ENVIRONMENTAL ASSESSMENT

Feral Swine Damage Management in Hawai`i

Prepared by:

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

In Consultation with:

State of Hawai`i Department of Land and Natural Resources
State of Hawai`i Division of Forestry and Wildlife

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EXECUTIVE SUMMARY

Feral swine (*Sus scrofa*) can cause significant damage to property, agriculture (crops and livestock), native species, ecosystems, and historic and cultural resources. They can also pose a threat to the health of wildlife, domestic animals, and humans. The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program has been working with federal, state, territorial, local agencies; tribes; organizations; and private individuals to address specific localized feral swine damage problems.

In this analysis, the term feral swine is used to refer collectively to free-ranging swine. This term includes escaped (stray) domestic and pet swine and their descendants, Polynesian pigs, and Eurasian (Russian) wild boar and their hybrids. Terms used by other entities may include wild pig, feral pig, wild hog, and wild boar (USDA 2015).

Wildlife Services' nationally coordinated program has provided a "template" for WS to use in preparing this Environmental Assessment (EA) to evaluate ways this responsibility can be carried out to reduce feral swine conflicts in the State of Hawai`i. The EA will evaluate the individual damage control activities and methods that could be conducted by WS to manage damage and threats caused by feral swine, while also considering the significance the animal holds in Hawaiian culture. WS chose to prepare this EA to facilitate planning, interagency coordination and the streamlining of program management, and to clearly communicate with the public the analysis of individual and cumulative impacts. This EA will assist WS in determining whether these activities could have a significant impact on the human environment based on past and present actions and the anticipation of receiving additional requests for expanded assistance. In addition, this EA has been prepared to evaluate and determine if there are any potentially significant or cumulative impacts on feral swine as well as non-target species and the environment from the proposed and planned damage management program.

Pursuant to the National Environmental Policy Act (NEPA) and the Council for Environmental Quality (CEQ) regulations, WS is preparing this EA to document the analyses associated with proposed federal actions and to inform decision-makers (public, private and Native Hawaiian) and the public, of reasonable alternatives capable of avoiding or minimizing adverse effects. In addition, the EA will facilitate planning, promote interagency coordination, and streamline program management analyses between WS and the Hawai`i Department of Land and Natural Resources.

This EA analyzes four alternatives of Feral Swine Damage Management (FSDM) by which feral swine control could be carried out to reduce or eliminate individuals and localized populations, to protect natural resources, agriculture, private property, public property and human health and safety:

<u>Alternative 1 - Continue the Current WS Program (No Action)</u>
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 baseline for comparison with the other alternatives. The No Action alternative is the continuation of an ongoing program and, as defined here, is consistent with the CEQ's definition (CEQ 1981).

<u>Alternative 2 - No Wildlife Services Program</u>
This alternative would eliminate WS involvement in FSDM in Hawai`i. WS would not provide direct operational or technical assistance and requestors of WS services would have to conduct their own FSDM without WS input, or possibly seek assistance through DOFAW or local hunters.

Alternative 3 – Only Non-lethal FSDM Methods Used by WS

This alternative would not allow for lethal WS operational FSDM in Hawai`i. This alternative would require WS to use only non-lethal methods to resolve feral swine damage problems. Non-lethal methods available for use by WS under this alternative would include various live capture techniques as well as hazing or harassment methods, such as propane exploders, pyrotechnics, and other scare devices. This alternative would not restrict other agencies or private individuals/hunters from using lethal control methods.

Alternative 4 - Technical Assistance Only

WS would only provide technical assistance for alleviating damage when requested. This alternative would not restrict other agencies or private individuals/hunters from using lethal or non-lethal control methods.

The reasons that a FSDM program is needed are covered in Chapter 1. The potential methods that may be used and the aspects of the human and natural environment that could be affected are discussed in chapters 2 and 3.

After examining various aspects of the four alternatives, WS recommends Alternative 1- Continue the Current WS Program, no change in action. WS uses an Integrated Wildlife Damage Management (IWDM) approach, also known as Integrated Pest Management (WS Directive 2.105[1]), in which a combination of methods may be used or recommended to reduce wildlife damage. These methods may include alteration of cultural practices and habitat and behavioral modification to prevent or reduce damage. The reduction of wildlife damage may require that the local populations of offending animal(s) be reduced through lethal means.

[1] WS Policy Manual - Provides guidance for WS personnel to conduct wildlife damage management activities through Program Directives. WS Directives referenced in this EA can be found in the manual but will not be referenced in the Literature Cited Appendix.

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APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

APHIS	Animal and Plant Health Inspection Service
bTB	Bovine Tuberculosis
CEQ	Council for Environmental Quality
CDC	Center for Disease Control
CSF	Classic Swine Fever
CFSPH	Center for Food Security and Public Health
CZMA	Coastal Zone Management Area
DEA	Drug Enforcement Administration
DOFAW	Division of Forestry and Wildlife
EA	Environmental Assessment
EIS	Environment Impact Statement
EPA	Environmental Protection Agency
FAD	Foreign Animal Diseases
FDA	Food and Drug Administration
FMD	Foot and Mouth Disease
FMIA	Federal Meat Inspection Act
FONSI	Finding of No Significant Impact
FSDM	Feral Swine Damage Management
HDLNR	Hawai`i Department of Land and Natural Resources
HDOA	Hawai`i Department of Agriculture
HRS	Hawai`i Revised Statute
IPM	Integrated Pest Management
IWDM	Integrated Wildlife Damage Management
MIS	Management Information System
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWRC	National Wildlife Research Center
PCVAD	Porcine Circovirus Associated Disease
SIV	Swine Influenza Virus
T&E	Threatened and Endangered
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WDM	Wildlife Damage Management
WS	Wildlife Services

1.0 NEED FOR ACTION AND SCOPE OF ANALYSIS

1.1 Introduction

Feral swine *(Sus scrofa)* are a destructive invasive species, they have been introduced into numerous countries, including the United States. Feral swine are rapidly expanding their geographic range and their population continues to increase in the United States and Hawai`i (Waithman et al. 1999, Ballari and Barrios-Garcia 2012) because of their adaptability and high reproductive potential. Domesticated swine have been in Hawai`i for nearly 1,200 years (Singer 1981), perhaps longer. The early Polynesian type of swine is presumed to have been rather small in size and may have readily remained in domestication (Tomich 1986). Present-day Hawaiian feral swine were considered to be descended primarily from European stocks and may represent a relatively recent introduction to Hawai'i's montane forest ecosystems according to some workers (Bryan 1937, Cooray and Mueller-Dombois 1981). However, analysis of recent DNA tissue samples revealed Polynesian, European, and Asian origins but confirmed that Hawaiian feral swine are mostly genetic hybrids from the descendants of those originally introduced during the Polynesian settlement of the islands (Linderholm 2016).

Changes in land use in Hawai`i have occurred over the past two decades, it's likely these changes have also contributed to an increase in feral swine-human conflicts. Private parcels provide excellent feral swine habitat due to ample vegetative cover, hunting restrictions, and inclusion of diversified crops. Landscaping, gardens, and domestic animals also attract and provide food sources to feral swine on these private parcels. This, along with expanding residential developments into these former agricultural lands, has contributed to the increase in human-wildlife interactions within the state.

Historical land uses, such as agriculture, livestock grazing and logging, probably had a profound effect on the present distribution of feral swine within native forests. Translocation of feral swine by hunters into previously unoccupied areas could also account for the present pig distribution. Feral swine are considered the most abundant large mammal found in the Hawaiian Islands (Giffin 1978), but the actual population is not well known.

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program in Hawai`i receives requests for assistance to reduce or prevent damage to crops, pastures, natural resources, property and threats to human health and safety caused by feral swine. Human/wildlife conflict issues are complicated by a wide range of public perceptions to wildlife and wildlife damage. What may be unacceptable damage to one person may be a normal cost of living with nature to someone else.

Wildlife damage management (WDM) is the science of reducing damage or other problems associated with wildlife and is recognized as an integral part of wildlife management (The Wildlife Society 2016). WS uses an Integrated Wildlife Damage Management (IWDM) approach, also known as Integrated Pest Management (IPM) (WS Directive 2.105), in which a combination of methods may be used or recommended to reduce wildlife damage. These methods may include alteration of cultural practices, habitat, or behavioral modification to prevent or reduce damage. The reduction of wildlife damage may also require that the local populations of offending animal(s) be reduced through lethal means.

WS is a cooperatively funded, service-oriented program that receives requests for assistance with wildlife damage management from private and public entities, including tribes and other governmental agencies. As requested, WS cooperates with land and wildlife management agencies to reduce wildlife damage effectively and efficiently in accordance with applicable federal, state, tribal, and local laws and Memoranda

of Understanding (MOUs) between WS, other agencies. Under congressional direction, APHIS recently developed and began implementing a National Feral Swine Damage Management Program. This nationally coordinated program will oversee WS in preparing this Environmental Assessment (EA) to evaluate ways that this responsibility can be carried out to reduce feral swine conflicts in the State of Hawai`i.

This EA will evaluate the individual damage control activities and methods that could be conducted by WS to manage damage and threats caused by feral swine. WS chose to prepare this EA to facilitate planning, interagency coordination, the streamlining of program management, and to clearly communicate with the public the analysis of individual and cumulative impacts. This EA will assist WS in determining whether these activities could have a significant impact on the human environment based on past and present actions and the anticipation of receiving additional requests for expanded assistance.

1.2 Need for Action

Feral swine can cause significant damage to agricultural, natural, cultural resources, property, and they pose risks to human and animal health. The International Union for Conservation of Nature (IUCN), Invasive Species Specialist Group (ISSG) has included feral swine in their listing of "100 of the World's Worst Invasive Alien Species" (Lowe et al. 2000). The damage from feral swine to natural and agricultural resources can be substantial (Seward et al. 2004). Pimentel (2007) estimated damage caused by feral swine could be $300/animal/year. While the exact number of feral swine in Hawai`i is not known, the population is estimated to be between 10,000 and 40,000 (Mayer 2014). This would indicate that damage estimates in Hawai`i could be between three and twelve million dollars annually.

Feral swine also damage habitat and natural resources in many ways. They can consume large quantities of herbaceous vegetation (3–5% of their body weight daily) and have been linked to 95% declines of understory vegetation in some systems (Cole et al. 2012). They can consume large amounts of seeds, nuts and seedlings that may ultimately reduce the potential for forest regeneration (Campbell and Long 2009), and may influence future over-story composition and reduce tree diversity directly through consumption of seeds (Tolson and LaCour 2013).

Soil disturbance and vegetation loss associated with trampling, wallowing, and rooting by feral swine increases erosion and associated problems with water contamination and siltation. Siltation and water contamination in stream reaches and coastal areas with swine activity have contributed to declines in aquatic organisms, including freshwater mussels and insects (West et al. 2009). In some areas, feral swine have been implicated as the cause of elevated waterborne bacteria levels in streams, including levels which exceeded thresholds for the protection of human health (Kaller et al. 2007).

Feral swine foraging, rooting, and wallowing can also damage landscaping, golf courses, recreational fields, cemeteries, parks, and lawns. Rooting by feral swine likewise damages roadsides, dikes, and other earthen structures. Cultural sites impacted by feral swine have included national historic sites, tribal sacred sites and burial grounds and archaeological sites and digs (Native American and European origin).

Feral swine can carry 30 viral and bacterial diseases, and nearly 40 parasites that may affect humans, domestic livestock, and wildlife species (Ruiz-Fons et al. 2008, Meng et al. 2009). Feral swine can also harbor the causative agents of important foodborne diseases such as *Escherichia coli* (E. coli), *Salmonella* spp. and trichinosis (Brown et al. 2018). Additionally, feral swine can transmit many of these diseases to pets, including pseudorabies. Dogs, particularly hunting dogs, become infected with pseuorabies after

coming into contact with infected feral swine. Once a dog is infected, there is no treatment, and death typically occurs 48–72 hours after symptoms appear (HAID 2014).

1.2.1 Need to Manage Damage to Agriculture

Feral swine are responsible for an estimated $1.5 billion or more in damage each year to agricultural commodities in the United States (Coblentz and Bouska 2004, Pimentel 2007). Agricultural commodities that require irrigation, or have fruits, nuts, or rhizomes can attract crop depredation by feral swine (Coblentz and Bouska, 2004). Feral swine damage crops through consumption of crops and other behaviors, such as rooting, trampling, and wallowing, which can destroy fields or reduce productivity. Field crops commonly damaged by feral swine include sugar cane, corn, grain sorghum, wheat, oats, peanuts, and rice, among others. Vegetable crops, such as lettuce, spinach, melons, and pumpkins are also damaged (Schley and Roper 2003, Seward et al. 2004). Rooting out seeds and trampling seedlings impacts regeneration of forest plantations (Lipscomb 1989). Feral swine also can reduce the vigor of larger trees, retarding growth or causing a decline in nut crops, such as pecans and almonds (Campbell and Long 2009).

Damage to Crops

The seed crop industry in Hawai`i cultivates seed corn, soybean, wheat, sunflower, and other seed crops. (Loudat and Kasturi 2013). ). The value of Hawai`i's seed industry is estimated at $121 million for the 2017-2018 season according to the USDA National Agricultural Statistics Service (2017). Seed corn accounts for $115 million or 95 percent of the total value. For all seed crops, the number of acreages that were harvested in the 2017-2018 season was 3,210 acres (USDA NASS 2018).

Seed companies experience depredation by wildlife on experimental and parent seed crops. WS has provided assistance to the seed crop industry in Hawai`i for over 20 years under cooperative service agreements. The assistance is typically in the form of direct lethal control to reduce depredation caused by feral swine, axis deer, and birds. Figure 1 shows the funding WS received each federal fiscal year from seed companies on O`ahu, Kaua`i, Moloka`i and Maui to control feral swine and bird depredations on the same properties. Seed companies reimbursed WS an average of $465,086 per fiscal year to control feral swine and bird depredation from FY11 through FY16.

Figure 2 shows the number of feral swine taken by WS to protect seed crops and all other resources in the state FY 2004-2016. This information is derived from the WS' Management Information System[2] (MIS). The Hawai`i macadamia nut crop for 2016-2017 was estimated at $42 million (net, wet-in-shell basis). In crop acreage was estimated at 18,000 in acres and 16,000 harvested acres. Feral swine were identified as a concern for the industry (USDA NASS 2018).

[2] All USDA WS personnel are accountable for documenting field activities and technical assistance work they conduct while on official duty. The Management Information System (MIS) is the national reporting system for WS operational field and technical assistance activities. Archived Database record for years 1992-2003 are available through special request by MIS administrators only, and records for years 2004-2016 are available online to all authorized WS personnel.

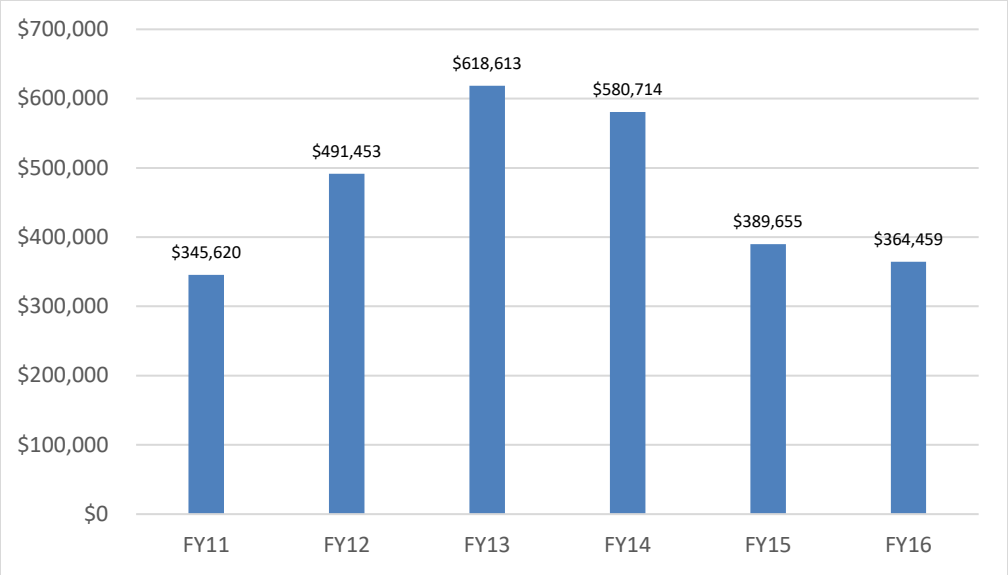

Figure 1. Expenditures by the Hawai`i seed crop industry to reimburse WS to manage feral swine and feral swine/bird depredations (work agreements may include managing bird depredations on the same property) in Hawai`i.

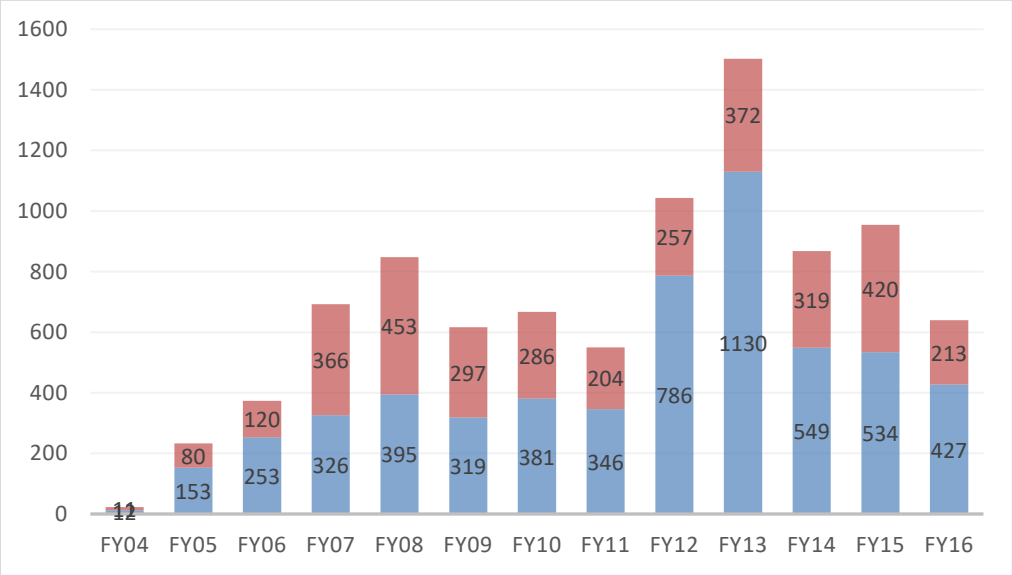

Figure 2. Feral Swine take by Wildlife Services in Hawai`i each federal fiscal year to protect seed crops (Blue) and all other resources (Red).

Damage to Domestic Livestock

Feral swine can be efficient predators of livestock and wildlife. Feral swine have been known to prey on calves, kids, lambs, and poultry (Stevens 1996, Beach 1993). The livestock industry in Hawai`i is comprised of both cattle/dairy farming and commercial swine operations, but there are also a few commercial sheep operations and meat goat producers. In 2013, the value of all cattle and calves in

Hawai`i was $52.9 million and hogs were worth $2.6 million (NASS 2014). There are no comparable statistics for sheep or goats.

Livestock are susceptible to infection from a variety of diseases which can be transmitted by feral swine. Though biosecurity measures are in place at most farms in Hawai`i, the extent to which these measures are in place varies from farm to farm; and the degree to which domestic livestock are exposed to diseases in feral swine depends on the extent of biosecurity on the premises. Disease transmission is likely to occur where domestic livestock and feral swine have a common interface, such as at water sources or livestock feeding areas. The contraction of any of these diseases listed below by domestic herds is likely to have a dramatic impact on the productivity and value of livestock commodities in Hawai`i.

Bovine Tuberculosis (bTB)

Bovine TB is a chronic, debilitating disease of cattle, other ungulates, and humans. The causative agent of bTB is the bacterium *Mycobacterium bovis*. Since the 1997 depopulation of the last bTB-infected cattle herd found on the eastern end of the island of Moloka`i (Maui County), the state of Hawai`i has been classified by the USDA as bTB-free (HDOA Letter to Gov. 2002).

Despite this classification, annual bTB testing occurs at the expense to cattle owners east of Kamalo who are required to provide all facilities necessary to safely restrain cattle and conduct the testing. Cattle on the east end are required to have an annual negative bTB test or be tested negative within 30 days prior to movement out of the area.

In 1985, in an effort to eradicate bTB, the island of Moloka`i was entirely depopulated of domestic cattle. Cattle were brought back to Moloka`i in 1986-1987; then in 1997, an infected herd was detected on the east-end and consequently depopulated. The following year, in 1998, a State/USDA/hunter-assisted survey of wildlife was initiated on Moloka`i to investigate the source of infection and ascertain whether a wildlife reservoir for bTB exists. Historically, on Moloka`i, axis deer, feral swine, and mongoose were found infected with *M. bovis*. As this survey has continued, only feral swine have been found to be infected with *M. bovis*, and may be acting as a reservoir for bTB. As a result, Quarantine Order No. 87-A disallows the movement of feral swine from areas east of Kamalo.

Porcine Reproductive and Respiratory Syndrome (PRRS)

PRRS is an economically important viral disease of swine, first recognized in the United States during the late 1980s (Holtkamp et al. 2013) and became endemic in most areas of swine production in the world by 1991 (Molina et al. 2009). A 2011 study estimates that, in the U.S., the total cost of productivity losses due to PRRS was $664 million, resulting from reproductive and respiratory problems to include late-term abortions, premature farrowing events, dead and mummified piglets, and persistent respiratory disease with secondary infections (Holtkamp et al. 2013).

The first PRRS outbreak in Hawai`i was documented in 1996, and in 2000-2001, a serological survey by the Hawai`i Department of Agriculture (HDOA) reported the highest prevalence of PRRS on O`ahu (59% farms and 35% swine tested positive) and lowest prevalence on east Hawai'i (6% farms and 3% swine tested positive); Kaua`i is the only PRRS-free island. As a result, the movement of swine onto Kaua`i is now governed by quarantine rules regulated by the HDOA (Letter to Gov 2001/2002).

From 2007 through 2010, 345 blood serum samples collected by WS from feral swine on the islands of Hawai`i (Hawai`i County) and O`ahu (Honolulu County) were serologically tested for PRRS. Of the 293 serum samples tested from Honolulu County, 2.0% were seropositive, while 3.8% of the 52 serum samples

collected from Hawai`i County were seropositive; between these two counties, the data indicate an apparent prevalence of 2.3% for the State.

Type 2 Porcine Circovirus (PCV2)

PCV2 is associated with a group of swine diseases known as Porcine Circovirus Associated Disease (PCVAD). PCVAD causes swine to suffer from a variety of wasting, respiratory, and reproductive difficulties and contributes to significant economic losses to the commercial swine industry. While PCV2 is necessary for disease, its presence alone does not always result in the development of PCVAD. PCV2 infection can lead to immunosuppression, and is usually found with other swine pathogens, such as PRRS and swine influenza virus (SIV) (Opriessnig and Halbur 2012).

From 2007 through 2010, 345 blood serum samples collected by Wildlife Services from feral swine on the islands of Hawai`i (Hawai`i County) and O`ahu (Honolulu County) were serologically tested for PCV2. Of the 293 serum samples tested from Honolulu County, 61.8% were seropositive, while 32.7% of the 52 serum samples collected from Hawai`i County were seropositive; between these two counties, the data indicate an apparent prevalence of 57.4% for the State.

Foot and Mouth Disease (FMD)

FMD is an extremely contagious vesicular viral disease of cloven-hoofed animals, both domestic and wild. FMD is characterized by fever, vesicular lesions, and erosions of the epithelium of the mouth, tongue, nares, and feet. The disease is rarely fatal in adult animals, but results in increased losses in the production of meat and milk; conversely, FMD may cause increased mortality rates in young animals. The combined effects of FMD have the potential to significantly impact livestock economies.

FMD is considered a foreign animal disease (FAD), in that it is not detected in any animal population in the U.S.; in fact, the U.S. has been free of FMD since 1929. The State of Hawai`i has taken measures to preclude the introduction of FMD to include increased detection efforts at all ports of entry, increased identification and inspection of swine operations feeding garbage, and ensuring that foreign garbage arriving in the State is properly sterilized.

Experimental studies have demonstrated that feral swine are vulnerable to FMD and may play an important role as a carrier or reservoir for the disease. During FY10 and FY11, WS in Hawai`i collected over 100 nasal swab surveillance samples from feral swine as part of a study designed to test whether the same diagnostics used to test domestic herds can be used on feral populations; none of the collected samples tested positive.

Classical Swine Fever (CSF)

Similar to FMD, CSF is a FAD that can be transmitted between feral swine and livestock, and can adversely impact the American livestock industry. The U.S. has been CSF-free since 1978, but impacts to the industry due to an incursion by CSF would come from the high cost of disease control and eradication, the slaughter of infected/exposed swine, lost production, and export restrictions (Brown and Bevins 2018).

CSF, or hog cholera, is a viral septicemia of swine which causes fever, skin discoloration, conjunctivitis, diarrhea, and abortions. The most likely method of transmitting CSF virus is from the movement of apparently healthy, but infected, pigs, and from contaminated pork and pork products. The virus can be shed in any bodily secretion, and the most frequent route of infection is oronasal. Since 2006, Wildlife Services in Hawai`i has sampled over 1000 feral swine for exposure to CSF; none have tested positive.

Brucellosis

Swine brucellosis is caused by *Brucella suis*, a bacteria that is similar to the one that causes brucellosis in cattle. Cattle that are in close contact with swine harboring the disease may become infected (Brown et al. 2018). Swine infected with the disease can develop clinical signs or appear healthy; making laboratory tests an important diagnostic tool. Infection can move through a herd quickly. Swine brucellosis is a zoonotic bacterial infection and is transmitted through oral and venereal routes (Thorne 2001). Boars can shed bacteria in their semen, and both sexes may experience short-term or permanent sterility. Infected sows may abort or give birth to weak piglets. Infection can also cause lameness.

Feral swine on all of the major islands of Hawai`i are known to be infected with swine brucellosis. According to the Hawai`i Department of Agriculture, all domestic herds ever found infected in the State were traced to exposure with infected feral swine (2002).

Pseudorabies Virus

Pseudorabies (also known as Aujesky's disease or "mad itch") is a viral disease most prevalent in swine, often causing newborn piglets to die. Older pigs can survive infection, becoming carriers of the pseudorabies virus for life. It is an alpha herpes virus and transmission usually occurs by oral or venereal contact (Wyckoff et al. 2009). Infected cattle and sheep can first show signs of pseudorabies by scratching and biting themselves. In dogs and cats, pseudorabies can cause sudden death. The virus is not known to cause illness in humans, but is fatal in dogs. Domestic swine in the United States recently achieved pseudorabies-free status after a 17-year effort and the expenditure of approximately $200 to $250 million dollars (Hutton et al. 2006).

Feral swine on all major islands in Hawai`i, except for Moloka`i and Lana`i (which has no feral swine at all), are infected with pseudorabies. The Hawai`i Department of Agriculture reports that the PRV rate in feral swine on Maui is the lowest of the islands, at 3%, with infection rates from 20-40% on other islands.

1.2.2 Need to Manage Feral Swine Damage to Property

As populations of feral swine in North America have spread and increased in size they have also begun to expand into new habitats not previously occupied by feral swine including urban and suburban environments (Extension 2012b). Feral swine can cause significant damage in suburban/urban areas with their foraging activities. The most common foraging impact observed is rooting. In urban areas this type of damage primarily affects grassed areas such as residential lawns, parks, golf courses, sports fields, and cemeteries. In addition to damaged turf, rooting can also cause other physical impacts to landscaping areas such as erosion, slope failure and down-grade sedimentation. Foraging by feral swine in developed areas can also result in significant damage to ornamental species planted in landscaped areas. Feral swine have also been observed damaging backyard fruit and vegetable gardens and are known to disperse garbage and refuse which can create litter and sanitary issues (Extension 2012b).

Additionally, rooting damage to levees and dikes caused by feral swine leaves the soil vulnerable to being washed away during a flood (SEAFWA 2012) and increases risk of flooding damage. In addition to costs associated with repair and prevention of feral swine damage to property, feral swine damage can adversely impact property values. Conversely, the presence of feral swine may be considered a positive impact on property values in areas where feral swine hunting is desired and permitted by law.

Feral swine can damage lawn irrigation and sprinkling systems by digging up and breaking the piping associated with these systems. There have been documented instances of feral swine accidentally

entering commercial businesses and private residences. In these situations, feral swine can cause significant property damage trying to escape from the confined surroundings (Extension 2012b).

The need to manage feral swine damage to property in Hawai'i was evident when the County of Hawai`i requested assistance from WS in 2006-2007 to control feral swine damage in the county. The county based its request for assistance on an increasing and overwhelming volume of complaints from residents about damages and threats from feral swine on the Island of Hawai`i. Based on the number of complaints in communities throughout east and west Hawai`i county, the Hawai`i county council members unanimously voted to pass a resolution to provide funding for a one year program to address the citizens' requests for assistance with feral swine damages (Pers. Comm., D. Yagong, D. Ley and D. Hopkins, September 30, 2007). The Hawai`i Department of Land and Natural Resources (HDLNR) was not equipped to respond to the volume of requests for assistance, and therefore the County of Hawai`i entered into an agreement with WS Hawai`i to assist with resolving the conflicts. Within two months of establishing a hotline to record complaints, WS received over 240 calls from individual residents requesting assistance in alleviating feral swine damage (Pers. Comm. with S. Veriato, September 2007).

Pets

Encounters with feral swine in suburban areas have resulted in attacks of humans and their pets. These encounters are uncommon but appear to be increasing. Feral swine are potentially dangerous animals and have been known to be very aggressive when threatened or cornered. The presence of dogs being walked by their owners has been suggested to represent a hazard with respect to instigating feral swine attacks (Extension 2012b). Several reports document attacks, some fatal, by feral swine to domestic pets (Sanchez 2011, Burkhart 2012, Billi 2013).

1.2.3 Need to Manage Feral Swine Threats to Human Health and Safety

Feral swine can carry a number of parasites and diseases that potentially threaten the health of humans, livestock, and wildlife. Humans can be infected by several of these, including diseases such as brucellosis, leptospirosis, salmonellosis, toxoplasmosis, sarcoptic mange, E. coli, and trichinosis. Zoonotic diseases are diseases of animals which are communicable to humans. Feral swine are potential reservoirs for at least 30 different bacterial and viral diseases transmissible to humans, including swine brucellosis, swine influenza virus (SIV), toxoplasmosis, and leptospirosis.

Infection by zoonoses from feral swine may occur from direct exposure to carcasses, through contaminated food crops, or through secondary infection of a third host, where the disease is transmitted to other animals which then might transmit disease to humans. Brucellosis is a bacterial disease which is mainly spread among animals, but humans can become infected by coming in contact with contaminated animals or animal products. Brucellosis is rare in humans in the United States (Center for Food Security and Public Health 2009), but hunters may be infected through skin wounds or by accidentally ingesting the bacteria after cleaning infected animals. Hunters should take precautions such as using rubber gloves when field dressing animals (Hawai`i State Department of Health 2005).

There are various species of the bacteria Brucella that can affect different animals, but most are associated with a limited number of hosts. *Brucella suis* is the species that infects domestic and feral swine; it can occasionally affect horses (Center for Food Security and Public Health (CFSPH) 2009) and can be seen in dogs, cattle, bison and reindeer (USDA-APHIS-VS 2003). Swine brucellosis causes chronic inflammatory lesions in the reproductive organs and in the bones. Clinical disease includes lameness, paralysis, abortion, and birth of dead or weak piglets (USDA-APHIS-VS 2003, CFSPH 2009). *B. suis* strains (biovar 1

and 3) are highly pathogenic and can cause severe disease in humans (USDA-APHIS-VS 2003), and a recent analysis of lymph nodes collected from feral swine showed that there is at least one strain (biovar 3) present in Hawai`i (Pedersen et al., 2014).

Feral swine may also act as re-assortment vessels for influenza viruses, whereby the re-assortment of viral DNA could lead to new strains of influenza viruses that could become easily transferrable to and among humans. Also, if feral swine become infected by the protozoan *Toxoplasma gondii*, the causative agent of toxoplasmosis and a disease transmitted by cats, human infection can occur through direct ingestion of infected and undercooked meat. Similarly for Leptospira bacteria; if feral swine become infected, there is an increased potential that through direct contact with infected urine, or indirectly though waste run-off into streams, humans will become infected.

WS in Hawai`i conducts disease surveillance in the feral swine population by means of its National Wildlife Disease Surveillance Program. Table 1 shows the number of positive results for each disease and the number of samples tested from FY2011-2015. There was a high prevalence of pseudorabies, leptospirosis, swine brucellosis and toxoplasmosism.

Table 1. Apparent Prevalence (%) of Feral Swine Diseases in Hawai`i during Federal FY11-15.

Apparent Prevalence (%) of Diseases in Feral Swine in Hawai`i During Federal FY11-15										
	FY11		FY12		FY13		FY14		FY15	
Disease	Number Samples Tested	Number Positive (%)	Number Samples Tested	Number Positive (%)	Number Samples Tested	Number Positive (%)	Number Samples Tested	Number Positive (%)	Number Samples Tested	Number Positive (%)
Classical Swine Fever	221	0 (0%)	189	0 (0%)	126	0 (0%)	135	0 (0%)	158	0 (0%)
Pseudorabies Virus	229	94 (41.0%)	298	143 (48.0%)	240	138 (57.5%)	212	96 (45.3%)	158*	64* (40.5%)*
Swine Brucellosis	228	23 (10.1%)	296	54 (18.2%)	240	58 (24.2%)	213	41 (19.2%)	159*	26* (16.4%)*
Swine Influenza Virus (nasal swab)	112	0 (0%)	100	0 (0%)	74	0 (0%)	44	0 (0%)	8	0 (0%)
Swine Influenza Virus (serum)	142	21 (14.8%)	128	3 (2.3%)	27	1 (3.7%)	138	39 (28.3%)	134*	13* (9.7%)*
Leptospirosis	32	6 (18.8%)	16	7 (43.8%)	134	93 (69.4%)	118	93 (78.8%)	-	-
Hepatitis E Virus	35	2 (5.7%)	260	30 (11.5%)	-	-	-	-	-	-
Foot and Mouth Disease	67	0 (0%)	-	-	-	-	-	-	-	-
African Swine Fever	30	0 (0%)	-	-	-	-	-	-	-	-
Toxoplasmosis	-	-	-	-	44	26 (59.1%)	22	14 (63.6%)	-	-
Genetics	-	-	80	N/A	100	N/A	13	N/A	97	N/A
Trichinosis	-	-	-	-	-	-	83	0 (0%)	-	-
PRRS†	-	-	-	-	-	-	134	6 (4.5%)	157	4 (2.5%)

† PRRS: Porcine Reproductive and Respiratory Syndrome
***** Results pending

Vehicle Collisions

Feral swine collisions with vehicles are known to occur in the United States (Thompson 1977, Synatzske 1993, Mayer 2005). As the numbers of feral swine have increased, the frequency of feral swine-vehicle collisions has also increased (Mayer and Brisbin 2009, Burns 2009, Mildenburg 2012). Mayer and Johns (2011) collected data from 179 feral swine-vehicle collisions in South Carolina occurring between 1968 and 2006. Those accidents collectively involved 212 feral swine. The study found that feral swine-vehicle collisions occurred year-round and throughout the 24-hour daily time period. Most accidents were at night and the presence of lateral barriers was significantly more frequent at collision locations. Collisions with feral swine are most common in areas of preferred feral swine habitat. An evaluation of 311 feral swine vehicle collisions in South Carolina determined that collisions were more likely in areas closer to streams and with less pine forest than would occur if collisions were randomly distributed (Beasley et al. 2013). The mean vehicle damage estimate was $1,173 and the projected cost of vehicle collisions with feral swine in the U.S. was estimated to be as high as $36 million annually. Human injuries were infrequent but potentially serious (Mayer and Johns 2011).

In addition to collisions with automobiles and motorcycles, feral swine have also been involved in collisions with trains and aircraft. In 1988, two feral swine collided with an F-16 fighter jet at the Jacksonville International Airport that was attempting to take off, destroying the $16 million aircraft in the subsequent crash (Extension 2012a). Collisions with trains have also been documented to occur in North America, Western Europe, and Asia.

1.2.4 Need to Protect Natural Resources

Feral swine have been documented to disturb large areas of vegetation and soils through rooting, it is also documented that swine inhabiting coastal, upland, and wetland ecosystems are uprooting, damaging, and feeding on rare native species of plants and animals (Means 1999). Swine can disrupt natural vegetative communities, eliminate rare plants and animals, alter species composition within a forest including both canopy and low growing species (Lipscomb 1989, Frost 1993), increase water turbidity in streams and wetlands (reducing water quality and impacting native fishes), and increase soil erosion and alter nutrient cycling (Singer et al. 1982). Feral swine may adversely affect stream ecosystems by causing erosion which increases sedimentation in streams, thereby negatively affecting wildlife that depends on clear water. Additionally, feral swine, through their waste products, can contribute to increased bacterial loads in waterways, enabling pathogens such as Leptospira spp. to be transported through the environment, potentially increasing the likelihood that other animals, including humans, might become infected.

Where feral swine are numerous, they have substantial impacts on Hawaiian forest communities (Cooray and Mueller-Dombois 1981, Ralph and Maxwell 1984). Many state and federal natural resource managers control feral swine numbers because of their known impact to endangered plants and animals (Thompson 1977). Feral swine pose a significant threat to native biodiversity and watershed integrity of Hawaiian forests by damaging native vegetation and exposing soil to erosion (Stone 1985.). In montane wet forests, there is a direct correlation between pig-induced soil disturbance and the increase of weeds (Aplet et al. 1991.). In addition, feral swine have been shown to spread root-rot fungi (Baker 1979.), create muddy areas and provide mosquito breeding habitat that helps transmit the spread of avian diseases such as avian pox and malaria (Baker 1979, Warner 1956 – 1969, Giffin 1978.).

Protecting the forests in Hawai`i is important because of the direct impact to humans and our water supply. While many people are familiar with the water cycle and how rainfall ends up in groundwater that is used by humans, fewer people may be aware of the large role forests play in supplying and purifying our fresh

water. Fog condensing on trees is an important source of moisture and can increase measurable precipitation by 20% (Juvik and Nullet 1995, Juvik and Perreira. 1973.). Forests collect and filter water into the groundwater and streams. A healthy forest without soil disturbance limits aquatic pollutants (e.g. siltation, suspended solids, turbidity, nutrients, organic enrichment, toxins and pathogens) due to erosion and runoff. Forests may also reduce the impacts of flooding and erosion by slowing down water as it flows down the mountain.

Control of feral swine in certain locations is necessary to conserve and protect Hawai`i's natural resources because they cause damage and may contribute to the extinction of native species (Stone, C. P. and Anderson 1988., Cuddihy and Stone, 1990., Loope 1998., Scott et al. 1986., Stone and Scott 1985., Drake and Pratt, 2001., Busby et al. 2010., Stone and Loope 1987., Vitousek et al. 1987., Ralph and Maxwell 1984., Loope, et al. 1991., Loope and Scowcroft 1985., National Park Service 2013., Spatz and Mueller-Dombois 1975., Aplet et al. 1991., LaRosa 1992., United States Geological Service 2005., Mitchell et al. 2005., USFWS 1992.).

1.3 National Environmental Policy Act and WS Decision-making

Pursuant to the National Environmental Policy Act (NEPA) and the CEQ regulations, WS is preparing this EA to document the analyses associated with proposed federal actions and to inform decision-makers and the public of reasonable alternatives capable of avoiding or minimizing adverse effects. The CEQ defines an EA as documentation that "...(1) briefly provides sufficient evidence and analysis for determining whether to prepare an [Environmental Impact Statement]; (2) aids an agency's compliance with NEPA when no environmental impact statement is necessary; and (3) facilitates preparation of an Environmental Impact Statement when one is necessary."

This EA will serve as a decision-aiding mechanism to ensure that WS follows the policies and goals of the NEPA and the CEQ. This EA will also aid WS with clearly communicating the analysis of individual and cumulative impacts of proposed activities to the public. In addition, the EA will facilitate planning, promote interagency coordination, and streamline program management analyses between WS and the Hawai`i Department of Land and Natural Resources.

Individual wildlife damage management projects conducted by the WS program could be categorically excluded from further analysis under the NEPA, in accordance with APHIS implementing regulations for the NEPA (7 CFR 372.5(c), 60 FR 6000-6003). However, the purpose of this EA is to evaluate cumulatively the individual projects that WS could conduct to manage the damage and threats that feral swine cause, including those projects that WS could conduct at the request of cooperators. More specifically, the EA will assist WS with determining if alternative approaches to managing feral swine damage could potentially have significant individual and/or cumulative effects on the quality of the human environment that would warrant the preparation of an Environmental Impact Statement (EIS) in compliance with the NEPA and Council for Environmental Quality (CEQ) regulations.

This EA will assist in determining if the proposed cumulative management of feral swine damage could have a significant impact on the environment based on previous activities conducted by WS and based on the anticipation of conducting additional efforts to manage damage. WS' mission and directives would be to provide assistance when the appropriate property owner or manager requests such assistance, within the constraints of available funding and workforce. Therefore, it is conceivable that additional damage

management efforts could occur beyond those efforts conducted during previous activities. Thus, this EA anticipates those additional efforts and the analyses would apply to actions that may occur in any locale and at any time within Hawai`i as part of a coordinated program.

The analyses contained in this EA are based on information derived from WS' MIS, data from Hawai`i, published documents, interagency consultations and public involvement. The EA evaluates the need for action to manage damage associated with feral swine in the state, the potential issues associated with wildlife damage management, and the environmental consequences of conducting alternative approaches to meeting the need for action while addressing the identified issues. WS initially developed the issues and alternatives associated with wildlife damage management in consultation with the Hawai`i Department of Land and Natural Resources, Division of Forestry and Wildlife (HDLNR-DOFAW), which has the authority to manage feral swine populations in the state. To assist with identifying additional issues and alternatives to managing damage, WS will make this EA available to the public for review and comment prior to the issuance of a decision (either a Finding of No Significant Impact (FONSI) or a Notice of Intent to prepare an EIS).

1.4 Objectives

The primary objective of the WS program in Hawai`i is to reduce localized damage to agriculture, natural and cultural resources, property, and human health and safety in cooperation with agency partners, organizations representing native Hawaiians, and other entities where requested by landowners/managers. The proposal includes Feral Swine Damage Management (FSDM) to protect agriculture, property, human health and safety, and natural resources where public hunting is not allowed. Based on public concern, it is stressed that the objective of the proposal is to manage localized damage only. Feral swine eradication from Hawai`i is not an objective of the program, and FSDM is not being proposed in State public hunting areas.

1.5 Decisions to be made

USDA APHIS WS is the lead agency for this EA and is therefore responsible for the scope, content, and the decisions to be made. Based on the scope of this EA, the decisions to be made are: 1) How should WS respond to the need for action to manage feral swine damage in the state? 2) Would the Preferred Alternative result in significant effects to the environment requiring the preparation of an EIS.

1.6 Scope of Analysis

This EA evaluates the proposed FSDM program for various properties in present or future programs throughout Hawai`i. The proposal includes implementing FSDM for the protection of agriculture (livestock, rangeland and crops), property (rural and urban parks and residential areas), human health and safety (vehicle collisions, zoonotic diseases), and natural resources (forests, wetlands, coastal areas, native plants and animals) in Hawai`i.

This EA analyzes four alternatives by which feral swine control could be carried out to reduce or eliminate individuals and localized populations to protect natural resources, agriculture, private property, public property and human health and safety. The potential methods that may be used and the aspects of the human and natural environment that could be affected are discussed in Chapters 2 and 3.

1.6.1 Geographical Area and Land Designations

WS provides FSDM on federal, state, county and private lands in Hawai`i. If WS were requested to conduct FSDM on federal lands for the protection of public resources, this EA would cover the actions implemented unless there are additional issues not analyzed in this EA, then the requesting federal agency would be responsible for complying with NEPA.

1.6.2 Site-Specificity

This EA analyzes potential impacts on the human environment as required by NEPA and addresses WS activities on all lands under Cooperative Agreement or Agreements for Control, or as otherwise covered by WS work plans. It also addresses the impacts of projects on areas where additional agreements with WS may be written in the reasonably foreseeable future in Hawai`i. Because the proposed alternative is to continue the current program under this EA, and because the current program's goal and responsibility is to provide feral swine damage management when requested within the constraints of available funding and manpower, it is conceivable that additional feral swine damage management efforts would occur. Thus, this EA anticipates potential expansion and analyzes the impacts of such expanded efforts as part of the current program to protect natural resources, agriculture, property, and human health and safety.

Planning for feral swine damage 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 response organizations, insurance companies, and other service agencies. Although some of the sites where feral swine damage is likely to occur and lead to requests for WS assistance can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted. This EA emphasizes major issues as they relate to specific areas; however, many issues can result from feral swine damage and therefore management decisions are based on site specific parameters. The standard WS Decision Model (Slate et al. 1992) and WS Directive 2.105 are the site-specific routine thought processes for determining methods and strategies to use or recommend for individual actions conducted by WS.

1.7 Agencies Involved in this EA and Their Roles and Authorities

Lead Agencies

United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS)

USDA is authorized by law to protect American agriculture and other resources from damage associated with wildlife (Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 8351–8352) as amended, and the Act of December 22, 1987 (101 Stat. 1329–331, 7 U.S.C. 8352). Within the USDA, this authority has been delegated to the APHIS-WS program. APHIS-WS' mission, developed through its strategic planning process, is: 1) *"to provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and 2) to safeguard public health and safety."* APHIS-WS recognizes that wildlife is an important public resource greatly valued by the American people. By its very nature, however, wildlife is a highly dynamic and mobile resource that can cause damage to agriculture and property, pose risks to human health and safety, and affect industrial and natural resources.

APHIS-WS conducts programs of research, technical assistance, and applied management to resolve problems that occur when human activity and wildlife conflict. The USDA APHIS WS' the National Wildlife Research Center (NWRC) conducts research and provides technical assistance, including training, for governmental and non-governmental entities in management of wildlife hazard management. Memoranda of Understanding among WS and other governmental agencies also define WS' responsibilities in wildlife damage management. WS enters into Cooperative Agreements with entities to assist with specific wildlife damage management situations. WS' directives define program objectives and guide WS' activities in managing wildlife damage. WS is a fee-for-service agency.

Based on agency relationships, missions, and legislative mandates, WS is the lead agency and decision maker for this EA, and therefore responsible for the EA's scope, content, and outcome.

Consulting Agencies

Hawai`i Department of Land and Natural Resources, Division of Forestry and Wildlife

The Hawai`i Department of Land and Natural Resources (HDLNR), Division of Forestry and Wildlife (DOFAW) is the state agency authorized to manage wildlife and authorize damage management of wildlife that are destructive to crops, agriculture or constitute a nuisance or health threat. The department may enter into agreements with USDA to accomplish these objectives (Hawai`i Revised Statutes §183D-2, §183D-8, §183D-61). As a consulting agency, HDLNR DOFAW provided input towards the development of this EA. The Division of Forestry and Wildlife has statewide management authority of swine that are living in a wild or feral state not under domestication, and has designated them as game mammals according to Hawai`i Revised Statutes (HRS) 183D-51.

Hawai`i Department of Agriculture

The Hawai`i Department of Agriculture (HDOA), Animal Industry Division is the state agency responsible for the prevention and eradication of contagious, infectious, and communicable diseases among animals. The department may cooperate with the USDA in its efforts to eradicate any transmissible disease of animals, and to inquire into the causes of such diseases (Hawai`i Revised Statutes §142-1, §142-3, §142-21).

1.8 Documents Related to this EA

Final Environmental Impact Statement – Feral Swine Damage Management: A National Approach
WS has prepared a programmatic feral swine environmental impact statement (EIS) to evaluate alternatives for a nationally coordinated feral swine damage management program in the U.S., American Samoa, Guam and the Commonwealth of the Northern Mariana Islands, U.S. Virgin Islands, and Puerto Rico (hereinafter USDA 2015). The Record of Decision (ROD), issued July 2015, selected a nationally coordinated, integrated Feral Swine Damage Management (FSDM) program. The selected alternative in the ROD incorporated all legally available FSDM methods and retained the flexibility to continue to work with local stakeholders under state or local level NEPA decisions, with local stakeholders to manage feral swine damage according to local feral swine management goals. This EA is consistent with the applicable findings, policies, and operational procedures evaluated in the Final EIS (FEIS).

Environmental Assessment – *Wildlife Damage Management to Protect Hawaiian Agriculture*.
Wildlife Services, Honolulu, Hawai`i, 1998. Feral swine damage management is addressed on a smaller scale than under the proposed action and some operational assistance to respond to requests for damage management was initiated under the resulting decision document.

**Environmental Assessment – *Protecting Property, Health and Safety from Nuisance Wildlife in Hawai`i.*** Wildlife Services, Honolulu, Hawai`i, July 30, 1999. This EA addresses feral pig damage management in the State of Hawai`i on a small scale. Operational assistance in response to requests for damage management was initiated under the resulting decision document.

**Environmental Assessment – *Feral Swine Damage Management in Hawai`i County*.** Wildlife Services, Honolulu, Hawai`i. 2008. This EA addresses an integrated feral swine damage management pilot project to assist the public in Hawai`i County in the State of Hawai`i with alleviating threats and damages by feral swine.

1.9 Public Involvement

As a part of the process for this proposed action, and as required by the Council on Environmental Quality (CEQ) and APHIS' NEPA implementing regulations, this document is being noticed to the public through legal notices published in local print media, through direct mailings to parties that have requested to be notified or have been identified to have an interest in WS programs, and by posting the pre-decisional EA on the APHIS website at: http://www.aphis.usda.gov/wildlife_damage/nepa.shtml.

WS will provide a 30-day comment period for the public and interested parties to provide new issues, concerns, and /or alternatives. Through the public involvement process, WS will clearly communicate to the public and interested parties the analysis of potential environmental impacts on the quality of the human environment. New issues or alternatives identified from the public involvement process will be fully considered to determine whether the EA should be revisited and, if appropriate, revised prior to the issuance of a final Decision or the publication of a Notice of Intent to prepare an EIS.

1.10 Rational for Preparing an EA rather than an EIS

Based on guidance from APHIS NEPA implementing procedures, 7 CFR 372.5(a) States: Actions normally requiring environmental impact statements. Actions in this class typically involve the agency, an entire program, or a substantial program component and are characterized by their broad scope (often global or nationwide) and potential effect (impacting a wide range of environmental quality values or indicators, whether or not affected individuals or systems may be completely identified at the time). Ordinarily, new or untried methodologies, strategies, or techniques to deal with pervasive threats to animal and plant health are the subjects of this class of actions. 7 CFR 372.5(b) States: Actions normally requiring environmental assessments but not necessarily environmental impact statements. This class of APHIS actions may involve the agency as a whole or an entire program, but generally is related to a more discrete program component and is characterized by its limited scope (particular sites, species, or activities) and potential effect (impacting relatively few environmental values or systems). Individuals and systems that may be affected can be identified. Methodologies, strategies, and techniques employed to deal with the issues at hand are seldom new or untested. Alternative means of dealing with those issues are well established. Mitigation measures are generally available and have been successfully employed. Actions in this class include: (1) Policymaking and rulemakings that seek to remedy specific animal and plant health risks or that may affect opportunities on the part of the public to influence agency environmental planning and decision making.

Considering these guidelines, WS believes the proposed action is limited in scope. This EA is species-specific and is generally limited to particular sites where individual conflicts occur between property owners and feral swine. The methodologies, strategies and techniques employed are not new or untested and have been successfully deployed. WS' intent in developing this EA has been to determine if the proposed action or the other alternatives could potentially have significant individual and/or cumulative impacts on the quality of the human environment that would warrant the preparation of an EIS. This EA addresses impacts for managing damage and threats to human safety associated with feral swine in Hawai`i and evaluates individual and cumulative impacts to provide a thorough analysis.

As cited in 1.9 Public Involvement above, if new issues or alternatives are identified in the public involvement process or if the proposed action was determined to have significant impacts based on the context and intensity factors listed by the Council on Environmental Quality (CEQ) at 40 CFR 1508.27 it would require the preparation of an EIS. If this EA determines that an EIS is necessary, then WS would follow that course of action and issue a Notice of Intent to prepare an EIS.

1.11 Environmental Status Quo Discussion

As defined by the NEPA implementing regulations, the "human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment" (40 CFR 1508.14). Therefore, when a federal action agency analyzes their potential impacts on the "human environment", it is reasonable for that agency to compare not only the effects of the proposed federal action, but also the potential impacts that would occur or could occur in the absence of the federal action by a non-federal entity.

When a non-federal entity (*e.g.*, agricultural producers, counties, private companies, individuals, or any other non-federal entity) takes action to alleviate feral swine damage or threat, the action is not subject to compliance with NEPA due to the lack of federal involvement in the action. In addition, methods available for resolving damage associated with feral swine would also be available for use by other entities. Under such circumstances, the environmental baseline or status quo must be viewed as an environment that includes those resources as they are managed or impacted by non-federal entities in the absence of the federal action being proposed. Therefore, in those situations in which a non-federal entity takes a management action directed towards feral swine and uses the same methods as WS, then participation by WS in the action would not affect the environmental status quo. Involvement by WS would not change the environmental status quo if the requestor had conducted the action in the absence of any involvement by WS.

For feral swine management in Hawai`i, the Department of Land and Natural Resources, Division of Forestry and Wildlife has the authority to manage and authorize the taking of feral swine for damage management purposes. In those situations where a non-federal entity has obtained the appropriate permit or authority, and has already made the decision to remove, or otherwise manage feral swine to stop damage with or without WS' assistance, WS' participation in carrying out the action will not affect the environmental status quo. In some situations, however, certain aspects of the human environment may actually benefit more from WS' involvement than from a decision not to assist. For example, WS' management activities may have less of an impact on target and non-target species than if the non-federal entity conducted the action alone. Thus, in those situations, WS' involvement may have a *beneficial* effect on the human environment when compared to the environmental status quo in the absence of such involvement.

Therefore, based on the discussion above, in a situation where a non-federal entity conducts feral swine damage management to stop or alleviate damage associated with feral swine with or without the assistance of WS, participation by WS in carrying out the Proposed Action would not significantly change the environmental status quo.

1.12 Laws Related to this Discussion

Several federal laws and Executive Orders regulate wildlife damage management. WS complies with the following laws, relevant to this proposal, and consults and cooperates with other agencies as appropriate. Additionally, all FSDM activities would be conducted in accordance with applicable state and local regulations.

National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq.). All federal actions are subject to NEPA (42 U.S.C. §§ 4321 et seq.). WS follows CEQ regulations implementing NEPA (40 CFR 1500 et seq.) and USDA (7 CFR 1b) and APHIS implementing regulation (7 CFR 372) as part of the decision-making process. These laws and regulations generally outline five broad types of activities to be accomplished as part of any project: public involvement, analysis, documentation, implementation, and monitoring. NEPA also sets forth the requirement that all major federal actions be evaluated in terms of their potential to significantly affect the quality of the human environment for the purpose of avoiding or, where possible, mitigating and minimizing adverse impacts.

Pursuant to NEPA and CEQ regulations, this EA documents the analysis for potential impacts of a proposed federal action, informs decision-makers and the public of reasonable alternatives capable of avoiding or minimizing adverse impacts, and serves as a decision-aiding mechanism to ensure that the policies and goals of NEPA are infused into federal agency actions. This EA was prepared by integrating as many of the natural and social sciences as warranted, based on the potential effects of the proposed action. The direct, indirect, and cumulative impacts of the proposed action are analyzed.

Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.). It is federal policy, under the ESA, that all federal agencies shall seek to conserve threatened and endangered (T&E) species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). For actions that “may affect” listed species, APHIS-WS conducts Section 7 consultations with the United States Fish & Wildlife Service (USFWS) to ensure that "any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency shall use the best scientific and commercial data available" (Sec.7(a)(2)).

Depending on the species, the USFWS and the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) are charged with implementation and enforcement of the Endangered Species Act of 1973, as amended and with developing recovery plans for listed species. Under the authority of the ESA, the USFWS acts to prevent the extinction of plant and animal species. It does this by identifying species at risk of extinction, designating ("listing") these species as threatened or endangered, providing protection for these species and their habitats, developing and implementing recovery plans to improve their status, and ultimately "delisting" these species and returning full management authority to the states and tribes.

While a species is listed, most management authority for the species rests with the USFWS/NMFS. However, the agency continues to work with other federal agencies, states, and tribes along with private landowners to protect and recover the species. The USFWS helps ensure protection of listed species

through consultations (section 7 of the ESA) with other federal agencies. Under section 10 of the ESA, the USFWS also issues permits which provide exceptions to the prohibitions established by other parts of the Act. These permits provide for conducting various activities including scientific research, enhancement of propagation or survival, and incidental take while minimizing potential harm to the species. For species federally classified as threatened, the USFWS may also issue 4(d) rules which may allow for greater management flexibility for the species. The USFWS also issues grants for protection and enhancement of habitat and for research intended to improve the status of a listed species.

Federal Meat Inspection Act (FMIA). The Federal Meat Inspection Act (FMIA) applies to all meat or products obtained from any cattle, sheep, swine, goat, horse, mule, or other equines intended for distribution in commerce. Animals falling under jurisdiction of the FMIA must be inspected pre- and post mortem. Animals that are killed before they reach a slaughter facility are classified as "adulterated meat", and cannot be used for human food per the FMIA. Feral swine fall under authority of the FMIA, and therefore could only be donated to charitable organizations for use as food by needy individuals if they are delivered alive to a USDA approved feral swine slaughter facility. Chapter 12, subchapter 1, section 623 of the FMIA provides an exemption for persons having animals of their own raising and game animals slaughtered for their own use without inspection. This provision allows landowners to utilize feral swine removed from their own property, with the understanding that meat derived from these feral swine will be consumed only by the landowner, his/her immediate family and/or nonpaying guests.

Coastal Zone Management Act (CZMA). This law 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, to identify uses of the area to be regulated by the state, the mechanism (criteria, standards or regulations) for controlling such uses, and 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 varies, depending on whether the federal action involves a permit, license, financial assistance, or a federally authorized activity.

Controlled Substances Act. 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 could be used in capture and handling of feral swine.

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

The Proposed Action would not cause major ground disturbance, does not cause any physical destruction or damage to property, would not cause any alterations of property, wildlife habitat, or landscapes, and does not involve the sale, lease, or transfer of ownership of any property. In general, such methods in the proposed action 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. In addition, the Proposed Action is not expected to have any potential impacts to Native Hawaiian cultural values of feral swine and is discussed in detail in section 3.1.1, Effects on Social and Cultural Values. Therefore, the methods described under the Proposed Action are not generally the types of activities that would have the potential to affect historic properties or cultural values. 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.

Facilitation of Hunting Heritage and Wildlife Conservation (Executive Order 13443). This order directs federal agencies conducting activities that have a measurable effect on outdoor recreation and wildlife management, to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat. It directs federal agencies to cooperate with states to conserve hunting opportunities. Wildlife Services will determine if its activities might have a measurable effect on hunting opportunities and follow the direction of Section 2 (G) in the order and "Seek the advice of State and tribal fish and wildlife agencies, and, as appropriate, consult with the Sporting Conservation Council and other organizations, with respect to the foregoing Federal activities".

Executive Order on Environmental Justice. Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations requires federal agencies to analyze disproportionately high and adverse environmental effects of proposed actions on minority and low-income populations. APHIS-WS has analyzed the effects of the proposed action and determined that implementation would not have adverse human health or environmental impacts on low-income or minority populations.

Executive Order on Protection of Children from Environmental Health and Safety Risks. Executive Order 13045 was passed to help protect children who may suffer disproportionately from environmental health and safety risks for many reasons. The analysis in Section 3.1.1 of this EA supports a conclusion of very low to no risk of adverse effects on human health and children from the Proposed Action. Implementation of the Proposed Action would not increase environmental health or safety risks to children.

Invasive Species - Executive Order 13112

Executive Order 13112 establishes guidance to federal agencies to prevent the introduction of invasive species, provide for the control of invasive species, and to minimize the economic, ecological, and human health impacts that invasive species cause. The Order states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law: 1) reduce invasion of exotic species and the associated damages, 2) monitor invasive species populations and provide for restoration of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education of invasive species. WS Directive 2.320 provides guidelines for WS' actions in the management of invasive species in fulfillment of Executive Order 13112.

Hawai`i State Legal Guidelines

Hawai`i Department of Agriculture The Hawai`i Department of Agriculture, Animal Industry Division is the state agency responsible for the prevention and eradication of contagious, infectious, and communicable diseases among animals. The department may cooperate with the United States Department of Agriculture

in its efforts to eradicate any transmissible disease of animals, and to inquire into the causes of such diseases (Hawai`i Revised Statutes §142-1, §142-3, §142-21).
Hawai`i Department of Land and Natural Resources The Department of Land and Natural Resources, Division of Forestry and Wildlife is the state agency authorized to manage wildlife and authorize the control of wildlife which are destructive to crops, agriculture or that constitute a nuisance or health threat. The department may enter into agreements with the USDA to accomplish these objectives (Hawai`i Revised Statutes §183D-2, §183D-8, §183D-61). The Division of Forestry and Wildlife manages feral swine in Hawai`i as a game animal on state lands. HDLNR does not issue wildlife control permits for feral swine damage management on private property because feral swine are considered the property of the landowner (Pers. Comm.,Thomas Kaiakapu), however, a night hunting permit from HDLNR is required if control work is conducted at night. Administrative Rules for DOFAW allow for feral swine hunting as defined in Title 13, Chapter 123. Depending on the location (hunting unit), the bag limit is up to one or two feral swine per season for hunters. This information is pertinent to the analysis of total mortality and hunter take will be used to help determine cumulative effects on feral swine in Hawai`i.

If feral swine are found on private property and pose a nuisance or threaten damage, the property owner may remove them at any time (HRS 142-91). WS operates under a permit issued by DOFAW pursuant to Hawai`i Administrative Rules Title 13, Section 123-9, which allows taking feral swine that pose a nuisance or threaten damage to crops, vegetative habitat, or native plants. The permit does not allow any taking of feral swine in public hunting areas. No limit on take is provided for damage situations.

2.0 ISSUES AND ALTERNATIVES

Chapter 2 contains a discussion of the issues relevant to the development and comparison of alternatives for FSDM, along with IWDM strategies, decision-making, and methods used by WS. Issues considered for detailed analysis represent a cause and effect relationship between the proposed action and potential significant effects that are necessary to analyze to make a reasoned choice between alternatives.

2.1 Introduction to issues and Alternatives

This chapter describes and identifies the issues and the alternatives that will be analyzed in this environmental assessment. NEPA requires consideration of reasonable and feasible alternatives, including a No Action Alternative to be used for comparison purposes. The following issues will be evaluated in detail for their potential environmental, social, and human health impacts as appropriate in Chapter 3, Environmental Effects. These issues have been identified based on WS' experience, previous EAs and public comments on those EAs.

Effects on Feral Swine Populations

Effects on Non-Target and T&E Species

Effects on Social and Cultural Values

Effects on Human Health and Safety

Humaneness / Ethics of FSDM Methods

In addition to identifying the issues, several criteria were used to help shape the alternatives and develop the range of "reasonable alternatives," as defined by the Council for Environmental Quality (CEQ 1981) for detailed evaluation. These criteria include:

Alternatives must respond to the Purpose and Need

Specifically, the project goal of reducing feral swine damage to agriculture, natural and cultural resources, property, animal health, and human health and safety in Hawai`i by reducing or eliminating feral swine populations, in cooperation with agency partners, hunting and native Hawaiian organizations, and others.

Alternatives must comply with Federal Environmental Regulations

Specifically, they must be legally and environmentally sound, they must be based on the most current and available science and they must be economically and logistically feasible.

Alternatives must be Flexible

An alternative should be able to facilitate collaboration with agency partners and other cooperators. It should accommodate the variation found among state, territorial and local laws, management objectives, environmental conditions, or variations in funding levels.

2.2 FSDM Strategies used to develop the Alternatives

WS's activities are conducted to prevent or reduce wildlife damage to agricultural, industrial and natural resources; property; livestock; and threats to public health and safety on private and public lands. Activities are performed in cooperation with federal, state and local agencies, hunting and native organizations, and private individuals. The WS program uses an Integrated Wildlife Damage Management (IWDM) approach (WS Directive 2.105), in which a combination of methods may be used or recommended to reduce wildlife damage. These methods may include non-lethal techniques like alteration of cultural practices, habitat management, repellents, frightening devices, and physical exclusion to prevent or reduce damage. The reduction of wildlife damage may also require removal of individual animals, reducing the local animal populations through lethal means. In some instances, the goal may be to eradicate an invasive species. Program activities are conducted to reduce damage and risks to human and livestock health and safety, and are used as part of the WS Decision Model (Slate et al. 1992).

2.3 Integrated Wildlife Damage Management (IWDM)

As used and recommended by the WS program, IWDM encompasses the integrated application of approved methods simultaneously or sequentially as appropriate to reduce or prevent wildlife damage. The philosophy behind IWDM is to implement the best combination of effective management methods in the most cost-effective manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM may incorporate cultural practices (e.g., animal husbandry), habitat modification (e.g., exclusion), animal behavior modification (e.g., scaring), removal of individual offending animals, local population reduction or elimination or any combination of these, depending on the circumstances of the specific damage problem. The basic strategies included into a IWDM approach are as follows:

2.3.1 Technical Assistance Recommendations

"Technical assistance", as used herein, is information, demonstrations, and advice on available and appropriate wildlife damage management methods and approaches. The implementation of damage management actions is the responsibility of the requester. In some cases, WS provides supplies or materials that are of limited availability for use by non-WS entities. Technical assistance may be provided through a personal or telephone consultation, or during an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems. These strategies are based on the level of risk, need, and the practicality of their application. In some instances, wildlife-related information provided to the requestor by WS results in tolerance/acceptance of the situation. In other instances, management options are discussed and recommended.

Under APHIS NEPA implementing regulations and specific guidance for the WS program, WS technical assistance is categorically excluded from the need to prepare an EA or EIS. However, it is discussed in this EA because it is an important component of the IWDM approach to resolving feral swine damage problems.

2.3.2 Operational Damage Management

Direct damage management assistance includes damage management activities that are directly conducted or supervised by WS personnel. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone and when a *Work Initiation Document for Wildlife Damage Management* is completed to provide for direct damage management by WS. The initial investigation defines the nature, history, and extent of the problem; species responsible for the damage; and methods available to resolve the problem. The professional skills of WS personnel are often required to effectively resolve problems, especially if restricted use pesticides are necessary or if the problems are complex.

From FY 2011 through FY 2016, the total number of direct management actions (work tasks) completed by WS in Hawai`i was 864,852. Of that total, 28,502[3] or 3.29 percent were directed at feral swine to reduce conflicts and damage to agricultural resources, property, natural resources, and threats to human safety from feral swine. A list of the types of resources protected by WS is provided in Table 2.

[3] WS MIS Conflict/Loss Drilldown for Hawai`i State from 10/01/2010 to 09/30/2016

Table 2. The number and of Work Tasks (WTs) undertaken by WS to protect resources in Hawai'i from feral swine between FY2011-2016 (t/e = threatened and endangered species, ag = agriculture, nr = natural resources).

Resource Protected	WTs
Aircraft	392
Beans, soybeans	5
Beans, (other)	1
Birds, colonial sea (all)	87
Birds, coots, Hawaiian (t/e)	6
Birds, ducks, Hawaiian (t/e)	27
Birds, moorhens, Hawaiian common (t/e)	29
Birds, pheasant (all) nr	1
Birds, quail (all) nr	1
Birds, shearwaters, wedge-tail	18
Birds, stilts, Hawaiian (t/e)	247
Birds, turkey, wild	1
Birds, upland game (other)	1
Birds, (other)	1
Buildings, non-residential	24
Designated natural areas	1375
Fruit, (other)	12
Gardens, veg./fruits/nuts	806
Goats, z-(other kids)	10
Golf courses	1384
Grains, corn (field)	8976
Grains, corn (sweet)	6526
Grains, (other)	6
Hlth/Sfty, human (aviation)	432
Hlth/Sfty, human (general)	966
Mammals, (other)	1
Melons, (other)	571
Peppers, chilies	7
Plants, commercial nursery/greenhouse (all)	305
Potatoes	288
Property (general)	132
Pumpkins	448
Recreational areas (other)	322
Reptiles, turtles, green sea (t/e)	8
Soil (i.e. erosion)	221
Squash	614
Sunflowers	3
Tomatoes	616
Trees, seedlings ag	1027
Trees, seedlings nr	220
Trees, standing	224
Trees, standing (mixed)	221
Trees, standing/shrubs	343
Trees, fruit/nut (other)	221
Turf and/or flowers	977
Vehicles, land	11
Watershed	273
Wetlands	10
Landscaping (other)	105
TOTAL	28502

2.3.3 Educational Efforts

Education is an important element of WS program activities because wildlife damage management is about finding balance and coexistence between the needs of people and needs of wildlife. This is extremely challenging as nature has no balance, but rather, is in continual flux. In addition to the routine dissemination of recommendations and information to individuals or organizations sustaining damage, lectures, courses, and demonstrations are provided to producers, homeowners, state and county agents, colleges and universities, and other interested groups. Wildlife Services frequently cooperates with other agencies in education and public information efforts. Additionally, technical papers are presented at professional meetings and conferences so that WS personnel, other wildlife professionals, and the public are periodically updated on recent developments in damage management technology, programs, laws and regulations, and agency policies.

2.4 Wildlife Services Decision Making

WS personnel use a thought process for evaluating and responding to damage complaints which is depicted by the WS Decision Model and described by Slate et al. (1992) (Figure 3). Wildlife Services personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate to reduce damage. Wildlife Services personnel assess the problem, then evaluates the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, methods deemed to be practical for the situation are incorporated into a management strategy. After this strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management is ended. In terms of the WS Decision Model (Slate et al. 1992), most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not a written documented process, but a mental problem-solving process common to most, if not all, professions.

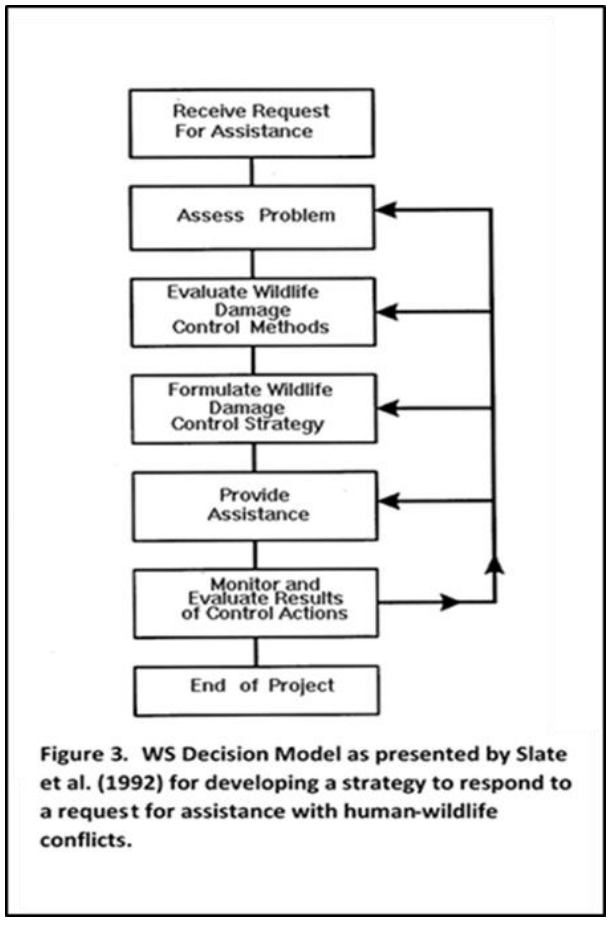

Figure 3. WS Decision Model as presented by Slate et al. (1992) for developing a strategy to respond to a request for assistance with human-wildlife conflicts.

2.4.1 Community-based Decision Making

The WS program in Hawai`i follows the "co-managerial approach" to solve wildlife damage or conflicts by incorporating adaptive resource management[4] and adaptive impact management[5] as described by Decker and Chase (1997). Within this management model, WS could provide technical assistance regarding the biology and ecology of mammals and effective, practical, and reasonable methods available to the local decision-maker(s) to reduce damage or threats. This could include non-lethal and lethal methods depending on the alternative selected. Wildlife Services and other state, tribal and federal wildlife management agencies may facilitate discussions at local community meetings when resources are available.

Requests for assistance to manage damage caused by wildlife often originate from the decision-maker(s) based on community feedback or from concerns about damage or threats to human safety. As representatives of the community, the decision-maker(s) are able to provide the information to local interests either through technical assistance provided by WS or through demonstrations and presentations by WS on wildlife damage management activities. This process allows decisions on wildlife damage management activities to be made based on local input. They may implement management recommendations provided by WS or others on their own. They may request management assistance from WS, other wildlife management agencies, local animal control agencies, private businesses or other organizations.

2.4.2 Community Decision-Makers

The decision-maker for the local community would be elected officials or representatives of the community. The elected officials or representatives are popularly elected residents of the local community or appointees who oversee the interests and business of the local community. This person or persons would represent the local community's interest and make decisions for the local community, or bring information back to a higher authority or the community for discussion and decision-making. Wildlife Services could provide technical assistance and make recommendations for damage reduction to the local community or local business community decision-maker(s). Direct control could be provided by WS only if requested by the local community decision-maker, funding is provided, and if the requested direct control was compatible with WS' recommendations.

2.4.3 Private Property Decision-Makers

In the case of private property owners, the decision-maker is the individual that owns or manages the affected property. The decision-maker has the discretion to involve others as to what occurs or does not occur on property they own or manage. Due to privacy issues, WS cannot disclose cooperator information to others. Therefore, individual property owner or managers make the determinations regarding involvement of others in the decision-making process for the site. Direct control could be provided by WS if requested, funding is provided, and the requested management is in accordance with WS' recommendations.

[4] Adaptive Resource Management is a philosophical approach for integrating science and management to improve the outcome of management actions on components of the ecosystem (Decker and Chase 1997). It has three major components: 1. Integration of experience and science to make predictions, 2. Design of a specific management experiment, 3. Linking the management experiment with the policy making process (Stankey et. al 2005).

[5] Adaptive Impact Management advocates adaptive, experimental management of wildlife, habitat, and people to enhance management decision-making (Decker and Chase 1997).

2.4.4 Public Property Decision-Makers

The decision-maker for local, state, or federal property would be the official responsible for or authorized to manage the public land to meet interests, goals, and legal mandates for the property. Wildlife Services could provide technical assistance to this person and recommendations to reduce damage. Direct control could be provided by WS if requested, funding provided, and the requested actions were within the recommendations made by WS. Public involvement would be conducted by the agency responsible for managing the site in accordance with agency procedures.

2.4.5 Native Hawaiian Decision-Makers

The decision-makers for native Hawaiian property and ceded lands (e.g. Department of Hawaiian Homelands[6]) would be the officials responsible for or authorized to manage these lands and the land's resources identified under treaty rights, to meet interests, goals, and legal mandates for the property. Wildlife Services could provide technical assistance and recommendations to reduce damage. Direct control could be provided by WS if requested, funding provided, and the requested actions were within the recommendations made by WS. Involvement of native Hawaiian organization members or members of the surrounding community would be conducted in accordance with the established regulations and procedures for the affected group(s).

2.5 Methods

As depicted above in the WS decision model, when WS receives a request for assistance, the problem is first assessed and then the control methods to resolve the problem are evaluated. FSDM control methods used are generally broken down into two categories, Non-lethal and lethal methods and are described below. Some methods such as cage traps can be used both as a non-lethal or lethal method depending on objectives. Table 3 shows the methods used to take feral swine by WS in Hawai`i from FY 2011-2016.

2.5.1 Non-lethal Methods

Non-lethal methods are always evaluated before lethal methods are considered. It's only practical that if the problem can effectively be resolved using non-lethal methods, in most cases, it would be simpler and less intrusive than most lethal methods. Non-lethal methods are often tried by the cooperators before requesting assistance from WS. In such a case, WS will evaluate rather or not the cooperator adequately tried the non-lethal methods and may recommend continued use of those methods or offer other non-lethal techniques to enhance the effort. Below are the common non-lethal methods used and recommended by WS.

<u>Exclusion</u>

Involves the physical exclusion of wildlife from protected resources and/or prevention of girdling, gnawing, rooting and general damage (i.e. tree wraps, fencing, electrical barriers, etc.).

[6] Section 5(f) of the Hawai`i Statehood Admission Act created the ceded lands trust. As a condition of statehood, section 5(f) mandated that the State of Hawai`i manage certain ceded lands for a number of purposes, including the "betterment of the conditions of native Hawaiians". (Lyndsey 2010).

Cultural methods and Habitat modification

These methods are typically implemented by agricultural producers or property owners. They consist primarily of non-lethal preventive methods which minimize exposure and/or reduce the amount or attractiveness of the protected resource to wildlife that would cause damage or pose a threat. A few examples of these types of techniques are: changing animal husbandry practices, switching to short variety crops, picking less palatable varieties of landscape plants, picking up and containing garbage in animal resistant containers, not leaving pet food out at night, and keeping the vegetation around the protected resource short or tall depending on management objectives.

Animal behavior Modification

These tactics refer to altering the animal's behavior to reduce damage. Some of these strategies may include but are not limited to the use of pyrotechnics, propane exploders, distress calls or other sound producing devices, visual or chemical repellents and livestock guarding dogs.

Non-lethal Capture Devices

These can include foot-hold traps, culvert traps, corral traps, catch poles, cable restraints and snares (used with a closing stop), nets, and box/cage traps to capture wildlife. These devices hold the animal until the Specialist arrives and relocates the animal (pursuant to State laws and regulations as appropriate). Alternatively, when monitoring for diseases in wildlife, samples may be collected and then the animal is released at the capture site. WS could also use these capture methods for animals to be outfitted with transmitters used for wildlife research.

Anesthetizing drugs

Drugs such as Ketamine, Telazol, Xylazine, and Yohimbine are used to capture, sedate, and handle animals involved in wildlife damage or disease situations. They may also be used to capture animals to receive transmitters for research purposes. These and other drugs are available for WS use, pursuant to State and Federal regulations, and are identified as approved drugs by the WS program through its Immobilization and Euthanasia Committee.

2.5.2 Lethal Methods

Lethal methods are used at the discretion of the specialist and are chosen by using the decision model and what is most appropriate for the situation while also considering local laws, and WS policies.

Lethal Capture Devices

Non-lethal capture devices as discussed above (foot-hold traps, neck snares, leg snares, box/cage traps, culvert traps, corral traps, catch poles, nets, etc.) can also be used as lethal methods when the captured animal is killed via shooting or euthanasia chemicals discussed below.

Shooting

Shooting with firearms is sometimes used in managing wildlife damage problems particularly when lethal methods are deemed appropriate for the situation. Shooting is also used in some situations to supplement and reinforce dispersal techniques and to dispatch animals in traps. It is selective for target species and can be used in conjunction with spotlights, night vision, thermal imaging and other techniques.

Tracking/Trailing Dogs

WS employs the use of tracking/trailing dogs to locate or pursue feral swine. WS personnel are aware of and will abide by WS Directive 2.445, which requires that WS personnel handle and maintain trained dogs such that the dogs do not pose a threat to people or domestic animals. Dogs would only be used in areas where WS has landowner or land manager permission to use the technique.

Euthanasia drugs

Sodium Pentobarbital and Potassium Chloride are commonly used to euthanize animals. These and other drugs are available for WS' use for wildlife damage or disease situations, pursuant to state and federal regulations and are identified as approved drugs by the WS Immobilization and Euthanasia Committee.

Recreational Harvest

Sport hunting of feral swine is not generally recommended as a means to extirpate or control a population of feral swine (Richardson et al. 1995) and in fact, has been shown to increase populations in some situations due to humans transplanting them to new areas to increase hunting opportunities, either intentionally through release of animals into the wild, or unintentionally through escapes from hunting preserves (Waithman et al. 1999). However, Hawai`i manages feral swine as a game animal and therefore management objectives are substantially different than in most states. Sport hunting could be used, to the extent practical, in some individual cases in conjunction with other WDM strategies to help manage damage caused by feral swine. This is explained in more detail in Section 3.1.1. Effects on Social and Cultural Values.

Table 3. Methods used to take feral swine in Hawai`i by WS from FY2011-16.

Method	Lethal	Freed/ Released	Dispersed	Surveyed
No methods specified				5
Dog			4	
Firearms	1,125		452	
Handcaught/Gathered	3			
Pyrotechnics (all)			1	
Snares, Foot/Leg	340	1		
Snares, Neck	2,793			
Traps, Cage	273			
Traps, Corral	1,005			
Traps, Other	15	5		
Vehicles (all)			139	
Total	**5,554**	**6**	**596**	**5**

2.6 Field Operating Procedures for FSDM Methods

WS has a number of field operating procedures and operational policies. These policies and procedures are designed to prevent, reduce or compensate for any undesirable consequence that could occur as a result of an action from WS. These procedures are incorporated into all alternatives as applicable, except the no federal program alternative (Alternative 2). Most operational policies are instituted to abate specific

issues while some are more general and relate to the overall program. Policies and procedures include those recommended or required by regulatory agencies such as the Environmental Protection Agency (EPA) and these are listed where appropriate. Specific measures to protect resources such as T&E species that are managed by cooperating agencies (USFWS, DOFAW and HDLNR) are included in the lists below.

2.6.1 General Field Operating Policies used by WS in FSDM

- WS complies with all applicable laws and regulations that pertain to conducting FSDM on private and non-hunting public lands.

- WS coordinates with agency officials for work on non-hunting public lands to identify and resolve any issues of concern with FSDM.

- All personnel who use firearms would be trained according to WS' Directives.

- WS personnel adhere to all label requirements for immobilization, euthanasia, and contraceptive drugs. EPA/Food and Drug Administration (FDA) approved labels provide information on preventing exposure to people, pets, and T&E species along with environmental considerations. These label requirements generally preclude or reduce exposure to non-target species, the public, pets, and the environment.

- WS' personnel would operate in accordance with WS Directive 2.210 (Compliance with federal, state and local laws and regulations) and WS Directive 2.450 (Traps and trapping devices).

- WS' personnel would use immobilizing drugs and euthanasia chemicals according to the DEA and the FDA guidelines, along with WS' directives and procedures.

- WS' personnel would only use controlled substances registered with the DEA or FDA.

- WS' personnel that use controlled substances would receive training and certification to use those substances.

- Pesticide and controlled substance use, storage, and disposal would conform to label instruction and other applicable laws and regulations, and Executive Order 12898.

- WS' personnel would dispose of carcasses retrieved in accordance with WS Directive 2.515.

2.6.2 WS Field Operating Policies Specific to Issues

The following is a summary of operating policies used by WS specific to the issues used to develop the Alternatives.

<u>Effects on Feral Swine Populations</u>

- Feral swine take is monitored. WS provides data on total take of target animal numbers to other agencies (DOFAW as appropriate).

- WS only targets those individuals or groups of target species identified as causing damage or posing a threat of damage.

- WS will not relocate feral swine because of concerns regarding feral swine disease, the impact of feral swine on human health and safety, property, agriculture, and natural resources.

- WS personnel would selectively place capture devices where there is recent (fresh) feral swine sign and depredation or damage activity. The smallest number of capture devices that will remove the offending animal(s) would be used. Due to trap check policies, animal welfare and non-target species concerns and time limitations, WS personnel would be experienced at identifying recent feral swine sign and the efficient use and deployment of trap devices.

Effects on Non-Target and T&E Species

- WS' personnel would release non-target animals live-captured in traps unless it was determined that the animal would not survive and/or that the animal could not be released safely.

- WS' personnel would dispose of carcasses retrieved in accordance with WS Directive 2.515.

- As appropriate, capture devices would be equipped in such a manner to reduce the potential of capturing non-target animals.

- When conducting feral swine damage management activities via shooting, identification of the target would occur with consideration of the surrounding area and public safety.

- As appropriate, suppressed firearms would be used to minimize noise.

- WS personnel work with research programs such as the NWRC to continually improve and refine the selectivity of management devices, thereby reducing non-target take.

- When working in an area that has T&E species or has the potential for T&E species to be exposed to FSDM methods, WS personnel will know how to identify T&E species and apply or not apply FSDM methods accordingly.

- WS implements all requirements to protect state or federally listed species as issued in USFWS Section 7 consultations. These consultations provide species specific guidelines to ensure T&E species are not impacted. Communications and consultations with USFWS or DOFAW are re-initiated if there is any new information or if management actions change.

Effects on Social and Cultural Values

- Feral swine are considered an important recreational and subsistence hunting resource in Hawai`i. In certain cases, when determined to be an effective FSDM method for a desired outcome, WS will provide information to property owners to engage DOFAW to reduce feral swine populations that cause damage to property and natural resources through the use of hunting.

Effects on Human Health and Safety

- WS Specialists who use firearms and pyrotechnics are trained and certified by experts in the safe and effective use of these materials.

- Conspicuous warning signs, alerting people to the presence of traps or other FSDM methods, are placed at major access points when they are set in the field.

Humaneness of FSDM Methods

- Euthanasia procedures that do not cause pain or undue stress are used by trained WS personnel when practical and where safe.

- WS personnel euthanize captured target animals that are slated for lethal removal. The American Veterinary Medical Association's 2013 Guidelines and WS Directives 2.430 and 2.505 are followed for Euthanasia. Where euthanasia methods are not possible in some field situations, the animal is dispatched as humanely and quickly as possible.

- Trap monitoring devices would be employed where appropriate, which would minimize the amount of time feral swine may be confined to minimize pain and distress of live-captured swine.

- NWRC is continually conducting research to improve the selectivity and humaneness of wildlife damage management devices used by personnel in the field

2.7 Alternatives Considered in Detail

The following alternatives were developed to meet the need for action and address the identified issues with managing feral swine in Hawai`i. The below alternatives will be discussed in detail in chapter 3.

Alternative 1 – Continue the Current WS Program (No Action)

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 baseline for comparison with the other alternatives. The No Action alternative is the continuation of an ongoing program and, as defined here, is consistent with the CEQ's definition (CEQ 1981).

Alternative 2 – No Wildlife Services Program

This alternative would completely eliminate WS involvement in FSDM in Hawai`i. WS would not provide direct operational or technical assistance and requestors of WS services would have to conduct their own FSDM without WS involvement.

Alternative 3 – Only Nonlethal FSDM Methods Used by WS

This alternative would not allow for lethal WS operational FSDM in Hawai`i. This alternative would require WS to use only non-lethal methods to resolve feral swine damage problems.

Alternative 4 – Technical Assistance Only

Under this alternative, WS would cease from conducting direct control operations on behalf of cooperators to control feral swine damage and would only provide technical assistance or information.

2.8 Alternatives, issues and Strategies Not Considered for Analysis

Several alternatives were considered but not analyzed in detail. Not all issues raised warrant comparative analysis and the rationale for not considering these issues in detail are given below.

2.8.1 Compensation for Feral Swine Damage Loses

The Compensation Alternative would require the establishment of a system to reimburse persons impacted by feral swine damage. This alternative was eliminated from further analysis because no federal or state laws currently exist to authorize such action. Feral swine are destructive to numerous resources and compensation would not stop damages. A compensation program would require a substantial amount of funding to develop, investigate and validate damage claims, administer the program and pay claims. Compensation programs generally give little incentive to resource owners to limit damage through cultural FSDM methods and husbandry, or other practices and management strategies. Compensation programs are also not practical for reducing threats to human health and safety. WS and cooperating agencies in Hawai`i recognize the growing need to manage feral swine damages and a compensation program would require additional resources that are currently not available and would not help to achieve the overall goal of reducing feral swine damage.

2.8.2 Relocation Rather than Lethal Control of Feral Swine

Translocation is not appropriate for FSDM because feral swine are nonnative and the movement of feral swine from high-density, damage areas to areas of lower feral swine density facilitates spread of an invasive species. It should also be noted that the American Veterinary Medical Association (AVMA), the National Association of State Public Health Veterinarians, and the Council of State and Territorial Epidemiologists oppose the relocation of mammals due to the potential for disease transmission to a healthy local population. This is particularly true for mammals such as feral swine, which have been shown to carry over 30 zoonotic diseases (Center for Disease Control 1990). Relocation of wildlife is also discouraged by WS policy (WS Directive 2.501) because it is not a biologically sound practice and typically the relocated individual does not remain in or near the release site.

2.8.3 Develop a Statewide Bounty Program for Feral Swine

Bounties have been used in many states for over 150 years for a variety of animals, and in particular, coyotes. Among coyote bounty case histories, no documented evidence exist that bounty programs have temporarily or permanently reduced coyote numbers or abundance in any state (Bartel and Brunson 2003). Kansas enacted a $2 bounty on coyotes in 1877 and it remained in place until 1970. This bounty cost the state approximately $100,000 per year. After 93 years and approximately 9.3 million dollars in bounty payments, the results were overwhelmingly conclusive that the bounty system did not control coyotes and it did not control damage to poultry or livestock (Henderson 1987). Although feral swine are very different than coyotes, biologists believe their reproductive potential could make them equally or even more difficult to control with a bounty program. Although nearly every state in the country has abandoned the idea of a bounty for predator control, Utah recently re-enacted a bounty on coyotes. Bartel and Brunson (2003) conducted a survey of the Utah bounty participants to determine the effectiveness of the program and to

determine what motivated the bounty participants. The study determined that the bounty program did not produce the desired results in terms of increasing hunter participation or reducing the coyote population. They found little evidence that new hunters or trappers were recruited by the bounty program and the survey showed that the income from the bounty was the least important reason for participating. Enjoying the outdoors was the number one reason they participated. This implies that the people who participate in a bounty program are the ones that are likely to participate in hunting and trapping regardless of a bounty. Therefore the bounty was not enough of an incentive to recruit new hunters and it was not enough of an incentive for current hunters to increase their efforts significantly.

Texas has the highest population of feral swine in the country. Feral swine numbers in Texas are estimated to exceed 2 million animals. Van Zandt County attempted a bounty on feral swine in 2003-2004. They paid $7 for each set of matched ears that came into the county extension office. WS contacted the extension office in that county to discuss the success of the program. According to the County Extension Specialist (B. Cummins, Tex. Coop. Ext., pers. comm. 2008) that administered the program, the program was a failure. The County paid out over $16,000 in bounties in 18 months with no apparent decrease in feral swine numbers or damage and therefore the bounty program was discontinued.

A bounty on feral swine would likely cause severe conflicts with the current status of feral swine as a game animal in Hawai`i and current FSDM activities. A bounty system is unlikely to be adopted by DOFAW, non-government organizations or supported by the hunting community. Second, a statewide bounty system may only increase hunting pressure on feral swine in accessible areas leaving population reservoirs in other remote areas where the pressure may actually be needed. Additionally, a bounty program would likely result in fewer disease samples from harvested animals which would decrease overall disease surveillance.

3.0 ENVIRONMENTAL EFFECTS

Chapter 3 provides information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. NEPA requires federal agencies to determine whether their actions have a “significant impact on the quality of the human environment.” The environmental consequences of the four alternatives are discussed below with emphasis on the issues presented in Chapter 2, with analysis of the direct, indirect, and cumulative effects, as applicable. The environmental consequences of each alternative are compared with the proposed action to determine if the real or potential impacts would be greater, lesser, or the same. Therefore, the proposed action or current program alternative serves as the baseline for the analysis and the comparison of expected impacts among the alternatives. The comparison of alternatives will be used to make a selection of the most appropriate alternative for WS FSDM activities.

Each major issue will be evaluated under each alternative and the direct, indirect and cumulative impacts will be estimated where applicable. NEPA describes the elements that determine whether or not an impact is "significant." Significance is dependent upon the context and intensity of the impact. The following factors were considered to evaluate the significance of the impacts on the human and natural environment that relate to context and intensity:

- Magnitude of the impact (size, number, or relative amount of impact).
- Duration and frequency of the impact (temporary, seasonal impact, year round or ongoing).

- Likelihood of the impact.
- Geographic extent; how widespread the program impact might be (intensity); and the legal status of a species that may be affected by the action (context).

3.1 Alternatives Considered in Detail and Their Associated Impacts

The issues identified in chapter 2 are addressed here in detail by alterative. This section analyzes the environmental consequences of the No Action Alternative (Continue the current program) with three other alternatives and compares these impacts with the projected environmental impacts of the Proposed Action.

3.1.1 Alternative 1 – Continue the Current WS Program (No Action)

The Proposed Action is to continue the current portion of WS operations that responds to requests for FSDM, and in response to increasing conflicts with agricultural and natural resources, property, and threats to human health and safety in Hawai`i. To meet these goals WS would have the objective of responding to all requests for assistance with, at a minimum, technical assistance or self-help advice, or where appropriate and when funding is available, direct damage management assistance in which professional WS personnel conduct FSDM.

An IWDM approach would be implemented which would allow the use of all available legal techniques, used singly or in combination, to meet the need of each requestor for resolving conflicts with feral swine. Agricultural producers and others requesting assistance would be provided with information regarding the use of effective non-lethal and lethal techniques. Lethal methods used by WS may include but not limited to, trapping, snaring, or shooting. Non-lethal methods used by WS may include propane exploders, pyrotechnics and other scare devices; barriers, fencing and other physical deterrents, and removal of attraction sources. In most situations, the implementation of non-lethal methods such as fencing would be the responsibility of the requestor to implement. Upon completion of an WS Form 12A Work Initiation Document, FSDM by WS would be allowed in the state, when requested, on private property sites or public facilities where a need has been documented. All management actions would comply with appropriate federal, state, and local laws as well as WS Directives.

Effects on Feral Swine Populations (Under Alternative 1)

A common concern among members of the public in Hawai`i is whether FSDM actions adversely affect the viability of feral swine populations. FSDM activities and effects depend upon management objectives. Damage management activities associated with feral swine would be conducted by WS only at the request of a cooperator to reduce damage that was occurring or to prevent damage from occurring and only after methods to be used were agreed upon by all parties involved. WS would monitor activities to ensure any potential impacts were identified and addressed. WS would work closely with state and federal resource agencies to ensure WS' activities were considered as part of management goals established by those agencies. Historically, WS' activities to manage feral swine in Hawai`i have not reached a magnitude that would cause adverse effects to populations in the State.

Evaluation of activities relative to the feral swine population indicated that program activities would likely have no cumulative adverse effects on feral swine populations in the State when targeting those feral swine responsible for causing damage or posing a threat of damage. WS' actions would be occurring simultaneously, over time, with other natural processes and human generated changes that are currently taking place. These activities include, but would not be limited to: Natural mortality, mortality from vehicle

collisions, and other human induced mortality from hunter harvest or other damage management activities. All of these factors play a role in the dynamics of feral swine populations.

Swine are not native to Hawai`i. They can be found on all the main islands except Kahoolawe and Lana`i. Local feral swine populations throughout the state are managed by a number of federal, state and nongovernment organizations (NGO) conducting feral swine damage activities on lands that are exclusively managed to protect and enhance extant native forest ecosystems. Some Natural Areas Reserve System (NARS) preserves may allow public hunting (NARS Commission 1997). Feral swine take in NARS preserves was not readily available. The number of feral swine harvested on private lands (including private conservation areas) for sport hunting or to prevent damage by either private individuals or NGO's is also not known.

Harvests of feral swine in state public hunting areas are monitored through self-reporting by hunters (Table 4). The numbers of feral swine taken in federal fiscal years 2013 to 2016 by the National Park Service (excluding Haleakala NP) and the Fish and Wildlife Service are presented in Table 5. Table 6 shows the number of feral swine taken by Wildlife Services over a four year period. These removals represent an average of 32 percent of all known feral swine taken from public hunters and federal government agencies in Hawai`i.

Table 4. Feral swine harvest summary collected from hunter check stations throughout the State of Hawai`i. Source: DLNR.

State Fiscal Year Jul 1- Jun 30	E. Hawai`i	W. Hawai`i	Maui	Moloka`i	O`ahu	Kaua`i	Total
2013	217	178	523	38	347	645	1948
2014	398	90	388	57	155	715	1803
2015	361	84	386	38	150	805	1824
2016	136	49	405	27	151	743	1511

Table 5. Feral swine take from federal parks, refuges and historical sites in Hawai`i.

Federal Fiscal Year Oct 1 – Sep 30	Hakalau Forest NWR E. Hawai`i	Hawai`i Volcanoes NP. E. Hawai`i	Haleakalā NP Maui	Kalaupapa NHS Moloka`i	Total
2013	373	67	30	22	492
2014	153	69	16	30	268
2015	376	86	3	32	497
2016	390	34	No data	No data	424

Table 6. Feral swine take by Wildlife Services in Hawai`i by island.

Federal Fiscal Year Oct. 1 – Sep. 30	Hawai`i	Maui	Moloka`i	O`ahu	Kaua`i	Total
2013	16	0	0	1046	440	1502
2014	24	0	0	465	371	867
2015	53	1	0	583	311	954
2016	43	0	0	509	88	640

Mayer (2009) estimated the feral swine population in Hawai`i to be between 10,000-40,000. The estimate was based on an annual hunter harvest percentage, of approximately 10-30% of total population taken per year. Figure 4 shows the annual take of feral swine by WS in the state of Hawai`i. The average annual take of feral swine by WS over the 12-year period was 697 animals which is less than 10 percent of Mayer's (2009) lower population estimate. Based on the required annual removal rates (41-70%) suggested by Dziecolowski et al (1992), Hess et al. (2006) and Timmons et al. (2012) to achieve population reduction, it is highly unlikely that the annual take contributed by WS throughout the state, could reduce the feral swine population in Hawai`i except in localized fenced exclosures.

Ditchkoff and West's (2007) conclusion that feral swine are difficult to eradicate due to their high reproductive potential is relevant to this analysis. Feral swine have the highest reproductive rate of any ungulate species (Read and Harvey 1989). Research in Australia suggests that feral swine can withstand a 70 percent population reduction and rapidly return to pre-control levels (Dziecolowski et al. 1992). Locally, Hess et al. (2006), estimated that an annual removal of up to 43 percent in Hakalau Forest National Wildlife Refuge would be necessary to induce a temporary decline in the population there. WS' feral swine take is limited with the focus of control efforts occurring on small private parcels of land, the constraints on available staffing and funding which result in WS usually only able to respond to the most urgent requests for assistance. Therefore it is estimated that only localized population reduction and some eradication in localized fence exclosures is expected to occur on properties receiving damage assistance.

Based on the removal that could occur by WS under the proposed action alternative (Figure 4) and based on the annual take of feral swine that has occurred previously by all other sources (including the take numbers from NARS or private sources which were not available), the cumulative removal of feral swine would likely be far below the levels required to stabilize or lower current statewide feral swine populations. Taking these factors into consideration WS concludes that there would not be a significant effect on the feral swine population in Hawai`i, expect in localized fenced exclosures.

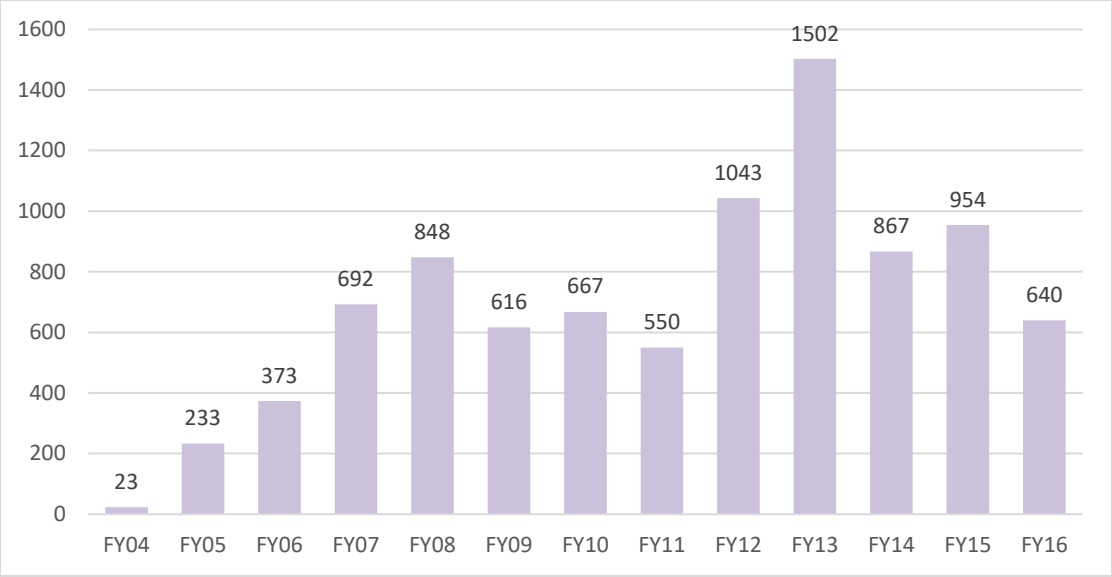

Figure 4. Feral swine take by WS each federal fiscal year in the state of Hawai`i.

Effects on Non-target and T&E Species (Under Alterative 1)

A common concern among members of the public and wildlife professionals, including WS personnel, is the potential impacts of FSDM on non-target species, particularly T&E species. In the course of protecting agriculture, property, human health and safety, or natural resources from feral swine damages, considerations must be given so that these management activities do not adversely affect any federally and state listed threatened and endangered species, or other protected species. The potential for impacts on any non-target animal would be associated with accidental injury or death occurring due to efforts to control feral swine.

The proposed action would use firearms, neck snares, leg snares, cage/box and corral traps as preferred methods for capturing and removing feral swine to protect resources. Cage/box traps are typically used around residential areas because other methods may not be conducive to an urban area such as shooting. Cage/box traps in an urban setting have the potential to capture free roaming pets or other animals such as small livestock, however, placement, baiting practices and field operating policies minimize non-target captures and can be released unharmed or returned to their owners. Typically, WS abides by state law requirements for trap check laws, however the state of Hawai`i does not have a trap check law so WS Hawaii has a maximum 72 hour trap check policy. However, it is general practice to check traps every 24 hours. If, under some circumstances, traps are to be checked longer than 24 hours, WS employees will ensure that adequate conditions such as food, water and shade are present during an extended trap check to provide acceptable animal welfare conditions for both target and non-target animals. Therefore, cage/box traps are not anticipated to have any negative effect on non-target species.

Leg and neck snares would only be used where they would not pose a risk to pets or other animals. The potential for capturing free roaming dogs in a leg and/or neck snare exists, but would be minimized by placement in feral swine specific areas (trails, wallows or rubs), using snare stops on neck snares that prevent the snare from closing down below a certain size (allowing non-targets to pull loose) and through notification of landowners. Snares must be checked as frequently as possible, but no less frequently than 48 hours, thereby minimizing non-target take.

Trained trailing dogs would be used to pursue and remove feral swine that are posing immediate threats that cannot be otherwise trapped. This method is not expected to have an effect on non-target animals because these dogs and their handlers are trained and experienced, the dogs follow the target animals. Radio tracking collars could be used on trailing dogs to facilitate recovery and prevent dogs from getting lost. The use of dogs is expected to be minimal.

The use of firearms would be selective for target species since identification of an individual would be made prior to shooting. Use of firearms does not usually affect non-target animals except for the occasion where the sound of a firearm may temporarily startle or scare an animal when the firearm is discharged. Therefore, the use of firearms would not affect non-target species.

To date there have been no non-target animals taken while performing feral swine management activities by WS in Hawai`i. When methods and techniques were implemented by WS, the potential lethal take of non-target wildlife species would be expected to be minimal to non-existent. Methods used or recommended by WS program would likely have no cumulative adverse effects on target and non-target wildlife populations.

Effects of Lead Ammunition

Agencies and members of the public have expressed concerns regarding the potential for adverse environmental impacts and risks to non-target species, specifically scavengers, from the materials used in ammunition. The majority of concerns expressed pertain to the use of lead ammunition and this section correspondingly focuses on risks associated with lead (e.g., Kostnett 2009). WS uses lead-free ammunition when practical, effective, and available to mitigate and/or minimize the effects of its use of lead ammunition on the environment, wildlife, and public health and in compliance with federal or state regulations on the use of lead ammunition. WS has specific ammunition and firearm requirements to maximize performance, safety, and humaneness (Caudell et al. 2012). Precision performance of bullets is essential for project efficacy, safety, humaneness (shot placement to result in rapid death) (MacPherson 2005, Caudell et al. 2009). WS will not use lead ammunition where prohibited by land owners/managers, however availability of an acceptable substitute may affect cost or feasibility of a project. Current non-lead shot substitutes being considered for use are four times as expensive as traditional lead ammunition. WS is utilizing non-lead shot where available and practical, however, lead shot may be used when acceptable non-lead alternatives are not available. Risk of ricochet is a safety concern when working at airports, in areas near residences, and other sensitive sites and for the protection of WS personnel. Ammunition which conveys it's full energy to the target animal and which results in low or no pass through is needed for reasons of humaneness (instant or near-instant incapacitation) and to reduce safety risks associated with wounded animals traveling from the project site.

The lethal removal of feral swine with firearms by WS to alleviate damage or threats would occur from the use of shotguns, rifles or handguns. In an ecological risk assessment of lead shot exposure in non-waterfowl birds, ingestion of lead shot was identified as the biggest concern rather than just contact with lead shot or lead leaching from shot in the environment (Kendall et al. 1996). It is unlikely that lead poisoning of migratory birds scavenging on feral swine shot with ammunition containing lead would be effected since Hawai`i has few scavenging species. The Hawaiian crow (*Corvus hawaiiensis*) is known to pick at the flesh of carcasses but the current range of the species is restrictive and it is unlikely that WS would be working in Hawaiian crow range. In the unlikely event that Hawaiian crows move out of their current range, alternatives to lead would be used in the area.

Bird sensitivity to lead from exposure to ammunition such as lead shot, bullets, or bullet fragments has been studied. Clinical signs of lead poisoning in birds are observed when blood lead concentrations reach 20 to 50 µg/dL, while severe clinical signs are observed at concentrations exceeding 100 µg/dL. Clinical signs of lead poisoning include wing droop, anemia, and weakness in affected birds (The Wildlife Society 2008). The effects of ingestion of lead shot have been noted in various avian species. Pain et al. (2009), in a review regarding the impacts of lead shot and bullets on terrestrial birds, documented impacts to 33 raptor species and 30 other species including, but not limited to, ground nesting birds, cranes, and upland game birds. Lead impacts from spent ammunition have also been noted in numerous waterfowl species (Tranel and Kimmel 2009). Cruz-Martinez et al. (2012) evaluated data on 1,277 bald eagles admitted to the University of Minnesota Raptor Rehabilitation Center from January 1966 to December 2009. Of the birds admitted 334 were identified as elevated lead cases (322 live, 12 dead). They detected significantly increased odds for elevated lead levels based on season (late fall and early winter), deer hunting rifle zone and age of bird (adult birds). Eagles submitted to the rehabilitation center that came from hunting zones where rifles were used were at a higher risk of elevated lead levels than eagles from hunting zones where only shotguns were permitted. The difference was attributed to the fact that rifle bullets were more likely to fragment into small pieces that would be more readily ingested by eagles. Similar seasonal patterns in lead exposure corresponding with hunting season have been reported for ravens (Craighead and Bedrosian 2008). An individual lead pellet has been shown to result in lead toxicosis in waterfowl and ground nesting birds. Lethal and sublethal impacts have been noted with the experimental ingestion of 2000 mg (10 pellets of Number 4 lead) of lead in bald eagles (Eisler 1998). The 00 shot frequently used to remove swine is relatively large (over 8mm diameter). The size of the shot would likely reduce risks of accidental ingestion by smaller birds seeking grit. Shot is also unlikely to fragment on contact compared with some types of bullets (Cruz-Martinez et al. 2012). Consequently, it may be easier for scavengers to detect and avoid lead than other ammunition. Large shot and bullet fragments are also more likely to be regurgitated (cast) with other undigested food items such as hair, feathers and bone fragments.

Deposition of lead into soil could occur if, during the use of a firearm, the projectile passes through feral swine, if misses occur, or if the carcass was not retrieved. Laidlaw et al. (2005) reported that, because of the low mobility of lead in soil, all of the lead that accumulates on the surface layer of the soil is generally retained within the top 20 cm (about 8 inches). In addition, concerns occur that lead from bullets deposited in soil from shooting activities could contaminate ground water or surface water from runoff. Stansley et al. (1992) studied lead levels in water that was subjected directly to high concentrations of lead shot accumulation because of intensive target shooting at several shooting ranges. Lead did not appear to "transport" readily in surface water when soils were neutral or slightly alkaline in pH (i.e., not acidic), but lead did transport more readily under slightly acidic conditions. Although Stansley et al. (1992) detected elevated lead levels in water in a stream and a marsh that were in the shot "fall zones" at a shooting range, the study did not find higher lead levels in a lake into which the stream drained, except for one sample collected near a parking lot. Stansley et al. (1992) believed the lead contamination near the parking lot was due to runoff from the lot, and not from the shooting range areas. The study also indicated that even when lead shot was highly accumulated in areas with permanent water bodies present, the lead did not necessarily cause elevated lead levels in water further downstream. Muscle samples from two species of fish collected in water bodies with high lead shot accumulations had lead levels that were well below the accepted threshold standard of safety for human consumption (Stansley et al. 1992).

Craig et al. (1999) reported that lead levels in water draining away from a shooting range with high accumulations of lead bullets in the soil around the impact areas were far below the "action level" of 15 parts per billion as defined by the EPA (i.e., requiring action to treat the water to remove lead). The study

found that the dissolution (i.e., capability of dissolving in water) of lead declines when lead oxides form on the surface areas of the spent bullets and fragments (Craig et al. 1999). Therefore, the transport of lead from bullets or shot distributed across the landscape was reduced once the bullets and shot formed crusty lead oxide deposits on their surfaces, which served to reduce naturally the potential for ground or surface water contamination (Craig et al. 1999). Those studies suggest that, given the very low amount of lead being deposited and the concentrations that would occur from WS' activities to reduce feral swine damage using firearms, lead contamination of water from such sources would be minimal to nonexistent.

Since those feral swine removed by WS using firearms could be lethally removed by other entities using the same methods in the absence of WS' involvement, WS' assistance with removing those animals would not be additive to the environmental status quo. The amount of lead deposited into the environment could be lowered by WS' involvement in damage management activities due to the proficiency training received by WS' employees in firearm use and accuracy. The training of WS' employees in proficient firearms use would increase the likelihood that feral swine were lethally removed humanely in situations that ensure accuracy and that misses occur infrequently, which further reduces the potential for lead to be deposited in the soil from misses and the need for multiple shots. Based on current information, the risks associated with lead projectiles that could be deposited into the environment from WS' activities would be below any level that would pose any risk from exposure or significant contamination of water.

Effects on Biodiversity

The WS program does not attempt to eradicate any native wildlife species in Hawai`i. WS operates in accordance with all applicable federal and state laws and regulations enacted to ensure the viability of native species. Impacts on non-target species populations due to WS's lethal FSDM activities are minor. Given the non-native status of feral swine in Hawai`i and the associated damage that feral swine can cause to natural resources, any activities that reduce the density of feral swine in specific areas would likely enhance biodiversity in the area by reducing habitat destruction, competition and predation. The need for action in Chapter 1 of this EA describes the potential adverse effects that feral swine could have on natural resources within the state. Reduction in feral swine populations in Hawai`i could provide some benefit to native animals and native plants.

Effects on State and Federally listed T&E Species

Feral swine damage management projects to protect property, health and safety are generally in residential and agricultural areas. These management activities are conducted on specific properties on the islands of Hawai`i, Kaua`i and O`ahu. As stated in section 1.6.2. Site Specificity, all specific locations or times where such damage will occur in any given year cannot be predicted. Therefore, any effects on T&E species can only be analyzed on properties or locations where WS is already currently conducting management activities or in areas where WS expects management activities to occur such as agricultural or residential areas. WS conducts Section 7 consultations with the U.S. Fish & Wildlife Service (USFWS) to ensure that "any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species".

WS reviewed the status, critical habitats designations, and current known locations of all species listed as State or Federally threatened, endangered, or candidates within the islands and properties where FSDM is occurring or likely to occur. Species effects determinations were made for each location and where applicable, were submitted to the USFWS for concurrence pursuant to Section 7 of the Endangered Species Act. If WS is requested to conduct management activities in areas or properties that contain additional T&E species or critical habitats that are not listed below, than WS will initiate an updated

consultation with USFWS to ensure any direct or indirect effect on a T&E species can be adequately analyzed.

WS prepared a Biological Assessment (BA) for FSDM activities on O`ahu and submitted it to the USFWS for Section 7 consultation and received a letter of concurrence May 1, 2018 (01EPIF00-2018-I-0314). Below are the species and effect determinations for those species on O`ahu.

Table 7. Species listed as threatened, endangered, or candidate on the island of O`ahu where FSDM is occurring or is likely to occur.

Common Name	Scientific Name	Status†	Determination‡
ANIMALS			
Snails			
O`ahu Tree Snail	*Achantinella mustelina*	E	NE
Insects			
Orangeblack Hawaiian damselfly	*Megalagrion xanthomelas*	E	MANLAA
Mammals			
Humpback Whale	*Megatera novaengliae*	E	NE
Hawaiian Monk Seal	*Monachus schauinslandi*	E	NE
Hawaiian Hoary Bat	*Lasiurus cinerius semotus*	E	MANLAA
Birds			
Hawaiian Gallinule	*Gallinula chloropus sandvicensis*	E	MANLAA
Hawaiian Coot	*Fulica alai*	E	MANLAA
Hawaiian Duck	*Anas wyvilliana*	E	MANLAA
Hawaiian Stilt	*Himantopus mexicanus knudseni*	E	MANLAA
Hawaiian Goose	*Branta sandvicensis*	E	MANLAA
O`ahu `Elepaio	*Chasiempis sandwichensis ibidis*	E	NE
Pueo	*Asio flammeus sandwichensis*	State E	NE
PLANTS			
`Ewa Plain `akoko	*Chamaesyce skottsbergii* var. *Kalaeloana*	E	NE
Akoko	*Euphorbia haeleeleana*	E	NE
`Ohai	*Sesbania tomentosa*	E	NE
Ihiihi	*Marsilea villosa*	E	NE
Ko`oloa`ula	*Abutilon menziesii*	E	NE
Ko`oloa`ula	*Bidens amplectens*	E	NE
Pu`uka`a	*Cyperus trachysanthos*	E	NE
Mao hau hele	*Hibiscus brackenridgei* spp. *mokuleianus*	E	NE
Round Leafed Chaff-Flower	*Achyranthes spends* var. *rotundata*	E	NE
No Common Name	*Abutilon sandvicense*	E	NE
No Common Name	*Chamaesyce kuwaleana*	E	NE
No Common Name	*Diellia unisora*	E	NE
No Common Name	*Hedyotis parvula*	E	NE
No Common Name	*Lepidium arbuscular*	E	NE
No Common Name	*Lipocaeta lobate* var. *leptophylla*	E	NE
No Common Name	*Neraudia angulate* var. *angulatar*	E	NE
No Common Name	*Neraudia angulate* var. *dentate*	E	NE
No Common Name	*Schiedea hookeri*	E	NE
No Common Name	*Viola chamissonia* ssp. *Chamissonian*	E	NE

Common Name	Scientific Name	Status†	Determination‡
No Common Name	*Diellia falcate*	E	NE
No Common Name	*Gourania meyenii*	E	NE
No Common Name	*Melicope saint-johnii*	E	NE
No Common Name	*Melicope pallida*	E	NE
No Common Name	*Sanicula mariversa*	E	NE
No Common Name	*Silene perlmanii*	E	NE
No Common Name	*Tetramolopium lepidotum* spp. *Lepidotum*	E	NE
No Common Name	*Urera kaalae*	E	NE

†T=Threatened; E=Endangered; C=Candidate; PT=Proposed Threatened

‡NE=No effect; MANLAA=May affect, not likely to adversely affect

WS conducted an informal consultation with the USFWS for T&E species that are expected to exist on or near properties that WS expects to conduct FSDM on the island of Hawai`i. WS received a letter of concurrence from the USFWS regarding the species listed below on August 9, 2017 (01EPIF00-2016-I-0338).

Table 8. Species listed as threatened, endangered, or candidate on the island of Hawai`i where FSDM is occurring or is likely to occur.

Common Name	Scientific Name	Status†	Determination‡
ANIMALS			
Insects			
Blackburn's Sphinx Moth	*Manduca blackburni*	E	MANLAA
Mammals			
Hawaiian Hoary Bat	*Lasiurus cinerius semotus*	E	MANLAA
Birds			
Hawaiian Hawk	*Buteo solitarius*	E	MANLAA
Hawaiian Petrel	*Pterodroma sandwichensis*	E	NE
Newell's Shearwater	*Puffinus newelli*	T	NE
Band-rumped Storm Petrel	*Oceanodroma castro*	E	NE
Hawaiian Goose	*Branta sandvicensis*	E	MANLAA
Hawaiian Duck	*Anas wyvilliana*	E	MANLAA
PLANTS			
Haiwale	*Cyrtandra nanawaleensis*	E	MANLAA

†T=Threatened; E=Endangered; C=Candidate; PT=Proposed Threatened; PD=Proposed Delisting

‡NE=No effect; MANLAA=May affect, not likely to adversely affect

WS conducted an informal consultation with the USFWS for T&E species that are expected to exist on or near properties that WS expects to conduct FSDM on the island of Kaua`i. WS received a letter of concurrence from the USFWS regarding the species listed below on June 22, 2017 (01EPIF00-2017-I-0057). WS also conducts FSDM activities on the Pacific Missile Range Facility (PMRF) on Kaua`i and therefore adheres to the conservation measures described in the September 9, 2014 Formal Consultation and BO issued to the Department of the Navy (2014-F-0066).

Table 9. Species listed as threatened, endangered, or candidate on the island of Kaua`i where FSDM is occurring or is likely to occur.

Common Name	Scientific Name	Status†	Determination‡
ANIMALS			
Insects			
Hawaiian picture-wing fly	*Drosophila musaphilia*	E	NE (PMRF BO)
Hawaiian picture-wing fly	*Drosophila sharpi*	E	NE (PMRF BO)
Mammals			
Hawaiian Hoary Bat	*Lasiurus cinerius semotus*	E	MANLAA (PMRF BO)
Reptiles			
Green Sea Turtle	*Chelonia mydas*	T	MANLAA (PMRF BO)
Birds			
Hawaiian Gallinule	*Gallinula chloropus sandvicensis*	E	MANLAA
Hawaiian Coot	*Fulica alai*	E	MANLAA
Hawaiian Duck	*Anas wyvilliana*	E	MANLAA
Hawaiian Stilt	*Himantopus mexicanus knudseni*	E	MANLAA
Hawaiian Goose	*Branta sandvicensis*	E	MANLAA
Newell's Shearwater	*Puffinus newelli*	T	NE
Hawaiian Petrel	*Pterodroma sandwichensis*	E	NE
Band-rumped Storm Petrel	*Oceanodroma castro*	E	NE
PLANTS			
No Common Name	*Wilkesia hobdyi*	E	NE (PMRF BO)
No Common Name	*Spermolepis hawaiiensis*	E	NE (PMRF BO)
CRITICAL HABITAT			
Lauehu Plant	*Panicum niihauense*	E	NE (PMRF BO)
No Common Name	*Wilkesia hobyi*	E	NE (PMRF BO)
No Common Name	*Spermolepis hawaiiensis*	E	NE (PMRF BO)

†T=Threatened; E=Endangered; C=Candidate; PT=Proposed Threatened; PD=Proposed Delisting

‡NE=No effect; MANLAA=May affect, not likely to adversely affect, MANLJ=May affect, not likely to Jeopardize. PMRF BO= determination is provided in Pacific Missile Range Facility Biological Opinion.

Below is brief summary and rational for the effects determinations WS made for the T&E species on Hawai`i, Kaua`i and O`ahu.

Birds

Hawaiian T&E birds may nest and/or forage within the proposed FSDM project areas on the islands of Hawai`i, Kaua`i and O`ahu. FSDM actions may impact Hawaiian T&E birds by causing nests to fail if parents are flushed from the nest repeatedly (e.g., exposing to predation) or from other WDM activities such as setting feral swine traps, disturbance from shooting, etc. that may adversely affect the eggs, chicks or adults of these species. WS analyzed these potential direct and indirect impacts to these species and concluded that by incorporating the avoidance and minimization measures described in Section 2.6.2 of the Field Operating Policies the probability of FSDM activities adversely affecting Hawaiian birds are insignificant and discountable. The USFWS has concurred with WS' determination that FSDM activities on the islands of Hawai`i, Kaua`i and O`ahu. may affect, but are not likely to adversely affect the Hawaiian goose, Hawaiian duck, Hawaiian stilt, Hawaiian Gallinule, Hawaiian coot, and the Hawaiian Hawk, that may be present within the project areas. WS has made no-effect determinations for Hawaiian petrel, Newell's

shearwater, band-rumped storm petrel, O`ahu `Elepaio, and the state endangered Pueo. These determinations were either made because there are not records of the species within the project areas, or occurrences of the species are rare. FSDM activities do not take place in suitable habitat for these species and WS does not anticipate any adverse effects to these species as a result of FSDM project implementation.

Mammals

There are three endangered mammals within the project areas of Hawai`i, Kaua`i and O`ahu. The Hawaiian monk seal and the humpback whale are known to exist within the project areas of O`ahu. WS have given no effect determinations to these species because WS will not conduct any FSDM in or near aquatic habitat that would affect either species. The Hawaiian hoary bat roosts in woody vegetation across all islands and leave young unattended in trees and shrubs when they forage. If trees or shrubs are cleared during the pupping season, there is a chance that young bats could accidentally be harmed or killed if they are too young to fly. On rare occasions, WS may need to clear small patches of trees or brush to place feral swine traps. In order to minimize any potential direct impacts to Hawaiian hoary bats WS will not disturb, remove or trim any woody vegetation that is greater than 15 ft. tall during the bat birthing and pup rearing season (June 1st through September 15th). By incorporating these measures, the USFWS concurs with WS' determination that we may affect but are not likely to adversely affect the Hawaiian hoary bat while conducting FSDM activities.

Reptiles

The Green Sea Turtle is found on PMRF and is included in the Department of the Navy's BO of which WS cooperates with and adheres to any conservation measures that may apply to FSDM activities. Based on avoidance and minimization measures as well as the inclusion of the conservation measures to reduce night lighting described in the Navy's BA, the Service concurred with the Navy's determination that the proposed project may affect, but is not likely to adversely affect the green sea turtle. WS believes FSDM activities will have no effect on the green sea turtle.

Insects and Invertebrates

There are five T&E insects and invertebrates found within the proposed FSDM project areas on the islands of Hawai`i, Kaua`i and O`ahu. The orangeblack Hawaiian damselfly is present on some project areas on O`ahu and the Blackburn's sphinx moth is present on Hawai`i. Orangeblack Hawaiian damselflies are found in aquatic habitats across the islands. Breeding habitat includes pools, streams, marshes, ponds, and even artificial pools and seeps. Major threats include reduced habitat quality from ungulates. To avoid or minimize potential adverse effects to orangeblack Hawaiian damselflies WS would avoid stream areas and would not disturb standing pools of water at project sites to prevent disturbing damselflies at all life stages and their habitat.

Threats to Blackburn's sphinx moth include habitat loss and fragmentation. Feral swine trap placement and activities generally occur along established trails and any disturbance is kept to a minimum. Personnel implementing FSDM activities are trained to recognize host plants such as tree tobacco *(Nicotiana glauca)* to ensure these host plants are left undisturbed while conducting FSDM. By incorporating these measures, the USFWS concurs with WS' determination that we may affect but are not likely to adversely affect the orangeblack Hawaiian damselfly or the Blackburn's sphinx moth while conducting FSDM activities. The O`ahu tree snail, and two species of Hawaiian picture-wing fly exist on project sites on Kaua`i and O`ahu

but WS does not anticipate conducting any FSDM activities that would affect these species and therefore have made no effect determinations for these species.

Plants and Critical Habitat

There are several T&E plants and some critical habitats listed in project areas on Hawai`i, Kaua`i and O`ahu. There is no action or proposal within the project descriptions to alter forest habitat, or traverse forested areas outside of established trails and roads, However, WS personnel are trained to identify haiwale and other T&E plants and can avoid disturbing the plants if encountered. Based on these avoidance measures and consultations with the USFWS, WS has determined we may affect but are not likely to adversely affect haiwale and have made no effect determinations for the remaining species listed above.

Effects on Social and Cultural Values (Under Alternative 1)

Social impacts implies the consequences to human populations of any of the proposed actions that may alter the ways in which people live, work, play, relate to one another, organize to meet their needs and generally cope as members of society. The term also includes cultural impacts involving changes to the norms, values, and beliefs that guide and rationalize their perception of themselves and their society.

Although feral swine are an introduced invasive species to Hawai`i, they are classified as a game animal and have become an important part of local culture to many Hawaiians and non-Hawaiians. Feral swine could also be viewed by some people in Hawai`i as "wildlife" and people generally regard wildlife as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people.

The pig or (*pua'a as pronounced in native Hawaiian)* is important to Hawaiian history. Their early role as a domesticated food source and important cultural symbol has evolved into an important culture of recreational and subsistence hunting (Maly et al. nd). Kepa Maly, a well-recognized Hawaiian historian and cultural expert states that "The custom of recreational and subsistence hunting evolved over the last hundred fifty years as native Hawaiians assimilated to western traditions….Although hunting is not widely practiced in contemporary Hawaiian society – only two percent of the state's residents obtain a hunting license – it is a visible and common occurrence across the state….Pig hunting, in particular, is a cherished modern practice for island sportsmen, including some whose subsistence depends to greater or lesser extent on wild game (Maly et al. nd)." Although the statewide percentage of licensed hunters is only two percent, it is likely that in rural communities, the percentage of people of all ethnicities, who hunt is probably much higher than the statewide average.

Due to their size, ability to detect and avoid hunters, and reputation for aggressive behavior, and the fact that hunting opportunities are limited, feral swine are a prized game species in Hawai`i. Due to the uniqueness and lack of big game animals in Hawai`i, guided feral swine hunts can be a profitable business and likely have indirect economic benefits to local communities including license fees and indirect benefits associated with travel, lodging, dining and other associated services and purchases. Hunters spent an estimated $50,962,000 in Hawai`i according to the 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (USFWS 2012).

Some people are concerned that removing feral swine for damage management activities would affect sport and subsistence hunting opportunities and be a waste of an important food resource. It is unlikely that the proposed alternative impacts sport and subsistence hunting opportunities. WS is not proposing to conduct FSDM on Public Hunting Areas in Hawai`i under any of the proposed alternatives. The proposed

action would also have little to no impact on hunting on private lands since WS only works on property when requested and funded. It is unlikely that a private landowner having provided hunter access would have WS conduct FSDM in the same area.

Private individuals may be involved in removing feral swine from private property to control damage but this is not considered sport or subsistence hunting but animal damage management. Contrary to recreational hunting in most states which is generally not effective at controlling feral swine populations, hunting in Hawai`i, because of its smaller more confined area, can be an effective way of managing some populations in certain situations. At the same time, recreational hunting can indirectly assist with some damage control but the primary purpose would be to provide food, trophies and recreational opportunities. WS typically will not work in the same area where private damage control operators are active or if there is any hunting taking place. Additionally, if it is a long term project, WS will require reimbursement or significant cost sharing for the services. Many private operators will work for only the meat which means the services are essentially free to the landowner.

In Hawai`i, due to the uniqueness of feral swine being classified as a game species, WS has been an advocate of cooperating with the public hunter whenever possible to help manage damage caused by feral swine. Hunters on public or private lands may help alleviate damage to crops, sensitive plants and other natural resources on these lands. However, WS also recognizes that depending on management objectives, such as extirpation from a specific area, public hunting is not generally effective at eliminating populations of feral swine (Richardson et al. 1995, Bevins et al. 2014) Therefore, depending on the situation, the use of public hunting may not be recommended based on management objectives.

Depending on the objectives, the involvement of federal and state agencies in the control of local game mammal populations, like feral swine, can be an extremely controversial issue in the State of Hawai`i. In 1981, a federal district court held that the State of Hawai`i's game management practices involving feral goats and sheep in the Palila's (*Loxioides bailleui*) habitat on Mauna Kea, Island of Hawai`i, constituted an unlawful "taking" as defined by the Endangered Species Act. The court then ordered that the sheep and goats be permanently removed from the bird's critical habitat which was a state Game Management Area. The National Park Service, U.S. Fish and Wildlife Service and the U.S. Army manage lands in Hawai`i where the objective is to eradicate ungulate populations within entire parks or refuges or in local exclosures to protect native ecosystems or endangered species (Hess and Jacobi 2011).

The State of Hawai`i's Natural Areas Reserve System has similar ungulate management strategies as does The Nature Conservancy of Hawai`i (Hess and Jacobi 2011). The cumulative impact of these ungulate management strategies by government and non-government agencies has fostered concern and resistance by not only hunters but local communities to ungulate control in the state. A prime example of this community concern was the establishment of a Game Management Advisory Commission by voters in the County of Hawai`i General Election of 2012, for the purpose of advising County, State and Federal agencies on matters related to the preservation of subsistence hunting and fishing, as well as protecting traditional and cultural gathering rights. Other counties have not followed suit, however, in 2016 Act 210 established a State Game Management Advisory Commission (Hawaii Revised Statutes 183D-4.5) to serve as a stakeholder advisory body to the Board of HDLNR. The state legislature found that the enhancement and maintenance of sustainable public hunting opportunities or subsistence and recreational purposes are of critical importance to the State and its people and therefore a coordinated resource management effort involving stakeholders was needed to prevent and offset the loss, destruction, or degradation of public hunting areas on all the islands of the State and to expeditiously find replacement land for such hunting (HB1041-CD1 HMS 2016-3554).

WS will only agree to conduct FSDM operations, if requested and funded, and in areas where no other animal damage management operator is engaged. WS also offers technical assistance to the public on ways to conduct better FSDM. Under this alternative, WS is not proposing to conduct any eradication of feral swine except in local and restricted fenced exclosures. The majority of WS FSDM work in Hawai`i is to protect agriculture and private property. WS does not anticipate substantially increasing FSDM for conservation lands since most agencies and NGO's conduct their own FSDM. Based on the parameters of the proposed action, WS does not believe they will directly, indirectly or cumulatively effect the social or cultural values of the people of Hawai`i.

Effects on Human Health and Safety (Under Alternative 1)

FSDM has the potential to affect human health and safety whether implemented by WS, other agencies, or the public. Some people may have concerns that FSDM methods, in particular the use of firearms, hunting dogs and snares by WS personnel could pose a threat or cause injuries to people or pets, and possibly harm the environment. Impacts resulting from implementing FSDM methods can range from direct injury to indirect impacts (e.g., impacts to water quality). As noted in the need for action, FSDM is also conducted in some areas to reduce risks to human and pet health and safety from feral swine vehicle collisions, transfer of zoonotic diseases and aggressive feral swine. WS incorporates many measures to minimize or nullify risks to the public.

FSDM methods which may pose risks to human health and safety include firearms, use of aircraft for monitoring, snares, foot-hold traps, pyrotechnics for hazing, cage traps, drugs, and handling feral swine carcasses. When used by WS, the proposed FSDM methods pose minimal threat to human health and safety. No adverse effects on human health and safety have occurred or have been reported to occur from WS' use of FSDM methods. FSDM operations are implemented only by request, and only as specified in MOUs, cooperative service agreements, or similar documents developed in coordination with landowners and managers. WS employees who conduct FSDM activities are knowledgeable in the safe and effective use of the methods and relevant APHIS-WS Directives. Safety considerations are always considered in the decision making process as outlined in the WS Decision Model (Slate et al. 1992). Safety risks depend not only on the method used, but also on the location and timing of use. Property ownership or jurisdiction and land use are considered in assessing safety risks. For example, private property in a rural area with limited or controlled access would raise fewer safety concerns with FSDM methods than would a public park. In both cases, close coordination with either the landowner or land manager helps to ensure that human safety risks are minimized. Some measures to reduce risks on public lands include avoiding high use areas, working in closed areas, or timing operations to occur when the public is not present (off-season, at night, or early morning). Another routine precaution taken regardless of land ownership is posting warning signs at access points. The risks and additional precautions specific to the methods are discussed below.

A work initiation document would list the methods the cooperator agreed could potentially be used on property owned or managed by the cooperator. At the time the document is prepared, and as needed thereafter, WS would consult with the landowner regarding any risks which may be associated with the proposed methods and strategies to reduce or prevent risks.

Shooting

Shooting with shotguns or rifles is used to reduce feral swine damage when lethal methods are determined to be appropriate. Shooting is selective for target species. To help ensure safe use and awareness, WS employees who use firearms during official duties are required to attend an approved firearm safety-training course and to remain certified for firearm use in accordance with the WS Directive 2.615. As a condition of

employment, WS employees who carry and use firearms are subject to the Lautenberg Domestic Confiscation Law (18 USC § 922(g)(9)), which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence. A safety assessment based on site evaluations, coordination with cooperating and local agencies (if applicable), and consultation with cooperators would be conducted before firearms are deemed appropriate to alleviate or reduce feral swine damage and threats to human safety at a site. WS would work closely with cooperators to ensure all safety issues were considered before firearms would be included in agreements and used.

The use of lead ammunition during shooting activities has the potential to impact human health and safety. The toxicity of lead to humans has been well documented due to its widespread historical and current use. Lead affects the neurological system, cardiovascular system, renal system, immune system, hematological system, and developmental system in humans and other mammals. The body integrates lead into its composition by substituting lead for other essential elements or nutrients, such as calcium which is used in many different processes in the body. Children are especially vulnerable since they are able to absorb lead more efficiently and are in contact more with media that may be contaminated with lead. Prolonged lead exposure in children may cause damage to the brain and nervous system, behavioral problems, anemia, liver and kidney damage, hearing loss, hyperactivity and developmental delays. Lead is also a probable human carcinogen and is considered mutagenic.

Lead exposure and risk to human health from FSDM activities is not expected to result in significant risk to any subgroups of human populations (such as WS personnel, and the general public, including minority populations, children, and hunters). There is potential for exposure and risk to WS personnel who handle lead ammunition. However, exposure and risk is expected to be low because firearms are used outdoors reducing inhalation exposure from lead fumes and dust that may occur during firing. In addition, APHIS policies and practices for WS personnel handling firearms would reduce the potential effects of lead exposure as well as reduce the potential for injuries related to discharging a firearm.

The Meat Inspection Act requirements for pre and post mortem inspections of swine prior to entering the public food supply (e.g., food banks), therefore feral swine recovered by WS personnel from lead shooting would not be donated to food banks. Swine taken by WS could be donated to and consumed by the landowner/manager. Risks to these individuals are expected to be similar to risks hunters experience when consuming game meat that they harvest. In a 2008 study by the Centers for Disease Control (CDC) and North Dakota Departments of Health, Agriculture, and Game and Fish, blood lead levels were checked in 738 volunteers who made varying use of wild game harvested with lead bullets (Iqbal 2008). Study results indicated that there was a slight elevation in blood lead levels in individuals who ate a lot of wild game, but no participant had blood lead levels higher than the CDC recommended threshold of 10 g/dl – the level at which CDC recommends case management. Additionally, the mean blood level for the study population was lower than that of the overall U.S. population.

Feral swine that are killed by WS personnel and left on site could potentially be obtained and consumed by individuals other than the landowner/manager. This is not expected to be a significant exposure pathway because carcasses left in the field would typically be away from roads or other public areas and would not be fit for human consumption due to rapid scavenging and decomposition of the carcass. Feral swine that are wounded during shooting by WS personnel could occasionally be harvested later by hunters. In this scenario, there is the potential for lead exposure from bullets or fragments to be present in tissue that could be used for human consumption. However, this type of exposure is expected to be minor for several reasons. First, the goal of WS personnel when using ammunition is efficient and effective lethal control, ensuring a quick, humane death. Secondly, areas where fragments of lead may occur would be noticed by

hunters and those fragments removed during preparation of the meat for consumption. Finally, the potential for lead exposure would be reduced in cases where WS personnel can use non-lead ammunition. Over time, the use of lead ammunition is expected to decrease as non-toxic shot becomes more readily available. Therefore, the low potential for lead exposure from activities related to FSDM is expected to result in negligible risk.

Tracking/Trailing Dogs

In some situations, WS employs the use of tracking/trailing dogs to locate or pursue feral swine. WS personnel are aware of and will abide by WS Directive 2.445, which requires that WS personnel handle and maintain trained dogs such that the dogs do not pose a threat to people or domestic animals. Dogs would only be used in areas where WS has landowner or land manager permission to use the technique. The use of well-trained dogs by experienced handlers is not expected to result in adverse impacts on human health or safety.

Carcass Disposal

WS has identified that carcasses of feral swine removed during FSDM activities may be buried on site, or buried in approved landfills, the number of carcasses disposed of in any given area would be minimal. The potential for carcasses to harbor diseases may be unknown unless the feral swine were specifically targeted for disease monitoring. In general, very little information is available regarding the length of time disease agents persist in the burial environment or the potential for dissemination from the burial site. Concerns stem from the fact that burial, unlike some other disposal methods such as incineration or rendering, serves only as a means of eliminating carcass material, but does not necessarily eliminate disease agents that may be present (NABCC 2004). The question arises as to the possibility that disease agents could disseminate from the burial site and pose a risk to human health (NABCC 2004). In any case, feral swine that are host to a disease agent would have died in place and/or may have spread the disease to other swine or other animals if not removed in FSDM. Thus, overall risks from onsite burial or composting may not exceed the status quo as long as carcass numbers are not concentrated.

Carcasses may also be kept by the landowner/manager for their use and use by family and employees. However, there are risks to human health from consuming feral swine that may not necessarily occur with domestic swine. Feral swine are known to carry diseases, such as swine brucellosis, which have been eradicated from the commercial swine herds in the U.S. or which are uncommon in meat from domestic swine due to biosecurity and handling and production practices (Pedersen et al. 2014, CDC 2009, 2012). People can contract these diseases and others through contact with animal body fluids and tissues while processing carcasses and/or through improperly cooked meat. When landowners request to keep feral swine for their use, WS will inform them of the health risks associated with handling and consumption of feral swine and proper precautions to minimize risks (e.g., Davis and Ivey 2011, CDC Undated).

The risks to human health and safety stemming from feral swine carcass disposal would be negligible since carcasses are either donated to the landowner or land manager, buried on site or buried in approved landfills. As per WS Directive 2.515, all carcass disposals will be made in a manner that demonstrates WS' recognition of public sensitivity to the viewing of wildlife carcasses. The potential for the general public to encounter a feral swine carcass would be expected to be extremely remote.

Traps and Snares

The use of live-capture traps, foothold traps, and snares has been identified as a potential issue for human health and safety. Live-capture traps available for feral swine would typically be walk-in style traps where

feral swine enter, but are unable to exit. Foothold snares and neck snares would typically be set in areas where human and pet activity was minimal or could be controlled to ensure public safety. Signs as well as direct communication with people warning of the use of those tools in the area would be prominently posted to increase awareness that those devices were being used and to avoid the area. Therefore, if left undisturbed, risks to human safety would be minimal. However, there can be incidents of injury or death with pets from the use of snares. In situations where there is this potential, WS may elect to use alternative capture devices such as corral traps or cage traps.

Immobilization and Euthanasia Drugs

Immobilizing drugs and euthanasia chemicals would be used infrequently. Immobilizing drugs would be limited to situations where swine would be sedated to fit radio collars and/or to collect samples and then be released. When euthanasia chemicals are administered, immobilizing drugs would also be administered prior to euthanasia. Immobilization of feral swine minimizes stress to the animal and reduces the likelihood of injury to the individual captured and for the safety of personnel handling the swine. Immobilizing drugs would be administered according to recommended methods and doses from published sources. If feral swine were immobilized for sampling or to be fitted with a radio collar and released, risks could occur to human safety if harvest and consumption occurred prior to the end of the withdrawal period for the drug. WS marks animals which have received immobilization drugs with a tag that provides a phone number to contact before consumption. WS personnel that may use drugs for immobilization and euthanasia are certified through WS and abide by WS policies and applicable federal, state, territorial, tribal, and local laws and regulations.

In general, due to the cost of the drugs, the need to handle each animal and concerns regarding disposal, euthanasia chemicals would rarely be used as part of FSDM. Euthanasia chemicals would be administered after live capture and immobilization and under close monitoring. Euthanized feral swine are disposed of in accordance with APHIS-WS' Directives (2.430 and 2.515) and therefore, would not be available for harvest and consumption. There is no plan to use euthanizing drugs in FSDM operations in Hawai`i.

GonaCon™

Reproductive inhibitors are currently under investigation as a potential nonlethal option to help reduce feral swine populations and associated damage. However, at this time, no methods are currently approved by EPA or FDA for feral swine control. Of the methods currently under investigation, the injectable formulation of GonaCon™ is the most likely to be available for FSDM in the near future. Data on this type of use are sufficient for analysis of risks associated with this method and are presented in this EA. Consequently, in the event that an injectable formulation of GonaCon™ is registered for use in feral swine in Hawai`i, it could be available for use without additional supplementation of this EA. Because of the many issues that have not yet been resolved regarding the impacts of feed-based reproductive inhibitors, these methods would be subject to additional NEPA analysis prior to inclusion in any APHIS FSDM operational program.

Available toxicity data for GnRH suggests the active ingredient is essentially non-toxic to mammals. This is reflected in the lowest toxicity (Category IV) for acute oral, dermal, inhalation, and ocular exposure routes determined by EPA/Office of Pesticide Programs (OPP) (USEPA 2009). The potential exposure to humans is the greatest for workers; however, exposure and subsequent risk is expected to be minimal based on label requirements and restrictions. Labeled requirements regarding personal protective equipment (PPE) and prohibition of allowing pregnant women from handling the product may reduce the exposure and risk to this portion of the population. Additionally, GonaCon™ is classified as a Restricted Use Pesticide and all users must be certified pesticide applicators, or be under the supervision of a certified pesticide applicator.

For both EPA/OPP approved GonaCon™ labels for use in deer is further restricted to WS or state wildlife management agency personnel or persons working under their authority. The product label for equines (wild horses and burros), is restricted to employees of WS and Veterinary Services (VS), Bureau of Land Management (BLM), USFWS, National Park Service (NPS), U.S. Department of Defense (DoD), federally recognized native American tribes, state agencies responsible for wild or feral horse and burro management, public and private wild horse sanctuaries, or persons working under their authority. In addition, both labels specify that applicators are not to use these products near humans, domestic animals, and pets and the products are required to be registered with states prior to use. A labelled use for feral swine would be anticipated to have similar restrictions to those proposed for the current labels resulting in minimal risk to workers and the general public.

The other subgroup of the population that could be exposed to GonaCon™ are people who harvest and consume feral swine that are treated with GonaCon™. The potential for exposure and risk to this part of the population is also expected to be minimal. In addition, exposure to GnRH would only be anticipated for meat that is consumed at the injection site immediately after dosing. The half-life of GnRH is short (< 1 hour) and would degrade prior to the animal being harvested. However, if a person does consume a treated game animal shortly after administration, that person is unlikely to be adversely affected because the active ingredient GnRH is a protein, which is digested into its component amino acids instead of absorbed intact in the digestive tract of mammals.

SOPs employed by WS to reduce risks are discussed in this EA. Meeting the requirements of the Animal Medicinal Drug Use Clarification Act of 1994 (21 CFR 530) should prevent any adverse effects on human health with regard to this issue. All APHIS-WS personnel who handle and administer chemical methods would be properly trained in the use of those methods. Training and adherence to agency directives (see WS Directive 2.430) would ensure the safety of employees applying chemical methods. Feral swine euthanized by WS or taken using chemical methods would be disposed of in accordance with WS Directive 2.515. All euthanasia would occur in the absence of the public, whenever possible, which would minimize risks.

Sodium Nitrite, HOGGONE®

The product HOGGONE® is a sodium nitrite based bait that has been developed in Australia. The product is a toxicant bait developed for lethal control of feral swine. It is currently being field tested in the U.S. and pending positive test results, efforts will be made to register the product with the EPA. The product has been in development for several years and results are very promising but currently the data is still insufficient to analyze its potential use as an operational tool. WS predicts that if the tool is made available, it will likely not be registered for use until 2023. The method would be subject to additional NEPA analysis prior to inclusion in any WS FSDM operational program.

Disease Impacts on Human Health and Safety

WS works with cooperators on a case-by-case basis to assess the nature and magnitude of feral swine conflicts including providing information on the limitations about what we know regarding health risks associated with feral swine. Cooperators may consider even a low level of risk to be unacceptable and others may wish to eliminate or minimize risks before human illness occurs because of conditions on their site. In most cases, the risk of contracting a disease from feral swine is relatively low. Although reports of human illness associated with feral swine are rare, this may be due to the lack of reported human cases (Amass 1998). There are likely illnesses contracted from swine that people may perceive as the common flu that are left untreated, unreported, or misdiagnosed (Hutton et al. 2006).

While current biosecurity and herd health procedures minimize the occurrence of disease in domestic swine herds, diseases such as those discussed in this EA can be costly to treat. Successful FSDM could reduce the potential for zoonotic disease transmission between feral swine and humans possibly providing a positive impact on human health and safety.

Other Impacts on Human Health and Safety

Feral swine increase sedimentation in water by damaging vegetation and increasing soil erosion. Increased levels of pathogenic bacteria and fecal coliform have been discovered in water bodies as a result of feral swine defecation in or near them (Kaller et al. 2007). FSDM in select areas could potentially decrease this risk.

Feral swine also represent a potential source of meat, but donations of feral swine as a food source is not practical, feasible, or allowed in most cases. Food Safety Inspection Service has ruled that all swine are subject to the Federal Meat Inspection Act and even if donated are considered to be in commerce; therefore, all animals must be processed under inspection at an official establishment. Additionally, many states may require additional clearances such as health certificates. Thus, based on these limitations, feral swine are not likely to be donated to charities. Carcasses may be left with individual property owners where the swine were killed for personal consumption, if requested and allowed by law. In this case, information is provided to the landowner on health risks and on precautions to take to minimize risks while handling the carcass and cooking the meat. Hunting feral swine can also be a source of low cost supplemental food for some families. Removing offending individuals from feral swine populations would not decrease the population in many areas under the Current FSDM Program. Consequently, impacts on use of feral swine as supplemental food under this alternative are likely limited and localized.

In conclusion, no direct, indirect or cumulative adverse effects on human health and safety have occurred or have been reported to occur from WS activities conducted. The overall risks to human safety from the current FSDM program are low. FSDM benefits human health and safety by reducing the potential for zoonotic disease transmission between feral swine and humans and by reducing the potential for swine related vehicle accidents and other conflicts with swine.

Humaneness / Ethics of FSDM Methods (Under Alternative 1)

The perceptions regarding whether or not FSDM methods are justified will depend, in part, on individual perceptions of the humaneness of the action. Individual perceptions of humaneness can vary depending on a range of factors, which can include the risk of harm to individual target animals, the nature and duration of any adverse impacts on individual animals, and the selectivity of the method (i.e., risk to non-target species).

In the context of impact on individual target animals, nonlethal methods are commonly considered more humane than lethal methods. Some individuals would likely prefer methods such as frightening devices, repellents, fencing or educational programs. However, these methods would generally only be applicable to relatively limited areas and, except for the educational programs, would not address the issue of an increasing national feral swine population. Opinions regarding the ethics of reproductive inhibitors would be mixed, with some individuals approving of the method because it is a nonlethal strategy and others opposed because there is insufficient information regarding risks to non-target species and humans and/or perceptions that interfering with reproduction is an unacceptable intrusion on individual animals' rights and wellbeing. In terms of selectivity, risk of adverse impacts from repellents and frightening devices are likely

to be minimal. Fencing, depending on design, also has the potential to impact movements or cause injury or mortality in non-target animals.

Lethal methods which result in a quick, painless, and relatively stress-free death are generally preferable in terms of humaneness (AVMA 2013). For example, when using firearms as a control method, WS personnel are trained to place shots that result in quick death and minimize pain and suffering. In this context, shooting would be considered to be among the most humane methods available. Additionally, risks to non-target species are negligible. Foothold traps and snares could be considered undesirable and inhumane by some perhaps because of the time between when an animal is captured and its death. These devices also have the potential to capture and injure or kill non-target animals. Implementation of Association of Fish and Wildlife Agencies (AFWA) Best Management Practices (BMPs), when applicable, helps to ensure that the program minimizes the pain and suffering to individual target animals, however there are no specific AFWA BMPs for feral swine (AFWA 2006). Because WS uses methods in a highly target-specific manner, very few non-target animals are captured. Most often, non-target animals that are caught can be easily released unharmed. Humaneness concerns associated with pursuit with dogs include risk of injury to the dog or the feral swine and stress to swine during pursuit. Dogs would not be used to kill swine and swine located through use of dogs would be killed via gunshot.

The disposition of animals lethally removed has also been identified by members of the public as a factor in considerations regarding the humaneness and ethics of FSDM. Some individuals will perceive lethal removal of animals for any reason to be an inhumane and a morally unacceptable solution. However, for other individuals, knowledge that the animals removed are put to a "good use" may impact their acceptance of lethal methods. In sport hunting, lethal removal that results in use of all or most of the animal for food, or cultural and religious purposes is generally accepted by the public. Similarly, in wildlife damage management, projects that result in animals being donated to programs which feed individuals in need are generally better accepted than programs that only result in burial or other forms of animal disposal. WS donates animals taken during damage management efforts if permitted by state, federal, territorial, and tribal regulations and if donation can be conducted in a safe and practical manner. Unfortunately, the inspection requirements of the Meat Inspection Act make donation of feral swine for human consumption prohibitively expensive and impractical to implement in most situations. However, feral swine are offered to landowners and managers for their personal use in accordance with the Act. Although this will be considered a more appropriate disposition for the animals, concerns remain regarding diseases in feral swine that may not be encountered in commercially available meat.

The goal of the Hawai`i WS FSDM program is to reduce damage to agriculture, natural and cultural resources, property, and human health and safety. This alternative would use the WS Decision Model (Slate et al. 1992; Figure 3) and an integrated management approach to develop the most effective site specific management plans while minimizing adverse impacts on the human environment. Factors considered in the decision model include, but are not limited to, considerations of humaneness of individual methods and the varying philosophies regarding the need for FSDM. WS personnel are trained in the safe and effective use of FSDM methods and use these methods as humanely as possible. WS Directives (http://www.aphis.usda.gov/wildlifedamage) provide details on measures used to address concerns regarding the humaneness of FSDM methods and measures to minimize the risk of adverse impacts from FSDM.

In summary, the Current FSDM Program in Hawai`i is ethical and humane. For any individual or group who accepts the idea that feral swine are an invasive species in Hawai`i, cause damage to various resources, and require control in many situations would likely find this alternative to be acceptable or even insufficient,

based on knowledge about feral swine biology, the damage they are capable of, and values that include preservation of the environment. Groups or individuals who believe that human control of wildlife in any way is wrong are not likely to find this alternative to be acceptable. Because no changes to current approaches would be made, this alternative would also probably be unacceptable to groups or individuals who specifically object to lethal or non-lethal control of feral swine. In addition, any groups or individuals who generally object to the ethics or humaneness of current WS activities would likely continue to object this alternative.

3.1.2 Alternative 2 – No Wildlife Service Program

This alternative eliminates WS involvement in FSDM in Hawai`i. WS would not be available to provide operational or technical assistance and land owners would have to conduct their own FSDM without WS involvement or possibly seek assistance through DOFAW or local hunters. This EA describes FSDM methods that could be employed by private individuals or other agencies under this alternative. However, information on future developments in non-lethal and lethal management techniques from NWRC, the world leader in developing tools for WDM, would also not be available to producers or resource owners.

Effects on Feral Swine Populations (Under Alternative 2)

Under this alternative, WS would have no effect on the feral swine population in Hawai`i. Landowners experiencing damage or threats could only depend on advice and responses from private animal damage control operators or other entities. Entities requesting lethal assistance would have to determine if a commercial or other private individual with the capabilities, approvals, and interest is available. Private efforts to reduce or prevent feral swine damage could increase in proportion to the reduction of services that would normally be provided by WS. Private efforts to reduce feral swine damage frequently result in relocation of captured feral swine to other areas which could spread the problem and increase the risk of disease transmission to unaffected populations.

Effects on Non-target and T&E Species (Under Alterative 2)

Wildlife Services would have no effect on non-target species under this alternative. Negative impacts on livestock or native species may increase without WS control actions. Private control operators are not required to consult with the FWS when engaged in FSMD activities on private lands. Private individuals or entities would be responsible for employing FSDM methods and techniques. If a private individual were to incorrectly implement methods or techniques without WS advice or assistance, it could lead to an increase in non-target removal or negative effects on T&E species compared to the proposed action alternative. It could also be conceivable under this alternative that frustration caused by the inability to reduce damages by and inexperienced individual could lead to the unwise or illegal use of some methods which could impact local non-target and T&E species populations (White et al. 1989). Finally, feral swine would be least likely to be controlled efficiently under this alternative and, thus, their impacts on non-target and T&E species would likely be the greatest under this alternative.

Effects on Social and Cultural Values (Under Alternative 2)

Under this alternative, Wildlife Services would have no FSDM program. Hunting for recreation or subsistence would not be impacted under this alternative, but more private animal damage control operators would be expected to be used to assist landowners with FSDM on some properties. Feral swine that are located on private property and are causing damage are no longer considered to be a public resource in Hawai`i, however, some members of the public still expect government agencies to assist with WDM. This alternative would not fulfill that expectation in terms of providing a government source for

assistance since local and state governments do not provide WDM operational assistance to the public in Hawai`i. Economic damages would be expected to continue or increase without WS assistance.

Effects on Human Health and Safety (Under Alternative 2)

Under this alternative it is possible that less experienced personnel implementing FDSM methods could lead to greater risk to human health and safety than a federal FSDM program (United States Food and Drug Administration 2003). WS personnel are required to adhere to specific requirements for training and certification in the use of several FSDM methods. Hazards to human health and safety could be greater under this alternative if personnel implementing the action do not have the same level of training in FSDM methods as WS personnel. As noted in the need for action, FSDM is also conducted in some areas to reduce risks to human and pet health and safety from feral swine-vehicle collisions, transfer of zoonotic diseases and aggressive feral swine. WS would no longer conduct disease surveillance activities under this alternative. Without a federal FSDM program it is likely that these risks may not be addressed effectively.

Humaneness / Ethics of FSDM Methods (Under Alternative 2)

Under this alternative, methods viewed by some persons as inhumane could likely be employed by private individuals. Use of traps, snares and shooting by private individuals could increase. This could result in less experienced persons doing the control work and consequently could cause an increase in non-target take of wildlife and potentially greater animal suffering. It is hypothetically possible that frustration caused by the inability to reduce damages could lead to illegal use of methods such as chemical toxicants or other inhumane and unethical methods which could result in increased animal suffering (USFWS 2001). Thus, WS believes it would be likely that more animal suffering could occur under this alternative.

3.1.3 Alternative 3 – Only Nonlethal FSDM Methods Used by WS

This alternative would require WS to use only non-lethal methods to resolve feral swine damage problems. Non-lethal methods available for use by WS under this alternative would include various live capture techniques as well as hazing or harassment methods, such as propane exploders, pyrotechnics, and other scare devices. This alternative would not restrict other agencies or private individuals/hunters from using lethal control methods.

Effects on Feral Swine Populations (Under Alternative 3)

Under this alternative, WS would not lethally remove any feral swine. Without WS conducting some level of lethal FSDM activities, private efforts would likely increase. The effect on feral swine populations from private control efforts is unregulated and therefore unknown; however it is likely that this take would increase slightly over alternative 2 because WS could be providing technical advice to other entities conducting lethal control operations. The overall feral swine take could be slightly higher than alternative 2 (no WS program), but likely less than alterative 1 (current program) due to the lack of direct WS involvement in lethal control, there could be similar consequences to alternative 2 (no WS program) such as increased use of illegal or ill-advised methods and or the potential for more feral swine to be relocated.

Effects on Non-target and T&E Species (Under Alterative 3)

Under this alternative, WS take of non-target animals would probably be less than Alternative 1 (current program) because no lethal FSDM would be conducted by WS. However, non-target take would probably not differ substantially from the Alternative 1 (continue the current program) because the current program takes very few non-target animals. The impact on non-target species through private control efforts is

unknown because these efforts are not regulated and there is no government oversight of feral swine take on private property. Under this alternative, WS could still assist cooperators with non-lethal techniques and technical assistance, which would provide some technical expertise that may help reduce some risks to non-target and T&E species. However, the impact on non-target and T&E species would likely be higher without the direct involvement, expertise and professionalism of WS personnel to conduct lethal removal of feral swine.

Effects on Social and Cultural Values (Under Alternative 3)

Under this alternative, the effects on hunting for subsistence and recreation, as well as animal control activities would be similar to Alternative 2 (no WS program) because WS would not be conducting any lethal control of feral swine and therefore would not directly impact any local feral swine populations. However, WS could still be available to provide technical assistance and other non-lethal methods to assist cooperators with feral swine damage.

Effects on Human Health and Safety (Under Alternative 3)

Using non-lethal methods only would not eliminate problem animals or reduce the local feral swine population resulting in the potential for the damage to continue in areas where only non-lethal methods were being used. Fencing is a non-lethal method and is very effective in eliminating the problem in an enclosed area, but not in adjacent areas. Under this alternative, WS would not be able to continue the current level of disease surveillance activities. This is largely due to the fact that disease surveillance is a by-product of an active direct control program that includes lethal take of feral swine. Wildlife Services could be requested to conduct disease surveillance apart from a direct control program but it would be more costly and the agency is not adequately funded to accomplish disease surveillance in this manner and therefore reduced disease surveillance activities under this alternative would result in increased risks on human health and safety. It is anticipated that under this alternative, fewer feral swine could be removed depending on the level of effort expended by state agencies and the public and therefore risks to human health and safety could increase.

Humaneness / Ethics of FSDM Methods (Under Alternative 3)

Perceptions of the humaneness of a non-lethal methods only FSDM program could be viewed more favorably by some individuals than the current FSDM program (Alternative 1); however, to those individuals who view feral swine as a destructive species that requires control, this alternative may not be viewed as efficient or ethical. This alternative will decrease the number of feral swine lethally removed by WS compared to the current program (Alternative 1), however, other entities, including land owners/managers and private operators, would implement lethal control in place of WS. The humanness of those actions is reliant upon the operator's level of education and skill at using lethal methods. WS employees receive considerable training and stay up-to-date on the current research into humanness of methods, and this level of expertise cannot be guaranteed with non-WS operators. It is also conceivable that due to the lack of WS involvement in lethal control, results could be similar to alterative 2 (no WS program) in that inexperienced personnel conducting lethal control could use illegal, inhumane or unethical methods.

3.1.4 Alternative 4 – Technical Assistance Only

WS would only provide technical assistance for alleviating damage when requested. This alternative would not restrict other agencies or private individuals/hunters from using lethal or non-lethal control methods. The WS program regularly provides technical assistance to individuals, organizations, and other federal, state, and local government agencies for managing feral swine damage. Technical assistance includes

collecting information about the species involved, the extent of the damage, and previous methods that the cooperator has attempted to resolve the problem. WS then provides information on appropriate methods that the cooperator may consider to resolve the damage themselves. Types of technical assistance projects may include a visit to the affected property, written communication, telephone conversations, or presentations to groups such as homeowner associations or civic leagues.

This alternative would place the immediate burden of operational damage management work on the resource owner, other governmental agencies, and/or private businesses. Those persons experiencing damage or are concerned with threats posed by feral swine could seek assistance from other governmental agencies, private entities, or conduct damage management on their own. Those persons experiencing damage or threats could take action using those methods legally available to resolve or prevent feral swine damage as permitted by federal, state, and local laws and regulations or those persons could take no action.

Effects on Feral Swine Populations (Under Alternative 4)

Under this alternative WS would have no direct effect on feral swine populations in Hawai`i because WS actions would be limited only to providing information on FSDM. By providing technical assistance only to individuals or cooperators, feral swine take should be slightly higher than alternative 2 (no WS program) and would likely be very similar to alternative 3 (non-lethal only by WS). The lack of direct WS involvement in lethal FSDM could also have similar negative consequences such as those explained in alternative 2.

Effects on Non-target and T&E Species (Under Alterative 4)

Under this alternative WS would have no impact on non-target species, however, other entities conducting the work may have an increased impact on non-targets. Other factors would essentially be the same as described in Alternative 3 (Non-lethal only).

Effects on Social and Cultural Values (Under Alternative 4)

Under this alternative hunting for subsistence and recreation, as well as animal control activities would have a similar effect as Alternative 3 (Non-lethal only).

Effects on Human Health and Safety (Under Alternative 4)

Providing only technical assistance would have similar effects on managing feral swine damage as Alternative 3 (Non-lethal only). In general, the risks to human health and safety and the environment from WS using firearms, snares, and cage traps would not occur, and the use of these methods could be slightly less depending on the level of effort expended by the state and private individuals on FSDM. Increased use of firearms by less experienced and trained private individuals could occur without WS direct operational assistance which would likely increase human safety risks, similar to Alternative 3. Also, as under Alternative 3, people frustrated from a lack of an organized control effort could resort to the unwise or illegal use of methods that could also have an effect on human safety, pets, and the environment.

Humaneness / Ethics of FSDM Methods (Under Alternative 4)

Under this Alternative, WS would only provide technical assistance to individuals requesting assistance with feral swine damage. Therefore, WS would not use those methods that individuals may consider inhumane, however, such methods are still likely to be employed by private individuals. Use of traps, snares and shooting by private individuals would probably increase. Similar to Alternative 2, this could result in less experienced persons doing control work with similar results. Greater take and suffering of

non-target wildlife could result. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which might result in increased animal suffering.

3.2 Issues Not Considered for Comparative Analysis

3.2.1 Wildlife Damage is a Cost of Doing Business

WS is aware that some people feel federal FSDM should not be allowed until economic losses reach some arbitrary pre-determined threshold level. One issue identified as a concern is that WS or other entities should establish a threshold of loss before employing lethal methods to resolve damage and that wildlife damage should be a cost of doing business. In some cases, cooperators likely tolerate some damage and economic loss until the damage reaches a threshold where the damage becomes an economic burden. The appropriate level of allowed tolerance or threshold before employing lethal methods would differ among cooperators and damage situations. In addition, establishing a threshold would be difficult or inappropriate to apply to human health and safety situations. For example, vehicles striking feral swine can lead to property damage and can threaten occupant safety. Therefore, addressing the threats of feral swine accidents prior to an actual accident occurring would be appropriate.

In a ruling for Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie National Forest, et al., the United States District Court of Utah denied the plaintiffs' motion for a preliminary injunction. In part, the court determined that a forest supervisor could establish a need for wildlife damage management if the supervisor could show that damage from wildlife was threatened, to establish a need for WDM (Civil No. 92-C-0052A January 20, 1993). Thus, there is judicial precedence indicating that it is not necessary to establish a criterion such as a percentage of loss of a particular resource to justify the need for damage management actions.

3.2.2 Cost-benefit Analysis of FSDM

The CEQ does not require a formal, monetized cost-benefit analysis to comply with NEPA. Consideration of this issue is not essential to making a reasoned choice among the alternatives WS is considering. However, the methods determined to be most effective to reduce damage and threats to human safety caused by feral swine and that prove to be the most cost effective would likely receive the greatest application. As part of an integrated approach and as part of the WS Decision Model, evaluation of methods would continually occur to allow for those methods that were most effective at resolving damage or threats to be employed where feral swine were causing damage or posing a threat.

3.2.3 Resources Not Affected by the Proposal

The actions discussed in this EA involve minimal to no ground disturbance or construction, and will not alter or destroy property, habitats, or landscapes. Any ground disturbance would be extremely minor (from the use of vehicles or setting corral traps). When habitat modification is recommended it is almost always conducted by the landowner and is subject to all federal, state and county laws, regulations, and permits. The proposed methods 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. In addition, the following resource values are either not affected, or are not expected to be significantly affected by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, air quality, prime and unique farmlands, aquatic resources, vegetation, and historic or cultural

resources. Other than the minor uses of fossil fuels for normal operations, there are no irreversible or irretrievable commitments of resources.

3.2.4 Donation of Feral Swine Taken by FSDM for Human Consumption

The Federal Meat Inspection Act (FMIA) applies to all meat or products obtained from any cattle, sheep, swine, goat, horse, mule, or other equines intended for distribution in commerce. Animals falling under jurisdiction of the FMIA must be inspected pre- and post mortem. Animals that are killed before they reach a slaughter facility are classified as "adulterated meat", and cannot be used for human food per the FMIA. Feral swine fall under authority of the FMIA, and therefore could only be donated to charitable organizations for use as food by needy individuals if they are delivered alive to a USDA approved feral swine slaughter facility. Transporting live feral swine to slaughter facilities also increases the potential for spreading disease to domestic swine at facilities were swine are being held prior to slaughter. Donated feral swine are not eligible for an inspection exemption due to 21 USC 464(c) and §623(a). Therefore, feral swine would not be donated to food banks.

3.3 Summary of Impacts

3.3.1 Alternative 1 – Continue the Current WS Program (No Action)

Effects on Feral Swine Populations

Localized population reduction or eradication in fenced exclosures is expected to occur on properties receiving damage assistance but the feral swine population in the islands will not be significantly affected by this proposal, even if the proposed action were to expand or continue into the foreseeable future.

Effects on Non-Target and T&E Species

The majority of WS FSDM projects involve protecting property, health and safety and are generally in residential or agricultural areas. Before FSDM activities are conducted in natural areas or wildlife sanctuaries managed by state, federal or military agencies, WS requires the requester to comply with NEPA and the ESA by consulting with USFWS. WS has consulted with USFWS on all FSDM project areas and implements a variety of measures to ensure no T&E species are negatively impacted by FSDM.

Effects on Social and Cultural Values

The proposed action is intended to temporarily alleviate economic damages on properties where crops, landscaping and other resources are being damaged by feral swine, therefore the proposed action would provide some economic benefit by stopping or reducing further damages. WS FSDM in Hawai`i is not expected to have any adverse effects on cultural uses of feral swine. Removal of feral swine that cause damage to cultural resources by destroying native habitats and cultural sites is expected to benefit cultural resources in Hawai`i. The proposed action would have little to no impact on hunting on private lands since landowners decide how they will address FSDM and WS only works on property when requested.

In Hawai`i, due to the uniqueness of feral swine being classified as a game species, WS has been an advocate of cooperating with the public hunter whenever possible to help manage damage caused by feral swine. However, WS also recognizes that depending on management objectives, such as extirpation from a specific area, public hunting is not generally effective at eliminating populations of feral swine. Therefore, depending on the situation, the use of public hunting may not be recommended based on management

objectives. WS is not proposing to conduct any FSDM on Public Hunting Areas. Under this alternative, there would be no change to the current activities that are being conducted to control feral swine in Hawai`i.

Effects on Human Health and Safety

The proposed FSDM methods pose minimal threat to human health and safety. No adverse effects on human health and safety have occurred or have been reported to occur from WS' use of FSDM methods. FSDM operations are implemented only by request, and only as specified in MOUs, or work initiation documents developed in coordination with land owners and managers. WS employees who conduct FSDM activities are knowledgeable in the safe and effective use of the methods and use them under specific WS Directives. Safety considerations are always considered in the decision making process as outlined in the WS Decision Model. Safety risks depend not only on the method used, but also on the location and timing of use. Property ownership or jurisdiction and land use are considered in assessing safety risks.

Humaneness / Ethics of FSDM Methods

Current considerations for the perspectives on the ethics or humaneness of feral swine control activities would continue under this alternative. WS would continue to follow all applicable policies, guidelines, directives, and general field operating procedures when conducting any future feral swine damage management. The current FSDM program in Hawai`i is ethical and humane. However, because no changes to current approaches would be made, groups or individuals who generally object to the ethics or humaneness of current WS activities, would likely continue to object this alternative.

3.3.2 Alternative 2 – No Wildlife Services Program

Effects on Feral Swine Populations

WS would have no effect on the feral swine population in Hawai`i. Feral swine populations that could not be hunted by private or public hunters or removed by private or other government persons would continue to thrive in areas where they cause damage to residential and commercial property and agriculture. Relocation of feral swine by private efforts could spread the problem to other areas and increase the risk of disease transmission to unaffected populations.

Effects on Non-Target and T&E Species

WS would have no effect on non-target species or T&E species. Negative impacts to livestock or native species may increase without WS control actions. Private individuals are not required to consult with the USFWS when engaged in FSDM activities on agricultural lands frequented by T&E species and may cause more disturbances to these species than WS.

Effects on Social and Cultural Values

Wildlife Services would have no effect on the social or economic resources associated with feral swine under this alternative. Hunters or other private individuals would likely be used to assist landowners with swine damage on some properties. Because wildlife is a public resource, some members of the public expect government agencies to assist with wildlife damage management. This alternative would not fulfill that expectation in terms of providing a federal source for assistance. Economic damages would be expected to continue or increase without assistance.

Effects on Human Health and Safety

Under this alternative it is possible that less experienced personnel implementing FSDM methods could lead to greater risk to human health and safety than a federal FSDM program. WS personnel are required to adhere to specific requirements for training and certification in the use of several FSDM methods. Hazards to human health and safety could be greater under this alternative if the personnel implementing FSDM do not have the same level of training or expertise as WS personnel. As noted in the need for action, FSDM is also conducted in some areas to reduce risks to human and pet health and safety from feral swine-vehicle collisions, transfer of zoonotic diseases and aggressive feral swine. Without a federal FSDM program it is possible that these risks may not be addressed as effectively.

Humaneness / Ethics of FSDM Methods

Under this alternative, methods viewed by some persons as inhumane could be employed by private individuals. Use of traps, snares and shooting by private individuals would probably increase. This could result in less experienced persons doing the control work and consequently could cause an increase in non-target take of wildlife and potentially greater animal suffering.

3.3.3 Alternative 3 – Only Nonlethal FSDM Methods Used by WS

Effects on Feral Swine Populations

The effect on feral swine populations from private control efforts is unregulated and therefore unknown, however, it is likely that this take could increase slightly over alternative 2 (No WS program) because WS would be available to provide technical assistance to other entities conducting lethal control operations.

Effects on Non-Target and T&E Species

The impact on non-target species through private control efforts is unknown because these efforts are not regulated and there is no government oversight of feral swine take on private property. The impact on non-target species could be higher without the involvement, expertise and professionalism of WS personnel.

Effects on Social and Cultural Values

Without the ability to use lethal control, it is unlikely that cooperators would use WS to protect resources. Resource damages could be higher or cost the cooperator more if reliance on private providers is the only choice. Private providers would not be regulated and are not accountable to the public. Effects under this alternative would be similar to alternative 2 (No WS program).

Effects on Human Health and Safety

Using non-lethal methods only would not eliminate problem animals or reduce the feral swine population resulting in the potential for the damage to continue in areas not subject to such action. Wildlife Services would not be expected to continue the current level of disease surveillance activities under this alternative, since a large part of disease surveillance is a by-product of an active direct control program with lethal take.

Humaneness / Ethics of FSDM Methods

This alternative will decrease the number of feral swine lethally removed by WS compared to the current program (Alternative 1), however, other entities, including land owners/managers and private operators, would implement lethal control in place of WS. Due to the lack of WS involvement in lethal control, results

could be similar to alterative 2 (no WS program) in that if inexperienced personnel conduct lethal control, use of illegal, inhumane or unethical methods could increase.

3.3.4 Alternative 4 – Technical Assistance Only

Effects on Feral Swine Populations

WS would have no effect on feral swine populations in Hawai`i because WS action would be limited only to providing information on FSDM. The effects on the population by other entities conducting operational work in the absence of WS operations would be similar to Alternatives 2 and 3.

Effects on Non-Target and T&E Species

WS would have no impact on non-target or T&E species, however, other entities conducting the work may have an increased impact on non-target and T&E species.

Effects on Social and Cultural Values

Without the ability to use lethal control, it is unlikely that cooperators would use WS to protect resources. Resource damages could be higher or cost the cooperator more if reliance on private providers is the only choice. Private providers would not be regulated and are not as accountable to the public.

Effects on Human Health and Safety

Providing only technical assistance would have a very similar effect on managing feral swine damage as Alternative 3 (Non-lethal only). The effects on disease issues would be similar to Alternative 3 where WS would not be expected to continue the current level of disease surveillance activities, since a large part of disease surveillance is a by-product of an active direct control program that includes lethal take.

Humaneness / Ethics of FSDM Methods

WS would only provide technical assistance to individuals requesting assistance with feral swine damage. Therefore, WS would not use those methods that individuals may consider inhumane, however, such methods are still likely to be employed by private individuals. Greater take and suffering of non-target wildlife could result. It is possible that frustration caused by the inability to reduce feral swine damages could lead to illegal use of chemical toxicants or other illegal methods which might result in increased animal suffering.

3.3.5 Summary Table

Table 10. Summary of Environmental Effects by Alternative

Environmental Resource	Alternative 1: Continue the Current WS Program	Alternative 2: No WS Program	Alternative 3: Only Nonlethal FSDM Methods Used by WS	Alternative 4: Technical Assistance Only
Effects on Feral Swine populations	Localized reductions, no overall effect.	No effect, possible increase.	No effect, possible increase.	No effect, possible increase.
Effects on Non-Target and T&E Species	Not likely to adversely affect.	No effect, possible increased disturbances to T&E species due to lack of federal involvement.	No effect, possible increased disturbances to T&E species due to lack of federal involvement in direct control methods.	No effect, possible increased disturbances to T&E species due to lack of federal involvement in direct control methods.
Effects on Social and Cultural Values	Beneficial to cultural resources, no effect on recreational hunting.	No adverse effect.	No adverse effect.	No adverse effect.
Effects on Human Health and Safety	No adverse effect.	Possible greater risk to human health and safety due to less experienced individuals implementing FSDM methods.	Possible greater risk due to lack of disease monitoring by WS.	Possible greater risk due to lack of disease monitoring by WS.
Humaneness / Ethics of FSDM Methods	Current program is ethical and humane. Professional involvement in FSDM ensures humane methods.	Possible increase of less humane methods due to lack of federal involvement.	Possible increase of less humane methods due to lack of federal involvement with lethal methods.	Possible increase of less humane methods due to lack of federal involvement with lethal methods.

3.4 Conclusions

The action proposed by this environmental assessment is the implementation of an Integrated Pest Management approach to control the damage of feral swine in forests, watersheds, wetlands, agriculture, parks and residential and commercial properties in Hawai`i where public hunting is not allowed and only upon request of the landowner. The direct, indirect and cumulative impacts of the proposed action are individually analyzed by the effected resource in 3.1.1. Based on those analysis, WS believes no significant negative impacts would be expected from the implementation of the proposal. The proposed action is intended to provide benefit to Hawai`i's economy and ecology by reducing negative economic and

environmental impacts from feral swine damage. The proposed action is also intended to provide information to resource management agencies regarding the nature and extent of feral swine damage and the prevalence of brucellosis, pseudorabies and other diseases potentially transmitted by swine. The information will be used to assess the need for future control efforts. Wildlife Services' proposal includes the potential to continue a feral swine damage management assistance program, depending upon the need for continued federal assistance, and if funding is made available by other sources.

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APPENDIX A. Literature Cited

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APPENDIX B: Responses to public Comments

There were a total of 5 comment letters submitted during the public comment period. These comments have been summarized and are addressed below. Some commenters expressed more than one topic in their comment and therefore there are more than five responses to comments.

1. **Numerous commenters recognized the damages that feral swine cause and described a variety of ways they are harmful to the environment and expressed their support for the Proposed Action.**

Response: Wildlife Services (WS) agrees that feral swine are detrimental to many resources. These comments are consistent with peer reviewed research referenced in the EA and relate to the purpose and need of the EA. The Need for Action is addressed in 1.2 of the EA and 1.4 of the EA describes the objective of the WS program in Hawai`i is to reduce localized damage to agriculture, natural and cultural resources, property, and human health and safety in cooperation with agency partners, organizations representing native Hawaiians, and other entities where requested by landowners/managers. WS' thanks the commenters for the letters of support for the Proposed Action.

2. **Commenter expressed their belief that the current feral swine damage management (FSDM) role and Proposed Action of WS in Hawai`i is not adequate to address the magnitude of the feral swine problem in the state.**

Response: The commenter also acknowledged that feral swine are a complex issue in Hawai`i particularly because they are classified as a game animal. WS conducts FSDM in every state that feral swine exist in the U.S., however, the classification or status of feral swine varies significantly between states. The National Feral Swine Damage Management Program provides aid to federal, state, territorial, tribal, local, and private management efforts to reduce damage, and threats to human and animal health from feral swine but does so under the request or management goals of each state or territory. In Hawai`i, the scope of this EA is based on the level or "magnitude" of feral swine damage management that is appropriate and aligned with the states management goals for feral swine.

3. **Commenter states that WS is not transparent and does not allow the public to know what activities are conducted and does not allow public comment.**

Response: WS has prepared this EA to inform the public of the agency's proposed actions, provide analysis on the potential effects on the human environment, and allow for public comment on the alternatives and issues.

4. **Commenter is concerned that WS does not use humane methods.**

Response: Section 3.1.1 of the EA discusses different perspectives of public opinion in regard to the humaneness and ethics of FSDM. WS believes that the Proposed Action is humane and ethical.

5. **Commenter suggests WS consider effects of FSDM on Hawaiians that utilize feral swine for food or economic gain.**

Response: The EA provides a thorough analysis of this consideration in Section 3.1.1., under the Effects of Social and Cultural Values. In summary, WS believes that the proposed action would not have an adverse effect on Hawaiians that utilize feral swine as a subsistence food source or any other local entity that may receive a financial benefit from feral swine.

6. **Commenter urges WS to focus on helping small farms as opposed to large corporation farms. The Commenter suggests that as a percentage, damage to smaller farming operations by feral swine is much larger and detrimental than that caused to larger corporate farms.**

Response: The need to address feral swine damage to property is discussed in Section 1.2.2. of the EA. WS responds to requests for feral swine damage management from small farms, large farms and any other property owner or entity equally. The appropriate level of assistance is based on the WS Decision model and is discussed in Section 2.4. The level of response varies with every situation based on the severity of the problem. In many cases, damage complaints from smaller farms are less complex due to the smaller sized property and although damage can still be very severe (as the commenter suggests, a higher percentage of dollar loss compared to larger farms), the problem can typically be solved quickly and therefore limiting damages. Feral swine damage to larger corporate farms may be more complex and require a longer term solution. In those instances, the cooperator is required to reimburse WS for an increased level of service which is stated in Section 1.7. Furthermore, Section 2.3.2 discusses the numbers and types of damage complaints that WS receives and the vast majority originate from private residents or small farms.

7. **Commenter expressed support for the EA and suggests WS consider employing them for feral swine control in Hawaii.**

Response: Considering someone for employment is outside the scope of the EA. Any employment opportunities are always posted on usajobs.com and are open for the public to apply. Any questions regarding any upcoming employment opportunities in Hawaii can be directed to the Hawai`i WS state office, 3375 Koapaka St., Suite H-20, Honolulu, HI 96819.