SUPPLEMENT TO THE ENVIRONMENTAL ASSESSMENT:

FIELD TRIAL OF AN EXPERIMENTAL RABIES VACCINE, HUMAN ADENOVIRUS TYPE 5 VECTOR IN NEW HAMPSHIRE, NEW YORK, OHIO, VERMONT, AND WEST VIRGINIA

United States Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services

In cooperation with:
United States Department of Agriculture
Forest Service

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I. INTRODUCTION

In 2012, the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program prepared an environmental assessment (EA) to evaluate the potential impacts to the quality of the human environment from the implementation of a field trial to determine the safety and immunogenicity of the human adenovirus type 5-rabies glycoprotein (AdRG1.3) (trade name ONRAB; Artemis Technologies Inc., Guelph, Ontario, Canada) rabies vaccine in New Hampshire, New York, Ohio, Vermont, and West Virginia (USDA 2012). The EA evaluates the need for oral rabies vaccination (ORV) field trials and the relative effectiveness of three alternatives to meet that need, while accounting for the potential environmental effects of those activities.

Comments from the 2012 EA public involvement process were reviewed for substantive issues and alternatives and were considered during the development of the Decision for the EA. After consideration of the analysis contained in the EA and review of public comments, a Decision and Finding of No Significant Impact (FONSI) for the EA was issued on August 13, 2012. The Decision and FONSI selected the proposed action alternative to use federal funds to purchase ONRAB oral vaccine baits and to implement expanded ORV field trials involving the distribution of ONRAB oral vaccine baits in select areas of New Hampshire, New York, Ohio, Vermont, and West Virginia and to assist in monitoring and surveillance efforts by capturing and releasing or killing target species for purposes of obtaining biological samples.

In 2013, APHIS-WS determined there was a need to expand the ONRAB field trial into additional counties in New York that were not previously included in the EA (USDA 2013). Subsequently, in 2015, APHIS-WS further determined the need to shift the geographic range of the ONRAB field trial zone in Ohio and to increase bait distribution density in portions of the West Virginia zone (USDA 2015). In 2017, APHIS-WS determined the need to further extend the field trial into additional counties in Ohio, West Virginia, and New York (USDA 2017b). To fully analyze the potential environmental effects of this expansion, APHIS-WS completed supplements to the EA (USDA 2013, 2015, and 2017b) and issued FONSIs for the EA on July 17, 2013, August 18, 2015, and August 17, 2017.

This document adds to and updates the 2012 EA, 2013 supplement, 2015 supplement, and 2017 supplement to the EA. All information and analyses in the 2012 EA, 2013 supplement, 2015 supplement, and 2017 supplement to the EA remain valid unless otherwise noted below.

II. PURPOSE

The purpose of the EA remains as addressed in section 1.2 of the EA (USDA 2012). The purpose of this supplement to the EA is to 1) examine potential environmental impacts of APHIS-WS' program as it relates to expanding the geographic range of the field trial zone in Ohio and West Virginia, 2) clearly communicate to the public the analysis of individual and cumulative impacts of the proposed action since 2012, the 2013 supplement to the EA, the 2015 supplement to the EA, and the 2017 supplement to the EA and 3) document the analysis of WS' ORV field trial activities in New Hampshire, New York, Ohio, Vermont, and West Virginia since the Decision/FONSI was issued in 2012 to ensure that program activities remain within the impact parameters analyzed in the EA, the 2013 supplement to the EA, the 2015 supplement to the EA, and the 2017 supplement to the EA.

III. NEED FOR ACTION

A description of the need for action to control rabies in wildlife populations and to prevent the westward movement of the raccoon (*Procyon lotor*) rabies virus variant is provided in section 1.3 of the EA (USDA 2012). To further assess the immunogenicity and safety of the ONRAB vaccine, APHIS-WS' National Rabies Management Program (NRMP) proposes to expand the geographic area of the ONRAB field trial into Belmont and Monroe Counties in Ohio and Brooke, Hancock, Marshall, and Ohio Counties in West Virginia as analyzed in this proposed supplement to the EA (USDA 2012).

Currently, APHIS-WS conducts an ORV program using the only licensed oral rabies vaccine in the U.S., RABORAL V-RG® (vaccinia-rabies glycoprotein [RABORAL V-RG® is a registered trademark in the USA and elsewhere of Merial, Inc., which is now part of Boehringer Ingelheim, Ingelhiem, Germany]) in the above listed Ohio and West Virginia counties as part of a national ORV program. APHIS-WS' use of the V-RG vaccine has resulted in several notable accomplishments including the elimination of canine rabies from sources in Mexico which had spread to coyotes (*Canis latrans*) in south Texas, the successful control of gray fox (*Urocyon* cinereoagrenteus) rabies virus variant in western Texas, and the prevention of any appreciable spread of raccoon rabies in the eastern U.S. While these represent major accomplishments in rabies management, the inability to eliminate raccoon rabies from high risk spread corridors prompted the need to evaluate vaccine baits capable of producing higher levels of population immunity in raccoons.

An ORV zone has been in place in Ohio since 1997 using V-RG and since 2012, using a combination of V-RG and ONRAB. In 2017, in response to a rabies virus breach of the V-RG ORV barrier, APHIS-WS implemented a contingency action in Ohio (USDA 2017b) using ONRAB vaccine-baits. Based on favorable results from previous U.S. ONRAB field trials and because there have been no new wildlife rabies cases reported in the area following the 2017 contingency action, APHIS-WS determined the need to use ONRAB vaccine-baits in the remaining areas of the Ohio ORV zone where rabies cases may still persist (e.g., disease pressure from PA). Additionally, based on favorable field trial results and pressure with potential for spread from rabies cases in Pennsylvania and the West Virginia panhandle, APHIS-WS further determined the need to distribute ONRAB vaccine-baits in additional counties in West Virginia.

IV. DECISIONS TO BE MADE

Based on the scope of the EA, the 2013 supplement, 2015 supplement, 2017 supplement, and this supplement, the decisions to be made are: 1) Should APHIS-WS undertake expanded field trials in NH, NY, OH, VT, and WV, including portions of National Forest System lands, but excluding Wilderness Areas, to determine the immunogenic potential of ONRAB as an oral rabies vaccine for raccoons, skunks (*Mephitis mephitis*), gray foxes (*Urocyon cinereoargenteus*), and coyotes (*Canis latrans*); 2) Do the alternatives have significant cumulative impacts meriting an Environmental Impact Statement?

V. SCOPE OF THE ANALYSIS

The EA (USDA 2012), the 2013 supplement to the EA (USDA 2013), the 2015 supplement to the EA (USDA 2015), the 2017 supplement to the EA (USDA 2017b), and this supplement evaluate ORV field trial activities in New Hampshire, New York, Ohio, Vermont, and West Virginia. The scope of this analysis remains valid as addressed in the EA [see Section 1.5 of the EA (USDA 2012)]. This supplement analyzes a proposal to expand the geographic boundary of the Ohio portion of the ONRAB field trial to include Belmont and Monroe Counties; and Brooke, Hancock, Marshall, and Ohio Counties

in West Virginia. This supplement to the EA analyzes these changes with regard to the proposed alternative to ensure continued implementation of the selected alternative would not adversely affect the human environment.

Actions Analyzed

The EA, the 2013 supplement to the EA, the 2015 supplement to the EA, the 2017 supplement to the EA and this supplement evaluate the need for APHIS-WS funding of and participation in ORV field trials in New Hampshire, New York, Ohio, Vermont, and West Virginia for determining the safety and immunogenicity of ONRAB as an oral rabies vaccine for meso-carnivores including raccoons and skunks in the U.S. Under the proposed action, ORV distribution and monitoring and surveillance activities are conducted on private, federal, state, county, and municipal lands in New Hampshire, New York, Ohio, Vermont, and West Virginia including USDA-Forest Service National Forest System (NFS) lands, but excluding Wilderness Areas. This supplement analyzes the potential environmental impacts of expanding the geographic range of the field trial in Ohio and West Virginia with regard to the proposed action.

Native American Lands

As discussed in the EA, the 2013 supplement to the EA, the 2015 supplement to the EA, and the 2017 supplement to the EA, APHIS-WS does not conduct ORV activities on tribal lands without the consent of the Tribes. ORV activities on tribal lands would occur only pursuant to prior written or oral authorization from the Tribe. Because Tribal officials would be responsible for determining what methods would be available during ORV field trial bait distribution and monitoring and surveillance activities, no conflict with traditional cultural properties or beliefs would be anticipated. The activities and methods addressed in this supplement would include those activities that could be employed on Native American lands, when requested and agreed upon by the Tribe and WS.

Period for which this Supplemental EA is Valid

Unless it is determined that an Environmental Impact Statement (EIS) is needed, the supplemented EA will remain valid until WS determined that new need for action or new alternatives having different environmental effects must be analyzed. At that time, this analysis will be revised as necessary. Review of the EA will be conducted each year to ensure that it is complete and still appropriate to the scope of oral rabies vaccination (ORV) field trials in New Hampshire, New York, Ohio, Vermont, and West Virginia.

Site Specificity

The EA, the 2013 supplement to the EA, the 2015 supplement to the EA, the 2017 supplement to the EA, and this supplement analyze potential impacts of ONRAB as an oral rabies vaccine-bait for managing rabies in raccoons and skunks in New Hampshire, New York, Ohio, Vermont, and West Virginia, including NFS lands, but excluding Wilderness Areas. The scope of the analysis remains valid as addressed in the EA (see Section 1.5 of the EA), in the 2013 supplement to the EA, in the 2015 supplement to the EA, and in the 2017 supplement to the EA. This supplement analyzes potential environmental impacts of expanding the geographic range of the field trial in Ohio and West Virginia to ensure that field trial activities under the proposed alternative are within the parameters evaluated in the EA and to ensure continued implementation of the selected alternative would not adversely affect the human environment.

VI. SUMMARY OF PUBLIC INVOLVEMENT

The pre-decision 2012 EA, 2013 supplement to the EA, the 2015 supplement to the EA, and 2017 supplement to the EA were made available for public review and comment through publication of notices of availability in the *Federal Register,* by posting on the WS stakeholder registry, and by posting these documents and a notice of availability on the APHIS website located at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml. WS responses to specific comments are included as a part of the respective Decisions/FONSIs for the EA and the supplements to the EA. All letters and comments are maintained at the WS Office in Pittstown, New Jersey.

This supplement will also be made available to the public for a 30 day comment period. As with the previous documents, a notice of availability for this supplement to the EA will be published in the *Federal Register*, on the WS stakeholder registry, and on the APHIS website at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml. Comments received during the public involvement process would be fully considered for new substantive issues and alternatives.

VII. RELATIONSHIP OF THIS DOCUMENT TO OTHER ENVIRONMENTAL DOCUMENTS

Section 1.8 of the EA (USDA 2012) provides a detailed description of those documents containing information pertinent to the EA, the 2013 supplement to the EA (USDA 2013), the 2015 supplement to the EA, the 2017 supplement to the EA, and this supplement.

WS' environmental assessment *Field Trial of an Experimental Rabies Vaccine, Human Adenovirus Type 5 Vector In New Hampshire, New York, Ohio, Vermont, and West Virginia* (USDA 2012), as supplemented (USDA 2013, 2015, 2017b), was previously developed to analyze the need for action to undertake new wildlife rabies vaccine field trials in the aforementioned states. Changes in the need for action and affected environment have prompted WS to initiate this new analysis for the vaccine field trial into this Supplement.

VIII. AUTHORITY AND COMPLIANCE

APHIS-WS' activities with regard to ORV programs are regulated by federal, state, and local laws and regulations. The authority of APHIS-WS is discussed in section 1.9 of the EA (USDA 2012), along with the authorities of other federal, state, and local entities. APHIS-WS' compliance with relevant laws and regulations are also discussed in detail in section 1.9 of the EA (USDA 2012). APHIS-WS' authorities and those of federal, state, and local entities under this supplement would remain as addressed in the EA, including compliance with all applicable federal, state, and local laws and regulations.

IX. RELATIONSHIPS OF AGENCIES DURING THE PREPARATION OF THIS EA SUPPLEMENT

Based on agency relationships, Memorandums of Understanding (MOUs), and legislative authorities, WS was the lead agency during the development of the EA and the Supplement to the EA, and therefore, was responsible for the scope, content, and decisions made. The USDA-Forest Service (USFS) provided input throughout the EA preparation to ensure an interdisciplinary approach in compliance with NEPA and agency mandates, policies, and regulations.

X. ISSUES ANALYZED IN DETAIL

Issues are concerns raised regarding potential environmental problems that might occur from a proposed action. The following issues, identified during the scoping process for the EA and discussed in detail in Chapter 2 of the EA (USDA 2012) are analyzed in detail in this supplement with regard to the proposed expanded geographic range of APHIS-WS' ONRAB field trial in Ohio and West Virginia:

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

Based on those ORV field trial activities conducted previously by WS since the Decision and FONSI were signed in 2017, no additional issues have been identified that require detailed analyses. Those issues identified during the development of the EA (USDA 2012) remain applicable and appropriate to ORV field trial activities.

XI. ALTERNATIVES INCLUDING THE PROPOSED ACTION

The alternatives considered and evaluated using the identified issues are described and discussed in detail in Chapter 3 of the EA (USDA 2012). In addition, the EA contains a detailed description and discussion of the alternatives and the effects of the alternatives on the issues identified (USDA 2012). The EA also provides a description of the methods that could be used or recommended by APHIS-WS under each of the alternatives. The EA describes three alternatives that were developed to address the issues identified above. The following alternatives were developed for this supplement to address the issues identified above:

Alternative 1. Maintain the Status Quo (No Action Alternative).

This alternative would involve the use of federal funds to maintain the status quo of the ONRAB field trials in New Hampshire, New York, Ohio, Vermont, and West Virginia, as described in the 2012 EA and the decision and Finding of No Significant Impact (FONSI) for the EA (USDA 2012), as supplemented (USDA 2013, 2015, and 2017b).

Alternative 2. Proposed Action (the Preferred Alternative).

This alternative would involve the use of federal funds to expand the geographic range of the ONRAB field trials, described in the EA as supplemented (USDA 2012, 2013, 2015, and 2017b), into Belmont and Monroe Counties in Ohio and Brooke, Hancock, Marshall, and Ohio Counties in West Virginia as proposed in this supplement.

Under this alternative, APHIS-WS would use federal funds to purchase ONRAB oral vaccine-baits under the authorities of the appropriate state agencies in New Hampshire, New York, Ohio, Vermont, and West Virginia to evaluate the immunogenic and safety characteristics of the ONRAB vaccine for wildlife rabies under limited field conditions. Under this alternative, as described in the 2012 EA, the 2013 supplement to the EA, the 2015 supplement to the EA, the 2017 supplement to the EA, and this supplement, APHIS-WS would also assist in monitoring and surveillance efforts by capturing and releasing or killing target species for purposes of obtaining biological samples.

Alternative 3. No ORV Field Trials.

Under this alternative, there would be no involvement by APHIS-WS in ORV field trials in the states identified in Section 1.4 of the EA (USDA 2012) or in any of the additional counties in Ohio or West Virginia proposed in this supplement.

XII. STANDARD OPERATING PROCEDURES

APHIS-WS has adopted Standard Operating Procedures (SOPs) that serve to prevent, reduce, or compensate for negative impacts that otherwise might result from an action. The current ORV programs, including field trials, use many such SOPs that would be incorporated into the expanded field trial activities. The SOPS discussed in the EA [see section 3.3 (USDA 2012)] remain appropriate for APHIS-WS' ONRAB field trial, including the proposed expansion of the field trial zone into Belmont and Monroe Counties in Ohio and Brooke, Hancock, Marshall, and Ohio Counties in West Virginia as analyzed in this supplement.

XIII. ENVIRONMENTAL CONSEQUENCES

The major issues are discussed in detail in Chapter 2 of the EA (USDA 2012). Alternatives developed and identified during the development of the EA to meet the need for action and to address those issues are discussed in Chapter 3 of the EA (USDA 2012). The potential impacts of Alternative 1 and 3 on the human environment have not changed from those described and analyzed in the EA, as supplemented, and, thus, do not require additional analyses in this supplement. Chapter 4 of the EA contains a detailed discussion and comparison of the identified alternatives and the major issues (USDA 2012). Alternative 2 (proposed action), as described in the EA, addresses the need and implementation of expanding ORV field trials using the ONRAB vaccine by APHIS-WS. The following is an analysis of potential impacts of Alternative 2 (proposed action) for each of the major issues analyzed in the EA since the completion of the EA and includes consideration of the addition of Belmont and Monroe Counties in Ohio and Brooke, Hancock, Marshall, and Ohio Counties in West Virginia.

Issue 1 – Potential for adverse effects on target wildlife species populations.

The primary concern is whether the ONRAB vaccine-bait might cause disease in target raccoons and striped skunks, the target species in this ONRAB field trial, if they consume this vaccine-bait. In order for such vaccines to be licensed for use they must be shown to be safe, pure, potent, efficacious, and genetically stable (CFIA 2015).

The EA (USDA 2012) includes discussion of studies conducted by Charlton et al. (1992), Prevec et al. (1990), and Knowles et al. (2009) documenting the safety of AdRg1 and ONRAB in ORV target species including raccoons, foxes, and skunks. Additionally, the EA presents findings from previous field trial studies conducted in Canada.

Following the initial field trial study in West Virginia, raccoons sampled by APHIS-WS during the post-ONRAB ORV monitoring and surveillance activities displayed a 49.2% seroconversion rate (n=262) (i.e., these raccoons received a sufficient dose of ONRAB and are considered to be vaccinated against the rabies virus). While raccoons sampled pre-ONRAB ORV activities displayed a 9.6% (n=395) seroconversion, this may be explained by a possible occurrence of naturally acquired immunity from sub-lethal exposures to raccoon rabies or movements of orally vaccinated raccoons into sampling cells from the adjacent V-RG zone (Slate et al. 2014).

A study focusing on immune response in raccoons following treatment with ONRAB (Brown et al. 2012) found similar, promising results. In this study, forty two wild-caught, captive raccoons were offered an ONRAB vaccine bait. Results of this study concluded that ONRAB effectively stimulated the production of RVNA in a high proportion of raccoons (67%) within the first two months after vaccination. Twenty of these ONRAB treated raccoons were later challenged with rabies virus infection. Of these raccoons, fifteen (75%) survived rabies virus challenge. Throughout the study, no vaccine- induced morbidity or mortality was observed among raccoons (Brown et al. 2012).

As discussed in the EA, field studies using ONRAB in Ontario, Canada have reported vaccine efficacy in raccoons in the wild ranging from 79% to 81% using baiting densities similar to APHIS-WS' ORV programs (i.e., 75-150 baits/km^2) (Rosatte 2009). As discussed in the 2013 and 2015 supplements to the EA, further studies have compared field performance between ONRAB and V-RG. In 2008, ORV programs in Maine, distributing V-RG baits, and New Brunswick, Canada, distributing ONRAB baits, provided an opportunity to carry out a comparative analysis of the field performance of these two vaccine-baits in skunks and raccoons (Fehlner-Gardiner et al. 2012). While antibody prevalence in skunks was low in both Maine and New Brunswick, Fehlner-Gardiner et al. (2012) concluded that this may be attributed to bait densities and flight line spacing. Samples collected from raccoons receiving ONRAB baits in New Brunswick showed antibody response rates ranging from 67% to 78%, depending on the test used for analysis. Conversely, samples from raccoons receiving V-RG baits in Maine showed lower antibody response rates of 25% to 32%. Although a number of factors, as described by Fehlner-Gardiner et al. (2012), could have impacted the interpretation of antibody data, many of these factors would have favored the V-RG results in Maine. The antibody prevalence in raccoons achieved in this study using ONRAB suggests that this vaccine may prove effective not only for the prevention of raccoon rabies in enzootic areas, but also for rabies elimination (Fehlner-Gardiner et al. 2012). Mainguy et al. (2013) conducted a similar cross-border comparison between ONRAB and V-RG. This study examined antibody response rates between raccoon receiving ONRAB baits in Quebec, Canada versus raccoons receiving V-RG in neighboring Vermont. This study found that the percentage of antibody-positive raccoons was greater with ONRAB in Quebec (51%) than with V-RG in Vermont (38%) although field conditions, similar to those in the above mentioned New Brunswick-Maine study, should have favored a higher prevalence in Vermont.

Serology results for the 2015 post-ONRAB distribution raccoon sampling from New Hampshire, New York, Ohio, Vermont, and West Virginia are presented in Table 1. During raccoon sampling efforts, APHIS-WS also collected and sampled 276 striped skunks, 3 fishers, 3 gray foxes, 8 red foxes, and 1 coyote. Of those 71 striped skunks (26%), 2 red foxes (25%), 1 fisher (33%), 0 gray foxes, and 0 coyotes had RVNA.

Table 1. APHIS-WS Post-ONRAB Sampling Efforts – Raccoon Serology Results 2015

State	All post-ONRAB serum samples	Positive rabies antibody response (≥0.05IU) (% Positive)	Post-ONRAB tooth samples	Presence of tetracycline	RVNA due to IMRAB[1]
NH	No samples collected				
NY	834	557 (66.8%)	856	317 (37.0%)	
OH	187	81 (43.3%)	183	48 (26.2%)	
VT	328	160 (48.8%)	381	104 (27.3%)	1
WV	589	508 (86.2%)	450	313 (69.6%)	
Total	1,938	1,306 (67.4%)	1,870	782 (41.8%)	1
Mean ± Standard Deviation		61.3±19.4%		40.0±20.3%	

As discussed in section 4.1.1 of the EA (USDA 2012), post- field trial ORV monitoring and surveillance activities conducted to evaluate the safety and effectiveness of the ONRAB vaccine-bait are expected to have negligible adverse risks or impacts to target species populations. Expanding the geographic area to include Belmont and Monroe Counties in Ohio and Brooke, Hancock, Marshall, and Ohio Counties in West Virginia will continue to result in negligible adverse risks to target species populations with regard to monitoring and surveillance activities. APHIS- WS and cooperating state and local agencies continue to expect to humanely kill less than 1% of the lowest number of raccoons in all ORV program states, including any raccoons that may be humanely killed for critical samples during ONRAB field trials. The current V-RG ORV program conducts raccoon monitoring and surveillance activities in 17 eastern states. To date lethal removal has accounted for less than 0.006% - 0.2% of the lowest estimated raccoon population annually (USDA 2018, 2017a, 2016a, 2016b, 2014) indicating that the potential for cumulative impacts to raccoon populations continues to be negligible. Additionally, based on the conservative state-wide striped skunks population estimates for New Hampshire, New York, Ohio, Vermont, and West Virginia described in section 4.1.1 of the EA, APHIS-WS and cooperating state and local agencies continue to expect to lethally remove less than 1% of the total striped skunk population in any of the involved states.

In the absence of the ORV program, including the field trial proposed in the EA and updated in the 2013, 2015, and 2017 supplements and this supplement, it is highly likely that substantially greater numbers of raccoons would succumb to the invariably fatal rabies virus with other animal and public health implications than are removed during monitoring and surveillance activities.

As discussed in the EA, the 2013 supplement to the EA, the 2015 supplement to the EA, and the 2017 supplement to the EA, although the ORV ONRAB field trial specifically targets raccoons and striped skunks, several other species may be treated as targets for monitoring and surveillance. These species are referred to as non-ORV targets for purposes of the EA and supplements to the EA. The methods proposed for use in monitoring and surveillance activities would have no significant adverse effects on non-ORV target species. Species that are considered targets for monitoring and surveillance, but are not targets for the ORV ONRAB field trial will include all known rabies reservoir or common vector species,

[1] Some animals had a record of previous hand vaccination with IMRAB®3 so rabies antibodies may be attributed to IMRAB and not ONRAB.

including: the red fox (*Vulpes vulpes*), grey fox, coyote, spotted skunk (*Spilogale putoris*), bobcat (*Lynx rufus*), fisher (*Martes pennanti*), groundhog (*Marmota monax*), feral dog (*Canis familiaris*), and feral cat (*Felis domesticus*). Additionally, several small mammal species may be targets for monitoring and surveillance including Eastern chipmunk (*Tamias* striatus), Eastern gray squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*), Southern flying squirrel (*Galucomys volans*), short-tailed shrew (*Blarina brevicauda*), deer mouse (*Peromyscus maniculatus*), white-footed mouse (*Peromyscus leucopus*), Southern red-backed vole (*Clethrionomys gapperi*), meadow vole (*Microtus pennsylvanicus*), and pine vole (*Microtus pinetorum*). Occasionally, samples may be collected for serology from some mammal species that are incidentally captured during ORV monitoring and surveillance activities, but not specifically targeted by the ORV ONRAB field trials. They may be opportunistically sampled to determine the potential effectiveness of ONRAB as many of these species have a propensity for contracting, harboring, and spreading the rabies virus. Non-ORV target animals captured in cage traps would normally be released unharmed unless the animal appears sick or injured. Therefore, monitoring and surveillance should have little or no effect on non-ORV target populations as a result of the proposed expansion of the field trial in Ohio and West Virginia.

Based on the safety data presented above and in the EA, as supplemented, as well as APHIS-WS' continued limited lethal removal (i.e., less than 1% of target species populations), no adverse effects to target animals is expected. Beneficial impacts to target species may be expected as previous studies indicate higher levels of rabies antibody response in animals treated with ONRAB versus V-RG. Additionally, monitoring and surveillance activities in the area will not differ or increase in intensity from those analyzed in the earlier ORV EAs (USDA 2010, 2012), therefore effects on target species will remain within the impact parameters established in the EA and Supplement.

Issue 2 – Potential for adverse effects on nontarget wildlife species, including threatened and endangered species.

The issue of nontarget species effects, including effects on threatened and endangered species, arises from the potential consumption of wildlife vaccines and the use of monitoring and surveillance methods as described in the EA (USDA 2012).

As discussed in section 4.1.2 of the EA (USDA 2012), at least 17 species have been included in the safety studies on ONRAB (Knowles et al. 2009) from several taxonomic groups. No adverse reactions in the animals studied were found following oral inoculation of the experimental vaccine, while, in most cases, antibodies against the rabies viral protein were detected on day 28 post-exposure (CFIA 2008, 2010). Test animals were found to be clinically healthy after vaccination with ONRAB; however, viral nucleic acids were detected in some tissues or feces of some vaccinated animals, suggesting that ONRAB was replicating or persisting in these hosts for a few days to a couple of weeks post-vaccination. Replication of adenovirus in immunocompromised animals such as nude mice and severe combined immunodeficient (SCID) mice did not appear to result in adverse reactions (CFIA 2008, 2010). Over dosage of ONRAB in amounts four to five times greater than the dose found in the vaccine baits resulted in no adverse effects in experiments involving skunks and raccoons (Artemis 2010).

As described in the 2013 supplement to the EA, subsequent to the completion of the EA (USDA 2012), APHIS-WS' National Wildlife Research Center (NWRC) conducted research expanding on the species evaluated by Knowles et al. (2009) to investigate the safety of ONRAB in wildlife species likely to come into contact with the vaccine-bait as a result of WS' ORV distribution (Fry et al. 2013). A 10x dose of ONRAB was administered to Eastern wild turkeys (*Meleagris gallopavo silvestri*), opossums (*Didelphis virginiana*), cottontail rabbits (*Sylvilagus floridanus*), fox squirrels (*Sciurus niger*), and woodrats

(*Neotoma spp*.). Oral swabs, feces, and blood samples were collected from all species. Following inoculation, no behavior changes were observed in any of the animals. By 7 days post-inoculation (dpi) no viral DNA was detected in the fecal swabs of turkeys, opossums, or cottontails and by 21 dpi no viral DNA from fecal swabs was detected in any of the individuals. At 7 dpi oral shedding was detected in only three of the treated fox squirrels. The limited viral recovery through both oral and fecal routes is of minimal concern regarding potential persistence of ONRAB in nontarget species (Fry et al. 2013). Post-mortem examination did not reveal gross or histopathological pathology that could be linked to the vaccine. These study results suggest low likelihood or persistence of ONRAB in the environment or in individual animals that contact the vaccine even at ten times the desired dose (Fry et al. 2013). Based on the study results, Fry et al. (2013) determined that there was no reason to conclude that ONRAB would have detrimental effects on nontarget wildlife species that incidentally ingest ONRAB during ORV campaigns in the U.S. Similarly, the distribution of ONRAB to control the spread of rabies in Canada has not resulted in any concern regarding nontarget species.

The methods proposed for use in ONRAB field trial monitoring and surveillance areas, including the proposed geographic expansion in Ohio and West Virginia, 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. Analysis of nontarget take resulting from other APHIS-WS ORV programs can be found in USDA 2010.

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. Mitigation measures and SOPs to avoid T&E effects are described in section 3.3 of the EA (USDA 2012).

APHIS-WS reviewed lists of federal and state T& E species (Appendices A and B), as well as Regional Forester Sensitive Species (Appendix C) to determine if any species might be affected due to new listing since the completion of the EA (USDA 2012) or the presence of T&E species in the additional Ohio counties (Belmont and Monroe) and West Virginia counties (Brooke, Hancock, Marshall, and Ohio). The review showed the additional listing of the rusty patched bumble bee (*Bombus affinis*) has occurred in 13 states, including Ohio and West Virginia, since the completion of the last supplement (USDA 2017b). Based on a review of the activities previously conducted and those methods currently available, WS determined that activities conducted under Alterative 2, as supplemented in this document, would have no effect on the rusty patched bumble bee.

Although no T&E species were specifically tested for safety of ONRAB baits, safety studies involving ONRAB on other species representing 11 unique taxonomic families [see EA Section 4.12 (USDA 2012)] indicate that no T&E species will be affected by the baits (Knowles et al. 2009, Randrianarison-Jewtoukoff and Perricaudet 1995, Artemis 2010).

APHIS-WS has determined that the proposed geographic expansion of ONRAB field trials will not result in adverse effects to nontarget species, including T&E species, in the additional counties in Ohio (Belmont and Monroe) and West Virginia (Brooke, Hancock, Marshall, and Ohio) where the trial are conducted. Further, the proposed program could have an indirect beneficial effect by reducing the chances that nontarget and T&E species are exposed to the rabies virus in the wild.

Additionally, monitoring and surveillance activities in these areas will not differ or increase in intensity from those analyzed in the EA, as supplemented (USDA 2012, 2013, 2015, 2017b), therefore effects on nontarget species will remain within the impact parameters established in the EA and Supplements.

Issue 3 – Potential for adverse effects on people, pets, and livestock that are exposed to or consume the vaccine laden baits.

As described in the EA, the 2013 supplement to the EA, the 2015 supplement to the EA, and the 2017 supplement to the EA, the recombinant virus used as the ONRAB vaccine-bait cannot cause rabies. This is because the ONRAB 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 be required for the disease to occur. Implementation of ORV programs would reduce the risk of human exposure to rabies by reducing the chance of encountering rabid animals that have been infected by rabid raccoons, striped skunks, foxes, or coyotes.

Over 150 million doses of ORV utilizing V-RG have been distributed in the U.S. since the early 1990s. Human contact with V-RG has been rare, with only two reported human *Vaccinia* infections having occurred from vaccine exposure. However, ONRAB is an alternative that may have a different human safety profile than V-RG given the high prevalence of antibodies in humans to adenovirus type 5 as well as the generally mild illness that may result from infection with this virus (CDC 2013). The ONRAB vaccine employs a human adenovirus type 5 vector into which has been inserted a glycoprotein gene from the ERA rabies vaccine virus. While this live human adenovirus-vectored rabies vaccine virus could cause infection in humans accidentally breaking open the bait packages, if the person is not already immune (CFIA 2008, 2010), adenovirus infections are ubiquitous and are normally without significant or severe clinical symptoms. Adenoviruses are distributed worldwide and infections with human adenovirus type 5 do not typically result in serious disease (Rowe et al. 1995, Andiman and Miller 1982, Charlton et al. 1992, Russell 1998 *in* Rosatte et al. 2009).

It is unlikely that there will be any significant increase in the number of humans who may be exposed to ONRAB vaccine-baits due to the proposed changes to the field trial as described in this supplement. While the total number of counties where ONRAB could be applied will increase the total area of the proposed zone and the proposed numbers of vaccine baits to be distributed is not expected to vary greatly from the previous years (Table 2).

Table 2. Proposed 2018 and Actual 2017 ONRAB Bait Distribution

State	Year[2]	Baits	Area (km^2)
WV	2017	391,800	7,247.27
	2018	684,000	9,362.23
OH	2017	663,700	8,522.85
	2018	709,200	10,915.38
NY	2017	1,155,614	14,502.33
	2018	1,227,916	12,182.1
VT	2017	664,172	9,595.70
	2018	589,052	11,074.46
NH	2017	30,983	638.74
	2018	25,787	662.56

Bait exposures[2] to ONRAB baits have remained relatively low, as discussed in Section 4.1.3 of the EA

[2] 2018 numbers are estimates at the time this document is published and minor changes may occur prior to program implementation based on program needs and priorities.

(USDA 2012) and since the completion of the EA (Tables 3 and 4).

Table 3. Reported Number of Human Contacts with Oral Rabies Vaccine Baits, By Year (CDC 2016, 2018, USDA unpublished data)

	Year[3]	# Human Contacts	# Baits Found	# Potential Human Exposures to Vaccine	Bait Type Found
NH	**2013**	1	2	1	2 ONRAB
	2014	1	2	1	2 ONRAB
	2017	NR	NR	NR	NR
NY	**2013**	15	15	0	NR
	2014	NR	NR	NR	NR
	2017	5	18	2	1 V-RG, 15 ONRAB, 1 Unk
OH	**2013**	17	48	10	6 ONRAB; 11 V-RG
	2014	9	41	9	7 ONRAB; 34 V-RG
	2017	19	33	10	14 V-RG, 13 ONRAB, 6 Unk
VT	**2013**	2	6	2	6 ONRAB
	2014	1	6	1	6 ONRAB
	2017	18	39	1	1 V-RG, 38 ONRAB
WV	**2013**	6	35	6	35 V-RG
	2014	1	22	1	22 V-RG
	2017	NR	NR	NR	NR

Table 4. Number of Human-Bait Contacts per 100,000 Baits Distributed

	Year	# Baits Distributed	# Human Contacts/100,000 Baits Distributed
NH	**2013**	38,181	3
	2014	34,519	3
	2017	30,983	NR
NY	**2013**	831,863	2
	2014	921,286	NR
	2017	1,388,201	0.4
OH	**2013**	780,805	2
	2014	732,119	1
	2017	1,188,527	2
VT	**2013**	450,534	0.4
	2014	449,814	0.2
	2017	664,172	3
WV	**2013**	1,153,017	0.2
	2014	1,527,453	0.1
	2017	1,509,974	NR

Section 4.1.3.1 of the EA (USDA 2012) concluded that ONRAB field trials would have only a negligible risk of adversely affecting pets or other domestic animals that are exposed to or consume the vaccine

[3] At the time of this report ORV contact data for 2015-2016 are pending from the CDC.

laden bait. Pet exposures following ONRAB distribution in Ohio and West Virginia have remained low during the field trial (Table 5). Similar to V-RG, any reports of adverse reactions in pets have been limited to vomiting and/or diarrhea.

Table 5. Domestic Animal ORV Bait Contacts by Year (CDC 2016, 2018, USDA unpublished data).

	Year	# Pet-Bait Contacts	# Baits Distributed
NH	**2013**	2	38,181
	2014	1	34,519
	2017	NR	30,983
NY	**2013**	3	831,863
	2014	NR	921,286
	2017	5	1,388,201
OH	**2013**	26	780,805
	2014	17	732,119
	2017	NR	1,188,527
VT	**2013**	1	450,534
	2014	3	449,814
	2017	15	664,172
WV	**2013**	9	1,153,017
	2014	8	1,527,453
	2017	NR	1,509,974

Issue 4 - Potential for ONRAB to "revert to virulence" or recombine with other viruses and result in a virus that could cause disease in humans.

The concern is whether the ONRAB recombinant virus vaccine 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 vaccine, followed by the transmission and whether the ONRAB might come into contact with other viruses within infected cells of animals, exchange genetic material with them during replication, and result in new viruses that could cause more serious diseases in humans or animals.

As stated and analyzed in the EA (USDA 2012), ONRAB is highly genetically stable and has not shown evidence of substantial mutation during passage studies (Lutz-Wallace et al. 1995a, 1995b). Additionally, as discussed in section 4.1.4 of the EA (USDA 2012), recombination of the ONRAB vaccine is highly unlikely. However, if it were to occur, it is equally unlikely that the result would yield a viable, transmissible virus (CDC 2011). APHIS-WS believes this issue was adequately addressed in the EA and the effects of this issue will remain unchanged under the proposed program.

Issue 5 – Potential for aerially dropped baits to strike and injure people or domestic animals.

As discussed in section 4.1.5 of the EA (USDA 2012), under the proposed program baits will be distributed at common densities of 75 baits/km2 (194 baits/mi2) or 150 baits/km2 (388 baits/mi2). These densities are sparse enough to predict that the chance of a person being struck and harmed by falling bait is remote. The negligible risk of being struck is further supported by the fact that out of more than 150 million baits distributed in the U.S. by APHIS-WS during other ORV programs between 1995 and 2014, only 11 incidents have been reported in which a person claimed to have been struck by a falling bait (0.000007% chance of being struck by a bait or 1 strike per 13.6 million baits dropped) (USDA

unpublished). None of the reports since APHIS-WS' ORV program inception have resulted in injury or harm to the individuals involved.

None of the reports since APHIS-WS' ORV program inception have resulted in injury or harm to the individuals involved. In addition, trained aircrews avoid baiting in cities, towns, and other areas with human dwellings, or if humans are observed below. In areas with higher human density, ground placement of baits is normally used. These techniques used by APHIS-WS' current ORV programs would also be employed during the ONRAB field trials.

Issue 6 – Humaneness of methods used to collect wild animal species critical for timely program evaluation.

As discussed in the EA (USDA 2012), the 2013 supplement to the EA, the 2015 supplement to the EA, and the 2017 supplement to the EA humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal. People may perceive the humaneness of an action differently. The challenge in coping with this issue is how to achieve the least amount of animal suffering within the constraints imposed by current technology.

Some individuals believe any use of lethal methods to resolve damage associated with wildlife is inhumane because the resulting fate is the death of the animal. Others believe that specific types of methods can lead to a humane death. Others believe most non-lethal methods of capturing wildlife to be humane because the animal is generally unharmed and alive. Still others believe that any disruption in the behavior of wildlife is inhumane. With the varied attitudes on the meaning of humaneness, the analyses must consider the most effective way to address damage and threats caused by wildlife in a humane manner. The goal of WS is to use methods as humanely as possible to effectively resolve requests for assistance to reduce damage and threats to human safety. WS continues to evaluate methods and activities to minimize the potential for pain and suffering of wildlife when attempting to resolve requests for assistance. As mentioned previously, some methods have been stereotyped as "humane" or "inhumane". However, many "humane" methods can be inhumane if not used appropriately. For instance, a cage trap is generally considered by most members of the public as "humane". Yet, without proper care, live-captured wildlife in a cage trap can be treated inhumanely if not attended to appropriately.

If target animals were to be live-captured by WS, personnel would check capture devices in accordance with State laws and regulations to ensure personnel addressed animals captured in a timely manner and to prevent injury. Although stress could occur from being restrained, timely attention to live-captured animals would alleviate suffering; therefore, stress would likely be temporary. When personnel employ live-capture methods and translocation was not appropriate or available, WS would euthanize target animals live-captured pursuant to WS Directive 2.505. WS' use of lethal control methods when implementing Alternative 1 would follow WS' directives (see WS Directive 2.430, WS Directive 2.505).

Therefore, WS' mission is to effectively address requests for assistance using methods in the most humane way possible that minimize the stress and pain of the animal. WS' personnel are experienced and professional in their use of management methods, and methods are applied as humanely as possible.

Since those methods described in the EA (USDA 2012) would continue to be available under the proposed supplement to the EA, the issue of humaneness would be similar with regard to the changes proposed in this supplement. Those methods considered inhumane by certain segments of society would

be considered inhumane in spite of the frequency of use. Further, any increase in the use of methods would be exceedingly minimal as APHIS-WS currently conducts operational ORV programs in the area of the proposed field trial and would likely continue to do so even in the absence of field trials.

Therefore, the analyses of the humaneness of methods used by WS to conduct ORV field trials in the interest of eliminating rabies in wildlife has not changed from those analyzed in the EA (USDA 2012).

XIV. CUMMULATIVE IMPACTS

Cumulative impacts, as defined by CEQ (40 CFR 1508.7), are impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

No significant cumulative environmental impacts have resulted from implementation of APHIS-WS' ORV program, including ONRAB field trials. It is possible that Alternative 1 (Maintain the Status Quo) and Alternative 3 (No ORV Field Trials, as analyzed in the EA (USDA 2012), might indirectly lead to increased human exposures and domestic and wild animal rabies cases across the U.S. As discussed in Chapter 4 of the EA (USDA 2012) and this supplement, APHIS-WS and cooperating state and local agencies expect to continue to live-trap or humanely kill less than one percent of the lowest estimated number of the target species combined for monitoring and surveillance purposes or implementation of contingency plans involving lethal population reduction in all of APHIS-WS' ORV programs, including the ONRAB field trial.

Additionally, as discussed in Chapter 4 of the EA, the potential for adverse effects resulting from the recombination of ONRAB with other adenoviruses is negligible. It is unlikely that an exchange of genetic material with wild-type viruses would occur in the field. Even if it did occur, the event would not be expected to generate a more virulent virus than the already present wild-type virus (USDA 2011a). Broadening the distribution of ONRAB, or increasing the baiting density, will not alter this potential.

XV. SUMMARY

Impacts associated with activities under consideration here are not expected to be "significant". Although some persons will likely remain opposed to the use of recombinant vaccines or the use of human adenovirus type 5 as a component of ORV, and some will remain opposed to the lethal removal of raccoons, skunks, and other wild animals for monitoring, surveillance and to evaluate program progress and success, the analysis in APHIS-WS' ORV EAs (USDA 2010, 2012, 2013, 2015, 2017b) and this supplement indicate that ORV and lethal removal for critical sampling and surveillance will not result in significant risk of cumulative adverse impacts on the quality of the human environment. Risks to nontarget species from the proposed program are very low and unlikely to contribute to existing impacts on nontarget species. However, containment and eventual elimination of the rabies virus would have beneficial impacts to both target and nontarget wildlife species susceptible to the rabies virus. Risks to public safety are low.

The addition of those impacts to others associated with past, present, and reasonably foreseeable future actions, as described in USDA (2010), USDA (2012), USDA (2013), USDA (2015), and USDA (2017b), will not result in cumulatively significant environmental impacts. Monitoring the impacts of the program on the populations of both target and nontarget species will continue. All ORV activities that may take

place will comply with relevant laws, regulations, policies, orders, procedures including the Virus-Serum-Toxin Act; Federal Food, Drug, and Cosmetic Act; and the Animal Medicinal Drug Use Clarification Act of 1994. Table 4.2 of the EA (USDA 2012) presents a summary of relative comparisons of the anticipated impacts of each of the alternatives as they relate to each of the major issues identified in Chapter 2 of the EA.

XVI. ACRONYMS

AdRG1.3	Human Adenovirus Type-5 Rabies Glycoprotein Recombinant Vaccine
APHIS	Animal and Plant Health Inspection Service
CDC	Centers for Disease Control and Prevention
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DPI	Days Post-Innoculation
EA	Environmental Assessment
EIS	Environmental Impact Statement
FONSI	Finding of No Significant Impact
FR	Federal Register
ORV	Oral Rabies Vaccination
NEPA	National Environmental Policy Act
NFS	National Forest System
NPS	National Park Service
NRMP	National Rabies Management Program
RVNA	Rabies Virus Neutralizing Antibodies
SCID	Severed Combined Immunodeficient
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
TVR	Trap Vaccinate Release
USDA	United States Department of Agriculture
USFS	United States Forest Services
WS	Wildlife Services
V-RG	Vaccinia-Rabies Glycoprotien
USFWS	United States Fish and Wildlife Service

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APPENDIX A

SPECIES LISTED AS THREATENED OR ENDANGERED UNDER THE ENDANGERED SPECIES ACT

Information obtained from https://ecos.fws.gov/ipac/location/index on April 2018. Listed species based on historic range and population data. There may be other federally listed species that are not currently known or expected to occur in these states but are covered by the ESA wherever they are found; thus if new surveys detect them in these states they are still covered by the ESA.

New Hampshire

Animals – 7

Status	**Listing**
T	Canada lynx (*Lynx canadensis*)
T	Northern long-eared bat (*Myotus septentrionalis*)
T	Piping plover (*Charadrius melodus*)
T	Red knot (*Calidris canutus rufa*)
E	Roseate tern (*Sterna dougallii dougallii*)
E	Dwarf wedgemussel (*Alasmidonta heterodon*)
E	Karner blue butterfly (*Lycaeides melissa samuelis*)

Plants – 3

Status	**Listing**
E	Jesup's milk-vetch (*Astragalus robbinsil var. jesupi*)
E	Northeastern bulrush (*Scirpus ancistrochaetus*)
T	Small whorled pogonia (*Isotria medeoloides*)

New York

Animals – 13

Status	Listing
E	Indiana bat (*Mytois sodalist)*
T	Northern long-eared bat (*Myotis septentrioalis*)
E	Piping plover, Great Lakes watershed (*Charadrius melodus)*
T	Piping plover, except Great Lakes watershed (*Charadrius melodus)*
T	Red knot (*Calidris canutus rufua*)
E	Roseate tern (*Sterna dougallii dougallii*)
T	Bog turtle (*Clemmys muhlenbergii*)
T	Eastern massasauga (*Sistrurus catenatus*)
E	Clushell (*Pleurobema clava*)
E	Dwarf wedgemussel (*Alasmidonta heterodon*)
E	Rayed bean (*Villosa fabalis*)
T	Chittenango ovate amber snail (*Succinea chittenangoensis*)
E	Karner blue butterfly (*Lycaeides melissa samuelis*)

Plants – 8

Status	Listing
T	Houghton's goldenrod (*Solidago houghtonii*)
T	Leedy's roseroot (*Rhodiola integrifolia ssp. leedyi*)
E	Northern bulrush (*Scirpus ancistrochaetus*)
T	Northern wild monkshood (*Aconitum noveboracense*)
E	Sanplain gerardia (*Agalinis acuta*)
T	Seabeach amaranth (*Amaranthus pumilus*)
T	Small whorled pagonia (*Isotria medeoloides*)
T	American hart's-tongue fern (*Aslenium scolopendrium var. americanum*)

Ohio

Animals – 22

Status	Listing
E	Indiana Bat (*Myotis sodalis*)
T	Northern long-eared bat (*Myotis septentrionalis*)
E	Kirtland's warbler (*Setophaga kirtlandii* (*=Dendroica kirtlandii)*
E	Piping plover (*Charadrius melodus*)
T	Red knot (*Calidris canutus rufa*)
T	Copperbelly water snake (*Nerodia erythrogaster neglecta*)
T	Eastern massasauga (*Sistrurus catenatus*)
E	Scioto madtom (Nodturus trautmani)
E	Clubshell (*Pleurobema clava*)
E	Fanshell (*Cyprogenia stegaria*)
E	Northern riffleshell (*Epioblasma torulosa rangiana*)
E	Pink mucket (*Lampsilis abrupta*)

E	Purple cat's paw (*Epioblasma obliquata obliquata*)
T	Rabbitsfoot (*Quadrula cylindrica cylindrica*)
E	Rayed bean (*Villosa fabalis*)
E	Sheepnose mussel (*Plethobasus cyphyus*)
E	Snuffbox mussel (*Epioblasma triquetra*)
E	White catspaw (*Epioblasma obliquata perobliqua*)
E	American burying beetle (*Nicrophorus americanus*)
E	Karner blue butterfly (*Lycaeides melissa samuelis)*
E	Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*)
E	Rusty patched bumblebee (*Bombus affinis)*

Plants – 6

Status	**Listing**
T	Eastern fringed prairie orchid (*Plantanthera leucophaea*)
T	Lakeside daisy (*Hymenoxys herbacea*)
T	Northern wild monkshood (*Aconitum noveboracense*)
E	Running buffalo clover (*Trifolium stoloniferum*)
T	Small whorled pagonia (*Isotria medeoloides*)
T	Virginia spiraea (*Spiraea virginiana*)

Vermont

Animals – 4

Status	**Listing**
T	Canada lynx (*Lynx canadensis*)
E	Indiana bat (*Myotis sodalis*)
T	Northern long-eared bat (*Myotis septentrionalis*)
E	Dwarf wedgemussel (*Alasmidonta heterodon*)

Plants – 2

Status	**Listing**
E	Jesup's milk vetch (*Astralagalus robbinsiii var. jesupi*)
E	Northern bulrush (*Scirpus ancistrochaetus*)

West Virginia

Animals – 22

Status	**Listing**
E	Gray bat (*Myotis grisescens*)
E	Indiana bat (*Myotis sodalis*)
T	Norther long-eared bat (*Myotis septentrionalis*)
E	Virginia big-eared bat (*Corynorhinus* (*=Plectus*) *townsendii virginianus*)
T	Cheat Mountain salamander (*Plethodon nettingi*)

PT	Candy darter (*Etheostoma osburni*)
E	Diamond darter (*Crystallaria cincotta*)
E	Clubshell (*Pleurobema clava*)
E	Fanshell (*Cyprogenia stegaria*)
E	James spineymussel (*Pleurobema collina*)
E	Northern riffleshell (*Epioblasma torulosa rangiana*)
E	Pink Mucket (*Lampsilis abrupta*)
E	Rayed bean (*Villosa fabalis*)
E	Sheepnose mussel (*Plethobasus cyphyus*)
E	Snuffbox mussel (*Epioblasma triquetra*)
E	Spectaclecase (*Cumberlandia monodonta*)
E	Tubercled blossom (*Epioblasma torulosa torulosa*)
T	Flat-spired three-toothed snail (*Triodopsis platysayoides*)
E	Rusty patched bumble bee (*Bombus affinis*)
T	Big Sandy crayfish (*Cambarus callainus*)
E	Guyandotte River crayfish (*Cambarus veteranus*)
T	Madison cave isopod (*Antrolana lira*)

Plants – 6

Status	**Listing**
E	Harperella (*Ptilimnium nodosum*)
E	Northern bulrush (*Scirpus ancistrochaetus*)
E	Running buffalo clover (*Trifolium stoloniferum*)
E	Shale barren rock cress (*Arabis serotine*)
T	Small whorled pagonia (*Isotria medeoloides*)
T	Virginia spiraea (*Spiraea virginiana*)

E = Endangered, T = Threatened, PT = Proposed Threatened

APPENDIX B
SUMMARY OF SPECIES LISTED AS THREATENED, ENDANGERED, OR SPECIAL STATUS UNDER STATE LAW IN STATES PROPOSED FOR APHIS-WS INVOLVEMENT IN CONTINUED OR EXPANDED ONRAB FIELD TRIALS

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/offices/statelinks.html on April 2018.							
State	**Mammals**	**Birds**	**Reptiles**	**Amphibians**	**Fish**	**Invertebrates**	**Plants**
New Hampshire[a,g]	7E Canada lynx, New England cottontail	7E, 10T	2E, 2T	1E, 1T	2E, 3T	9E, 5T	317E, 80T
New York [b,h]	10E, 2T Canada lynx,	10E, 10T	7E, 5T	2E	8E, 11E	16E, 8T	332E, 152T,
Ohio[c,i]	3E, 2T American black bear, Allegheny woodrat	12E, 6T	5E, 4T	5E, 1T	22E, 11T	74E, 29T	253E, 162T,
Vermont[d,]	7E, 1T Canada lynx, Eastern mountain lion, American marten	10E, 3T	3E, 3T	2E	4E, 2T	10E, 7T	24E, 64T
West Virginia[e]	8S1, 16S2, 9S3 West Virginia Northern flying squirrel, Allegheny woodrat, Eastern spotted skunk	15S1, 15S2, 10S3	6S1, 6S2, 3S3	5S1, 9S2, 4S3	36S1, 20S2, 10S3	192S1, 112S2, 84S3	248S1,150 S2, 43S3

E=State Endangered; T=State Threatened; SC=Species of Concern; SI=Species of Interest; R=Rare; P=Potentially Threatened; S1, S2, and S3= designations for levels of concern.

[a] http://www.wildlife.state.nh.us/nongame/endangered-list.html
[b] http://www.dec.ny.gov/animals/7494.html
[c] http://wildlife.ohiodnr.gov/portals/wildlife/pdfs/publications/information/pub356.pdf
[d] http://www.vtfishandwildlife.com/threatenedspecies.html
[e] http://www.wvdnr.gov/Wildlife/PDFFiles/RTE_Animals.pdf

[f] http://www.vtfishandwildlife.com/common/pages/DisplayFile.aspx?itemId=229829
[g] https://www.nhdfl.org/DRED/media/Documents/TrackingList-PlantGeneral.pdf
[h] http://www.dec.ny.gov/docs/wildlife_pdf/2017rareplantlists.pdf
[i] http://wildlife.ohiodnr.gov/species-and-habitats/state-listed-species/state-listed-species-by-county#plants

APPENDIX C
REGIONAL FORESTER SENSITIVE SPECIES
For the
MONONGAHELA NATIONAL FOREST
(USDA2013b)

Federally Listed Species

Gray wolf	*Canis lupus*	Considered Extirpated
Eastern cougar	*Puma concolor couguar*	Considered Extirpated
Virginia big-eared bat	*Corynorlinus townsendii virginianus*	Endangered
Indiana bat	*Myotis sodalist*	Endangered
Cheat Mountain salamander	*Plethodon netting*	Threatened

Regional Forester Sensitive Species

Mammals

WV Northern flying squirrel	*Glaucomys sabrinus fuscus*
Southern rock vole	*Microtus chrotorrhinus carolinensis*
Eastern small-footed bat	*Myotis leibii*
Little brown myotis	*Myotis lucifugus*
Northern myotis	*Myotis septentrionalis*
Allegheny woodrat	*Neotoma magister*
Tri-colored bat	*Perimyotis subflavus*
Long-tailed or rock shrew	*Sorex dispar*
Southern water shrew	*Sorex palustris punctulatus*

Eastern spotted skunk	*Spilogale putoris*
Southern bog lemming	*Synaptomys cooperi*

Birds

Northern goshawk	*Accipiter gentilis*
Henslow's sparrow	*Ammodramus henslowii*
Long-eared owl	*Asio otus*
Olive-sided flycatcher	*Contopus cooperi*
American Peregrine falcon	*Flaco peregrines anatum*
Bald eagle	*Haliaeetus leucocephalus*
Migrant loggerhead shrike	*Lanius ludovicianus migrans*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Vesper sparrow	*Pooecetes gramineus*
Golden-winged warbler	*Vermivora chrysoptera*

Reptiles and Amphibians

Wood turtle	*Glyptemys insculpta*
Timber rattlesnake	*Crotalus horridus*
Green salamander	*Aneides aeneus*
Eastern hellbender	*Cryptobrachus alleghaniensis*
Mud salamander	*Pseudotriton montanus*

Fish and Mollusks

Redside dace	*Clinostomus elongatus*
Candy darter	*Etheostoma osburni*
Pearl dace	*Margariscus margarita*
New River shiner	*Notropis scabriceps*
Cheat minnow	*Pararhinichthys bowersi*
Appalachia darter	*Percina gymnocephala*
Kanawha minnow	*Phenacobious teretulus*
Elktoe	*Alasmindonta marginata*
Green floater	*Lasmigona subviridis*
Organ cavesnail	*Fontigens tartarea*

Insects and Invertebrates

Boreal fan moth	*Brachionycha borealis*
Northern metalmark	*Calephelis borealis*
Appalachian tiger beetle	*Cicindela ancocisconensis*
Northern Barrens tiger beetle	*Cicindela patruela*
Cow path tiger beetle	*Cicindela purpurea*
Early hairstreak	*Erora laeta*
Columbine duskywing	*Erynnis lucillius*
A geometrid moth	*Euchlaena milnei*
Rapids clubtail	*Gomphus quadricolor*
Green-faced clubtail	*Gomphus viridifrons*
A noctuid moth	*Hadena ectypa*
Cobweb skipper	*Hesperia metea*

Bronze Copper	*Lycaena hyllus*
West Virginia white	*Pieris virginiensis*
A cave beetle	*Pseudanophthalmus fuscus*
Timber Ridge cave beetle	*Pseudanophthalmus hadenoecus*
A cave beetle	*Pseudanophthalmus hypertrichosis*
Dry Fork valley cave beetle	*Pseudanophthalmus montanus*
Gandy Creek cave springtail	*Pseudosinella certa*
A springtail	*Pseudosinella gisini*
Southern grizzled skipper	*Pyrgus wyandot*
A springtail	*Sinella agna*
Diana fritillary	*Speyeria Diana*
Dry Fork Valley cave pseudoscorpion	*Apochthonius paucispinosus*
Cheat Valley cave isopod	*Caecidotea cannula*
Greenbrier Valley cave isopod	*Caecidotea holsingeri*
An isopod	*Caecidotea simonini*
An isopod	*Caecidotea sinuncus*
Elk River crayfish	*Cambarus elkensis*
An underground crayfish	*Cambarus nerterius*
Culver's cave isopod	*Stygobromus culveri*
Greenbrier cave amphipod	*Stygobromus emarginatus*
Pocahontas cave amphipod	*Stygobromus nanus*
Minute cave amphipod	*Stygobromus parvus*
Hoffmaster's cave flatworm	*Macrocotyla hoffmasteri*
A cave obligate planarian	*Phagocata angusta*
Greenbrier Valley cave millipede	*Pseudotremia fulgida*
Germany Valley cave millipede	*Pseudotremia lusciosa*
South Branch Valley cave millipede	*Pseudotremia princeps*
Culver's planarium	*Sphalloplana culveri*
Grand Caverns blind cave millipede	*Trichopetalum weyeriensis*
Luray Caverns blind cave millipede	*Trichopetalum whitei*
WV blind cave millipede	*Trichopetalum krekeleri*