-S, COC, COR, PRE, TON, GIL, CIB	Bird	*Pipilo aberti*	Abert's towhee	G3G4	
COR	Bird	*Ammodramus savannarum ammolegus*	Arizona grasshopper sparrow	G5TU	
A-S, CIB (KRB, BK), COR, LIN	Bird	*Ammodramus bairdii*	Baird's sparrow	G4	
COR, LIN	Bird	*Passerina versicolor*	Varied bunting	G5	
COR	Mammal	*Sorex arizonae*	Arizona Shrew	G3N2N3	
CAR, SFE	Mammal	*Sorex cinereus cinereus*	Cinereus (masked) shrew	GN5	
A-S, CIB, COC, GIL, KAI	Mammal	*Sorex merriami leucogenys*	Merriam's shrew	G5	
A-S, CAR, CIB, COC, GIL, KAI, LIN, SFE	Mammal	*Sorex nanus*	Dwarf shrew	G4	
CIB, LIN	Mammal	*Sorex neomexicanus*	New Mexico shrew	G2N2N3	
A-S, CAR, SFE	Mammal	*Sorex palustris navigator*	Water shrew	G5	
SFE	Mammal	*Sorex preblei*	Preble's shrew	G4	
COR	Mammal	*Notiosorex cockrumi*	Cockrum's desert shrew	GNR	
COR	Mammal	*Choeronycteris mexicana*	Mexican long-tongued bat	G4N2	
COR, TON	Mammal	*Macrotus californicus*	California leaf-nosed bat	G4N3N4	
COR	Mammal	*Lasiurus xanthinus*	Western yellow bat	G5N2	
A-S, COC, COR, GIL, KAI, PRE, TON	Mammal	*Lasiurus blossevillii*	Western red bat	G5N4	
A-S, CAR, CIB, COC, GIL, KAI, LIN, SFE,	Mammal	*Euderma maculatum*	Spotted bat	G4N3N4	

National Forest	Group	Scientific Name	Common Name	G-Rank	Candidate
TON					
A-S, CIB, COC, COR, GIL, KAI, TON	Mammal	*Idionycteris phyllotis*	Allen's lappet-browned bat	G3G4N3	
A-S, CAR, CIB, COC, COR, GIL, KAI, LIN, PRE, SFE, TON	Mammal	*Corynorhinus townsendii pallescens*	Pale Townsend's big-eared bat	GTN4	
COR, PRE, TON	Mammal	*Nyctinomops femorosaccus*	Pocketed free-tailed bat	G4	
A-S, COC, COR, TON	Mammal	*Eumops perotis californicus*	Greater western mastiff bat	G5T4N3	
CAR, SFE	Mammal	*Ochotona princeps*	Pika	GN5	
SFE	Mammal	*Ochotona princeps nigrescens*	Goat peak pika	G5TN1	
CAR, SFE	Mammal	*Lepus americanus*	Snowshoe hare	G5	
COR	Mammal	*Lepus callotis*	White-sided jack rabbit	G3	
CAR	Mammal	*Lepus townsendii campanius*	White-tailed jack rabbit	GN5	
CIB, LIN	Mammal	*Neotamias canipes*	Gray-footed chipmunk	GN3	
A-S	Mammal	*Tamias minimus arizonensis*	White mountains chipmunk	G5T2NR	
LIN	Mammal	*Neotamias minimus atristriatus*	Penasco least chipmunk	G5T1NX	
KAI	Mammal	*Neotamias minimus consobrinus*	Kaibab least chipmunk	G5TNR	
CAR, SFE	Mammal	*Marmota flaviventris*	Yellow-bellied marmot	GN5	
A-S, CIB, GIL, LIN	Mammal	*Spermophilus tridecemlineatus monticola*	White mountains ground squirrel	G5TN3	
CIB (KRB, BK only)	Mammal	*Cynomys ludovicianus ludovicianus*	Black-tailed prairie dog	G3	
CAR, CIB, SFE, GIL	Mammal	*Cynomys gunnisoni*	Gunnison's prairie dog	GN5	
KAI	Mammal	*Sciurus aberti kaibabensis*	Kaibab squirrel	G5T3Q	
GIL	Mammal	*Sciurus arizonensis arizonensis*	Arizona gray squirrel	GN4	
COR	Mammal	*Sciurus nayaritensis chiracahuae*	Chiricahua fox squirrel	G3	
LIN	Mammal	*Tamiasciurus hudsonicus lychnuchus*	Ruidoso red squirrel	G5	
CIB, GIL, SFE	Mammal	*Thomomys bottae aureus*	Botta's pocket gopher	G5	
COR	Mammal	*Thomomys bottae grahamensis*	Graham mountains squirrel	G5T3Q	
LIN	Mammal	*Thomomys bottae guadalupensis*	Guadalupe pocket gopher	G5TN2	
CIB	Mammal	*Thomomys bottae morulus*	Botta's pocket gopher	G5	
CIB	Mammal	*Thomomys bottae paguatae*	Cebolleta southern pocket gopher	G5TN2	
CIB	Mammal	*Thomomys bottae planorum*	Botta's pocket gopher	G5	
KAI	Mammal	*Thomomys talpoides kaibabensis*	Kaibab northern pocket gopher	UNK	
CIB	Mammal	*Thomomys talpoides taylori*	Mt. Taylor northern pocket gopher	UNK	

National Forest	Group	Scientific Name	Common Name	G-Rank	Candidate
COR	Mammal	*Thomomys umbrinus intermedius*	Huachuca pocket gopher	G5TN3	
COR	Mammal	*Thomomys umbrinus quercinus*	Southern (Pajarito) pocket gopher	G5TN3	
LIN	Mammal	*Cratogeomys castanops*	Yellow-faced pocket gopher	GN5	
LIN	Mammal	*Peromyscus pectoralis laceianus*	White-ankled mouse	GN5	
COC	Mammal	*Perognathus amplus cineris*	Wupatki Arizona pocket mouse	G5T2Q	
A-S	Mammal	*Perognathus flavus goodpasteri*	Springerville silky pocket mouse	G5TN3	
KAI	Mammal	*Dipodomys microps leucotis*	Houserock valley chisel toothed kangaroo rat	G5T2Q	
CIB, SFE	Mammal	*Dipodomys spectabilis clarenci*	NM Banner tailed kangaroo rat	G5TN4	
COR	Mammal	*Reithrodontomys fulvescens*	Fulvous harvest mouse	GN5	
COC, COR, PRE	Mammal	*Reithrodontomys montanus*	Plains harvest mouse	G5	
COR	Mammal	*Peromyscus merriami*	Mesquite (Merriam's) mouse	G5N2	
COR	Mammal	*Baiomys taylori ater*	Northern pygmy mouse	G4G5N4	
COR, GIL	Mammal	*Sigmodon ochrognathus*	Yellow-nosed cotton rat	G4G5N3 N4	
A-S, CAR, CIB, GIL, SFE	Mammal	*Clethrionomys gapperi*	Southern red-backed vole	GN5	
CAR, SFE	Mammal	*Phenacomys intermedius intermedius*	Western heather vole	GN5	
A-S, GIL	Mammal	*Microtus montanus arizonensis*	Arizona montane vole	G3	
A-S, COC, KAI	Mammal	*Microtus mogollonensis navaho*	Navajo mogollon vole	G4TN2Q	
A-S, CAR, CIB, COC, COR, GIL, LIN, KAI, SFE	Mammal	*Microtus longicaudus*	Long-tailed vole	GN5	
COR	Mammal	*Microtus longicaudus leucophaeus*	White-bellied long-tailed vole	G3TN3	
A-S, CAR, LIN, SFE	Mammal	*Zapus hudsonius luteus*	Meadow (New Mexico) jumping mouse	G3TN2	
TON, COR, GIL	Mammal	*Nasua narica*	White-nosed coati	G5N4	
CAR, SFE	Mammal	*Martes americana origenes*	American marten	GN5	
CAR, SFE	Mammal	*Mustela erminea muricus*	Ermine	GN5	
CAR, SFE	Mammal	*Mustela vison energumenos*	Mink	GN5	
COR, GIL	Mammal	*Mephitis macroura milleri*	Hooded skunk	G5N4	
CIB (KRB only)	Mammal	*Odocoileus virginianus texana*	Sandhill white-tailed deer	G5	
CAR, SFE, CIB, GIL, KAI, TON	Mammal	*Ovis canadensis canadensis*	Rocky mountain bighorn sheep	G4	
COR, TON	Mammal	*Ovis canadensis mexicana*	Desert bighorn sheep	G3	
COC, TON, COR, GIL	Reptile	*Heloderma suspectum suspectum*	Reticulate gila monster	G4T4	
COR, PRE, TON	Reptile	*Gopherus agassizii (Sonoran Population)*	Sonoran desert tortoise	G4T4	
COR	Reptile	*Sceloporus slevini*	Slevin's bunchgrass lizard	G4	
COR	Reptile	*Eumeces callicephalus*	Mountain skink	G5	
COR	Reptile	*Aspidoscelis burti stictogrammus*	Giant spotted whiptail	G4T3	
COR	Reptile	*Senticolis triaspis*	Green ratsnake	G5	

National Forest	Group	Scientific Name	Common Name	G-Rank	Candidate
COR	Reptile	*Oxybelis aeneus*	Brown vinesnake	G5	
COR	Reptile	*Gyalopion quadrangulare*	Thornscrub hooknosed snake	G4	
TON	Reptile	*Phyllorhynchus browni lucidus*	Maricopa leqaf-nosed snake	G5T2	
COR	Reptile	*Tantilla yaquia*	Yaqui black-headed snake	G4	
A-S, COC, COR,TON, PRE, GIL	Reptile	*Thamnophis eques megalops*	Mexican garter snake	G3T3	
CIB (KRB), LIN	Reptile	*Thamnophis proximus diabolicus*	Arid land ribbon snake	G5	
A-S, COC, GIL, PRE, TON	Reptile	*Thamnophis rufipunctatus*	Narrow-headed garter snake	G3G4	
LIN	Reptile	*Crotalus lepidus lepidus*	Mottled rock rattlesnake	G5T4T5	
COR	Reptile	*Crotalus pricei*	Twin spotted rattlesnake	G5	
COR	Reptile	*Crotalus willardi willardi*	Arizona ridge-nosed rattlesnake	G5T3	

TABLE 2: REGIONAL FORESTER SENSITIVE SPECIES – REGION 8

National Forest Desigations: 1 = Alabama National Forests, 2 = Daniel Boone National Forest (KY), 3 = Chattahoochee National Forest (GA), 4 = Cherokee National Forest (TN), 5 = Florida National Forests, 6 = Kisatchie National Forest (LA), 7 = Mississippi National Forests, 8 = George Washington/Jefferson National Forests (VA, KY), 11 = North Carolina National Forests, 12 = Sumter National Forest (SC), 13 TX National Forests, 17 = Land Between the Lakes National Forest (KY, TN)

National Forest	Group	Scientific Name	Common Name	G-Rank	Candidate
5	Amphibian	Amphiuma pholeter	One-toed amphiuma	G3	
5	Amphibian	Desmognathus apalachicolae	Apalachicola dusky salamander	G3	
4	Amphibian	Desmognathus caroliniensis	Carolina Mountain Dusky Salamander	G2	
4,11	Amphibian	Desmognathus santeetlah	Santeetlah dusky salamander	G3Q	
16	Amphibian	Eleutherodactylus eneidae	Coqui, mottled	G1	
16	Amphibian	Eleutherodactylus gryllus	a coqui	G2	
16	Amphibian	'Eleutherodactylus hedricki	a coqui	G2	
16	Amphibian	'Eleutherodactylus hedricki	Coqui, web-footed	G1	
16	Amphibian	'Eleutherodactylus locustus	Coqui, Martilitto	G3	
16	Amphibian	Eleutherodactylus richmondi	Coqui, Caoba	G3	
16	Amphibian	'Eleutherodactylus unicolor	Coqui, Burrow	G1	
4,11	Amphibian	Eurycea junaluska	Junaluska salamander	G3Q	
10	Amphibian	Eurycea tynerensis	Oklahoma salamander	G3	C
1	Amphibian	Necturus alabamensis	Black Warrior waterdog	G2	
11	Amphibian	Necturus lewisi	Neuse River waterdog	G3	
5	Amphibian	Notophthalmus perstriatus	Striped newt	G2G3	
4,11	Amphibian	Plethodon aureolus	Tellico salamander	G2G3Q	
9	Amphibian	Plethodon caddoensis	Caddo Mountain salamander	G2	
9	Amphibian	Plethodon fourchensis	Fourche Mountain salamander	G2	
8	Amphibian	Plethodon hubrichti	Peaks of Otter salamander	G2	
9	Amphibian	Plethodon kiamichi	Kiamichi slimy salamander	G2Q	
6	Amphibian	Plethodon kisatchie	Louisiana slimy salamander	G3Q	
9	Amphibian	Plethodon ouachitae	Rich Mountain salamander	G2, G3	

National Forest	Group	Scientific Name	Common Name	G-Rank	Candidate
8	Amphibian	Plethodon punctatus	Cow Knob salamander	G3	
9	Amphibian	Plethodon sequoyah	Sequoyah slimy salamander	G2Q	
3,4,11	Amphibian	Plethodon teyahalee	Southern Appalachian salamander	G2G3Q	
7,12	Amphibian	Plethodon websteri	Webster's salamander	G3	
4,8,11	Amphibian	Plethodon welleri	Weller's salamander	G3	
1,11,12	Amphibian	Rana capito capito	Carolina gopher frog	G3G4T3	
1,2,3,5,6,7,9,10,11,12,13	Bird	Aimophila aestivalis	Bachman's sparrow	G3	
16	Bird	'Dendroica angelae	Warbler, Elfin woods	G1	C
1,3,4,8,9,11	Bird	Falco peregrinus	Peregrine Falcon	G4	
5	Bird	Grus canadensis pratensis	Florida sandhill crane	G5T2T3	
3,4,8,11,12,13	Bird	Lanius ludovicianus migrans	Migrant loggerhead shrike	G4T3Q	
2,8,11	Bird	Thryomanes bewickii altus	Appalachian Bewick's wren	G5T2Q	
1,2,3,4,5,7,11,12,13,17	Mammal	Corynorhinus rafinesquii	Rafinesque's big-eared bat	G3G4	
4,8,11	Mammal	Microtus chrotorrhinus carolinensis	Southern rock vole	G4T3	
1,2,9,12,17	Mammal	Myotis austroriparius	Southeastern myotis	G3G4	
2,3,4,8,9,10,11,12	Mammal	Myotis leibii	Eastern small-footed bat	G3	
5	Mammal	Neofiber alleni	Round-tailed muskrat	G3	
5	Mammal	Podomys floridanus	Florida mouse	G3	
5	Mammal	Sciurus niger shermani	Sherman's fox squirrel	G5T2	
2	Mammal	Sorex dispar blitchi	Long-tailed shrew	G4T3	
3,4,8,11	Mammal	Sorex palustris puntculatus	Southern water shrew	G5T3	
16	Mammal	'Stenoderma rufum	Bat, Desmarest's fig-eating	GU	
1,5	Mammal	Ursus americanus floridanus	Florida black bear	G5T2	
3,4	Reptile	Clemmys muhlenbergi	Bog turtle	G3	
1,5	Reptile	Gopherus polyphemus	Gopher tortoise	G3	
1	Reptile	Graptemys ernsti	Escambia map turtle	G2	
5	Reptile	Lampropeltis getula goini	Apalachicola kingsnake	G5T2	
11	Reptile	Nerodia sipedon williamengelsi	Carolina salt marsh snake	G5T3	
1,11	Reptile	Ophisaurus mimicus	Mimic glass lizard	G3	
7	Reptile	Pithuophis melanoleucus lodingi	Black pine snake	G4T3	C
1,5	Reptile	Pituophis melanoleucus mugitus	Florida pine snake	G5T3	
6, 13	Reptile	Pituophis melanoleucus ruthveni	Louisiana pinesnake	G4T3	C
5	Reptile	Pseudemys concinna suwanniensis	Suwannee cooter	G5T3	
5	Reptile	Sceloporus woodi	Florida scrub lizard	G3	
5	Reptile	Stilosoma extenuatum	Short-tailed snake	G3	

TABLE 3: REGIONAL FORESTER SENSITIVE SPECIES – REGION 9

1 = Allegheny National Forest (PA), 2 = Finger Lakes National Forest (NY), 3 = Hiawatha National Forest (MI), 4 = Hoosier National Forest (IN), 5 = Huron-Manistee National Forests (MI),6 = Monongahela National Forest (WV), 7 = Ottawa National Forest (MI), 8 = Wayne national Forest (OH), 9 = White Mountain National Forest (NH, ME)

National Forest	Group	Scientific Name	Common Name	G-Rank	Candidate
4, 6, 8	Amphibians	Aneides aeneus	Green salamander	G3G4	
4, 5, 7, 8	Amphibians	Hemidactylium scutatum	Four-toed salamander	G5	
6, 8	Amphibians	Cryptobranchus alleganiensis	Hellbender	G3G4	
8	Amphibians	Acris crepitans blanchardi	Northern cricket frog	G5	
8	Amphibians	Psuedotriton montanus	Mud salamander	G5	

National Forest	Group	Scientific Name	Common Name	G-Rank	Candidate
1, 2, 3, 5, 6, 7	Bird	Accipiter gentilis	Northern goshawk	G5	
2,4, 5, 6, 8	Bird	Ammodramus henslowii	Henslow's sparrow	G4	
2	Bird	Bartaramia longicauda	Upland sandpiper	G5	
2, 5	Bird	Circus cyaneus	Northern harrier	G5	
1	Bird	Empidonax flaviventris	Yellow-bellied flycatcher	G5	
1, 3, 4, 5, 6, 7, 8	Bird	Haliaeetus leucocephalus	Bald eagle	G5	
1, 5, 9	Bird	Pandion haliaetus	Osprey	G5	
3	Bird	Ammodramus leconteli	Le Conte's sparrow	G4	
3, 5	Bird	Asio Flammeus	Short-eared owl	G5	
3, 5, 7	Bird	Buteo lineatus	Red-shouldered hawk	G5	
3, 5, 7	Bird	Chilidonias niger	Black tern	G4	
3, 5	Bird	Coturnicops noveboracensis	Yellow rail	G4	
3, 5, 7	Bird	Cynus buccinator	Trumpeter swan	G4	
3, 5	Bird	Dendroica discolor	Prairie warbler	G5	
3, 6, 7, 9	Bird	Flaco peregrines anatum	American peregrine falcon	G4T3	
3, 5, 7, 9	Bird	Gavia immer	Common loon	G5	
3, 4, 5, 6	Bird	Lanius ludovicianus migrans	Migrant loggerhead shrike	G4T3Q	
3, 5	Bird	Nycticorax nycticorax	Black-crowned night heron	G5	
3, 5, 7	Bird	Oporornis agillis	Connecticut warbler	G4	
3, 5, 7	Bird	Picoides arcticus	Black-backed woodpecker	G5	
3	Bird	Sterna caspia	Caspian tern	G5	
3	Bird	Sterna hirundo	Common tern	G5	
3, 5	Bird	Tympanuchus phasianellus	Sharp-tailed grouse	G4	
4	Bird	Bonasa umbellus	Ruffed grouse	G5	
4, 5, 8	Bird	Dendroica cerulea	Cerulean warbler	G4	
4, 5	Bird	Dolichonyx oryzivorus	Bobolink	G5	
4	Bird	Scolopax minor	American woodcock	G5	
4	Bird	Tyto alba	Barn owl	G5	
5	Bird	Ammodramus savannarum	Grasshopper sparrow	G5	
5	Bird	Asio otus	Long-eared owl	G5	
5	Bird	Botaurus lentigiinosus	American bittern	G4	
5	Bird	Caprimulgus vociferus	Whip-poor-will	G5	
5, 6	Bird	Contopus cooperi	Olive-sided flycatcher	G5	
5, 7	Bird	Falcipennis canadensis	Spruce grouse	G5	
5	Bird	Flaco columbarius	Merlin	G5	
5	Bird	Ixobrychus exilis	Least bittern	G5	
5, 6	Bird	Melanerpes erythrocephalus	Red-headed woodpecker	G5	
5	Bird	Rallus elegans	King rail	G4G5	
5	Bird	Seiurus motacilla	Louisiana waterthrush	G5	
5, 6	Bird	Vermivora chysoptera	Golden-winged warbler	G4	
6	Bird	Pooecetes gramineus	Vesper sparrow	G5	
9	Bird	Catharus bicknelli	Bicknell's thrush	G4	
9	Bird	Podilymbus podiceps	Pied-billed grebe	G5	
2, 6, 9	Mammal	Myotis leibii	Eastern small-footed bat	G3	
1	Mammal	Glaucomys sabrinus	Northern flying squirrel	G5T2	
3, 7	Mammal	Canis lupus	Gray (timber) wolf	G4	
4	Mammal	Lutra canadensis	River otter	G5	
4, 8	Mammal	Lynx rufus	Bobcat	G5	
4, 6	Mammal	Neotoma magister	Allegheny woodrat	G3G4	
4	Mammal	Nycticeius humeralis	Evening bat	G5	
4	Mammal	Taxidea taxu	American Badger	G5	
5	Mammal	Martes americana	American marten	G5	
5, 7	Mammal	Pipistrrrellus subflavus	Eastern pipistrelle	G5	
6	Mammal	Microtus chrotorrhinus carolinensis	Southern rock vole	G4T3	
6	Mammal	Sorex palustris punctulatus	Southern water shrew	G5T3	
6	Mammal	Spilogale putorius	Eastern spotted skunk		
8	Mammal	Ursus americanus	Black bear	G5	
9	Mammal	Synaptomys borealis sphagnicola	Northern bog lemming	G4T3Q	
2	Reptile	Lasmigonia subviridis	Bog turtle	G3	
1, 5, 6, 7, 9	Reptile	Clemmys insculpta (Glyptemys)	Wood turtle	G4	
1, 4, 6, 8	Reptile	Crotalus horridus	Timber rattlesnake	G4	
3, 5	Reptile	Emydoooooidea blandingii	Blanding's turtle	G4	
4	Reptile	Clonophis kirtlandii	Kirtland's snake	G2	

National Forest	Group	Scientific Name	Common Name	G-Rank	Candidate
5	Reptile	Hemidactylium scutatum	Spotted turtle	G5	
5	Reptile	Sistrurus catenatus catenatus	Eastern massasauga	G3G4T3T4	
5	Reptile	Terrapene carolin carolin	Easertn box turtle	G5T5	