National Park Service
U.S. Department of the Interior

Animal and Plant Health Inspection Service
U.S. Department of Agriculture

Texas Department of State Health Services

Palo Alto Battlefield National Historic Site, Brownsville, Texas

Oral Rabies Vaccination Program Environmental Assessment /Assessment of Effect

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Environmental Assessment
Assessment of Effect

Oral Rabies Vaccination Program
Palo Alto Battlefield National Historic Site
Brownsville, Texas

Summary

This Environmental Assessment (EA) documents the analysis of the potential environmental effects of a proposal to involve the U.S. Department of Interior (USDI), National Park Service (NPS) in an oral rabies vaccination (ORVAC) program at Palo Alto Battlefield National Historic Site (Palo Alto) in south Texas. The program would involve the distribution of ORVAC baits to create zones of vaccinated target species that would then serve as barriers to further cease the advancement of the canine rabies virus variant. The proposed ORVAC program would reduce the possibility of humans and animals becoming infected with the canine variant of the rabies virus and would support the state of Texas in its effort of reducing or eliminating this strain of the virus from south Texas. Currently, cooperative rabies vaccination programs are already being conducted on various land classes in Texas in addition to numerous other states in the U.S. By participating, the NPS would aid in enhancing the effectiveness of the national program. No cumulative impacts are anticipated from the distribution of ORVAC into the environment.

Public Comment

If you wish to comment on the environmental assessment, you may mail comments to the name and address below or post comments online at http://parkplanning.nps.gov/paal. This environmental assessment will be on public review for 30 days.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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EXECUTIVE SUMMARY

This Environmental Assessment (EA) documents the analysis of the potential environmental effects of a proposal to involve the U.S. Department of Interior (USDI), National Park Service (NPS) in an oral rabies vaccination (ORVAC) program at Palo Alto Battlefield National Historic Site (Palo Alto), located near Brownsville, Texas and part of the NPS Intermountain Region. The EA analyzes a number of environmental issues or concerns with the oral rabies vaccine and activities associated with the program.

Along with 25 other states, the state of Texas is involved in a national ORVAC program to stop the spread of specific variants or "strains" of the rabies virus and reduce or eliminate certain variants of the virus from the United States. If not stopped, these rabies virus variants could potentially spread to much broader areas of the U.S. and cause substantial increases in public and domestic animal health costs as a result of increased rabies exposures. The proposed action would be conducted in cooperation with the Texas Department of State Health Services (TDSHS); U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Wildlife Services (APHIS-WS); and/or other agencies with jurisdiction over vaccine use and application in wildlife and domestic animal species. In south Texas, the program would involve the distribution of ORVAC baits along the U.S. – Mexico border to create zones of vaccinated target species that would then serve as barriers to further cease the advancement of the canine rabies virus variant. The action would involve the use of APHIS-WS federal funds to assist with the distribution of ORVAC baits.

The proposed ORVAC program would reduce the possibility of humans and animals becoming infected with the canine variant of the rabies virus and would support the state of Texas in its effort of stopping the spread of this variant of the rabies virus and reducing or eliminating this variant of the virus from the U.S. Currently, cooperative rabies vaccination programs are already being conducted on various land classes in Texas in addition to numerous other states in the U.S. By participating, the NPS would aid in enhancing the effectiveness of the national program. If baiting programs were conducted around large land masses such as national parks, reservoirs of the virus would likely persist, potentially making the program less effective at stopping the forward advance or eliminating the canine variant of the rabies virus. No cumulative impacts are anticipated from the distribution of ORVAC into the environment. The ORVAC vaccine and bait that would be used has been found safe for use on coyotes and other animal species, has a negligible risk of causing adverse affects to humans, is readily consumed by target animal species, and does not cause bioaccumulation in the environment. A limited number of baits would be distributed one time per year, thereby minimizing the potential for persons to be exposed to an ORVAC bait or to bait distributing equipment.

Table of Contents

1.0 CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

1.1 BACKGROUND

1.1.1 Introduction

Rabies is an acute, fatal viral disease of mammals most often transmitted through the bite of a rabid animal (CDC 2007a). The earliest records suggest rabies was present in dogs about 2300 B.C., but the disease probably evolved before recorded history. Despite its long coexistence with humans, rabies is a public and animal health problem that annually results in 50,000 to 70,000 human deaths a year worldwide. Up until 1960, most cases of rabies in the United States were reported in dogs. However, the combination of public education and vaccination programs for companion dogs has controlled rabies in dogs. 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 (Blanton et al. 2006). These species include but are not limited to raccoons (*Procyon lotor*), coyotes (*Canis latrans*), skunks (primarily *Mephitis mephitis*), gray foxes (*Urocyon cinereoargenteus*), 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 (Blanton et al. 2006).

The vast majority of rabies cases reported to the Centers for Disease Control and Prevention (CDC) each year occur in raccoons, skunks, and bats (Order *Chiroptera*). Foxes account for approximately 6 percent of the reported rabies cases, with domestic cats, cattle, and dogs among those most often reported (Blanton et al. 2006). Two canine rabies epidemics 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 epidemic alone has resulted in two human deaths and caused over 3,000 people to receive postexposure rabies treatment (TDSHS 2007a).

1.1.2 Public Health Importance of Rabies

Over the last 100 years, rabies in the U.S. has changed dramatically. Greater than 90 percent of all animal cases reported annually to CDC now occur in wildlife (Blanton et al. 2006, CDC 2007a). 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 100 percent successful in preventing mortality when administered promptly and properly (CDC 2007a). 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.

Although human rabies deaths are rare, the estimated public health costs associated with disease detection, prevention, and control have risen, and are estimated to exceed $300 million annually (CDC 2007a). 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 2007a). In addition, each year tens of thousands of people are impacted by anxiety, fear, and trauma associated with potential or actual rabies exposure to themselves and their domestic animals. Exclusion, proper storage and disposal of garbage, and removal of

problem animals are often effective alternatives to address wildlife rabies threats at specific sites; however, oral rabies vaccination (ORVAC) is the only currently available technique that shows promise for wildlife rabies control on a broad geographic and species scale (Slate et al. 2002).

In the 1990s, it was reported that between 16,000 and 39,000 persons received PEP annually in the U.S. (Krebs et al. 1998, Shwiff et al. *in press*). When rabies becomes epidemic or prevalent in a region, the number of PEPs in that area increases. Costs of PEP have been reported to range between $700 and $5,000 (Chang et al. 2002, Uhaa et al. 1988, Kreindel et al. 1988, Shwiff et al. *in press*); however, the price differs regionally due to the cost of living and increases regularly with inflation as do other medical services. Shwiff et al. (*in press*) found that the mean total cost of a suspected human rabies exposure was $3,688. Of the total, direct costs (e.g. the provision and administration of PEP) per case were $2,564 and indirect costs (e.g., lost wages and transportation) were $1,124. In another study, Melter (1996) also reported costs to be as high as $3,000 or more (Meltzer 1996). In Massachusetts, between 1991-1995, the median cost for PEP was $2,376 per person (CDC 2007b). Also, as epidemics 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 2007b). The total cost of this single incident exceeded $160,000 based on the median cost for PEPs in that state. 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).

1.1.3 Development of Oral Rabies Vaccines and Baits

Although the concept of ORVAC 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 implementation of ORVAC programs in several Western European countries using either attenuated rabies vaccines or the recombinant Raboral V-RG® have resulted in several European countries being designated free of rabies (Slate et al. 2002). In North America, the Province of Ontario, Canada expanded research during the mid-1970s to evaluate the prospect of using ORVAC to eliminate rabies that became established in red foxes in the southern part of the Province during the last 1950s. Since 1989, the Ontario Ministry of Natural Resources has aerially distributed about 12 million baits containing an attenuated rabies virus (ERA vaccine) that has reduced rabies in foxes by more than 97 percent (Slate et al. 2002).

The emergence of raccoon rabies in the U.S. during the 1970s heightened interest in the application of ORVAC 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 ORVAC programs in Europe and Canada, raccoons were not readily immunized by the oral route with the modified "live virus" vaccines that worked well in foxes (Rupprecht et al. 1988). Furthermore, 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).

As a consequence of field safety testing in the early 1990's, a vaccinia-rabies glycoprotein (V-RG) vaccine was conditionally U.S. Department of Agriculture (USDA) licensed for vaccination of free-ranging raccoons in 1995 and fully licensed in 1997 in the U.S. (Hanlon et al. 1999). It remains the only effective vaccine licensed for use in the U.S. and Canada for

raccoons (CDC 2007c). V-RG was also recently licensed by the USDA in 2002 for vaccination of coyotes in the U.S. and Canada (although it is only being used for raccoons in Canada, as canine rabies has not been found in coyotes in Canada). It has also been approved for experimental use by USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Center of Veterinary Biologics for vaccination of free-ranging wild gray foxes in Texas (CDC 2007a, Hanlon et al. 1999).

The V-RG vaccine has proven to be orally effective in raccoons, coyotes and foxes (USDA 2004a, Oertli et al. 2002, Blanton et al. 2006). This vaccine was extensively laboratory-tested for safety in more than 50 animal species with no adverse effects regardless of route or dose (Rupprecht et al. 1992a). In addition, a domestic animal's annual rabies vaccination can be safely administered even if it recently ingested a dose of oral rabies vaccine (Oertli et al. 2002).

The vaccinia-rabies glycoprotein vaccine used by the ORVAC program is commercially available from MERIAL, 115 Transtech Drive, Athens, GA 30601 under the registered name RABORAL V-RG® (Merial 2007). 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 non-infective 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 66.3 million doses 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 (USDA 2007b, Rupprecht et al. 2001).

A number of studies have been conducted to determine the best bait formulations and strategies for delivery of ORVAC vaccines to raccoons (Hanlon et al. 1989; Hable et al. 1992; Hadidian et al. 1989; Linhart et al. 1991, 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[2] 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). 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

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

though it did not have measurable antibodies at the time of the exposure (C. Hanlon, CDC, pers. comm. 2003).

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 baits are rectangular or square in shape with hollow centers. The sachet[1] containing the liquid vaccine is contained in the hollow center of the bait. "Coated" sachets (Figure 1-1) 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. 2002). Using the "coated" sachet may be equal in effectiveness at lower cost per vaccinated target wild animal. The bait blocks are marked with a warning label that includes a phone number to call for additional information.

Figure 1-1. A (Left): Fishmeal polymer and B (Right): coated sachet baits utilized during the National ORVAC program. (Photos used with permission from MERIAL Limited, Athens, Georgia, USA).

Cornell University recently conducted a study (USDA 2005) comparing the performance of the coated sachet to fishmeal polymer baits for delivering oral rabies vaccine in the wild. Results from this study, along with those from captive studies being conducted by the USDA, APHIS-Wildlife Services (APHIS-WS), National Wildlife Research Center (NWRC), are critical to decisions regarding the best available bait for delivering oral rabies vaccine to raccoons. Preliminary results, yet to be published by Cornell, suggest that the coated sachet performs at least as well as the fishmeal polymer bait and often exceeds its performance. The coated sachet's higher performance at a lower cost (approximately 20 percent less than fishmeal polymer baits) make the coated sachet a good bait option while other baits continue to be evaluated for safety and efficacy.

Fishmeal and dog food polymer baits 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). 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).

In field tests conducted in the U.S., the majority of ORVAC 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. 1998a, 1998b; Hable et al. 1992; Hadidian et al. 1989; Hanlon et al. 1989; 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 nontarget 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, 1995a). For example, at temperatures between 68 and 100 degrees Fahrenheit the liquid viral vaccine potency remains stable for approximately 14 and 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.

1.1.4 Development of ORVAC Programs in the United States

Oral wildlife vaccination for rabies control has been under field evaluation in the U.S. since 1990. At that time a limited field release of the recombinant vaccine occurred on Parramore Island, VA to evaluate the potential effects that V-RG baits may have on free-ranging raccoon populations (Hanlon et al. 1998). As a result of this field trial and subsequent trials elsewhere an effective V-RG has been developed to control species specific rabies variants to complement other methods of rabies prevention and control including public education, domestic animal vaccination, and human PEP. In 2004, APHIS-WS, in cooperation with the CDC, conducted small mammal vaccinia surveillance on Parramore Island, VA (results are pending). Because this is the site where vaccinia was first released into the wild in ORVAC 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 as indicators for the environmental presence of viruses, such as vaccinia. Samples will be collected and tested at CDC laboratories to determine the presence of vaccinia virus in small mammals collected at this site. Similar vaccinia surveillance (sampling and testing) of small mammals was also conducted in 2004 and 2005 at Plum Brook, OH (results are pending).

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 2005 contributed to 66.3 million ORVAC baits disbursed in the U.S (USDA 2007b). Currently, the national rabies management program has ORVAC zones in place along the U.S./Canada border in the northeast and south from Lake Erie along the Appalachian ridge into Alabama (Figure 1-2) to combat the raccoon strain of the rabies virus. Numerous projects have been conducted or are in progress in eastern U.S. states lying within the current ORVAC zones. Programs are simultaneously conducted in south Texas, along the U.S./Mexico border, targeting coyotes to combat the canine variant of the rabies virus and in west-central Texas to combat the gray fox variant of the rabies virus (USDA 2007b, 2007c). Section 1.1.5 discusses the Texas ORVAC program in greater detail.

Provided below are summaries of some of the current ORVAC programs being conducted in the eastern U.S.:

Maryland ORVAC Program

In Maryland, an average of 19 positive raccoon rabies cases were reported per year on the Annapolis Peninsula alone before the ORVAC program began in 1998. Since 1998, with the intervention of 310,201 fishmeal polymer baits, only 13 rabid raccoons have been reported from the Annapolis Peninsula, indicating the success of the Anne Arundel County ORVAC program (USDA 2007c).

New York ORVAC Program

The raccoon variant of the rabies virus reached New York in 1990 where it quickly spread and now is present throughout most of the state. In 1994, the New York State Department of Health (NYSDOH) began experimenting with the use of ORVAC in an enzootic area of the Capital Region and was able to demonstrate a decrease in the number of rabid raccoons. This research led to the use of ORVAC as a rabies control technique in New York State, where 4 distinct ORVAC programs exist today (USDA 2007c).

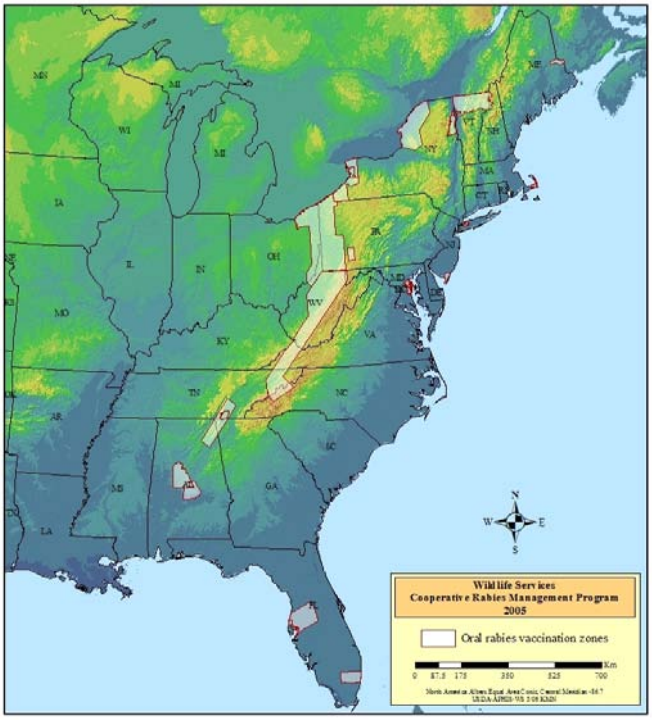

Figure 1-2. Oral rabies vaccination barrier zones in the eastern U.S. (USDA 2007c).

Champlain Valley - In 1995, after raccoon rabies made a sudden leap of 70 km (43.5 mi) from southern Essex County in the Adirondacks to mid-Clinton County, the NYSDOH initiated a point-source control plan involving the use of ORVAC baits. This was followed by the establishment of a Champlain Valley ORVAC zone to prevent further northward spread of raccoon rabies up the Lake Champlain valley into Quebec, Canada. In 1998, the Champlain Valley ORVAC zone was moved south into the enzootic area of Essex County following the successful elimination of raccoon rabies in Clinton County. The last documented case of raccoon variant rabies occurred in September 1997 (USDA 2007c).

St. Lawrence Region - In 1997, raccoon rabies was documented in St. Lawrence County and the following year an epizootic was identified in the county with 138 confirmed rabies cases in terrestrial wildlife (116 raccoons, 22 striped skunks). In 1998, a St. Lawrence ORVAC program was implemented by Cornell University, the Ontario Ministry of Natural Resources (OMNR), and APHIS-WS to prevent the northward spread of raccoon rabies in New York and ultimately into Ontario, Canada. Since 1998, the NYSDOH has documented a marked decline in terrestrial wildlife rabies cases in St. Lawrence County. In 2000, only 14 cases of rabies associated with the raccoon variant (7 raccoons, 6 skunks, 1 woodchuck) were reported in St. Lawrence County. Over the next 4 years, 6 cases of raccoon variant rabies (3 raccoons, 3 skunks) were confirmed in St. Lawrence County (USDA 2007c).

Nassau County - In August 2004, the NYSDOH confirmed raccoon variant rabies for the first time in Nassau County. By year's end, 10 rabid raccoons had been confirmed in the county. In response to this outbreak, an emergency rabies surveillance and control program was initiated by NYSDOH, APHIS-WS, and the Nassau County Department of Health. High raccoon densities in conjunction with an urban environment make implementing the Nassau County ORVAC program challenging. Bait distribution and surveillance trapping efforts are also hindered by high human populations, and in 2005, 35 cases of raccoon rabies variant were confirmed in Nassau County (USDA 2007c).

Western New York - In 1995, 138 rabid raccoons were confirmed in Niagara County. In response, and in an effort to prevent the westward spread of raccoon rabies into Ontario, the New York State Department of Agriculture and Markets (NYSDAM), Niagara County, and OMNR funded an ORVAC program. In 1996, baiting began in Chautauqua County to initially prevent the spread of raccoon rabies into Erie County, Pennsylvania. In following years, the rabies epizootic continued in Erie County, New York (a border county between Niagara and Chautauqua). In 2002, NYSDAM, OMNR, and APHIS-WS began baiting Buffalo, New York (Erie County) using helicopters and bait stations. This collective Western New York ORVAC zone has been tied to larger, national efforts to create an immune barrier from Maine to the Gulf of Mexico (USDA 2007c).

Vermont ORVAC Program

The raccoon variant of the rabies virus first entered Vermont in 1994 and quickly spread to all 14 counties in the state. Before the Vermont portion of the program was initiated in 1997, positive rabies cases were found 73 km (45.5 mi) south of the Quebec, Canada border. With an annual rate of spread of rabies at 56.3 km/year (35 mi/yr), positive raccoon strain rabies cases should have reached the Quebec, Canada border as early as 1999. Intervention with more than 2.5 million ORVAC baits over northern Vermont since 1997 has been instrumental in preventing raccoon rabies from spreading northward. The summer of 2005 marked the ninth year of WS cooperative participation in the Vermont ORVAC Program. Over those 9 years, the Vermont Department of Health has confirmed 604 cases of the raccoon variant of rabies in Vermont; only 18 (3.0%) of those cases occurred within the ORVAC zone (USDA 2007c).

Ohio ORVAC Program

In Ohio, 62 positive rabies cases were recorded prior to program implementation in 1997. In 1998, reported cases declined to 26. From 1999-2002, between zero and one case were reported in Ohio. In 2003, two cases were reported less than one mile west of the Pennsylvania border where raccoon rabies is still enzootic. 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. Thus, an ORVAC program was implemented in Pennsylvania in 2001 to address this issue (USDA 2007c).

During 2004, however, Ohio identified its first case of raccoon strain rabies in Lake County, located 10.6 km (6.6 mi) west of the existing ORVAC barrier. This outbreak was disconcerting as the Ohio barrier, up until this point, had been maintained and considered successful in nearly eliminating raccoon rabies from the state. The raccoon strain of the rabies virus quickly spread and cooperative surveillance efforts revealed 45 raccoons and one skunk positive for raccoon strain rabies within three counties (Geauga, Lake, and Cuyahoga) in Ohio. Prior to the 2004 ORVAC season, the Ohio program had prepared to move the existing 25-mile wide ORVAC barrier five miles east as the existing barrier had been maintained and considered successful in nearly eliminating raccoon strain rabies from the state. The only exceptions had been isolated cases of rabies occurring in "hot spots" less than one mile from the Ohio-Pennsylvania border. The western-most outbreak triggered a contingency action response, which encompassed a 2,471 km^2 (954 mi^2) area in 2004. In response to the case of raccoon strain rabies discovered in the contingency area, a large scale trap-vaccinate-release program was implemented in addition to the distribution of 98,565 ORVAC baits. This breach does not represent a failure of the national rabies management program; rather it reinforces the need for enhanced surveillance and public education about the translocation of wildlife. The rabies cases west of the ORVAC barrier, as well as those in "hot spot" areas near the Ohio-Pennsylvania border, are still a reminder that the continuation of ORVAC, supported by enhanced surveillance is necessary. This will allow WS to contain, reduce, and potentially eliminate the raccoon strain of the rabies virus in Ohio and throughout the Eastern U.S. (USDA 2007c).

West Virginia ORVAC Program

Raccoon variant rabies was first introduced into West Virginia in 1977 from raccoons translocated to Hardy County from the southern U.S. The virus then spread along the leeward side of the Appalachian Mountains into Pennsylvania, Maryland, and Virginia until it breached the Appalachian Mountain front and began spreading in the cardinal directions through West Virginia. In 2001, West Virginia became involved in the National ORVAC Program as a key state in establishing a national barrier to prevent the westward spread of raccoon rabies. By 2005, the West Virginia ORVAC bait zone covered 26, 021 km^2 (9,978 mi^2) and 7,194,337 ORVAC baits had been distributed since program inception in 2001. In 2005, 75 confirmed cases of rabies were reported in West Virginia, 34 of which were found in raccoons (USDA 2007c).

Massachusetts ORVAC Program

In Massachusetts, the rabies virus had not spread to Cape Cod 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. The canal served as the eastern anchor point for the ORVAC 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 Massachusetts Department of Public Health, and the Barnstable County Department of Health and the Environment. 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 ORVAC 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 other potential source of spread (USDA 2007c).

Tennessee ORVAC Program

In 2002, an ORVAC program was initiated in Tennessee as part of the national program to stop the westward spread of the raccoon (*Procyon lotor*) variant of rabies. Raccoon rabies had not been found in Tennessee at that point, but had been reported across the border in North Carolina. In an effort to stay ahead of the disease front, APHIS-WS, in cooperation with Tennessee Department of Health, Tennessee Department of Agriculture, Tennessee Wildlife Resources Agency, Chattanooga/Hamilton County Department of Health, and the CDC, extended the Appalachian Ridge ORVAC zone (which began at Lake Erie) into northeastern Tennessee. In June 2003, the rabies front, which had stalled in North Carolina, crossed into Tennessee and 4 cases of raccoon rabies were confirmed in Carter County, while 1 case was confirmed in Johnson County. There were no cases found in this area during 2004 despite increased surveillance. In 2005, 6 cases were confirmed in wildlife in the area, including positives in Washington and Unicoi Counties where raccoon rabies had not been previously documented (USDA 2007c).

Other ORVAC Programs

Projects have also been conducted or are in progress in New Jersey (2003-present), Florida (1995-present), Virginia (2000-present), West Virginia (2001-present), Pennsylvania (1995-present), New Hampshire (2002-present), Alabama (2003-present), Georgia (2003-present), Maine (2003-present), Kentucky (2003-present), Louisiana (2003-present), North Carolina (2005), and Mississippi (2003-present).

The challenge for successful elimination of these rabies virus variants in the U.S. involves cooperation by numerous states and land managers. Single states within the larger enzootic zones cannot proceed with elimination programs in isolation. Re-invasion from neighboring states will always be a risk unless all programs are coordinated carefully. In Germany, elimination of fox rabies has progressed slowly, at least partly because the individual states did not act in concert. In France, which had a national program, elimination occurred within 5 years. The use of oral vaccination in Switzerland during the past 20 years resulted in a declaration of rabies-free status in 1998. A similar declaration was made by France at of the end of 2000 (Blanton et al. 2006). The challenge in North America concerning raccoon rabies is to achieve cooperation and coordination between two or more levels of government in two countries (MacInnes and LeBer 2000).

1.1.5 Coyote and Gray Fox ORVAC Program in Texas

In 1988, two canine rabies epidemics emerged in Texas, one involving coyotes and dogs in South Texas and the other in gray foxes in West-Central Texas. The south Texas canine rabies epidemic alone has resulted in over 3,000 people receiving postexposure rabies treatment. In 1994, the public health threat created by these two expanding epidemics prompted the Governor of Texas to declare rabies a public health emergency in the state (Clark and Wilson 1995). In February 1995, the TDSHS initiated an ORVAC program with a goal of halting the spread of the virus among these two wild canine species (Oertli et al. 2002).

The TDSHS, along with APHIS-WS, Texas Wildlife Damage Management Service, Texas National Guard, CDC, Dynamic Aviation Group Inc., U.S. Army Veterinary Lab, and other agencies involved with rabies control of wildlife and domestic animal species are presently involved in an ORVAC program to stop the spread of specific gray fox and coyote rabies variants of the rabies virus in Texas (USDA 2004a). The program involves: 1) distribution of ORVAC baits; 2) assistance in monitoring rabies; 3) determining the effectiveness of the ORVAC programs through collection and testing of samples from wild animal specimens; and 4) if necessary, participation in implementing contingency actions that may include enhanced surveillance, increased baiting density or frequency, trap-vaccinate-release of target and specific nontarget species, or localized target species population reduction to address rabies emergencies (USDA 2001, 2007a).

Oral rabies vaccination zones in Texas are delineated based on the most current distribution of rabies cases and the expected direction of disease spread. Vaccination zones are determined in cooperation with the state rabies task force, TDSHS, and/or other agencies with jurisdiction over vaccine use and application in wildlife and domestic animal species. Baits are distributed over a variety of classes of land ownership, including private, public, tribal, and state and federal lands. As a variety of classes of land ownership are located within the proposed program boundaries, participation by the NPS helps ensure effective coverage and distribution of ORVAC baits and reduces the chance of foci that could serve as sources of rabies reinfection. Figure 1-3 shows the current anticipated ORVAC zones of the gray fox and coyote ORVAC programs in Texas. This only represents the area of need for 2007. Areas treated with ORVAC baits in future years may include other areas of the state where coyote or gray fox rabies outbreaks/emergencies occur.

Since 1995, the Texas ORVAC program has distributed more than 12.34 million vaccine-laden baits over 521,624 km^2 (201,400 mi^2) in South Texas and 19.21 million doses of vaccine over 579,901 km^2 (223,900 mi^2) in West-Central Texas (TDSHS 2007b). Prior to the ORVAC program in 1994, 122 canine variant rabies cases were reported in Texas (Oertli et al. 2002). Since implementation of the ORVAC program, canine rabies positive cases have declined annually. In 2001 and 2004, only one canine rabies case was reported each year, with zero cases reported between those two years and thereafter. Thus far, the south Texas ORVAC

program has proved to be highly effective in the elimination of the canine rabies variant in that area (USDA 2007c). Similar success has been sought in the gray fox epizootic in west-central Texas. The number of Texas fox-reported rabies cases in West-Central Texas declined from 188 in 1995 to 20 in 2001 (Oertli et al. 2002). In 2002, 18 positive cases of the gray fox rabies virus variant occurred outside the barrier, likely due to an interrupted baiting program in 2000 and 2001 as a result of a lack of funding. Increased funding was provided for the 2003 gray fox ORVAC program in Texas in order to encircle the zone where positive cases have been reported and to blanket the area. In 2003, only 6.6 percent of positive gray fox variant cases were found outside the ORVAC zone (the rest being found inside the encircled area). From 2004 to 2005, zero positive cases were reported outside the ORVAC zone and in 2006 12 of 45 cases were found outside the ORVAC zone (TDSHS 2007c). To effectively combat coyote and gray fox rabies in Texas, the TDSHS believes that it will become important to develop a "maintenance strategy" that can prevent a reintroduction of the virus into South Texas, especially along the southern Texas border and a need to continue an aggressive program in West-Central Texas (Oertli et al. 2002).

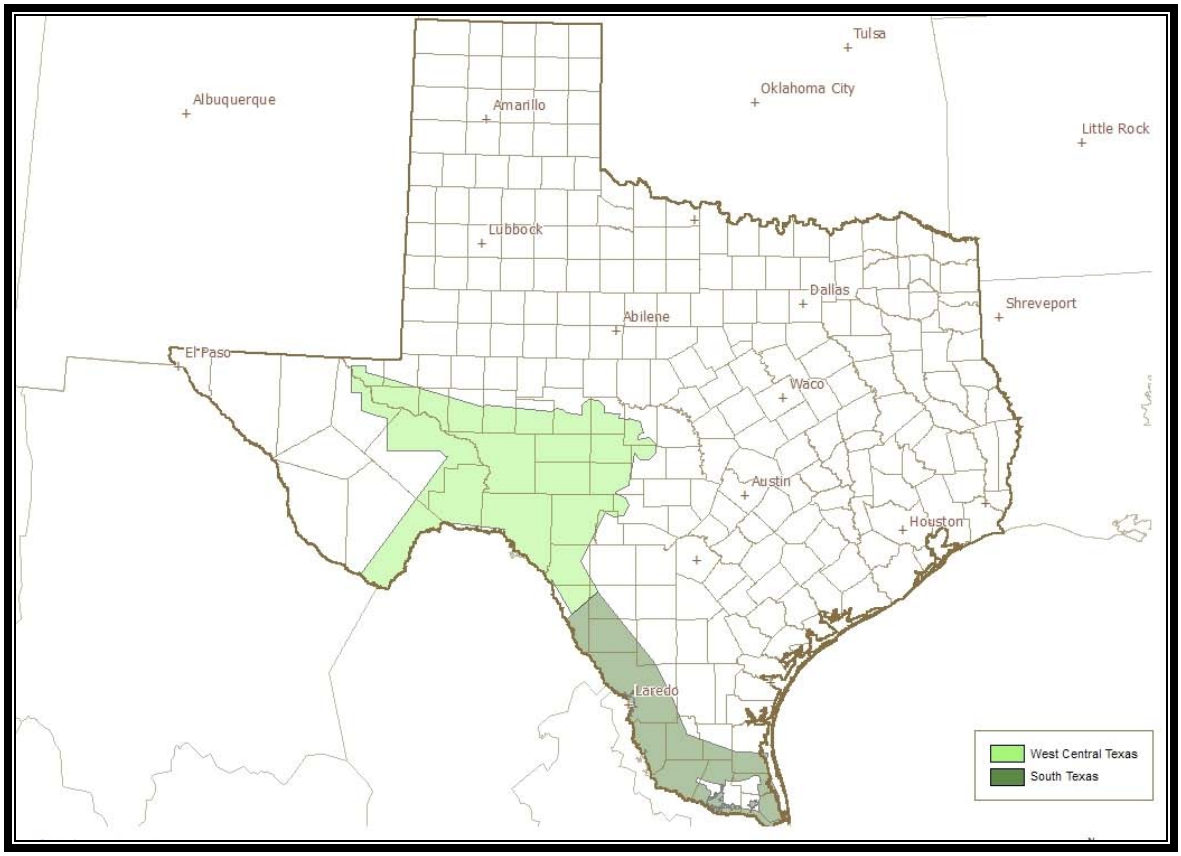

Figure 1-3. 2007 ORVAC zones in Texas. The West-central Texas zone targets the gray fox variant of the rabies virus and the South Texas zone targets the canid variant of the rabies virus in coyotes.

1.2 DESCRIPTION AND PURPOSE OF THE PROPOSED PROGRAM

The proposed program would distribute ORVAC baits at Palo Alto to support and cooperate with the state of Texas in their ongoing efforts of eliminating or stopping the forward spread of the canine variant of the rabies virus in south Texas.

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 ORVAC targeted zones (J.P. Koplan, M.D., Director, CDC, pers. comm. 2001). Therefore,

participation by these NPS units is necessary to support and cooperate with the involved state agencies and the USDA, APHIS-WS in their ongoing efforts of eliminating or stopping the northward spread of the canine variant of the rabies virus in Texas and in reducing the incidence of rabies cases involving wild and domestic animals and rabies exposures to humans by approving ORVAC programs on NPS-managed lands. Currently, cooperative rabies vaccination programs are being conducted on various land classes in Texas in addition to numerous other states in the eastern U.S. By participating, the NPS would aid in enhancing the effectiveness of the national program. If baiting programs were conducted around large land masses such as national parks, reservoirs of the virus would likely persist, potentially making the program less effective at stopping the forward advance or eliminating the canine variant of the rabies virus.

The program would involve the distribution of ORVAC baits to create zones of vaccinated target species that would then serve as barriers to cease the further advancement of raccoon rabies virus variants. Vaccination zones would be determined in cooperation with several state rabies task forces and/or other agencies with jurisdiction over vaccine use and application in wildlife and domestic animal species. The program would involve the use of APHIS-WS federal funds to purchase and distribute ORVAC baits.

As stated previously, the ORVAC that would be used is the V-RG vaccine. V-RG vaccine is approved by USDA, APHIS, VS, Center of Veterinary Biologics for use on coyotes in the U.S. and Canada. The V-RG vaccine would be encased in fishmeal type baits (fishmeal polymer or coated sachet baits). The bait blocks weigh approximately 26 grams and measures 11/4 x 11/4 x 3/4 inches. When an animal finds and ingests the bait, it receives a single dose of the vaccine. The bait blocks would 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. Individual baits may contain a non-toxic biomarker, tetracycline (Johnston et al. 1987, USDA 1991). This biomarker is used to aid in determining whether animals have eaten one or more baits for the purpose of monitoring project effectiveness within and outside the established ORVAC zones. Each state ORVAC program collects wild animals for monitoring purposes throughout the involved state (USDA 2004a). However, these state programs have determined that it would not be necessary to collect wild animals for monitoring purposes on NPS units. Therefore, no wild animals would be collected from Palo Alto for monitoring purposes. APHIS-WS and NPS would instead use monitoring data collected by the various state ORVAC programs on non-NPS lands surrounding the park to determine if program goals have been met.

On an annual basis, one treatment of ORVAC baits could be distributed by aircraft (fixed-wing airplane or helicopter) and ground placement on Palo Alto. The need to distribute baits at Palo Alto would be assessed annually and based on the most current distribution of rabies cases and the expected direction of disease spread. The annual treatment would continue on a recurring basis until the goals of the ORVAC program have been met. Baits would be distributed at an average density of 24-27 per km^2 (64-70 baits per mi^2) during the month of January. Air drops would be typically conducted at about 152.4 m (500 ft) above ground level and would only fly momentarily over any one point on the ground during any given bait distribution flight. The aircraft do not circle over areas repeatedly, but fly in straight "transect" lines for purposes of bait distribution. The transect lines would be spaced at a minimum of 500 m (1640.4 ft) to a maximum of 750 m (2460.6 ft) apart. ORVAC baits would not be aerially distributed in areas that are frequently used by a high volume of park visitors (i.e., visitor centers, campgrounds, etc.), as well as over lakes, reservoirs, and large rivers. Aerial distribution of baits would primarily target 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.

The proposed ORVAC program would be conducted in compliance with appropriate federal, state and local laws including NPS Management Policies 2006, Director's Orders, executive orders, general environmental legislation, and other laws used to guide management practices carried out on NPS lands.

1.3 NEED FOR ACTION

1.3.1 Need for a Coyote ORVAC Program

If new rabies strains such as those transmitted by 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 are affected.

Need to protect human health and safety
People are concerned with potential health threats and costs associated with being exposed to a rabid animal. People are most often exposed through a bite from a wild or domestic animal infected with the disease (CDC 2007a). More than 90 percent of all reported animal cases occur in wild animals (CDC 2007a). Rabies is a fatal disease in humans unless medically treated with post-exposure prophylaxis. Human health care concerns associated with the disease would be expected to increase as the rabies virus infects a much broader geographic area. Expansion of ORVAC activities to include NPS units is important for providing adequate coverage to the vaccination zone and other outbreak areas in order to retain program effectiveness. A more detailed description of the need to protect humans from exposure to the rabies virus is presented in Section 1.1.2 of this environmental assessment (EA).

Need to protect domestic animals
Texas is one of the most important states in the U.S. for livestock production. In 2006/2007, the USDA-National Agricultural Statistics Service states that an estimated 14 million head of cattle, 1.2 million goats, 1.1 million sheep and lambs, and 930,000 hogs and pigs are located in Texas and are valued at more than $84 million (USDA 2007d). Also within this area are countless numbers of domestic animals that are kept by people as pets (cats, dogs, rabbits, ferrets, etc). If canine rabies were to spread into Texas, many of these domestic animals would be at risk of being exposed to this specific variant.

1.4 AUTHORITIES

Federal Authorities

National Park Service Organic Act - Act of August 25, 1916 (16 U.S.C. 1, 2, 3, and 4) and Management Policies. By enacting the National Park Service Organic Act of 1916 (Organic Act), Congress directed the USDI and the NPS to manage units "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (16 USC 1). Congress reiterated this mandate in the **Redwood National Park Expansion Act of 1978** by stating that the NPS must conduct its actions in a manner that will ensure no "derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress" (16 USC 1a-1).

Despite these mandates, the Organic Act and its amendments afford the NPS latitude when making resource decisions that balance visitor recreation and resource preservation. By these acts Congress "empowered [the NPS] with the authority to determine what uses of park resources are proper and what proportion of the parks resources are available for each use" (*Bicycle Trails Council of Marin v. Babbitt,* 82 F.3d 1445, 1453 (9th Cir. 1996)).

Yet, courts consistently interpreted the Organic Act and its amendments to elevate resource conservation above visitor recreation. *Michigan United Conservation Clubs v. Lujan,* 949 F.2d 202, 206 (6th Cir. 1991) states, "Congress placed specific emphasis on conservation." The *National Rifle Ass'n of America v. Potter,* 628 F. Supp. 903, 909 states, "In the Organic Act Congress speaks of but a single purpose, namely, conservation." The NPS *Management Policies 2006* (USDI 2006) also recognize that resource conservation takes precedence over visitor recreation. The policy dictates "when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant" (NPS *Management Policies 2006,* sec. 1.4.3).

Because conservation remains predominant, the NPS seeks to avoid or to minimize adverse impacts on park resources and values. Yet, the NPS has discretion to allow negative impacts when necessary (NPS *Management Policies 2006,* sec. 1.4.3). While some actions and activities cause impacts, the NPS cannot allow an adverse impact that constitutes a resource impairment (NPS *Management Policies 2006,* sec. 1.4.3). The Organic Act prohibits actions that permanently impair park resources unless a law directly and specifically allows for the actions (16 USC 1a-1). An action constitutes an impairment when its impacts "harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values" (NPS *Management Policies 2006,* sec. 1.4.5). To determine impairment, the NPS must evaluate "the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts" (NPS *Management Policies 2006,* sec. 1.4.5).

Because park units vary based on their enabling legislation, natural resources, cultural resources, and missions, the recreational activities appropriate for each unit and for areas within each unit vary as well. An action appropriate in one unit could impair resources in another unit. Thus, this EA analyzes the context, duration, and intensity of impacts related to an oral rabies vaccination program at Palo Alto Battlefield National Historic Site as well as potential for resource impairment, as required by NPS *Director's Order #12: Conservation Planning, Environmental Impact Analysis and Decision-making (DO-12).*

Public Law 95-625. Palo Alto Battlefield was designated a National Historic Landmark on December 19, 1960. It became a National Historic Site on November 10, 1978, with a boundary change authorized on June 23, 1992. The Palo Alto Battlefield National Historic Site Act (Public Law 102-304), signed into law on January 3, 1992, significantly expanded the boundary and mission of the park. In response to research that had precisely identified the site of the battle of Palo Alto, park boundaries were extended to cover 3,400 acres of south Texas prairie and chaparral. In recognition that Palo Alto was the only unit of the National Park Service directed to preserve a battlefield of the U.S.-Mexican War, Congress directed the park to interpret the battle, the war, and the wide range of social, political, military, diplomatic, causes and consequences of the conflict. The legislation also required that any interpretation of this broad topic should reflect perspectives from both the United States and Mexico (NPS 2007).

Act of March 2, 1931 (7 U.S.C. 426, 426b and 426c). APHIS-WS is authorized to conduct programs to address wildlife-caused disease problems, including the suppression of rabies in wildlife, by the Act of March 2, 1931, 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 ORVAC programs in the eastern U.S. (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 a USDA license. Animal vaccines may not 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 control programs.

Public Health Service Act. The 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.

State Authorities

The state of Texas, involved in this proposed action, has a state agency or agencies with authority under state law to approve, conduct or coordinate rabies control programs. NPS involvement in rabies control in the state of Texas would only occur in complete cooperation with the appropriate state agency(ies) and in accordance with state authorities as identified by those agencies.

Texas Department of State Health Services (TDSHS) (Texas Administrative Code: Title 25; Part 1; Chapter 169). The TDSHS 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.

1.5 OTHER RELEVANT FEDERAL LAWS AND REGULATIONS

National Environmental Policy Act of 1969, as amended (NEPA) (42 U.S.C. 4321 et seq.). The purpose of NEPA is to declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

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 in potentially affected states, including Texas. 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.

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 and 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 would not affect any listed species (see Section 5.3).

National Historical Preservation Act (NHPA) of 1966 as amended (16 U.S.C. 470). The 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, to 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.

ORVAC 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.

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.

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)).

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.

1.6 RELATIONSHIP TO OTHER ENVIRONMENTAL DOCUMENTS

NPS PLANS

NPS Management Policies 2006 (USDI 2006). This manual provides guidance on enhancing visitor safety (Section 8.2.5.1) and managing exotic species (Section 4.4.4.), which directly relate to this proposed project. The expanding epidemic of the canine variant of the rabies virus in Texas is considered a public health emergency (Clark and Wilson 1995) and is therefore considered under the visitor safety section of the manual. The proposed project is, therefore, consistent with the NPS *Management Policies 2006* manual. Additionally, NPS personnel reviewed the appropriate plans (i.e., strategic, general management, and resource management plans) for the individual park unit of Palo Alto. There are no conflicts between the proposed action and any existing park plans. The proposed action is consistent with national guidance.

General Management Plan (February 1988) –Palo Alto Battlefield National Historic Site provides guidelines for the future direction and development of the park. The plan also stresses the need to work closely with partners in Mexico to achieve balanced interpretation and to comply with the park's founding legislation (USDI 2007b).

NEPA DOCUMENTS

A number of other NEPA documents have been prepared that analyzed the potential environmental effects of ORVAC programs. Pertinent information from those analyses has been incorporated by reference into this EA.

APHIS-WS Programmatic EIS. APHIS-WS has issued a final Environmental Impact Statement (EIS) (USDA 1997) and Record of Decision on the National APHIS-WS program.

EA and Finding of No Significant Impact – Oral Rabies Vaccination Program (NPS NE Region). Four separate EAs and Decisions/Finding of No Significant Impact (FONSI) (USDI 2005a-d), dated July 28, 2005, analyzed the environmental effects of NPS participation in ORVAC programs on 34 units in 10 states within the Northeast Region of the NPS. The states included Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Vermont, Virginia, and West Virginia. The objectives of the program involve 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 adverse impact on the quality of the human environment.

EA and Finding of No Significant Impact – Oral Rabies Vaccination Program (NPS SE Region). This EA and Decision/FONSI (USDI 2004), dated June 28, 2004, analyzed the environmental effects of NPS participation in ORVAC programs on 15 park units in 5 states within the Southeast Region of the NPS. The states included Alabama, Georgia, Florida, North Carolina, and Tennessee. The objectives of the program involve 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 adverse impact on the quality of the human environment.

EA and Finding of No Significant Impact – Oral Rabies Vaccination Program for Big Bend National Park, Guadalupe Mountains National Park, and Amistad National Recreation Area in Texas. This EA and Decision/FONSI (USDI 2003), dated June 13, 2003, analyzed the environmental effects of NPS participation in ORVAC 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 adverse impact on the quality of the human environment.

EA and Finding of No Significant Impact – Oral Vaccination to Control Specific Rabies Virus Variants in Raccoons, Gray Foxes, and Coyotes in the United States. This EA and Decision/FONSI (2001), dated July 30, 2001; a supplemental Decision/FONSI, dated August 5, 2002 (USDA 2002); a supplemental EA and Decision/FONSI (USDA 2003), dated June 12, 2003; a supplemental EA and Decision/FONSI (USDA 2004a), dated September 9, 2004; and the most recent, a new Decision/FONSI (USDA 2007a) analyzed the environmental effects of APHIS-WS involvement in the funding of and participation in ORVAC programs to eliminate or stop the spread of raccoon rabies in 25 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), the District of Columbia, and gray fox and coyote rabies in Texas. APHIS-WS determined the action would have a negligible adverse impact on the quality of the human environment.

EA and Finding of No Significant Impact - Oral vaccination to Control specific rabies virus variant in raccoons on National Forest System lands in the United States. This EA and Decision/FONSI (USDA 2004b), dated February 12, 2004, and a supplemental EA and Decision/FONSI (USDA 2006), dated March 2, 2006, analyzed the

potential environmental effects of a proposal to expand APHIS-WS' involvement in ORVAC programs to portions of National Forest System lands, excluding Wilderness Areas, in 25 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). Numerous National Forest System lands are located within current and potential ORVAC barrier zones. To effectively combat this strain of the rabies virus, it became increasingly important to bait these large land masses. APHIS-WS determined the action would have a negligible adverse impact on the quality of the human environment.

EA and Finding of No Significant Impact – Proposed Issuance of a Conditional United States Veterinary Biological Product License to Rhone Merieux, Inc., for Rabies Vaccine, Live Vaccinia Vector. This EA and Decision/FONSI dated April 7, 1995 was prepared by APHIS and concluded there would be no significant impact on the quality of the human environment from the decision to issue the conditional license referred to 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. This vaccine was studied under both laboratory and field trials prior to distribution and use in 1995 to control the spread of various strains of the rabies virus. No ecological concerns were determined to be associated with the licensing of the rabies vaccine (USDA 1991, 1992, 1993, 1994a, 1994b, 1994c, 1995a, *undated a, undated b*). USDA determined that the parental vaccinia virus has not established itself in nature, is readily consumed by target animal species, and does not cause bioaccumulation in the environment. Mitigative 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 and Finding of No Significant Impact – Proposed Field Application of an Experimental Rabies Vaccine, Live Vaccinia Vector, in South Texas. This EA and Decision/FONSI completed in 1995 analyzed the environmental effects of experimental distribution of ORVAC baits containing V-RG to eliminate and stop the spread of coyote rabies in south Texas (USDA 1995b). APHIS determined the action would have a negligible 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 Decisions/FONSIs covering those actions, (USDA 1991, 1992, 1993, 1994a, 1994b, 1994c), APHIS determined that these actions would have a negligible adverse impact on the quality of the human environment.

Risk Analyses for ORVAC 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, undated b*). Both analyses concluded the risk of adverse effects to animal safety, human safety, or the environment to be negligible.

1.7 DECISION TO BE MADE

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

- Should the NPS approve ORVAC bait distribution at Palo Alto Battlefield National Historic Site in TX?

- Would the proposed action have significant impacts on the quality of the human environment requiring preparation of an EIS?

1.8 GOALS

The primary goals of the proposed coyote ORVAC program are:

- To cooperate with the state of Texas in eliminating or stopping the northward advance of the canid variant of rabies in south Texas by approving the use of ORVAC to immunize portions of target species populations along the leading edges of the rabies fronts; and

- To cooperate with the state of Texas in reducing the incidence of rabies cases involving wild and domestic animals and rabies exposures to humans in the areas where the ORVAC programs are conducted.

Monitoring
APHIS-WS and involved state agencies will be responsible for determining the overall success of the ORVAC program and will use data collected from areas outside of NPS lands to monitor vaccination rates and instances of raccoon rabies virus.

1.9 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

Actions Analyzed/Site Specificity. This EA analyzes the potential environmental effects of NPS participation in an ORVAC program at Palo Alto Battlefield National Historic Site. The program would support the involved state agencies' efforts of eliminating or stopping the northward spread of coyote rabies (canid variant) in south Texas.

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, agencies involved with exotic pest control, etc. Although some of the sites where wildlife rabies outbreaks will occur can be predicted, all specific locations or times where such outbreaks will occur in any given year cannot be predicted. Thus, this EA addresses the substantive environmental issues that pertain to ORVAC use wherever these activities might occur on the NPS lands identified herein. The analyses in this EA are intended to apply to any action that may occur *in any locale* and at *any time* within the analysis area. In this way, the NPS believes it meets the intent of NEPA with regard to site-specific analysis and that this is the only practical way for the NPS to comply with NEPA and still be able to participate with APHIS-WS in effectively accomplishing its goal of managing rabies.

Period for which this EA is Valid. This EA will remain valid until the NPS 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 will be revised pursuant to NEPA.

1.10 SCOPING PROCESS

Scoping is an early and open process to determine the breadth of environmental issues and alternatives to be addressed in an EA. The NPS Intermountain Region conducted internal scoping with appropriate staff from the NPS and APHIS-WS. The interdisciplinary internal scoping process defined the purpose and need, identified potential actions to address the

need, determined what the likely issues and impact topics would be, and identified the relationship, if any, of the proposed action to other planning efforts at Palo Alto.

The external scoping process was conducted with the public and interested and affected groups and agencies. A scoping notice was issued on March 6, 2007 and was directly mailed to 73 interested and affected groups and agencies, including potentially affected American Indian tribes. Interested parties also had the opportunity to view the notice and comment online at http://parkplanning.nps.gov/paal, the NPS' Planning, Environment and Public Comment website. Comments were solicited during external scoping until April 16, 2007. Zero comment letters were received during the 41-day scoping period. Therefore, no other issues were identified or alternatives proposed.

2.0 CHAPTER 2: ISSUES

2.1 ISSUES

From comments received during scoping periods for this and other ORVAC EAs and interactions and input received from those involved with the national ORVAC program, the following issues were determined to be germane to the proposed action and were considered in detail in Chapter 4:

- Potential for adverse effects on people that become exposed to the vaccine or the baits
- Effects of the ORVAC V-RG vaccine on coyotes
- Potential for adverse effects on nontarget wildlife species, including threatened or endangered species
- Potential for adverse effects on pet dogs or other domestic animals that might consume the baits
- Potential for the recombined V-RG virus to "revert to virulence" and result in a virus that could cause disease in humans or animals
- 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 animal
- Potential for aerially dropped baits to strike and injure people or domestic animals
- Potential effects on NPS wilderness areas
- Potential impacts on visitor use/experience

2.2 ISSUES DISMISSED FROM FURTHER ANALYSIS

2.2.1 Potential for Adverse Impacts on Wildlife from Aircraft Overflights

The concern here is that wildlife species on NPS lands might be disturbed by the aircraft used in ORVAC bait distribution to the point that they are adversely affected.

USDI (1995) reviewed studies on the effects of aircraft overflights on wildlife. The report revealed that several studies have documented responses by certain wildlife species that suggest adverse impacts could occur. Few if any studies have proven that aircraft overflights adversely impact populations, although the report stated it is possible to draw the conclusion that impacts to wildlife populations are occurring. It appears that some species will frequently or at least occasionally show adverse responses to even minor/short-term overflight occurrences. In general, it appears that the more serious potential impacts occur when overflights are *chronic*, i.e., they occur daily or more often over long periods of time. Chronic exposure situations generally involve areas near commercial airports and military flight training facilities. ORVAC program aerial bait distribution activities are not chronic, but occur only one time per year. They are typically conducted at about 152.4 m (500 ft) above ground level and only fly momentarily over any one point on the ground during any given bait distribution flight. The aircraft do not circle over areas repeatedly, but fly in

straight "transect" lines for purposes of bait distribution. The transect lines would be spaced at a minimum of 500 m (1640.4 ft) to a maximum of 750 m (2460.6 ft) apart. Texas ORVAC bait distribution activities are normally conducted one time per year, during the month of January. Time of year for scheduled bait dispersal should eliminate the possibility of disturbing breeding or nesting sensitive species. In addition, Palo Alto does not have any overflight restrictions and is located along the flight path of aircraft utilizing the nearby local airport.

The following are some examples of species or species groups that have been studied with regard to this issue along with a determination of potential impacts from ORVAC aerial overflights:

- Colonial Waterbirds. Kushlan (1979) reported that low level [390 ft (118.8 m) followed by a second flight at 200 ft (60.96 m)] 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 percent of the observations, the individual birds either showed no reaction or merely looked up. ORVAC program overflights typically occur at about 152.4 m (500 ft) above ground and would only fly momentarily over any one point on the ground. Transect lines are also generally spaced between 500 m (1640.4 ft) and 750 m (2460.6 ft) apart. Thus, it appears that ORVAC program overflights would result in little or no disturbance to colonial waterbirds.

- Greater Snow Geese. Belanger and Bedard (1989, 1990) observed responses of greater snow geese (*Chen caerulescens atlantica*) to man-induced disturbance on a sanctuary area and estimated the energetic cost of such disturbance. They observed that disturbance rates exceeding two per hour reduced goose use of the sanctuary by 50 percent the following day. They also observed that about 40 percent of the disturbances caused interruptions in feeding that would require an estimated 32 percent increase in nighttime feeding to compensate for the energy lost. They concluded that overflights of sanctuary areas should be strictly regulated to avoid adverse impacts. ORVAC program overflights typically occur at about 152.4 m (500 ft) above ground and would only fly momentarily over any one point on the ground. Transect lines are also generally spaced between 500 m (1640.4 ft) and 750 m (2460.6 ft) apart. Thus, it appears that ORVAC program overflights would result in little or no disturbance to snow geese or other waterfowl species.

- Raptors. 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. Their results also 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 showed that ferruginous hawks (*Buteo 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 neither were they alarmed when the researchers flew within 100 ft 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 5 species of hawks, 2 falcon species, and golden eagles were "incredibly tolerant" of overflights by military fighter jets, and observed that, although birds frequently exhibited alarm, negative responses were brief and never limiting to productivity. These studies indicate that overflights by ORVAC program aircraft should have no significant adverse impacts on raptor populations by affecting nesting success.

- Bald Eagles. Several studies have shown that bald eagles (*Haliaeetus leucocephalus*) elicited varied responses (e.g., no response, alert, agitation, or flushing) by overflights of different types of aircraft such as military jets, fixed-wing aircraft, light planes, and helicopters (Grubb and Bowerman 1997, Watson 1993, Stalmaster and Kaiser 1997). Helicopters appeared to produce the greatest response, with military jets second, and fixed wing and light planes third (Grubb and Bowerman 1997, Watson 1993, Stalmaster and Kaiser 1997). The frequency of response and frequency of flight by bald eagles both increased through the nesting season from February to June (Grubb and Bowerman 1997). However, bald eagles were disturbed at higher rates when there were no young in the nest, when they were away from the nest, or when helicopters were hovering rather than moving (Watson 1993). The distance between eagle and aircraft, overflight duration, number of passes over nest, and type of aircraft appeared to be the most important characteristics influencing eagle responses (Grubb and Bowerman 1997, Watson 1993, Stalmaster and Kaiser 1997). However, Grubb and King (1991) concluded breeding bald eagles in Arizona may have become habituated to aircraft. Habituation was also reported at a nest site near a military air base in Michigan (Grubb et al. 1992, Grubb and Bowerman 1997). Nesting bald eagles have also been surveyed from fixed-wing aircraft with minimal disturbance (Fraser et al. 1985, Watson 1993). In general, conclusions about adverse effects on bald eagles and other raptors from aircraft overflights appear to be speculative. However, no direct evidence of adult or young mortality during helicopter or fixed-wing overflights has been observed (Watson 1993, Fraser et al. 1985). Although habituation may occur, most findings supported the use of buffer zones to distance nesting bald eagles from aircraft activity. Watson (1993) recommended helicopters remain at a distance greater than 196.9 ft (60 m) from nests. Stalmaster and Kaiser suggested a buffer of 1312.3-2624.7 ft (400-800 m) from military activity such as boats, aircraft and explosions. However, this suggestion is for wintering bald eagles. Grubb and Bowerman (1997) recommended any type of human activity be conducted at a distance of 1312.3 (400 m) or greater from nesting bald eagles. If this limitation is impractical, they recommended that duration and number of aircraft and/or passes be limited to less than 5 minutes and one aircraft and/or pass. This scenario would be expected for rabies bait distribution overflights, which would only involve one overflight pass, once per year, in which the duration of the pass over a given nest site would only be a few seconds at most.

Occasional overflights (i.e., radio telemetry, GIS mapping, commercial flights, and military training routes by fighter jets, helicopters, and/or transport ships) may occur over park units. Overflights for the purposes of ORVAC bait distribution activities would only occur one time per year and aircraft would only fly momentarily 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 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 ORVAC 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). Therefore, cumulative impacts from the combination of ORVAC bait distribution overflights and other overflights should be negligible. Thus, the short-term duration, infrequency, negligible intensity of flights over any given area, and time of year for scheduled bait distribution activities (January), in addition to the tolerance of wildlife of such activity, would have a negligible adverse environmental impact on wildlife as a result of ORVAC program overflights Therefore, this issue was dismissed as an impact topic.

2.2.2 Potential Human Health Impacts Resulting from the Human Consumption of a Vaccinated Wild Animal

The issue expressed here is the potential to develop a vaccinia infection from eating a vaccinated animal that has eaten one or more ORVAC baits.

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, by ultra-violet irradiation (sunlight), or by exposure to acid with a pH of 3 or less[1] (e.g., similar to the acid environment found in the stomach of animals). In contrast, however, poxviruses can be relatively stable for years in dry dust or in dried lesion crusts.

The vaccinia from V-RG would generally only bind to animal tissues in the mucous membrane of the oral cavity, pharynx and oesophagus 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 (Schumacher, Merial, Inc., pers. comm. 2001 *in* USDA 2001).

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 (Schumacher, Merial, Inc., pers. comm. 2001 *in* USDA 2001).

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 and/or bacteria/enzymes, temperature fluctuations, and cooking heat, the risk to human health should be negligible, especially when taking into consideration the attenuated or weakened condition of the vaccinia in the V-RG vaccine. Therefore, the potential for adverse health effects from consuming animals that have eaten ORVAC baits should be low. For the aforementioned reasons, this issue was dismissed as an impact topic. Additionally, hunting is not permitted at Palo Alto, thus people would not be expected to consume any animals that eat ORVAC baits distributed at this park unit.

2.2.3 Potential for ORVAC Bait Distribution to Affect Organic Farming

This issue concerns the potential for ORVAC 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 (CFR7 Part 205.672). In particular, this concern was raised by a producer of organically raised venison in Ohio (R. Krogwold, Ohio Dept. of Health, pers. comm. 2001 *in* USDA 2001) and by an organic farmer in Florida (H. McConnell, APHIS-WS, pers. comm. 2003).

The ORVAC baits are comprised of a matrix of 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 that will not dissolve or crumble apart readily when and if it is exposed to rain or melting snow. Sachets coated

[1] 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.

with a simple fishmeal attractant (coated sachets) may also be used and have been determined to be equally as effective as the bait blocks. The process for producing the baits 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 ORVAC baits is totally nonreactive and cannot be absorbed by plants or animals (M. Smith, Bait-Tek, pers. comm. 2001 *in* USDA 2001). 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 should pose no risk of contaminating crops or animals raised for food and, consequently, should have no effect on the ability of certified organic farms to maintain their status.

Field baiting studies suggest deer are not generally attracted to the ORVAC 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. 2002). Sulfur compounds are a byproduct of the breakdown of animal proteins, including those found in fishmeal (D. Nolte, APHIS-WS, National Wildlife Research Center (NWRC), pers. comm. 2001 *in* USDA 2001) and are generally repellent to herbivores (Nolte et al. 1994). Therefore, the ORVAC baits used to address 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. (2002). For these reasons, it is unlikely that the ORVAC baits would be consumed by deer on venison farms that are certified as organic producers.

On April 15, 2003, the USDA-Agricultural Marketing Service (AMS) ruled that ORVAC bait blocks, consisting of a vaccine imbedded in fishmeal bound by a polymer binding agent, on an organic operation would not have an adverse impact on organic operations. This ruling was posted on the USDA-AMS website at www.ams.usda.gov/nop. The USDA-AMS considers the ORVAC 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 ORVAC bait block and not penetrating the vaccine would not be adversely affected. In the unlikely event that an animal consumes the vaccine within the ORVAC 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 ORVAC bait block; however, to reduce the chances of livestock consumption, producers would be able to relocate any bait found within an area containing livestock to a point outside of that area.

This issue was dismissed as an impact topic as measures can be taken to minimize or eliminate effects to organic crops and livestock operations.

2.2.4 Potential Impacts on Water Resources

A concern has been expressed regarding the potential impacts of unconsumed V-RG vaccine and baits adversely impacting ground and surface water resources through direct and indirect exposure. Those baits that are not consumed may remain in the environment for several months after placement, depending on 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 ORVAC baits by animal species, 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 ORVAC baits being exposed to a site specific water resource is extremely low due to the bait distribution densities used by the program. Under the proposed program ORVAC baits would be distributed from aircraft at an average density of 24-27 per km^2 (64-70 baits per mi^2).

- The baits are non-toxic. The baits used for the coyote ORVAC program are of two types - either small blocks of fishmeal that are held together with a polymer binding agent or sachets coated with a simple fishmeal attractant (coated sachets). Both types of baits 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 (C. Rupprecht, CDC, pers. comm. 2002). Therefore, ORVAC is not expected to cause any adverse effects on fish, reptiles, amphibians, or any invertebrate species should any members of these species groups consume ORVAC baits or otherwise be exposed to the vaccine.

- The ORVAC baits are readily taken up and consumed by wildlife species, 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 nontarget species), bait preference, and the availability of alternative food sources. In field tests conducted in the U.S., the majority of ORVAC 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. 1998a, 1998b; Hable et al. 1992; Hadidian et al. 1989; Hanlon et al. 1989; 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 will become inactive (USDA 1992, 1995a). For example at temperatures between 68 and 100 degrees Fahrenheit 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 ORVAC baits can be found in Chapter 1.

- Program SOPs limit the possibility of ORVAC 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 ¼ mile from the water source to reduce the possibility of ORVAC 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 will cause any adverse affects since the vaccine liquid is biodegradable and nontoxic (USDA 1991, *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. Therefore, this issue was dismissed as an impact topic.

2.2.5 The Affected Area Described in the EA includes NPS Lands that Have Not Been Identified as Having a Rabid Coyote Problem

The affected area of the EA includes an NPS unit that has the potential for an outbreak of the coyote variant of the rabies virus to occur. ORVAC baits are distributed based upon vaccination zones. These vaccination zones are determined in cooperation with the involved state rabies task forces, state agencies, and/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 the NPS unit identified in this EA, Palo Alto, may be involved in an ORVAC bait distribution program on an annual basis. Figure 1-3 in Chapter 1 shows the current anticipated ORVAC zone based upon recent outbreaks of the virus. Palo Alto is being analyzed in this EA because of its possibility of being involved in the state of Texas' overall efforts of stopping the northward spread of the canid variant of the rabies virus.

2.2.6 Effects on Carnivore Populations in the Absence of Rabies

Concern has been expressed that specific carnivore populations may increase in the absence of the rabies virus as a mortality factor, leading to adverse effects on prey populations such as threatened and endangered species.

Numerous studies have been published concerning wildlife diseases, such as rabies, and their ability to control carnivore population densities. As a disease existing within natural systems, rabies is only one of several diseases which can influence dynamics of its vector and reservoir populations, and there is no indication that it has more serious effects on population levels than several other conditions. Pence (1995) noted that while the current rabies epizootic involving coyotes in southern Texas is a public health threat, it is unlikely to have a major impact on the coyote population. Instead, the probable net effect of canine rabies will be compensatory, rather than additive, with other mortality factors such as canine distemper, canine parvovirus, and sarcoptic mange infections that have caused recent epizootics in this coyote population (Pence 1995).

Milius (1998) noted that vaccinating raccoons in the city of Scarborough, Ontario against canine distemper in the early 1990s successfully reduced the prevalence of the disease in raccoons. The vaccination program did not trigger the population boom that some suggested. Canine distemper provides a good model for studying whether a disease regulates a population (Milius 1998). The cyclic nature of enzootic rabies suggests that it causes significant changes in numbers of animals, but direct evidence is fragmentary. Scientists have observed for years that raccoon populations decrease during the initial epizootic activities, but stabilize at pre-infestation levels after a few years (McLean, pers. comm. 2004). Guerra et al. (2003) does not support the idea that rabies exists specifically to control raccoon populations and note that after an initial peak, populations approach lower 'steady-state' conditions.

In Europe and Ontario, an increase in fox densities coincided with reduction of rabies by oral vaccination, but was found to result from ecological changes as much as or more than from rabies control; increases occurred at the same times in regions which had no rabies (MacInnes and LeBer 2000). An Ontario Ministry of Natural Resources project trapped, vaccinated, and released skunks and raccoons for both rabies and canine distemper in certain areas of the City of Scarborough, Ontario. Researchers concluded that the vaccine had decreased the prevalence of the diseases (1.4 percent of raccoons infected versus 8.3

percent prior to implementation of the program), yet the program did not change overall growth trends in the raccoon population (Milius 1998). Canine distemper may have impacts as large as or larger than rabies on raccoon populations, but where measured explicitly during one outbreak it had only small effects.

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 antibody 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 it historically has been implicated as a virus of importance to carnivore mortality.

Parvoviruses, infectious canine hepatitis, and other viral diseases have the potential to severely affect fox, skunk, and raccoon populations. The whole question of the influence of disease on wildlife numbers is complex and far from fully explained (MacInnes and LeBer 2000). Though unproven, Pence (1995) conjectured that the abundant and pathogenic dog hookworm represents the only macroparasitic infection that may regulate coyote populations in south Texas by reducing juvenile recruitment. As a result, Pence (1995) believes it is important to understand the actual effect of common diseases on the specific host population in question prior to implementation of any intervention or control procedures for those diseases.

The NPS understands the potential health significance of rabies on humans and other native animals as it continues to expand into new areas of the U.S. However, intervention into the biological activities of a natural system for any reason is something that NPS managers do with great care. NPS Management Policies require "that the environmental costs and benefits of proposed operations, development, and resource management are fully and openly evaluated before taking actions that may impact the natural resources of parks. The evaluation must include appropriate participation by the public; the application of scholarly, scientific, and technical information in the planning, evaluation, and decision-making processes; the use of NPS knowledge and expertise through interdisciplinary teams, and processes; and the aggressive incorporation of mitigation measures, pollution prevention techniques, and other principles of sustainable park management." As the NPS implements the ORVAC program within its parks, every effort would be made to evaluate the park-specific benefits and impacts of the project. To accomplish this goal, the NPS would work with APHIS-WS and other cooperating agencies to assure that surveillance is carried out to track coyote and other vector species populations and rabies prevalence. Great care would be made to protect native resources found in the parks, with a watchful eye on resources that are rare, threatened, and endangered. Resources within the NPS, for the collection of

this information, are extremely limited and would therefore be provided by APHIS-WS or other cooperators within the national rabies management team.

In situations where diseases like West Nile Virus, Lyme Disease, Hantavirus, and rabies could affect park resources, visitors, and employees, the NPS is directed to seek the guidance of the U.S. Public Health Service and CDC. The director of the CDC has indicated that rabies presents a serious public health problem in the U.S. (letter to APHIS-WS, dated May 29, 2001). Potential direct exposure to rabid coyotes, or indirect exposure by a pet that had an encounter with a rabid coyote, creates this human health threat. The NPS Public Health Program concurs with the CDC assessment that rabies is a significant public health risk and that every reasonable effort should be made to control the disease (M. Wild, NPS, pers. comm. 2004).

This issue was dismissed as an impact topic as the literature does not indicate that the absence of the rabies virus would significantly affect carnivore populations.

2.2.7 Effects of Nontarget Species Consumption of ORVAC Baits on Program Effectiveness

Consumption of ORVAC baits by nontarget species is not expected to impact program effectiveness. As described in Section 1.1.3, 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. However, various studies have shown that nontarget species do account for some uptake of baits and this has been taken into consideration in determining bait distribution needs in an area. For instance, Linhart et al. (2002) found during field trials that 12.6 percent of placebo baits distributed on three Georgia coastal plain sites were taken by nontargets (mainly feral swine). They also found that 22.9 percent of baits distributed on an Ohio Erie coastal plain site were taken by nontarget species (mainly opossums). Thus, depending on the density of the target species, coyotes, bait distribution is arranged to account for various factors including the presence of nontargets in the area. In general, a distribution of 24-27 baits per km^2 (64-70 baits per mi^2) has been determined sufficient to maintain program effectiveness. Therefore, the issue of nontarget consumption of baits was dismissed as an impact as it will have a negligible effect on program effectiveness.

2.2.8 Warning labels on individual baits should be bilingual and include Spanish wording for those not fluent in English.

The block type baits have warning labels advising persons not to handle or disturb the bait along with a toll-free telephone number to call for further information. Due to the small size and outer fishmeal coating, the coated sachet baits do not contain warning labels. The warning label on the bait blocks is written in English. Due to the limited surface area of the bait blocks (11/4 x 11/4 x 3/4 inches), it would not be possible for Spanish wording to be included on the warning label. To be able to accomplish this task, the text size of the warning label would be so small that it would be illegible. To accommodate Spanish speaking individuals the toll-free number provides the caller with an opportunity to speak with someone fluent in Spanish. This should allow those persons not fluent in English the opportunity to obtain information on the ORVAC bait they have encountered. The toll-free number provides an opportunity for both English and Spanish-speaking callers, therefore this issue was dismissed as an impact topic.

2.2.9 Potential Impacts to Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by USDI agencies be explicitly addressed in environmental

documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes.

There are no Indian trust resources at Palo Alto. The lands comprising the park unit are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, the Indian Trust Resources issue was dismissed as an impact topic.

Copies of this EA will be forwarded to each tribe traditionally associated with the park unit's lands for review and comment. If the tribes subsequently identify the presence of ethnographic resources, appropriate mitigation measures would be undertaken if necessary in consultation with the tribes. The location of ethnographic sites would not be made public. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during the proposed program, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed. Because there are no known ethnographic resources within the project area, ethnographic resources issues were dismissed as an impact topic. Also, since the ORVAC bait distribution does not involve any ground disturbance, there is little or no potential for disturbance of ethnographic resources.

2.2.10 Potential for Adverse Impacts on Lightscape

The NPS strives to preserve the natural ambient landscapes, which are natural resources and values that exist in the absence of human-caused light. Recognizing the roles that light and dark periods play in natural resource processes and the evolution of species, the NPS seeks to protect natural darkness and other components of the natural lightscape in parks. (NPS policy for this topic is found in *Management Policies 2006* (USDI 2006), 4.10, Lightscape Management.)

The concern may be that the lightscape conditions in a national park environment might be adversely affected by aircraft overflights during ORVAC bait distribution. Aircraft overflights for ORVAC bait distribution normally occur during daylight hours; however, certain circumstances (e.g., to avoid dropping baits during peak visitor use periods, security issues, etc.) may necessitate baiting outside of daylight hours. Aerial ORVAC bait distribution activities would only occur once per year and aircraft would only fly momentarily 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 only momentary duration, on a local scale, with negligible intensity. Therefore, this issue was dismissed as an impact as it will have no chronic effect on lightscape (see Section 2.2.1 for more information).

2.2.11 Potential for Adverse Impacts on Soundscape

An important part of the NPS mission is preservation of natural soundscapes associated with national park units. The natural ambient soundscape is the aggregate of all the natural sounds that occur in parks, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. (NPS policy for this topic is found in DO-47, *Sound Preservation and Noise Management* and *Management Policies 2006* (USDI 2006), 4.9, Soundscape Management.)

The issue expressed here is that the natural soundscape of NPS units may be adversely affected by aircraft overflights during ORVAC bait distribution activities. Aerial ORVAC bait distribution activities would only occur once per year and aircraft would only fly momentarily 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. Overflights are also conducted at a minimum of 152.4 m (500 ft) above ground level and transect lines would be spaced at a minimum of 500 m (1640.4 ft) to a maximum of 750 m (2460.6 ft) apart. Additionally, the types of aircraft used in bait distribution, the DeHavilland (DHC-6) Twin Otter and Beechcraft King Air B200, meet all FAR requirements regarding noise limits (FAR Part 36). The potential impact would be of extremely short-term duration, on a local scale, with negligible intensity. Therefore, this issue was dismissed as an impact as the ORVAC bait distribution activities will have no chronic effect on soundscape (see Section 2.2.1 for more information).

2.2.12 Potential for Adverse Impacts to Historical Properties

The 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, to 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.

ORVAC 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 and this issue was dismissed as an impact topic. 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.

The Texas state historical preservation officer has reviewed the proposed ORVAC program and has indicated that the proposed program will have no adverse effects on historic properties (letter from F. Lawrence Oaks, Executive Director, Texas Historical Commission - dated April 5, 2007 - copies of correspondence are located in the Administrative Record for this EA).

2.2.13 Potential for Adverse Impacts to Minority and Low-Income Populations

Executive Order 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. NPS 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. Therefore, this issue was dismissed as an impact topic.

2.2.14 Potential for Adverse Impacts to the Safety and Health of Children

Executive Order 13045 was passed to help protect children who may suffer disproportionately from environmental health and safety risks for many reasons. ORVAC 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). The analysis in this EA supports a conclusion of negligible to no risk of adverse effects to children from the ORVAC 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 ORVAC programs is consistent with and helps to achieve the goals of EO 13045. For these reasons, this issue was dismissed as an impact topic.

Resource Values. The following resource values would not be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range.

Irreversible and Irretrievable Commitment of Resources. Other than minor uses of fuels for aircraft and motor vehicles and other materials, there are no irreversible or irretrievable commitments of resources.

3.0 CHAPTER 3: ALTERNATIVES

3.1 ALTERNATIVES CONSIDERED, INCLUDING THE PROPOSED ACTION

3.1.1 Alternative 1. Authorize an ORVAC Program - Proposed Action (*this is the preferred alternative*)

Under this alternative, NPS would authorize the inclusion of Palo Alto Battlefield National Historic Site in the ongoing ORVAC program in Texas to create zones of vaccinated target species that would then serve as barriers to eliminate and/or cease the further advancement of the canid variant of the rabies virus. Vaccination zones would be determined in cooperation with state rabies task forces, state health departments, and/or other agencies with jurisdiction over vaccine use and application in wildlife and domestic animal species. The program would involve use of APHIS-WS federal funds to purchase and/or distribute ORVAC baits. On an annual basis, one treatment of ORVAC baits could be distributed by aircraft (fixed-wing airplane or helicopter) and ground placement at Palo Alto within the ORVAC project area in Texas. The need to distribute baits at Palo Alto would be accessed annually and based on the most current distribution of rabies cases and the expected direction of disease spread. The treatment would continue on a recurring basis until the goals of the ORVAC program have been met. A more detailed description of the proposed action can be found in Section 1.2 of this EA.

3.1.2 Alternative 2. No Action

This alternative would preclude the NPS from any involvement in ORVAC programs at Palo Alto Battlefield National Historic Site in Texas. However, APHIS-WS, involved state agencies, and rabies task forces would continue the ORVAC program on lands not managed by the NPS. The "No Action" alternative is a procedural NEPA requirement (40 CFR 1502), is a viable and reasonable alternative that could be selected, and serves as a basis for comparison with the other alternatives.

3.2 ALTERNATIVES DISMISSED FROM FURTHER ANALYSIS

3.2.1 An ORVAC Program with Animal Specimen Collections for Monitoring Purposes

Under this alternative, an ORVAC program would be implemented similar to the proposed action but would also include the collection of wild animal specimens from NPS lands for monitoring and project evaluation purposes through the use of a variety of live capture or lethal methods including shooting, leghold traps, cage traps, foot snares and wire cable neck snares (USDA 2004a). The Texas ORVAC program already collects wild animals for monitoring purposes in other areas of the state (USDA 2004a); thus, the Texas ORVAC program has determined that it would not be necessary to collect wild animals for monitoring purposes at Palo Alto at this time or within the foreseeable future. For this reason this alternative was not considered further.

3.2.2 Trap-Vaccinate-Release Programs

This alternative would involve the live capture of 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, 1992, 1993) and skunks (Rosatte et al. 1990, 1992, 1993). The method has not been attempted for vaccination of coyotes because they are much more difficult to capture in cage traps and it is difficult to live capture and release a high enough proportion of the population with other traps such as leghold traps and snares

(Rosatte et al. 1993; MacInnes, Ontario Ministry of Natural Resources pers. comm. 2001 *in* USDA 2001; personal observation of APHIS-WS personnel *in* USDA 2001). Currently, no vaccine is specifically licensed for this type of use (CDC 2007d). However, certain injectable vaccines may be used "off-label" under the direction of veterinarians to vaccinate wild animal species in certain situations (Mitzel, APHIS-Veterinary Services, pers. comm. 2001 *in* USDA 2001). This alternative was not considered further due to the labor-intensiveness and costliness involved in trying to capture an adequate number of coyotes for vaccination by hand.

3.2.3 Depopulation of Coyotes

This alternative would result in the lethal removal of coyotes throughout the zones where outbreaks of the canid variant of rabies virus is occurring or is expected to occur. The goal would be to achieve elimination of the canid rabies variant by severely suppressing populations of coyotes over broad areas so this specific variant of rabies could not be transmitted to other susceptible members of the same species. This could theoretically stop the forward advance of the disease and potentially result in elimination of the canid rabies variant since infected animals would die from rabies before they could transmit it to other members of the same species.

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 efforts 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 necessarily related to the population density of such vectors (MacInnes 1998).

The greatest difficulty with population reduction as a strategy for reducing or eliminating rabies is that a high level of effort must be maintained almost indefinitely (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 compensatory reproduction (i.e., larger litters and greater percentages of females breeding following population reduction) (Clark and Fritzell 1992, Connolly and Longhurst 1975). These two factors could result in local populations recovering to their previous population level in a relatively short period of time, thus requiring a sustained and frequent suppression effort to maintain populations at the desired levels.

For these reasons, and because depopulation of the coyote species would be considered inconsistent with the NPS mission, this alternative was not considered further.

3.2.4 Employ Other Types of ORVAC instead of the V-RG Vaccine

Under this alternative, the NPS would use or authorize the use of a "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. Modified-live-virus vaccines include those that have been used in the past to vaccinate domestic animals by injection in the U.S. 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,

1997). They have also been tested in red foxes in Canada (Lawson et al. 1989, 1997), and in red foxes and raccoons in the U.S. (Rupprecht et al. 1989, 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 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 2 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 probably be cost-prohibitive (Rupprecht et al. 1992c).

Currently, RABORAL V-RG® is the only vaccine licensed for use in coyotes in the U.S. (Merial 2007). For all of the above reasons, this alternative was not considered further.

3.3 MITIGATION IN STANDARD OPERATING PROCEDURES FOR RABIES ORVAC PROGRAMS

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for impacts that otherwise might result from that action.

A number of key mitigating measures are currently part of the standard operating procedures of state-operated ORVAC programs and would be used as part of the ORVAC program at Palo Alto. These include:

- Public information and education actions and media announcements to inform the public about ORVAC bait distribution activities before they occur.

- Notifying the appropriate government authorities/officials prior to distributing ORVAC baits along the U.S.-Mexico border.

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

- In the unlikely event of an adverse vaccinia virus exposure in humans, 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.

- Training of bait distribution navigators to avoid dropping baits on people, structures, and large bodies of water (lakes, reservoirs, rivers). During aerial bait drop operations, the bait dispensing equipment is temporarily turned off over large bodies of water, human dwellings, and when people are observed below. Every effort would be made to drop baits during off-peak visitor use on NPS lands.

- ORVAC baits would not be distributed by aircraft within 1/4 mile of water bodies to reduce the potential of baits entering the water source.

- Adherence of aircraft to air safety standards.

- Training of personnel in hand distribution of baits to avoid properties with greater risk of human or pet encounters with baits.

- Labels are affixed to ORVAC bait blocks instructing persons not to disturb or handle them and contain a toll-free telephone number to call for further information and guidance in the event of accidental exposure to the vaccine.

- Education campaigns by state and local health departments, the CDC, APHIS-WS, Cornell and Tufts Universities, and others are already occurring in conjunction with the ORVAC program to teach the general public about rabies prevention and risks (go to the CDC's website at http://www.cdc.gov/ or APHIS-WS' website at http://www.aphis.usda.gov/ws/rabies/index.html to learn more about rabies and its prevention).

- The Communication Planning Team, part of the Rabies Management Team, is developing a means to enhance interaction with the public regarding ORVAC, including web site creation. However, an immediate charge for this team is to bring together all key interests including hunters, dog trainers, rehabilitators, nuisance wildlife control operators, and agency personnel to seriously address translocation of rabies reservoir species, which could jeopardize national efforts to control terrestrial variants of rabies (Slate et al. 2002; R. Chipman, APHIS-WS, pers. comm. 2004).

3.4 ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is determined by applying the criteria suggested in Section 101 of the National Environmental Policy Act which states that "…it is the continuing responsibility of the federal government to…(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences; (4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice; (5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

Alternative 1, the Proposed Action, is the environmentally preferred alternative. Alternative 1 is believed to be the least environmentally intrusive alternative available for achieving the goals of eliminating and stopping the forward (northward) advance of the canid variant of the rabies virus in Texas and reducing the incidence of rabies cases involving wild and domestic animals and rabies exposures to humans. Alternative 1 surpasses the other alternative (no action) by recognizing the range of national environmental policy goals as stated in Section 101 of the National Environmental Policy Act. Alternative 1 integrates "…safe, healthful….surroundings" with resource protection.

4.0 CHAPTER 4: AFFECTED ENVIRONMENT

This section presents some descriptive information on the environment of the area that would be affected by the proposed action. Other descriptive aspects of the affected environment are included in Chapter 5 in the analysis of effects which is based on the environmental and other types of issues identified in Section 2.1.

"Major Habitat Types" as described by Ricketts et al. (1999) that would be affected by ORVAC programs under the proposed action are: Temperate Grasslands/Savannah/Shrub and Xeric Shrublands/Deserts. As described by Bailey (1995) the ecoregions for the affected area range from dry desert to grassland-shrub communities including the following two provinces in the "Dry Domain" series:

- 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; 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.

- Chihuahuan Desert Province – mostly desert with undulating plains with elevations near 4,000 ft.; long hot summers and short winters; 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.

The area of the proposed program includes Palo Alto in Texas where coyote rabies outbreaks could potentially occur. Palo Alto preserves the broad coastal prairie - scene to the 1846 battle between the U.S. and Mexico - and informs visitors about its national and international importance. As the only unit of the NPS with a primary focus on the U.S.-Mexican War, Palo Alto Battlefield also interprets the entire conflict, including the details of its origins and the broad range of consequences. Palo Alto was created to recognize an important historical event, but it is also notable for its natural features. Drawn around an expanse of more than 3,400 acres of undeveloped land, the park boundaries contain an abundance of plant and animal life, including many species that are unique to the U.S-Mexico border region (USDI 2007b).

The coastal plain surrounding Palo Alto is carpeted with clumps of razor-sharp cord grass and other low-lying grasses and flowers. The field stretches eastward for miles toward the Gulf of Mexico, interrupted only by scattered trees, yuccas, and prickly-pear cactus (USDI 2007b). To the north, south, and west, the open prairie gives way to dense thickets of mesquite, acacia, and thorny undergrowth. A series of shallow ravines, known as resacas, once formed the bed of the ever-shifting Rio Grande and interweave throughout the park. Although they remain dry for much of the year, occasional heavy rains create small pools in these former river channels and spur the growth of reedy plants that thrive in marshy areas. This assortment of habitats also supports a variety of wildlife such as coyotes, jackrabbits, bobcats, javelina, opossums, tortoises, and rattlesnakes. The abundance of wildlife, in addition to the battlefield scene, makes the Palo Alto Battlefield an attractive stopping point for visitors (USDI 2007b).

Currently, ORVAC program activities (cooperative rabies surveillance activities and/or baiting programs) are conducted in Texas along with 25 additional states, on a variety of different land classes including numerous NPS lands to manage several variants of the rabies virus. The proposed program would be part of a broader program to create zones of vaccinated target species that would then serve as barriers to cease the further advancement of the

canid rabies virus variant. Aerial distribution of ORVAC baits avoids urban and suburban areas that support high human population densities, as well as lakes and rivers. Aerial distribution of baits 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 are distributed by careful hand placement to help to minimize contact by humans, pets and other domestic animals. This approach would be used in the area included under the proposed action.

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 ORVAC targeted zones (J.P. Koplan, M.D., Director, CDC, pers. comm. 2001 *in* USDA 2001). Therefore, participation by the NPS is necessary to support and cooperate with the involved state agencies and APHIS-WS in their ongoing efforts of effectively managing rabies. Currently, cooperative rabies vaccination programs are conducted on various land classes in Texas in addition to 25 states in the eastern U.S. By participating, the NPS would aid in enhancing the effectiveness of the national program. If baiting programs were conducted around large land masses such as parks, reservoirs of the virus would likely still exist, creating holes in the program and potentially making the program less effective at stopping the forward advance or eliminating the canid variant of the rabies virus.

Three federally recognized American Indian Tribes, Alabama-Coushatta Tribe, Kickapoo Traditional Tribe, and Ysleta del Sur Pueblo, are located in Texas. These tribes have been notified of the proposed ORVAC program within their state, as well as past and current ORVAC programs, during public involvement processes.

Chapter 5 contains further affected environment information with respect to target and nontarget species and T&E species.

5.0 CHAPTER 5: ENVIRONMENTAL CONSEQUENCES

Methodology for Assessing Impacts

This section analyzes potential environmental consequences using Alternative 2 (No Action Alternative) as the baseline for comparison with the other alternatives to determine if the real or potential impacts are greater, lesser or the same. Tables 5-1 and 5-2, located at the end of this chapter, summarize a comparison of the issues and impacts to each alternative and the extent to which each alternative meets the project objectives.

Potential impacts are described in terms of context (are the effects site-specific, local, or even regional?), duration (short- or long-term?), and intensity (negligible, minor, moderate, or major?). The thresholds of change for the intensity of an impact are defined as follows:

- **Negligible**-the impact is at the lowest levels of detection
- **Minor**-the impact is slight, but detectable
- **Moderate**-the impact is readily apparent
- **Major**-the impact is a severe or adverse impact or of exceptional benefit

In addition to determining the environmental consequences of the preferred and other alternatives, NPS (*Management Policies 2006*) requires analysis of potential effects to determine whether or not actions would impair park resources.

The fundamental purpose of the National Park System, established by the Organic Act of 1916 and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute an impairment. An impact would be more likely to constitute an impairment to the extent it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

Cumulative Impacts. The Council on Environmental Quality (CEQ), which implements the National Environmental Policy Act, requires assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results 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 other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no-action and proposed action alternatives.

Cumulative impacts were determined by combining the impacts of the proposed alternative with potential other past, present, and reasonably foreseeable future actions. Therefore it was necessary to identify other ongoing or foreseeable future projects affecting these units and, if applicable, the surrounding region. No reasonably foreseeable future projects are anticipated which, in combination with the proposed project, may impact the NPS unit listed in this document. However, occasional overflights (i.e., radio telemetry, GIS mapping, military training routes) may occur over park units. Overflights for the purposes of ORVAC bait distribution activities would only occur once per year and aircraft will only fly momentarily over 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 duration, on a local scale, with negligible intensity. Therefore, cumulative impacts from the combination of ORVAC bait distribution overflights and other park unit overflights should be negligible (see Chapter 2 for additional information).

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

Alternative 1 - Authorize an ORVAC Program (Proposed Action)

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 ORVAC experimental programs (USDA 1991, 1992).

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. Replication of the virus would be necessary for the disease to occur.

Implementation of the ORVAC program would reduce the risk of humans contracting rabies by reducing the chance of encountering rabid animals that have been infected by the raccoon variant of the disease.

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). 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, 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 (CNS) can occur with vaccinia virus and are generally thought to be allergic in nature (USDA 1991). CNS complications occurred at an average rate of 3 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). 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 ORVAC 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 (USDA 1991). This characteristic even further reduces the risk of V-RG vaccine causing vaccinia-related illness in humans.

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, 1995a, *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, USDA 1991). To aid in further minimizing the potential for adverse effects on humans because of contact with V-RG vaccine, each ORVAC bait contains a warning label advising persons who make contact with baits or the vaccine liquid to contact officials. A telephone number is provided on the bait 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). 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). Potential non-laboratory 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; Moore, TDSHS, pers. comm. 2001 *in* USDA 2001).

Studies of the effects of V-RG vaccine on nonhuman primates can provide an indication of the potential to affect humans (USDA 1991). 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).

McGuill et al. (1998) conducted a retrospective 4-year survey of directors of five ORVAC programs that used the V-RG vaccine 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 109,181 km^2 (42,181 mi^2) of treated area and a total of nearly 6 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 66 million baits disbursed since APHIS-WS ORVAC program inception between 1995 and 2005, only 965 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 this document as an "exposure"). This equates to one human exposure per 68,746 baits distributed (0.0015 percent contact cases). 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 0.0015 percent of contact cases reported since APHIS-WS ORVAC program inception in 1995, only one known adverse reaction has occurred (USDA 2007a, 2007b, 2007c).

The adverse reaction occurred in Ohio in September, 2000, when a woman was bitten by her dog while trying to take away an ORVAC 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). 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). 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). The woman also tested positive for rabies antibodies three weeks after the exposure, indicating she may also have developed rabies immunity (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.

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 states 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 *in* USDA 2001). 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 *in* USDA 2001). 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). 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 *in* USDA 2001).

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 negligible based on the extremely low rate of reported occurrences in ORVAC programs.

Potential to Cause Cancer (Oncogenicity)

This issue has been addressed in a previous EA and in formal risk analyses (USDA 1991, *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.

Cumulative Impacts: Cumulative impacts of the proposed ORVAC program would likely be beneficial given that the possibility of humans becoming exposed to raccoon variant of the rabies virus would be reduced with this program. The ORVAC vaccine and bait that would be used has a negligible risk of causing adverse affects to humans. A limited number of baits would be distributed one time per year on an annual basis, thereby limiting the amount of exposure a person may have to an ORVAC bait or bait distributing equipment. Cumulative impacts to humans would likely be beneficial. Any adverse impacts to humans from exposure to the vaccine or baits would be negligible.

Conclusion: Based on this information, risks to humans from contact with the V-RG vaccine are believed to be negligible. The risk and potential severity of adverse effects from rabies exposures in humans would probably be greater without ORVAC programs than would be the risk of serious adverse effects from vaccinia virus infections with ORVAC programs. Implementation of an ORVAC program would likely have a beneficial impact to humans. This alternative would support the state of Texas in the effort of reducing or possibly eliminating of this variant of the virus from the U.S.

Alternative 2 - No Action (No Involvement in Rabies Prevention or Control)

Potential to Cause Rabies in Humans

The risk of humans being exposed to the vaccine or baits would not occur since ORVAC baits would not be distributed at Palo Alto in Texas. The no action alternative would most likely result in greater risk of human exposure to rabies than the proposed action because the involved state ORVAC programs would have less chance of being successful in stopping or preventing the northward spread of the canid rabies variant in coyotes.

Potential for Vaccinia Virus to Cause Disease in Humans

This risk would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

Potential to Cause Cancer (Oncogenicity)

This risk would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

Cumulative Impacts: Cumulative impacts of the No Action alternative could result in an increase in human exposure to the canid variant of the rabies virus. Reservoirs of the virus could remain in untreated areas making the total elimination of this strain of the virus highly unlikely. This alternative could result in moderate, adverse cumulative impacts to

humans. No cumulative impacts from the distribution of ORVAC into the environment would occur since no ORVAC baits would be used.

Conclusion: There would be no direct impact to humans as ORVAC baits would not be distributed and humans would, therefore, not be exposed the vaccine or baits. However, there could be an indirect adverse cumulative impact from increased human exposure to the canid variant of the rabies virus. This alternative would not support the efforts of the state of Texas in reducing or eliminating this variant of the virus from the U.S.

5.2 Effects of the ORVAC V-RG Vaccine on Coyotes

Alternative 1 - Authorize an ORVAC Program (Proposed Action)

The primary concern here is whether the V-RG virus may cause disease in coyotes that consume ORVAC baits. 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. In addition, extensive experimental field testing of V-RG vaccine with subsequent collections and necropsies of coyotes for monitoring purposes in Texas have not produced any observed pathological signs of disease or other adverse effects on this species (E. Oertli, TDSHS, pers. comm. 2001 *in* USDA 2001). 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 coyote populations.

Cumulative Impacts: Cumulative impacts would likely be beneficial as the proposed ORVAC program would reduce the possibility of coyotes becoming infected with the rabies virus. The ORVAC vaccine and bait that would be used has been found safe for coyotes. The ORVAC vaccine and bait that would be used has a negligible risk of causing adverse affects to coyotes. Cumulative impacts to coyotes would likely be beneficial as those animals that consume baits would likely be vaccinated against the rabies virus.

Conclusion: Adverse impacts to coyotes from contact with the V-RG vaccine are believed to be negligible. Implementation of an ORVAC program would likely have a beneficial impact to coyotes by reducing the occurrence of the canid variant of the rabies virus in the wild. This alternative would support the state of Texas in the effort of reducing or possibly eliminating of this variant of the virus from the U.S.

Because the actions described in the alternative would not severely affect a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the unit; (2) key to the natural or cultural integrity of the units or to opportunities for enjoyment of the unit; or (3) identified as a goal in the unit's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Alternative 2 - No Action (No Involvement in Rabies Prevention or Control)

The potential effects of coyotes being exposed to the V-RG vaccine would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

Cumulative Impacts: Cumulative impacts of the No Action alternative could result in an increase in coyote exposure to the rabies virus. Reservoirs of the virus could remain in untreated areas making the total elimination of the canid variant of the virus highly unlikely. This alternative could result in moderate, adverse cumulative impacts to coyotes. No cumulative impacts from the distribution of ORVAC into the environment would occur since no ORVAC baits would be used.

Conclusion: There would be no direct impact to coyotes as ORVAC baits would not be distributed and coyotes would, therefore, not be exposed to the vaccine or baits. However, there could be an indirect moderate adverse cumulative impact from increased animal exposure to the canid variant of the rabies virus. This alternative would not support the efforts of the state of Texas in reducing or eliminating this strain of the virus from the U.S.

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

Alternative 1 - Authorize an ORVAC Program (Proposed Action)

The primary concern here is whether the vaccinia virus-rabies glycoprotein combination (i.e., RABORAL V-RG® vaccine) might cause disease in nontarget animals that consume or otherwise come into contact with the vaccine. 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 and include relevant taxonomic groups believed to be potentially at risk for contact with the V-RG vaccine such as:

- Natural ecological competitors of foxes, such as raccoons (*Procyon lotor*), opossums (*Didelphis virginianus*), several mustelids [skunk, badger (*Taxidea taxus*), mink (*Mustela vision*), otter (*Lutra canadensis*), ferret (*Mustela putorius*)], other members of the canid family [coyote, red fox, gray fox, arctic fox (*Alopex lagopus*), raccoon dog (*Nyctereutes procyonoides*)], bobcat (*Lynx rufus*), and black bear (*Ursus americanus*).
- Domestic cats (*Felix domesticus*) and dogs (*Canis familiaris*).
- 19 rodent species (Order *Rodentia*) that might be expected to gnaw on or consume baits. Families within this order represented in the studies included: *Muridae, Erethizonidae* [porcupine (*Erithizon dorsatum*)], *Sciuridae, Cricetidae,* and *Zapodidae*.
- 1 bat species [Daubenton's bat (*Myotis daubentoni*)].
- 8 bird species, including three hawk species [red-tailed hawk (*Buteo jamaicensis*), common kestrel (*Falco tinnunculus*), common buzzard (*B. Buteo*)], and one species each of owl [great horned owl (*Bubo virginianus*)], crow [carrion crow (*Corvus corone*)], gull [ring-billed gull (*Larus delawarensis*)], magpie [European magpie (*Pica pica*)], and jay [Eurasian jay (*Garrulus glandarius*)].
- Domestic livestock [cattle (*Bos taurus*), 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 chimpanzee (*Pan troglodytes*)].

Rupprecht et al. (1992a) reported there has been no mortality or morbidity (i.e., signs or symptoms of disease) and no lesions typical of pox virus infections caused by V-RG vaccine 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 to date. In field trials with V-RG ORVAC baits to treat wild raccoons in which target and nontarget species were captured and tested, no vaccine-related lesions or other adverse effects have been found to occur (Rupprecht et al. 1992a). The ORVAC program would reduce the likelihood of wildlife being exposed to the rabies virus.

There is no evidence of potential harm to target or nontarget species from overdosage of RABORAL V-RG® vaccine by any route or from multiple doses. A number of nontarget species have been dosed with 2 to 10 times the amount of vaccine in an individual ORVAC bait without adverse effects (USDA 1991, 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.

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

With regard to threatened or endangered species, the RABORAL V-RG® vaccine distributed in baits would have no adverse effects on any federal- or state-listed threatened or endangered species or their critical habitats (see Appendix C and D for species lists). Several federal- and state-listed carnivorous species (listed below) occur within the state of Texas and may be attracted to ORVAC baits. If these species came in contact with and consumed an ORVAC bait it would be expected that they would experience no effect other than possibly becoming immunized against rabies.

Listed T&E Species (USDI 2007a and Texas Parks and Wildlife 2007):

- **Ocelot** (*Leopardus pardalis*) and **Gulf Coast Jaguarundi** (*Herpailurus yagouaroundi cacomitli*). These two species are both federal- and state-listed as endangered and potentially occur in south Texas where coyote rabies ORVAC programs are conducted. These species may be attracted to or consume ORVAC baits; however, the only effect of the baits on this species would be possible vaccination from rabies. Therefore, ORVAC bait distribution activities would have no adverse effect on this species. A potential indirect beneficial impact of ORVAC programs would be a reduced risk of contracting and dying of rabies if the spread of the canid variant of the rabies virus is successfully eliminated.

  The USFWS provided APHIS-WS an opinion that ORVAC programs in south Texas are not likely to adversely affect these species (letter dated January 18, 1995, copy contained in USDA 1995b). Methods that would be used to collect coyotes for monitoring purposes that might have the potential to affect these species include leghold traps and snares. APHIS-WS has agreed to certain program restrictions on the use of these methods in areas where ocelot and jaguarundis might occur in order to avoid incidental take or jeopardy to these species. The USFWS has issued a Biological Opinion (BO) and incidental take statement concurring that incidental take is unlikely to occur (USDI 1997). Monitoring and surveillance activities, including capture of animals, would only be conducted outside the boundaries of the park. Activities by APHIS-WS outside NPS lands have been analyzed in the APHIS-WS programmatic EA regarding ORVAC and other rabies management activities (USDA 2004a). ORVAC bait distribution activities, as discussed in this document under the proposed action, would have no effect on these species other than possibly immunizing them against the rabies virus.

- **Jaguar** (*Panthera onca*). This species is both federal- and state-listed as endangered in Texas. Although the jaguar's historical range includes south Texas, the latest record of occurrence was in 1948 (Nowak 1975). The general consensus indicates that habitat fragmentation and loss north and south of the Mexican border makes recurrence in Texas unlikely (62 FR 39147, July 22, 1997). For these reasons, ORVAC program activities would have no adverse impact on the jaguar in Texas.

  The USFWS issued a BO on the effects of the APHIS-WS program on the jaguar in 1999 in which the USFWS determined activities by APHIS-WS were not likely to jeopardize the continued existence of this species (USDI 1999). 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 (USDI 1999). Rabies program monitoring and surveillance activities, including capture of animals, would only be

conducted outside the boundaries of the park. Activities by APHIS-WS outside NPS lands have been analyzed in the APHIS-WS programmatic EA regarding ORVAC and other rabies management activities (USDA 2004a). ORVAC bait distribution activities, as discussed in this document under the proposed action, would have no effect on these species other than possibly immunizing them against the rabies virus.

- **Mexican Gray Wolf** *(Canis lupus baileyi)*. The Mexican gray wolf is both federal- and state-listed as endangered in Texas. The historical range of the Mexican gray wolf includes south Texas where the coyote rabies ORVAC programs are conducted. No Mexican wolves are currently known or believed to exist in Texas. Therefore, ORVAC bait distribution would have no effect on this species nor would it adversely affect the species should the wolf once again become established in Texas.

  In 1988, the USFWS issued a BO (for naturally occurring wolves) and Conference Opinion (on an experimental nonessential population being established in Arizona and New Mexico) on the effects of the APHIS-WS program on the Mexican wolf. In that BO, the USFWS determined activities by APHIS-WS were not likely to jeopardize the continued existence of this species (USDI 1998). The BO contains an incidental take statement that requires reinitiation of consultation if a wolf is taken (USDI 1998). Should this species be reintroduced in Texas, a potential beneficial indirect impact of ORVAC programs would be a reduced risk of contracting and dying of rabies if the spread of the canid variant of the rabies virus is successfully eliminated.

- **Red Wolf** (*Canis rufus*). The historic range of the red wolf occurred throughout the southeastern U.S. from the Atlantic Coast to central Texas and from the Gulf of Mexico to central Missouri. Red wolves are federal- and state-listed as endangered in Texas. However, red wolves are now considered to be extinct in the wild in this state. Therefore, the proposed action would have no adverse impact on this species.

- **Louisiana Black Bear** (*Ursus americanus luteolus*). This species is listed as federal- and state-listed as threatened in Texas. It is conceivable that this species could consume ORVAC baits intended for coyotes. Safety studies on black bears (Rupprecht et al. 1992a) indicate bears would not be adversely affected by ORVAC. An indirect beneficial effect would be a reduced risk of the species suffering further declines because of a rabies epizootic. Therefore, the proposed action would have no adverse impact on this species.

- **American Black Bear** (*Ursus americanus*). This species is state-listed as threatened in Texas. It is conceivable that this species could consume ORVAC baits intended for coyotes. Safety studies on black bears (Rupprecht et al. 1992a) indicate bears would not be adversely affected by ORVAC. An indirect beneficial effect would be a reduced risk of the species suffering further declines because of a rabies epizootic. Therefore, the proposed action would have no adverse impact on this species.

- **Margay** (*Leopardus weidi*). This species is state-listed as threatened in Texas. The margay is a neotropical felid that ranges from northern Mexico to northern Argentina. It has not been recorded in Texas since a specimen was taken near Eagle Pass in the 1850s. It is extremely unlikely this species would wander into portions of Texas where the ORVAC program is occurring. Therefore, the proposed action would have no adverse impact on this species. A potential indirect beneficial impact of ORVAC programs on margay conservation would be a reduced risk of contracting and dying of rabies if the spread of the canid variant of the rabies virus is successfully eliminated.

- **White-nosed Coati** (*Nasua narica*). This species is state-listed as threatened in Texas. It is conceivable this omnivorous species would be attracted to and consume ORVAC baits

intended for coyotes. Although not specifically tested for safety in this species, safety studies on other closely related species such as raccoons (Rupprecht et al. 1992a) indicate coatis would not be adversely affected if they were to consume ORVAC baits. Also, an indirect beneficial effect would be a reduced risk of the species suffering further declines because of a rabies epizootic. Therefore, the proposed action should have no adverse impact on this species.

The proposed action would have no effect on any of the other listed species in Texas (see Appendices C and D).

The USFWS Ecological Services field office in Texas reviewed the proposed ORVAC program and concurred that the program "may affect, but is not likely to adversely affect" the federally endangered ocelot and Gulf Coast jaguarundi. The USFWS also stated that concurrence is not necessary for the federally endangered jaguar, Mexican gray wolf, red wolf, and threatened Louisiana black bear as it is unlikely that these species currently occur in Texas (Allan M. Strant, Field Supervisor, USFWS Ecological Services field office in Corpus Christi – letter dated June 14, 2007 – copies of correspondence are located in the Administrative Record for this EA).

The Texas Parks and Wildlife Department, Wildlife Division has reviewed the proposed ORVAC program and has indicated that the proposed program will have no anticipated negative impacts to state-listed wildlife species (Michael E. Berger, Director, Wildlife Division, Texas Parks and Wildlife Department – letter dated March 28, 2007 - copies of correspondence are located in the Administrative Record for this EA).

Cumulative Impacts: There would be no adverse cumulative impacts of the proposed ORVAC program on nontarget wildlife species, including any federal- or state-listed threatened or endangered species. The ORVAC vaccine and bait that would be used has a negligible risk of causing adverse affects to nontarget wildlife species. Cumulative impacts to nontarget wildlife could possibly be beneficial as those species that consume baits may become vaccinated against the rabies virus. Additionally, the proposed program would reduce the likelihood of nontarget wildlife coming into contact with an animal infected with the rabies virus.

Conclusion: The RABORAL V-RG® vaccine distributed in baits would have no adverse effects on nontarget wildlife species, including any state or federally listed threatened or endangered species. Implementation of an ORVAC program would likely have a minor beneficial impact by possibly immunizing other wildlife species against the canid variant of the rabies virus and by reducing the likelihood of becoming exposed to an animal infected with rabies. This alternative would support the state of Texas in the effort of reducing or possibly eliminating of this variant of the virus from the U.S.

Because the actions described in the alternative would not severely affect a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the unit; (2) key to the natural or cultural integrity of the units or to opportunities for enjoyment of the unit; or (3) identified as a goal in the unit's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Alternative 2 - No Action (No Involvement in Rabies Prevention or Control)

The risk of a nontarget wildlife species being exposed to the V-RG vaccine would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

Cumulative Impacts: Cumulative impacts of the No Action alternative could result in an increase in exposure of nontarget wildlife to the rabies virus. Reservoirs of the virus could

remain in untreated areas making the total elimination of this variant of the virus highly unlikely. This alternative could result in minor, adverse cumulative impacts to other wildlife species. No cumulative impacts from the distribution of ORVAC into the environment would occur since no ORVAC baits would be used.

Conclusion: The risk of a nontarget wildlife species being exposed to the V-RG vaccine would not occur since ORVAC baits would not be distributed at Palo Alto in Texas. However, failure to stop or prevent the spread of rabies would result in adverse effects on wildlife by increasing the likelihood of exposure to an animal infected with the rabies virus. This alternative would not support the efforts of the state of Texas in reducing or eliminating this variant of the virus from the U.S.

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

Alternative 1 - Authorize an ORVAC Program (Proposed Action)

Rupprecht et al. (1992a) and Pastoret et al. (1995) summarized the results of V-RG safety trials in nontarget species. These studies included the oral vaccination of domestic dogs, cats, cattle, and sheep and found no adverse effects on these species. More than 66 million ORVAC 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. 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 or from multiple doses. A number of nontarget species have been dosed with 2 to 10 times the amount of vaccine in an individual ORVAC bait without adverse effects (USDA 1991, 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 5.1, 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 *in* USDA 2001). 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. The vaccinia virus portion of V-RG is more attenuated (i.e., *weaker*) than strains used in smallpox vaccines (USDA 1991). 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 (USDA 2007a, 2007b, 2007c). Reports of these types of instances have been few, and the dogs have reportedly not experienced any substantive or long term adverse effects. USDA (2007a, 2007b, 2007c) documented that of the more than 66 million baits distributed during the APHIS-WS ORVAC program between 1995 and 2005, only 724 instances have been reported where a pet or other domestic animal had contact with a bait. This equates to 1 domestic exposure per 91,630 baits disbursed or 0.001 percent contact cases. No cases of adverse reaction in pets or other domestic animals have ever been reported during the APHIS-WS program. 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 (2007a, 2007b) concluded that adverse cumulative impacts to pets and other domestic animals continue to be negligible.

Cumulative Impacts: There would be no adverse cumulative impacts of the proposed ORVAC program on pet dogs or other domestic animals. The ORVAC vaccine and bait that

would be used has a negligible risk of causing adverse affects to these animals. Cumulative impacts to pets and other domestic animals could possibly be beneficial as those species that consume baits may become vaccinated against the rabies virus. Additionally, the proposed program would reduce the likelihood of pets and other domestic animals coming into contact with an animal infected with the rabies virus.

Conclusion: The RABORAL V-RG® vaccine distributed in baits would have no adverse effects on pets or other domestic animals. Implementation of an ORVAC program would likely have a moderate beneficial impact by possibly immunizing these animals against rabies and reducing the likelihood of becoming exposed to an animal infected with the rabies virus. This alternative would support the state of Texas in the effort of reducing or possibly eliminating of this variant of the virus from the U.S.

Alternative 2 - No Action (No Involvement in Rabies Prevention or Control)

The risk of a pet dog or domestic animal being exposed to the V-RG vaccine would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

Cumulative Impacts: Cumulative impacts of the No Action alternative could result in an increase in exposure of pets and other domestic animals to the rabies virus. Reservoirs of the virus could remain in untreated areas making the total elimination of this variant of the virus highly unlikely. This alternative could result in moderate, adverse cumulative impacts to pets and other domestic animals. No cumulative impacts from the distribution of ORVAC into the environment would occur since no ORVAC baits would be used.

Conclusion: The risk of a pet dog or domestic animal being exposed to the V-RG vaccine would not occur since ORVAC baits would not be distributed at Palo Alto in Texas. However, failure to stop or prevent the spread of rabies would result in adverse effects on domestic animals by increasing the likelihood of exposure to rabid wild animals. This alternative would not support the efforts of the state of Texas in reducing or eliminating this strain of the virus from the eastern U.S.

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

Alternative 1 - Authorize an ORVAC Program (Proposed Action)

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 consume ORVAC 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 USDA, APHIS (USDA 1991, *undated a, undated b*). The Wistar Institute conducted experiments with mice in which the V-RG was "subpassaged[2]" four times into groups of mice (results cited in USDA 1991). The V-RG virus could not be found after passage through the second or third groups of mice. These 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 ORVAC baits (Rupprecht and Kieny 1988).

[2] 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.

Cumulative Impacts: Adverse cumulative impacts of the proposed ORVAC program as a result of the potential for the recombined V-RG virus to "revert to virulence" would be negligible.

Conclusion: The potential for the recombined V-RG virus to "revert to virulence" would be negligible. The RABORAL V-RG® vaccine distributed in baits would have no adverse effects on humans or animals.

Because the actions described in the alternative would not severely affect a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the unit; (2) key to the natural or cultural integrity of the units or to opportunities for enjoyment of the unit; or (3) identified as a goal in the unit's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Alternative 2 - No Action (No Involvement in Rabies Prevention or Control)

This risk would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

Cumulative Impacts: No cumulative impacts from the distribution of ORVAC into the environment would occur since no ORVAC baits would be used.

Conclusion: The risk of the recombined V-RG virus "reverting to virulence" would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

5.6 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

Alternative 1 - Authorize an ORVAC Program (Proposed Action)

The concern here is whether the RABORAL V-RG® vaccine in the ORVAC baits might encounter other 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 (RP) viruses (C. Rupprecht, CDC, pers. comm. 2001 *in* USDA 2001). 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).

For these types of unanticipated spontaneous recombinations to occur, the V-RG and RP would have to simultaneously infect the same cells in the same animal at the same time. 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). Wistar determined the probability of all three circumstances occurring at the same time was 1 chance in 100 million or less (USDA 1991). 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*). 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, 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. Laboratory experiments on mice infected with RP and inoculated with V-RG showed no adverse effects on the mice (USDA 1991).

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). 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 genetic engineering (i.e., 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.

Cumulative Impacts: Adverse cumulative impacts of the proposed ORVAC program as a result of the potential for the RABORAL V-RG vaccine to recombine with other viruses to form new viruses that could cause disease in humans or animals would be negligible.

Conclusion: 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 would be exceedingly unlikely and negligible. This is further supported by the fact that 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.

Because the actions described in the alternative would not severely affect a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the unit; (2) key to the natural or cultural integrity of the units or to opportunities for enjoyment of the unit; or (3) identified as a goal in the unit's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

Alternative 2 - No Action (No Involvement in Rabies Prevention or Control)

This risk would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

Cumulative Impacts: No cumulative impacts from the distribution of ORVAC into the environment would occur since no ORVAC baits would be used.

Conclusion: The risk of the RABORAL V-RG vaccine recombining with other viruses to form new viruses that could cause disease in humans or animals would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

5.7 Potential for Aerially Dropped Baits to Strike and Injure People or Domestic Animals

Alternative 1 - Authorize an ORVAC Program (Proposed Action)

Bait density would average 24-27 per km^2 (64-70 baits per mi^2) in south Texas in order to target coyote population. This density is 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 ORVAC baits were being dropped, and each person occupies about 2 ft^2 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 66 million baits distributed in the U.S. by APHIS-WS between 1995 and 2005, 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 6.6 million baits dropped) (USDA 2007a, 2007b). None of the reports since national ORVAC program inception have resulted in any injury or harm to the individuals involved.

Of the 11.6 million baits that were distributed by APHIS-WS in 2005, 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 2005 APHIS-WS ORVAC program (USDA 2007a, 2007b). In 2005, no cases were documented involving falling baits striking or injuring domestic animals. In 2005, 6 reports were received regarding baits striking property. The reports involved baits striking a house in West Virginia, a vehicle in West Virginia, and 4 swimming pools (3 in West Virginia and 1 in Georgia). No reports of falling baits striking people, pets, or property were reported in Texas. The area where baits are disbursed in Texas is extremely rural and, therefore, the likelihood of falling baits striking anything other than the natural habitat is remote. The potential of falling baits striking or injuring people or domestic animals is 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 areas frequently used by visitors (visitor centers, parking areas, etc.) or in suburban and urban situations, which would further reduce the risk of being struck. Additionally, in areas where backcountry campgrounds are difficult to discern from the air, bait drops would be coordinated to alert campers of the situation or would be conducted when hiking/camping densities are low.

Cumulative Impacts: Adverse cumulative impacts of the proposed ORVAC program as a result of the potential for aerially dropped baits to strike and injure people or domestic animals would be negligible.

Conclusion: The chance of a person or animal being struck and harmed by a falling bait would be extremely remote. To further mitigate the possibility of striking people or animals, bait drop crews would avoid areas containing human dwellings.

Alternative 2 - No Action (No Involvement in Rabies Prevention or Control)

This risk would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

Cumulative Impacts: No cumulative impacts from the distribution of ORVAC into the environment would occur since no ORVAC baits would be used.

Conclusion: There would be no risk of aerially dropped baits striking and injuring people or domestic animals since ORVAC baits would not be distributed at Palo Alto in Texas.

5.8 Potential Impacts on Visitor Use/Experience

Alternative 1 - Authorize an ORVAC Program (Proposed Action)

Many people visit NPS lands each year to escape the sounds and sights of everyday life. Others visit these areas to experience nature in its "natural" state or just to experience the serenity that a NPS park can provide. These people are concerned that the ORVAC program may adversely affect a person's outdoor experience when visiting Palo Alto in Texas.

Impacts of Aerial Distribution of ORVAC Baits

Some people have expressed that overflights of aircraft involved in the distribution of ORVAC baits may adversely impact visitor use and overall park experience. The natural quiet is an important natural resource of the NPS (USDI 1995). The ORVAC program recognizes this concern and attempts to limit a person's exposure to bait distributing aircraft.

Effects on park visitors can be highly variable depending upon the park activities utilized by the visitor (USDI 1995). Backcountry visitors (people using remote areas of the park that are inaccessible by vehicles) would likely be affected to a greater extent than frontcountry visitors (people using areas that are accessible to vehicles).

In general, it appears that the more serious potential impacts occur when overflights are *chronic*, i.e., they occur daily or more often over long periods of time. Chronic exposure situations generally involve areas near commercial airports and military flight training facilities. ORVAC program aerial bait distribution activities are not chronic, but only occur once per year. They are typically conducted during the month of January in Texas; at about 152.4 m (500 ft) above ground level; and only fly momentarily over any one point on the ground during any given bait distribution flight. The aircraft do not circle over areas repeatedly, but fly in straight "transect" lines for purposes of bait distribution. Transect lines would be spaced between 500 m (1640.4 ft) and 750 m (2460.6 ft) apart. Thus, there is a possibility that a visitor may be exposed to a brief encounter with an aircraft distributing baits but not to the extent that a person would be exposed repeatedly or for an extended period of time.

Due to the limited amount of exposure to bait distributing aircraft, it is highly unlikely that a person's park experience would be seriously impacted by this action.

Impacts of Finding an ORVAC Bait or Vaccine Sachet

People visiting Palo Alto in Texas are concerned that their park experience may be lessened as a result of finding an unconsumed bait or empty sachet. The likelihood of this occurring is extremely low due to the limited number of baits that are dropped in a specific area, the biodegradability of the vaccine liquid and baits, and the high consumption rate of ORVAC baits by animal species.

The possibility of a person coming in contact with an ORVAC bait is extremely low due to the bait distribution densities used by the program. Under the proposed program, ORVAC baits would be distributed once a year at an average density of 24-27 per km^2 (64-70 baits per mi^2). Furthermore, McGuill et al. (1998) conducted a retrospective 4-year survey of directors of several ORVAC programs using V-RG vaccine from 1992-1996. The programs occurred in Florida, Massachusetts, New Jersey, New York, and Texas. Altogether, they

involved a total of 109,248 km^2 (42,181 mi^2) of treated area and a total of nearly 6 million baits distributed. Human contacts with the baits totaled 316.

The baits used for the coyote ORVAC program are of two types, either small blocks of fishmeal that are held together with a polymer binding agent or sachets coated with fishmeal. Both types of baits are considered to be "food grade" materials. Therefore, the unconsumed bait material would quickly biodegrade when exposed to the environment.

The ORVAC baits are readily taken up and consumed by wildlife species, thereby reducing the possibility of a person coming into contact with an ORVAC bait. The likelihood of a bait being consumed is dependent upon several factors including animal densities (target and nontarget species), bait preference, and the availability of alternative food sources. In field tests conducted in the U.S., the majority of ORVAC 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. 1998a, 1998b; Hable et al. 1992; Hadidian et al. 1989; Hanlon et al. 1989; Linhart et al. 1994; Steelman et al. 2000, USDA 1995a).

There is a remote possibility that a park visitor may encounter a sachet since they are not readily digested by animals that consume ORVAC baits. This type of occurrence is expected to be minimal. Out of more than 66 million baits disbursed during the APHIS-WS program between 1995 and 2005, only 965 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 68,746 baits distributed (0.0015 percent contact cases) (USDA 2007a, 2007b, 2007c). 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. Most people were exposed to baits as a result of a pet finding the bait and bringing it home. Therefore, the possibility of a park visitor encountering a bait would likely be even lower on NPS units.

Risk of Being Exposed to a Rabid Animal

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 2005 contributed to more than 66 million ORVAC baits disbursed in the U.S (USDA 2007a, 2007b, 2007c). Numerous projects have been conducted or are in progress in the eastern U.S. and Texas (USDA 2007b, 2007c) as discussed in Sections 1.1.4 and 1.1.5. Since ORVAC program inception, positive rabies cases have either decreased or the advance of the virus has been slowed or stopped in many of the states where an ORVAC program was initiated.

Cumulative Impacts: The ORVAC vaccine and bait that would be used has a negligible risk of causing adverse affects to humans. A limited number of baits would be distributed one time per year on an annual basis, thereby limiting the amount of exposure a person may have to an ORVAC bait or bait distributing equipment (i.e., aircraft). Cumulative impacts to humans would likely be beneficial as the proposed ORVAC program would reduce the risk of humans encountering a rabid animal. Any adverse impacts to humans from exposure to the vaccine or baits would be negligible.

Conclusion: The ORVAC program should have no adverse effects on visitor use/experience (i.e., noise from bait distributing aircraft, finding a bait or sachet, and encountering a rabid animal) at Palo Alto in Texas. Due to the limited amount of exposure to a bait distributing aircraft, it would be highly unlikely that a person's park experience would be seriously impacted by this action. Although there would be a remote possibility that a park visitor may encounter a sachet since they are not readily digested by animals that consume ORVAC

baits, the potential would be negligible. The risk of a park visitor being exposed to a rabid animal would be greatly reduced under this alternative.

Alternative 2 - No Action (No Involvement in Rabies Prevention or Control)

Impacts of Aerial Distribution of ORVAC Baits

The potential impacts of aerial distribution of baits would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

Impacts of Finding an ORVAC Bait or Vaccine Sachet

The potential impacts of finding an ORVAC bait or sachet would not occur since ORVAC baits would not be distributed at Palo Alto in Texas.

Risk of Being Exposed to a Rabid Animal

The risk of a park visitor being exposed to a rabid animal would not be reduced under this alternative. This potential risk could adversely impact a person's park experience if the visitor is concerned with being exposed to or coming in contact with a rabid animal.

Cumulative Impacts: Cumulative impacts of the No Action alternative could result in an increase in human exposure to a rabid animal since animals would not receive vaccination by ORVAC bait distribution. This alternative could result in moderate, adverse cumulative impacts to humans. No other cumulative impacts on visitor use/experience, such as impacts of aerial distribution of ORVAC baits or impacts of finding an ORVAC bait or vaccine sachet, would occur since no ORVAC baits would be used.

Conclusion: The potential impacts of aerial distribution of baits and finding an ORVAC bait or sachet would not occur since ORVAC baits would not be distributed at Palo Alto. However, the risk of a park visitor being exposed to a rabid animal would not be reduced under this alternative since ORVAC baits would not be distributed at Palo Alto. This alternative could result in moderate, adverse cumulative impacts to humans.

Table 5-1. Comparative Summary of Environmental Impacts

Issue	Expected Impacts by Alternative	
	Alternative 1. Authorize an ORVAC Program - Proposed action (*this is the preferred alternative*).	**Alternative 2. No action.**
Potential for adverse effects on people that become exposed to the vaccine or the baits.	Negligible adverse impacts from humans being exposed to baits and vaccine. Reduced threat of human exposure to the rabies virus.	No impact from being exposed to baits or vaccine. Potential moderate, adverse impacts from risk of human exposure to rabies.
Effects of the ORVAC V-RG vaccine on coyotes.	No adverse impacts. Beneficial impact from immunizing coyotes against rabies.	No impact from being exposed to bait or vaccine. Potential moderate, adverse impacts from continued exposure to and possibility of acquiring rabies.
Potential for adverse effects on nontarget wildlife species, including threatened or endangered species.	No adverse impacts. Potential minor beneficial impact by possibly immunizing wildlife species against rabies.	No impact from being exposed to bait or vaccine. Potential moderate, adverse impacts from continued exposure to and possibility of acquiring rabies.
Potential for adverse effects on pet dogs or other domestic animals that might consume the baits.	No adverse impacts. Potential minor beneficial impact by possibly immunizing domestic animals against rabies.	No impact from exposure to baits or vaccine. Potential moderate, adverse impacts from continued exposure to and possibility of acquiring rabies.
Potential for the recombined V-RG virus to "revert to virulence" and result in a virus that could cause disease in humans or animals.	Negligible risk of adverse impacts.	No impact.
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 animal	Negligible risk of adverse impacts.	No impact.
Potential for aerially dropped baits to strike and injure people or domestic animals.	Negligible risk of adverse impacts.	No impact.
Potential impacts on visitor use/experience	Negligible impact from distribution of ORVAC baits. Beneficial impact by reducing the threat of being exposed to a rabid animal.	No impact from distribution of ORVAC baits. Potential moderate, adverse impacts from threat of being exposed to a rabid animal.

Table 5-2. Comparative Summary of Alternatives and Extent to which Each Alternative Meets the Project Objectives.

Alternative 1. Authorize an ORVAC Program – Proposed Action *(this is the preferred alternative)*.	**Alternative 2. No Action.**
This alternative would involve NPS participation in ORVAC programs at Palo Alto Battlefield National Historic Site in Texas to create zones of vaccinated target species that would then serve as barriers to eliminate and/or cease the further advancement of the canid variant of the rabies virus. Vaccination zones would be determined in cooperation with the involved states' rabies task forces, state health departments, and/or other agencies with jurisdiction over vaccine use and application in wildlife and domestic animal species. The program would involve the use of APHIS-WS federal funds to purchase and/or distribute ORVAC baits. On an annual basis, one treatment of ORVAC baits could be distributed by aircraft and/or ground placement at Palo Alto in Texas. The need to distribute baits at this park would be accessed annually and based on the most current distribution of rabies cases and the expected direction of disease spread. The treatment would continue on a recurring basis until the goals of the ORVAC program have been met.	This alternative would preclude the NPS from any involvement in an ORVAC program at Palo Alto Battlefield National Historic Site in Texas.
Meets Project Objectives? Yes. The NPS would assist the state of Texas in stopping the forward advance of the canid variant of the rabies virus in Texas by immunizing portions of target species (coyote) populations along the leading edges of the rabies fronts where Palo Alto is located. The NPS would assist the states of Texas in reducing the incidence of rabies cases involving wild and domestic animals and rabies exposures to humans in the areas where the ORVAC programs are conducted.	**Meets Project Objectives?** No. The NPS would not assist the state of Texas in stopping the forward advance of the canid variant of the rabies virus. The NPS would not assist the state of Texas in reducing the incidence of rabies cases in wildlife and domestic animals and rabies exposures to humans.