ENVIRONMENTAL ASSESSMENT

Reducing Aquatic Rodent Damage through an Integrated Wildlife Damage Management Program in the State of Alabama

Prepared by:

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

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CHAPTER 3: ALTERNATIVES

ACRONYMS

ADC	Animal Damage Control
ADCNR	Alabama Department of Conservation and Natural Resources
ALDOT	Alabama Department of Transportation
APHIS	Animal and Plant Health Inspection Service
ARDM	Aquatic Rodent Damage Management
ATF	Bureau of Alcohol, Tobacco, and Firearms
AVMA	American Veterinary Medical Association
BDM	Beaver Damage Management
BO	Biological Opinion
CDC	Centers for Disease Control and Prevention
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
DOJ	Department of Justice
DPR	Department of Pesticide Regulation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FDA	U. S. Food and Drug Administration
FEIS	Final Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FY	Fiscal Year
GAO	Government Accounting Office
IWDM	Integrated Wildlife Damage Management
MIS	Management Information System
MBTA	Migratory Bird Treaty Act
MIS	Management Information System
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NRCS	Natural Resource & Conservation Service
NWP	Nationwide Permit
NWRC	National Wildlife Research Center
OPM	Office of Pesticide Management
OSHA	Occupational Safety and Health Administration
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
WS	Wildlife Services

NOTE: On August 1, 1997, the Animal Damage Control program was officially renamed Wildlife Services. The terms Animal Damage Control, ADC, Wildlife Services, and WS are used synonymously throughout this Environmental Assessment.

CHAPTER 1:

INTRODUCTION

Across the United States, natural systems are being substantially altered as human populations expand and

increasing the potential for conflicting human/wildlife interactions. In addition, segments of the public strive for protection for all wildlife; this protection can create localized conflicts between humans and wildlife activities.

Animal Damage Control (ADC) (FEIS) summarizes the relationship in American culture of wildlife values and wildlife damage in this way (USDA 1997a):

> *Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife is generally regarded as providing economic, recreational and aesthetic*
>
> *the activities of some wildlife may result in economic losses to agriculture and damage to property . . . Sensitivity to varying perspectives and value is required to manage the balance between human and*
>
> *directly affected by wildlife damage but a range of environmental, sociocultural and economic considerations as well*

The United States Department of Agriculture (USDA) is authorized and directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for the *Act of March 2, 1931*, as amended (46 Stat. 1468; 7 U.S.C. 426-

100-202). WS activities are conducted in cooperation with other Federal, state and local agencies; and private organizations and individuals. Federal agencies, including the United States Department of Interior, Fish and

Wildlife damage management, or control, is defined as the alleviation of damage or other problems caused by, or related to the presence of wildlife (Leopold 1933, The Wildlife Society 1992, and Berryman 1991). The WS

"Integrated Pest Management" or IPM) (WS Directive 2.105[1]
recommended to reduce wildlife damage. IWDM is described in Chapter 1, 1-7 of the ADC FEIS (USDA 1997a). These methods include the alteration of cultural practices as well as habitat and behavioral modification to prevent

populations of the offending species be reduced through lethal methods. Potential environmental impacts resulting from the application of various wildlife damage reduction techniques are evaluated in this environmental

According to the Animal and Plant Health Inspection Service procedures implementing the National Environmental Policy Act (NEPA), individual actions may be categorically excluded [7 C.F.R. 372.5(c), 60 Fed.

coordination, and the streamlining of program management, and to clearly communicate with the public the analysis of individual and cumulative impacts. In addition, this EA has been prepared to evaluate and determine if

program.

[1] WS Policy Manual - Provides guidance for WS personnel to conduct wildlife damage management activities through Program Directives. WS Directives

The purpose of this EA is to analyze the potential environmental effects of the proposed Alabama WS beaver (*Castor canadensis*), nutria (*Myocastor coypus*), and muskrat (*Ondatra zibethica*) (hereafter referred to as aquatic rodents) damage management (ARDM) program to achieve a balance between the biological carrying capacity and cultural carrying capacity. This analysis relies predominately on existing Federal and state agency publications, information contained in scientific literature, and communications with other wildlife professionals. This EA also cites and is tiered to, the ADC FEIS (USDA 1997a).

All control activities will be in compliance with relevant laws, regulations, policies, orders, and procedures, including the Endangered Species Act (ESA). Notice of availability (NOA) of this document will be made consistent with the Agency's NEPA procedures in order to allow interested parties the opportunity to obtain and review this document and comment on the proposed management activities.

Biological carrying capacity is the land or habitat's limit for supporting healthy populations of wildlife without degradation to the animals' health or their environment over an extended period of time (Decker and Purdy 1988). Wildlife acceptance capacity, or cultural carrying capacity, is the limit of human tolerance for wildlife or the maximum number of a given species that can coexist compatibly with local human populations (Decker and Purdy 1988). These terms are especially important in urban areas because they define the sensitivity of a local community to a specific wildlife species. For any given damage situation, there will be varying thresholds by those directly and indirectly affected by the damage. This threshold of damage is a primary limiting factor in determining the cultural carrying capacity. While Alabama has a biological carrying capacity to support more than the current number of beaver, nutria, and muskrat, the cultural carrying capacity is often much lower. In many cases when the cultural carrying capacity is reached or exceeded, improper and sometimes illegal implementation of population control methods (e.g., illegal toxicants or unregulated trapping, shooting and snaring) may be used to alleviate property damage and other public health or safety threats (Loker et al. 1999).

WILDLIFE SERVICES PROGRAM

WS is a cooperatively funded, service-oriented program from which other governmental agencies and entities may request assistance. Before any operational wildlife damage management is conducted, *Agreements for Control*, *WS Work Plans*, or *Cooperative Agreements* must be completed by WS and the land owner/administrator. WS cooperates with private property owners and managers and with appropriate land and wildlife management agencies, as requested, with the goal of effectively and efficiently resolving wildlife damage problems in compliance with all applicable Federal, state, and local laws and MOU's between WS and other agencies.

WS' mission, developed through its strategic planning process, is: 1) to provide leadership in wildlife damage management for the protection of American agricultural, endangered and threatened species, and natural resources, and 2) to safeguard public health and safety (USDA 1997b). WS's Policy Manual reflects this mission and provides guidance for engaging in wildlife damage management through:

- Close cooperation with other Federal and state agencies;
- Training of wildlife damage management professionals;
- Development and improvement of strategies to reduce losses and threats to humans from wildlife;
- Collection, evaluation, and dissemination of management information;
- Cooperative wildlife damage management programs;
- Informing and educating the public on how to reduce wildlife damage; and
- Providing data and a source for limited-use management materials and equipment, including Federal and state registered pesticides (USDA 1999).

1.1 SCOPE AND PURPOSE OF THIS EA

The scope and purpose of this EA is to evaluate the potential impact from WS ARDM program to protect agricultural and natural resources, property, and public health and safety in Alabama. Damage can occur throughout the State, resulting in requests for WS assistance. Under the Proposed Action, ARDM could be conducted on private, Federal, state, county, and municipal lands in Alabama. Alabama encompasses 32.48 million acres that is divided into 67 counties. WS anticipates that under the proposed action in Alabama no more than 1,000 beavers, 100 nutria, and 100 muskrats would be removed by Alabama WS personnel annually. Currently, Alabama WS has 10 Wildlife Specialists conducting IWDM techniques to resolve beaver, nutria, and muskrat problems throughout the state.

1.2 HISTORICAL AQUATIC RODENT DAMAGE MANAGEMENT

Historically, beaver populations in the United States were managed by subsistence and commercial hunting and trapping (Hill 1976, Woodward 1983, Novak 1987a). Muskrat meat has been commonly used for human consumption and in some areas called by names such as "*marsh rabbit.*" However, following the decimation of the beaver population in the late 1800's and early 1900's, the number of beaver trappers declined. By the time trapping seasons were reopened, not only were beaver trappers scarce, but demands for short-haired fur were low. Consequently, beaver trapping was uncommon. The absence of an adequate beaver harvest in conjunction with insignificant non-human predation and an abundance of suitable habitat resulted in beaver populations reaching levels where the animals were considered a nuisance (Woodward 1983, Woodward et al. 1985). The subsequent decline in fur prices in the early 1980's led to further increases in beaver populations, with beaver damage reaching epidemic proportions in some areas.

A variety of attempts have been made to reduce damage caused by beaver in the southeastern U.S. For example, a Beaver Cooperative Association formed in Mississippi in 1977 showed promise for reducing beaver damage by increasing the marketability of beaver pelts, but eventually failed due to low pelt values on international markets (Woodward 1983). In North Carolina, a cooperative program between various agencies attempted to reduce beaver damage by allowing trappers to harvest more valuable furs (Woodward 1983) also showed promise but failed due to the decline in the fur markets in the early 1980's. Currently, the North Carolina WS program has a cooperative beaver damage management program that includes [redacted], State highway officials, soil and water conservation districts, municipalities, and private landholders, who collectively funded 86% of the 2000 program. In 2000, North Carolina WS beaver damage management saved an estimated $8.5 million in forestry and agricultural resources, waterways, highway infrastructure, and other property (J. Heisterberg, USDA/APHIS/WS, personal communication).

The Alabama WS Program conducts operational beaver, nutria, and muskrat damage management for a wide variety of cooperators, including Federal, state, county, and local government agencies as well as private landowners and companies. Projects are conducted to protect such resources as timber, roads, bridges, residences, and human health and safety.

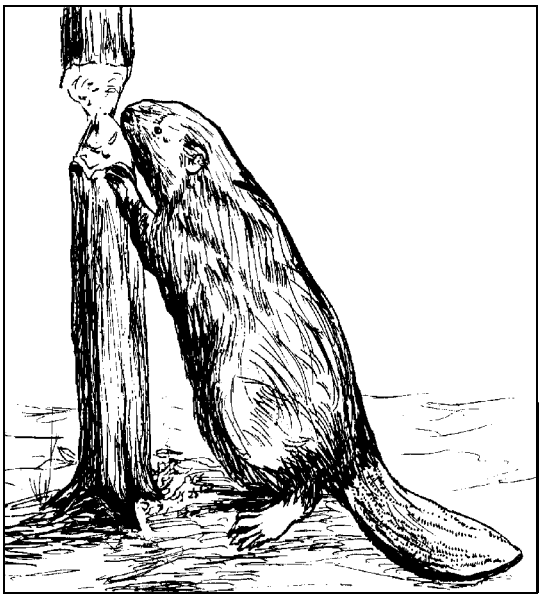

Figure 1.1. Beaver (*Castor canadensis*).

1.3 BEAVER, NUTRIA, AND MUSKRAT ACTIVITY IMPACTS TO THE ENVIRONMENT AND SOCIETY ATTITUDES

1.3.1 Benefits of Beaver Activities

Beaver (Figure 1-1) are found throughout much of North America (Figure 1-2). Although beaver may cause extensive damage, there are benefits associated with their activities. Beaver are generally considered beneficial where their activities do not compete with people's use of the land or property (Wade and Ramsey 1986). The opinions and attitudes of individuals, communities, organizations, etc., vary greatly and are primarily influenced and formed by the benefits and damage directly experienced by each person or entity (Hill 1982). Property ownership, options for public and private land use, and the effects on adjacent properties or land use impact public attitudes toward beaver (Hill 1982). In many cases, the beaver damage exceeds the benefits, resulting in a demand for beaver damage management.

Figure 1-2. Range of beaver in North America.

Woodward et al. (1976) found that 24% of landowners who reported beaver activity on their property indicated benefits to having beaver ponds on their land and also desired assistance with beaver pond management (Hill 1976, Lewis 1979, Woodward et al. 1985). Some of the benefits of beaver ponds include: trapping, hunting, and fishing opportunities, water source for livestock and other wildlife, and the value of beaver ponds in the natural environment. For example, beaver ponds contribute to the stabilization of water tables, help reduce rapid run-off from rain (Wade and Ramsey 1986), and serve as basins for the entrapment of streambed silt and eroding soil (Hill 1982). These wetland ecosystems also function as sinks, helping to filter nutrients and reduce sedimentation, thereby maintaining the quality of nearby water systems (Arner and Hepp 1989).

Beaver may increase habitat diversity by flooding and opening forest habitats, resulting in greater interspersion of successional stages and subsequently increasing the floral and faunal diversity of a habitat (Arner and Hepp 1989, Hill 1982). The creation of standing water, edge, and plant diversity, all in close proximity, results in excellent wildlife habitat (Hill 1982). The resulting wetland habitat may be beneficial to fish, reptiles, amphibians, waterfowl, shorebirds, and furbearers such as muskrats, river otter (*Lutra canadensis*), and mink (*Mustela vison*) (Arner and DuBose 1982, Miller and Yarrow 1994, Naimen et al. 1986).

Habitat modification by beaver, primarily dam building and tree cutting, can benefit many species of wildlife (Jenkins and Busher 1979, Medin and Clary 1990, Medin and Clary 1991, Arner and DuBose 1982, Arner and Hepp 1989, Hill 1982). Beaver impoundments can provide aesthetic and recreational opportunities for wildlife observation, nature study, hunting, fishing, trapping, wildlife photography, livestock water, and environmental education (Wade and Ramsey 1986). In addition, beaver ponds may be beneficial to threatened and endangered (T&E) species, because the U.S. Department of Interior, Fish and Wildlife Service (USFWS) estimates that up to 43% of T&E species rely directly or indirectly on wetlands for their survival (EPA 1995). In Mississippi, beaver ponds over three years in age were found to have developed plant communities which increase their value as nesting and brood rearing habitat for wood ducks (Arner and DuBose 1982). Reese and Hair (1976) found that beaver pond habitats were highly attractive to a large number of birds year-round and that the value of the beaver pond habitat to waterfowl was minor when compared to other species of birds (Novak 1987a).

Figure 1-3. Nutria (*Myocastor coypus*).

1.3.2 Benefits of Nutria Activities

The nutria (Figure 1-3) is a large, dark colored, semi-aquatic rodent that is native to South America. The dense grayish underfur is overlaid by long, glossy guard hairs that vary in color from dark brown to yellowish brown. They have short legs and a robust, highly arched body that is approximately 24 inches long. The forepaws have four well developed and clawed toes and one vestigial toe. Four of the five clawed toes on the hind foot are interconnected by webbing; the fifth outer toe is free. The hind legs are much larger than the forelegs. Their round tail is from 13 to 16 inches long and scantily haired. Males are slightly larger than females; the average weight for each is about 12 pounds. Males and females may grow to 20 pounds and 18 pounds respectively.

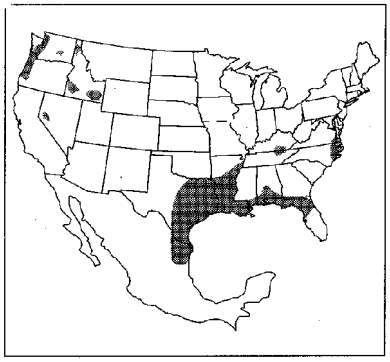

Figure 1-4. Range of nutria in North America.

Nutria are native to Central and South America and became established in the United States (Figure 1-4) after releases in the 1930's and 1940's from the promotion and failure of nutria "fur ranching." Nutria are found throughout the state of Alabama with the highest concentrations located in the southern half along or near the coastal marsh. In some areas, nutria were also released to control aquatic weeds (Kinler et al. 1987; Wade and Ramsey 1986). Nutria provide a means of income, through the sale of their meat and fur, for hunters and trappers. From 1977 to 1984 approximately $7.3 million worth of nutria fur was harvested in the United States (Boutin and Birkenholz 1987, Kinler et al.1987).

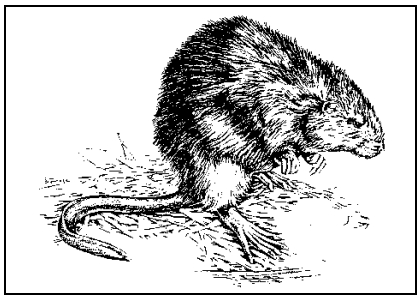

Figure 1-5. Muskrat (*Ondatra zibethica*).

1.3.3 Benefits of Muskrat Activities

The muskrat (Figure 1-5) is a native North American aquatic rodent and is the largest microtine rodent in the United States (Figure 1-6). It spends its life in aquatic habitats and is well adapted for swimming. Its large hind feet are partially webbed, stiff hairs align the toes, and its laterally flattened tail is almost as long as its body. The muskrat has a stocky appearance, with small eyes and very short, rounded ears. Its front feet, which are much smaller than its hind feet, are adapted primarily for digging and feeding. The overall length of adult muskrats is usually from 18 to 24 inches.

Figure 1-6. Range of muskrats in North America.

Muskrats are most abundant in the northern half of Alabama, but are found scattered in suitable habitat throughout the state. They inhabit creeks, rivers, lakes, ponds, and drainage ditches with a steady water level feeding primarily on cattails, bullrushes and aquatic grasses. It has historically been the most heavily utilized furbearer in North America with 6-20 million harvested annually since about 1935 (Boutin and Birkenholz 1987). Muskrats not only have economic value from the sale of their meat and pelt, but they are an indigenous species to North America that fill a niche in the ecosystem. They provide recreation or satisfaction to people that like to observe wildlife in its natural setting. In the prairie pothole region of the U.S. and Canada, muskrats, through feeding and building houses, clear or open up small areas in otherwise dense cattail marshes that create nesting and brood rearing habitat for nesting waterfowl.

1.3.4 Damage from Beaver Activities

Beaver are a part of the wildlife heritage in Alabama. The reintroduced beaver population in Alabama has exhibited a growth pattern similar to many states and Canadian provinces. This beaver population expansion has had a negative economic impact in many areas of North America (Novak 1987a). Beaver have only a few natural predators aside from humans, including coyotes (*Canis latrans*), bobcats (*Lynx rufus*), river otter, bears (*Ursus* spp.), and mink, who prey on the young (Miller and Yarrow 1994).

Identifying beaver damage is generally not difficult. Most of the damage caused by beaver is a result of dam building, bank burrowing, tree cutting, obstructing overflow structures and spillways, or flooding. Some cases of beaver damage include state highways being flooded, reservoir dams being destroyed by bank den burrows, and train derailments being caused by continued flooding and burrowing (Miller and Yarrow 1994). Housing developments have been threatened by beaver dam flooding (personal observation). Some small bridges have also been destroyed because of beaver dam-building activity. Miller (1983) estimated that the annual damage by beavers in the United States was $75-$100 million. The estimated value of beaver damage is perhaps greater than that of any other single wildlife species in the U.S. with economic damage estimated to have exceeded $4 billion in the southeastern U.S. over a 40-year period (Arner and Dubose 1979). In some southeastern states, losses from beaver damage have been estimated at $3 to $5 million annually (Miller and Yarrow 1994), with timber losses as the most common type of damage (Hill 1982). Tracts of bottomland hardwood timber up to several thousand acres in size may be lost to beaver activity (Miller and Yarrow 1994). Surveys in North Carolina and Alabama indicate that the majority of landowners with beaver damage on their property desire damage management via beaver removal (Hill 1976, Lewis 1979, Woodward et al. 1985). Loker et al. (1999) found that suburban residents may also desire lethal management methods to resolve beaver damage conflicts. Such conflicts, which are viewed as *"damage,"* result in adverse impacts that often outweigh benefits (Miller and Yarrow 1994).

Beaver activities also destroy habitat types (e.g., free-flowing water, riparian areas, and bird roosting and nesting areas) which are important to many species. Patterson (1951) and Avery (1992) reported that the presence of beaver dams can negatively affect fisheries. Beaver dams may adversely affect stream ecosystems by increasing sedimentation in streams, and thereby affecting wildlife that depend on clear water (i.e., fish and mussels). The Louisiana WS program has conducted beaver damage management activities to protect the Louisiana pearlshell (*Margaritifera hembeli*), which also requires clear, free-flowing water to survive (D. LeBlanc, USDA/APHIS/WS, personal communication).

Beaver impacts on trout habitat have been a major concern of Wisconsin Department of Natural Resource fisheries managers and the public since at least 1950. Patterson (1951) found that beaver impoundments in the Peshtigo River Watershed caused significant negative impacts to trout habitat by raising water temperatures, destroying immediate bank cover, changing water and soil conditions, and silting of spawning areas. Studies from other areas also reported negative aspects of beaver impoundments in regard to trout habitat (Sayler 1935, Cook 1940, Sprules 1940, Bailey and Stevens 1951). Evans (1948) suggested a continued increase in beaver populations in Minnesota would probably result in deterioration of streams for trout. The Wisconsin Department of Natural Resources guidelines for management of trout stream habitat stated that beaver dams are a major source of damage to trout streams (Churchill 1980, White and Brynildson 1967). More recent studies have documented improvements to trout habitat upon removal of beaver dams. Avery (1992) found that wild brook trout populations in tributaries to the North Branch of the Pemebonwon River in northeastern Wisconsin improved significantly following the removal of beaver dams. Also, the species abundance, species distribution, and total biomass of non-salmonids increased following the removal of beaver dams (Avery 1992).

Increased soil moisture both within and surrounding beaver flooded areas can result in reduced timber growth and mast production and an increase in bank destabilization. These habitat modifications can

conflict with human land or resource management objectives and can oppress some plants and animals, including T&E species.

Beaver often inhabit sites in or adjacent to urban/suburban areas and cut or girdle trees and shrubs in yards, undermine yards and walkways by burrowing, flood homes and other structures, destroy pond and reservoir dams by burrowing into levees, gnaw on boat houses and docks, and cause other damage to private and public property (Wade and Ramsey 1986). Additionally, roads and railroads may be damaged by saturation of the roadbed from beaver flooding or by beaver burrowing into the banks that comprise roadbeds and railroad beds. Beaver also cause an assortment of damage such as flooding of crop lands, pastures, and timberlands; feeding on crops (e.g., corn, soybeans, sorghum, etc.); interfering with irrigation systems and water level control structures; and washouts of ponds and levees (Hill 1982, Woodward 1983, Miller and Yarrow 1994, Wade and Ramsey 1986).

WS beaver damage management efforts in Alabama are primarily conducted for the purpose of minimizing damage to urban and suburban properties, roadways (state and county) and railroad infrastructures, and agricultural and timber resources. The Alabama WS program has provided technical assistance for 67, 79, 74, and 55 projects in 1998, 1999, 2000, and 2001, respectively, to protect the above-mentioned resources. In some cases, efforts are aimed at protecting wildlife habitat which is degraded due to beaver related flooding or dam building. WS personnel employ a variety of methods for reducing beaver damage which allows greater flexibility and more opportunity to formulate an effective strategy for each request for assistance (Appendix D).

1.3.5 Damage from Nutria Activities

Nutria are almost entirely herbivorous and eat animal material (mostly insects) incidentally. Freshwater mussels and crustaceans are occasionally eaten in some parts of their range. Nutria feed on valuable wetland vegetation and crops such as sugar cane and rice (Wade and Ramsey 1986). During the winter, the bark of trees such as black willow and bald cypress may be eaten. They also cause damage by eating lawn grasses found adjacent to aquatic habitats. Nutria are opportunistic feeders and eat approximately 25% of their body weight daily (LeBlanc 1994).

This introduced species from South America competes with the native muskrat. Nutria primarily inhabit brackish or freshwater marshes but are also found in swamps, rivers, ponds, and lakes. They live in dense vegetation, in abandoned burrows, or in burrows they dig along steam banks or shorelines (Wade and Ramsey 1986). Its burrowing activities can severely damage levees, dikes, earthen dams, and other structures.

Burrowing is the most commonly reported damage caused by nutria. Nutria are notorious in Louisiana and Texas for undermining and breaking through water-retaining levees in flooded fields used to produce rice and crawfish. Additionally, nutria burrows sometimes weaken flood control levees that protect low-lying areas. In some cases, tunneling in these levees is so extensive that water will flow unobstructed from one side to the other, necessitating their complete reconstruction.

Nutria sometimes burrow into the styrofoam floatation under boat docks and wharves, causing these structures to lean and sink. They may burrow under buildings, which may lead to uneven settling or failure of the foundations. Burrows can weaken road beds, steam banks, dams, and dikes, which may collapse when the soil is saturated by rain or high water or when subjected to heavy objects on the surface (such as vehicles, farm machinery, or grazing livestock). Rain and wave action can wash out and enlarge collapsed burrows and compound the damage.

Nutria depredation on crops is well documented (LeBlanc 1994). In the United States, sugarcane and rice are the primary crops damaged by nutria. Grazing on rice plants can dramatically reduce yields, and damage can be locally severe. Sugarcane stalks are often gnawed or cut during the growing season. Often only the basal internodes of cut plants are eaten. Other crops that have been damaged include corn, milo (grain sorghum), sugar and table beets, alfalfa, wheat, barely, oats, peanuts, various melons, and a variety of vegetables from home gardens and truck farms.

Nutria girdle fruit, nut, and shade trees and ornamental shrubs. They also dig up lawns and golf courses when feeding on the tender roots and shoots of sod grasses. Gnawing damage to wooden structures is common. Nutria also gnaw on Styrofoam floats used to mark the location of traps in commercial crawfish ponds.

At high densities and under certain environmental conditions, foraging nutria can substantially impact natural plant communities. In Louisiana, nutria often feed on seedling bald cypress and can cause the complete failure of planted and naturally regenerated stands. Overutilization of emergent marsh plants can damage stands of desirable vegetation used by other wildlife species and aggravate coastal erosion problems by destroying vegetation that holds marsh soils together. Nutria are fond of grassy arrowhead (Sagittaria platyphylla) tubers and may destroy stands propagated as food for waterfowl in artificial impoundments.

WS nutria damage management efforts in Alabama are primarily conducted for the purpose of minimizing damage to urban and suburban properties, roadways (state and county), railroad infrastructures, and agricultural and timber resources.

1.3.6 Damage from Muskrat Activities

Economic loss to muskrat damage can be very high in some areas, particularly in aquaculture producing areas. In some states damage may be as much as $1 million per year (Miller 1994). Elsewhere, economic losses because of muskrat damage may be rather limited and confined primarily to burrowing in farm pond dams. In such limited cases, the value of the muskrat population may outweigh the cost of the damage.

Muskrats dig burrows into banks, levees, and where higher ground is available, for dens (Linzey 1998, Perry 1982). Although muskrats are largely vegetarians, they also eat other animals as part of their diet (Perry 1982). Schwartz and Schwartz (1959), Neves and Odom (1989) and Miller (1994) reported muskrats also ate animal matter including mussels, clams, snails, crustaceans (i.e., crawfish), and young birds. The regular life activities of muskrats results in much of the conflict with man.

Damage by muskrats is usually not a major problem, but can be important locally in particular situations (Wade and Ramsey 1986). In aquaculture reservoirs generally maintained without lush aquatic vegetation, muskrat runs and burrows or remains of mussels, crayfish, or fish along with other muskrat signs are generally easy to observe. Much of the damage caused by muskrats is primarily through their burrowing activity (Miller 1994, Linzey 1998, Perry 1982) in dikes, dams, ditches, ponds, and shoreline. Muskrats dig burrows with underwater entrances along the shoreline and burrowing may not be readily evident until serious damage has occurred and when the water level drops the muskrat holes are expanded to keep pace with the retreating water level. Additionally, when water levels rise muskrats expand the burrows upward. One way to observe early burrowing in farm ponds or reservoirs is to walk along the edge of the dam or shorelines when the water is clear and look for *"runs"* or trails. These burrows can also collapse when walked upon by people or animals and crossed over with heavy equipment (i.e., mowers, tractors). The types of damage for which assistance could be requested include burrowing in waterfront lawns and yards creating cave-ins and shoreline derogation. As well as, dams used to hold

water or to control water flow such as flood control structures. The burrows can cause washouts which result in loss of water or flood damage depending on the situation, which can then cause the loss of crops and the need to rebuild the dams and levees (Wade and Ramsey 1986). Muskrat burrowing activity can seriously weaken earthen dams (Perry 1982). Burrowing activity can result in dams leaking or blowing out. This results in costly repairs and years to restore lost recreational fisheries.

Where damage is occurring to crops, plant cutting is generally evident. Muskrats eat a variety of natural emergent vegetation (Linzey 1998, Perry 1982) and cultivated crops (Perry 1982). Some of the cultivated crops eaten by muskrats include corn, alfalfa, carrots, rice, and soybeans. When muskrats become over-populated, generally an "eat-out" occurs and the feeding area is ruined for a number of years (O'Neil 1949). An "eat-out" occurs when vegetation, including soil binding roots, are consumed. The loss of vegetation removes food and cover for muskrats and other wildlife. Marsh damage from muskrats is inevitable when areas heavily populated by muskrats are under-trapped (Lynch et al. 1947). While eat-outs are beneficial to some bird species, it also results in stagnant water which predisposes the same birds to diseases (Lynch et al. 1947).

WS muskrat damage management efforts in Alabama are primarily conducted for the purpose of minimizing damage to urban and suburban properties, roadways (state and county), railroad infrastructures, and agricultural and timber resources.

1.3.7 Public Health and Safety Risks from Beaver, Nutria, and Muskrat Damage

Beaver and muskrat activity in certain situations can become a threat to public health and safety (e.g., burrowing into or flooding of roadways and railroad beds can result in serious accidents) (Miller 1983, Woodward 1983). Increased water levels in urban areas resulting from beaver activity can lead to unsanitary conditions and potential health problems by flooding septic systems and sewage treatment facilities (DeAlmeida 1987, Loeb 1994). Beaver damming activity also creates conditions favorable to mosquitoes and can hinder mosquito control efforts or result in population increases of these insects (Wade and Ramsey 1986). While the presence of these insects is largely a nuisance, mosquitoes can transmit diseases, such as encephalitis (Mallis 1982) and West Nile Virus (CDC 2000). In addition, beaver are carriers of the intestinal parasite *Giardia lamblia*, which can contaminate human water supplies and cause outbreaks of the disease Giardiasis in humans (Woodward 1983, Beach and McCulloch 1985, Wade and Ramsey 1986, Miller and Yarrow 1994). The Centers for Disease Control have recorded at least 41 outbreaks of waterborne Giardiasis, affecting more than 15,000 people. Beaver are also known carriers of tularemia, a bacterial disease, that is transmittable to humans through bites by insect vectors or infected animals or by handling animals or carcasses which are infected (Wade and Ramsey 1986). Skinner et al. (1984) found that in cattle-ranching sections of Wyoming the fecal bacterial count was much higher in beaver ponds than in other ponds, something that can be a concern to ranchers and recreationists. On rare occasions, beaver may contract the rabies virus and attack humans. In February 1999, a beaver attacked and wounded a dog and chased some children that were playing near a stream in Vienna, Virginia. Approximately a week later, a beaver was found dead at the site and tested positive for rabies (M. Lowney, USDA, Wildlife Services, Moseley, Virginia, personal communication). Furthermore, damming of streams may increase the number of aquatic snakes, including the poisonous cottonmouth (*Agkistrodon piscivorus*) (Wade and Ramsey 1986).

Nutria can be infected with several pathogens and parasites that can be transmitted to humans, livestock, and pets (LeBlanc 1994). The role of nutria, however, in the spread of diseases such as equine encephalomyelitis, leptospirosis, hemorrhagic septicemia (pasteurellosis), paratyphoid, and salmonellosis is not well documented. They may also host a number of parasites, including the nematodes and blood flukes that cause "swimmers itch" or "nutria itch" (*Strongyloides myopotami* and *Schistosoma mansoni*), the protozoan responsible for Giardiasis (*Giardia lamblia*), tapeworms (*Taenia* spp.), and common flukes

(*Fasciola hepatica*). The threat of disease may be an important consideration in some situations, such as when livestock drink from water contaminated by nutria feces and urine.

1.4 NEED FOR AQUATIC RODENT DAMAGE MANAGEMENT IN ALABAMA

The need for action in Alabama is based on the necessity for a program to protect: 1) agricultural and natural resources, 2) property, 3) roads, bridges, and railroads, and 4) public health and safety from beaver, nutria, and muskrat damage. Beaver, nutria, and muskrat populations can have a negative economic impact in Alabama. Alabama state agencies provide no direct assistance to landowners with beaver, nutria, and muskrat damage management due to time and funding constraints and a lack of expertise. Similarly, private trappers generally prove inadequate for reducing beaver, nutria, and muskrat damage due to the high costs to landowners, low number of licensed trappers, and lack of expertise in damage management.

Conflicts between humans and wildlife are common in Alabama. Comprehensive surveys of beaver, nutria, and muskrat damage in Alabama have not been conducted. However, Alabama WS has compiled reported estimates of damage perceived by property and resource owners or managers who requested WS assistance (Table 1-1).

Damage data obtained from Management Information System (MIS) for FY 1998 - FY 2001 are summarized (Table 1-1). These data represent only a portion of the total damage caused by beaver, nutria, and muskrat because not all people who experience such damage request assistance from WS (Loven 1985) and sometimes the economic losses from beaver, nutria, and muskrat damage are unknown.

Table 1-1. Reported beaver, nutria, and muskrat damage (US Dollars) by USDA, Wildlife Services in Alabama by fiscal year (FY) (October 1 - September 30).

FY	Combined reported damage
1998	$810,950
1999	$186,300
2000	$188,180
2001	$274,000

1.5 PROPOSED ACTION

The Proposed Action is for the Alabama WS Program to continue the current integrated ARDM program for the protection of agricultural and natural resources, property, public health and safety, roads, bridges, and railroads on all lands in Alabama where a need exists and a request is received. An IWDM approach would be used, including technical assistance recommendations and operational damage management assistance, and would consider all legal and appropriate ARDM methods either used singly or in combination to meet the requester needs for reducing damage. Non-lethal methods include environmental/habitat modification, cultural practices, animal behavior modification, and repellents. Additional methods include shooting, foothold traps, cage/box traps, snares, and body-grip (e.g., Conibear) traps. Beaver dams would be breached using binary explosives or by hand. Beaver, nutria, and muskrat damage management would be conducted in the state, when requested, on private or public property after an *Agreement for Control* or other comparable document has been completed. Management actions would be consistent with other uses of the area and would comply with appropriate Federal, state and local laws and in cooperation with other governmental agencies. (See Chapter 3 for a more detailed description of the current program and the proposed action).

1.6 OBJECTIVES FOR THE ALABAMA WS AQUATIC RODENT DAMAGE MANAGEMENT PROGRAM

The need to manage beaver, nutria, and muskrat damage in Alabama was used by WS to define the objectives for the WS program in Alabama:

- Resolve as many beaver, nutria, and muskrat damage problems that time and labor will allow.
- Respond to individual damage complaints within a two week time period.
- Prioritize work on state and county road problems before private complaints are worked.
- Maintain the take of non-target river otters below 5% of the total take during beaver, nutria, and muskrat damage management operations.

1.7 RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

1.7.1 ADC Programmatic Environmental Impact Statement

WS has issued a FEIS and Record of Decision on the national Animal and Plant Health Inspection Service (APHIS), WS program (USDA 1997a). This EA is tiered to the FEIS. Pertinent information available in the FEIS has been incorporated by reference into this EA.

1.8 DECISION TO BE MADE

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

- Should Alabama WS continue to implement an IWDM strategy, including non-lethal and lethal damage management methods, to meet the objectives for aquatic rodent damage management in Alabama?
- If not, should WS attempt to implement one of the Alternatives to an IWDM strategy as described in the EA?
- Would the proposed action have significant impacts on the quality of the human environment requiring preparation of an EIS?

1.9 RELATIONSHIP OF AGENCIES DURING PREPARATION OF THIS EA

Based on agency relationships, MOU's and legislative authorities, the Alabama WS program is the lead agency for this EA, and therefore, responsible for the scope, contents and decisions made. The Alabama Department of Conservation and Natural Resources (ADCNR) contributed input throughout the EA preparation to ensure an interdisciplinary approach in compliance with NEPA, and agency mandates, policies, and regulations.

1.10 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.10.1 Actions Analyzed

This EA evaluates planned beaver, nutria, and muskrat damage management to protect: 1) property, 2) agricultural and natural resources, 3) roads, bridges, railroads, and 4) public health and safety in Alabama. Protection of other resources or other program activities will be addressed in other NEPA analysis, as appropriate.

1.10.2 Wildlife Species Potentially Protected by Alabama WS

Alabama WS assistance may be requested to achieve management objectives for wildlife, including T&E species. If other needs are identified, a determination would be made on a case-by-case basis if additional NEPA analysis is needed.

1.10.3 American Indian Lands and Tribes

Currently, Alabama WS does not have any MOU's with any American Indian tribe. If WS enters into an agreement with a tribe for beaver, nutria, or muskrat damage management, this EA would be reviewed and supplemented if appropriate to insure compliance with NEPA. MOU's, Cooperative Agreements, and NEPA compliance would be conducted as appropriate before conducting beaver, nutria, or muskrat damage management on tribal lands.

1.10.4 Period for which this EA is Valid

This EA would remain valid until Alabama WS and other appropriate agencies determine that new needs for action, changed conditions or new Alternatives having different environmental effects must be analyzed. At that time, this analysis and document would be reviewed and revised as necessary. This EA will be reviewed each year to ensure that it is complete and still appropriate to the scope of WS activities.

1.10.5 Site Specificity

This EA analyzes the potential impacts of beaver, nutria, and muskrat damage management in Alabama and addresses activities that will occur or could occur on private or public property in Alabama. Because beaver, nutria, ana muskrat damage occurs throughout Alabama (unpublished MIS data) and the proposed action is to reduce damage caused by aquatic rodents, it is conceivable that WS ARDM activities could occur anywhere in the state. Thus, this EA analyzes the potential impacts of such efforts wherever and whenever they may occur in Alabama and this EA emphasizes significant issues as they relate to specific areas whenever possible. However, many issues apply wherever aquatic rodent damage and resulting management occurs, and are treated as such. The substantive issues analyzed in this EA were: 1) Effects on beaver, nutria, and muskrat populations; 2) Effects on plants and other wildlife species, including T&E species; 3) Effects on public and pet health and safety; 4) Humaneness of methods to be used; 5) Effects on wetlands; 6) Economic losses to property; and 7) Impacts to stakeholders, including aesthetics. The standard WS Decision Model (Slate et al. 1992) and WS Directive 2.105 is the routine thought process that is the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by WS in Alabama (see USDA 1997a, Chapter 3 for a more complete description of the WS Decision Model and examples of its application). Decisions made during this thought process will be in accordance with any mitigation measures and Standard Operating Procedures (SOP) described herein and adopted or established as part of the decision.

1.10.6 Public Involvement/Notification

As part of this process, and as required by the Council on Environmental Quality (CEQ) and APHIS-NEPA implementing regulations, this document and its Decision are being made available to the public through "Notices of Availability" (NOA) published in local media and through direct mailings of NOA to parties that have specifically requested to be notified. New issues or Alternatives raised after publication of public notices will be fully considered to determine whether the EA and its Decision should be revisited and, if appropriate, revised.

1.11 PREVIEW OF THE REMAINDER OF THIS EA

The remainder of this EA is composed of four (4) chapters and four (4) appendices. Chapter 2 discusses and analyzes the issues and affected environment. Chapter 3 contains a description of each Alternative, Alternatives not considered in detail, mitigation and SOP's. Chapter 4 analyzes consistency with environmental consequences and the environmental impacts associated with each Alternative considered in detail. Chapter 5 contains the list of preparers, reviewers, and consultations during the EA process. Appendix A is the literature cited used during the preparation of the EA, Appendix B is the authorities and compliance for conducting wildlife damage management in Alabama, Appendix C describes criteria for beaver dam breaching/removal, and Appendix D is a detailed description of the methods used for beaver, nutria, and muskrat damage management.

CHAPTER 2: ISSUES AND AFFECTED ENVIRONMENT

INTRODUCTION

Chapter 2 contains a discussion of the issues, including issues that received detailed environmental impact analysis in Chapter 4 (Environmental Consequences), issues used to develop mitigation measures and/or SOP's, and issues not considered in detail, with rationale. Pertinent portions of the affected environment are included in this chapter in the discussion of issues used to develop mitigation measures. Additional descriptions of affected environments are incorporated into the discussion of the environmental impacts in Chapter 4 and the description of the current program in Chapter 3.

Issues are concerns of the public and/or professional communities about potential environmental problems that might occur from a proposed Federal action. Such issues must be considered in the NEPA decision process. Issues relating to the management of wildlife damage were raised during the scoping process in preparing the programmatic ADC FEIS (USDA 1997a) and were considered in the preparation of this EA. These issues are fully evaluated within the FEIS, which analyzed specific data relevant to the Alabama WS program.

2.1 AFFECTED ENVIRONMENT

The areas of the proposed action include state and interstate highways and roads, and railroads and their right-of-ways where beaver, nutria, or muskrat activities would cause damage. The areas would also include property in or adjacent to subdivisions and business and industrial parks where beaver impound water and gnaw or fell trees. Additional affected areas include timberlands, crop lands, and pastures that experience financial losses from beaver flooding or gnawing. The proposed action could also include private and public property where beaver, nutria, or muskrat burrowing damages dikes, ditches, ponds, and levees, and where their feeding causes agricultural crop losses and negatively impacts state or Federally listed T&E species.

2.2 ISSUES ANALYZED IN DETAIL IN CHAPTER 4

The following are issues that have been identified as areas of concern requiring consideration in this EA and were used to develop mitigation measures:

- Effects on beaver, nutria, and muskrat populations
- Effects on plants and other wildlife species, including T&E species
- Effects on public and pet health and safety
- Humaneness of methods to be used
- Effects on wetlands
- Economic losses to property
- Impacts to stakeholders, including aesthetics

2.2.1 Effects on Beaver, Nutria, and Muskrat Populations

Some persons and groups are concerned that the Proposed Action or any of the Alternatives would result in the loss of local beaver, nutria, and muskrat populations or could have a cumulative adverse impact on regional or statewide beaver, nutria, and muskrat populations. The most beaver, nutria, and muskrat annually removed by WS in Alabama from FY 1998-2001 was 560 beaver in FY 1998, 4 nutria in FY 1999, and 12 muskrat in FY 1998 (Table 4-1). However, based upon current and an anticipated increase of work, Alabama WS expects that no more than 1,000 beavers, 100 nutria, and 100 muskrat would be removed annually while conducting WS direct control activities within the state. The ADCNR has determined that there is no evidence to suggest that human mediated mortality resulting from regulated fur harvest and damage management, including removal by WS, will be detrimental to the survival of the

beaver, nutria, or muskrat populations in the state of Alabama (letter from K. Guyse, ADCNR to F. Boyd, USDA, APHIS, Wildlife Services, February 28, 2002).

2.2.2 Effects on Plants and Other Wildlife Species, including T&E Species

A common concern among members of the public and wildlife professionals, including WS personnel, is whether the Proposed Action or any of the Alternatives would result in capture or removal of non-target animals, or to potentially cause adverse impacts to populations of plants or other wildlife, particularly T&E species. WS mitigation and SOP's are designed to reduce the effects on non-target species populations and are presented in Chapter 3. To reduce the risks of adverse affects to non-target species, WS would select damage management methods that are as target species-specific as possible or would apply such methods in ways to reduce the likelihood of capturing non-target species. Before initiating management techniques, WS would select locations which are extensively used by the target species and use baits or lures which are preferred by the target species.

In contrast to adverse impacts on non-target animals from direct take, some species may actually benefit from WS' methods. Beaver, nutria, and muskrat feed on and can eliminate many tree and plant (land and aquatic) species from an area. Flooding caused by beaver activity may adversely impact plant and animal communities. Additionally, flooding can also restrict access to areas of public and private land used for recreational purposes (i.e., hunting, camping, hiking, etc.).

2.2.2.1 Effects on Non-target Wildlife Species (Non-T&E Species)

Non-target species such as river otters, raccoons (*Procyon lotor*), turtles, and alligators (*Alligator mississippiensis*) may occasionally be captured in traps and snares. Healthy, uninjured non-target animals that are captured would be released unharmed. A relatively small number of non-target animals are captured and killed by Alabama WS annually (Table 2-1). The number of non-target furbearers incidentally taken by WS from FY 1998-2001 is far less than the number of furbearers harvested by licensed trappers during the states regulated trapping season (Table 2-1). WS does not expect the rate of WS non-target species take to substantially increase above current or past program levels under the proposed action or any of the Alternatives. Therefore, WS has concluded that non-target animals incidentally removed by the Alabama WS program would have no adverse effects on any native wildlife species population in Alabama. The ADCNR concurs that Alabama WS ARDM program would have no adverse effects on native wildlife populations in Alabama (letter from K. Guyse, ADCNR to F. Boyd, USDA, APHIS, Wildlife Services, February 28, 2002).

Table 2-1. State harvest data and non-target animals taken by USDA, Wildlife Services while conducting beaver, nutria, and muskrat damage management in Alabama[1] by Fiscal Year (October 1 - September 30).

Non-target data[1]	1998	1999	2000	2001
Estimated state harvest - river otter	164	188	319	N/A
WS - river otter (killed)	26	24	24	21
WS - river otter (freed)	1	0	1	0
Estimated state harvest - raccoon	92,400	64,100	49,700	67,000
WS - raccoon (killed)	40	46	32	46
WS - raccoon (freed)	9	0	0	0

Estimated state harvest - turtle	N/A	N/A	N/A	N/A
WS - turtle (killed)	69	62	40	45
WS - turtle (freed)	14	14	24	9

1 - Other non-target animals were incidentally killed while conducting beaver management activities but were not listed unless there were five or more killed per fiscal year.

2.2.2.2 Effects on T&E Species (Plants and Animals)

There are currently 88 Federally and 72 state listed T&E species in Alabama.

Beaver dams can adversely impact stream ecosystems by impounding habitat and increasing sedimentation in streams and affecting wildlife that depend on clear water, such as certain T&E species of fish and mussels.

Special efforts are made to avoid jeopardizing T&E Species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS has consulted with the USFWS under Section 7 of the Endangered Species Act (ESA) concerning potential impacts of WS IWDM methods on T&E species and has obtained a BO (USDI 1992). For the full context of the BO, see Appendix F of the ADC FEIS (USDA 1997a - Appendix F). WS is also in the process of reinitiating Section 7 consultation at the National level to assure that potential effects on T&E species have been adequately addressed. The USFWS's and ADCNR's list of Federal and State T&E species for Alabama were reviewed to determine whether any T&E species might be affected by the proposed action. WS has determined that the proposed WS beaver damage management program would not adversely impact Federally listed T&E species in the state of Alabama. WS will contact the USFWS upon the discovery of any wood stork rookeries in those areas where WS ARDM services are requested. The USFWS has concurred with WS conclusions of not likely to adversely affect (L. Goldman, USFWS).

2.2.2.3 Effects on Native Plant Species

The removal of beaver, nutria, and muskrats and breaching beaver dams would be beneficial to some native plant species that may be killed by foraging aquatic rodents and beaver related flooding. The increased soil moisture associated with excess flooding may result in reduced plant or timber growth and vitality, and could be detrimental to some wildlife species through a decrease in mast (e.g., acorn) production.

2.2.3 Effects on Public and Pet Health and Safety

A common concern is whether the Proposed Action or any of the Alternatives pose an increased threat to public and pet health and safety. Specifically, there is concern that the lethal methods of beaver, nutria, and muskrat removal (i.e., trapping, shooting, chemical toxicants) and explosives used in dam removal may be hazardous to people and pets, or that continued increases in beaver, nutria, and muskrat populations might threaten public and pet health or safety. A formal risk assessment of WS operational management methods found that risks to human safety were low (USDA 1997a - Appendix P). WS SOP's include measures intended to mitigate or reduce the effects on human and pet health and safety and are presented in Chapter 3.

Firearm use in wildlife damage management can be a publicly sensitive issue. Safety issues related to the misuse of firearms and the potential human hazards associated with firearms use are concerns both to the public and WS. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of

their appointment and a refresher course every 3 years thereafter (WS Directive 2.615). WS employees who carry and use firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence. Additionally, USDA runs thorough background checks on all new employees entering the agency.

The use of restraining traps such as foothold or body-grip traps or snares is a sensitive issue because of the lack of understanding and experience by the public in using these devices. Some people believe they could be captured and restrained by these traps. Some believe these traps indiscriminately and automatically capture people who may unknowingly approach locations where these traps or snares are set. To mitigate some of these concerns, WS personnel meet with landowners to explain and demonstrate the use of traps and snares to alleviate anxiety some may have. WS also is assisting with the development of Best Management Practices (BMP's) for improving traps and trapping programs in the U.S. These BMP's evaluate the animal welfare and efficiency of various traps for species which can be legally harvested in North America.

All chemicals used by APHIS-WS are regulated by the EPA through the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and by WS Directives. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used according to label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997a - Appendix P).

The use of explosives for beaver dam removal can also be a sensitive issue with the inexperienced public. WS personnel that use explosives are required to take and pass in-depth training, and must be able to demonstrate competence and safety in their use of explosives. WS personnel adhere to WS policies as well as regulations from the Bureau of Alcohol, Tobacco and Firearms (ATF), the Occupational Safety and Health Administration (OSHA), and the U.S. Department of Transportation (USDOT) with regards to explosives use, storage, and transportation. Binary explosives require two components to be mixed before they can be actuated which virtually eliminates the hazard of accidental detonation during storage and transportation. Storage and transportation of mixed binary explosives is illegal. When explosives are used, signs are placed to stop public entry. Where dams are near roads, police or other road officials are used to stop traffic and public entry to ensure public safety. Therefore, no adverse effects to public safety are expected from the use of explosives by WS under any Alternative.

2.2.4 Humaneness of Methods to be Used

The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management for societal benefits could be compatible with animal welfare concerns, if *". . . the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process."*

Suffering is described as a *". . . highly unpleasant emotional response usually associated with pain and distress."* However, suffering *". . . can occur without pain . . ."* and *". . . pain can occur without suffering . . . "* (AVMA 1986). Because suffering carries with it the implication of a time frame, a case could be made for *". . . little or no suffering where death comes immediately . . ."* (CDFG 1991), such as shooting.

Defining pain as a component in humaneness of WS methods appears to be a greater challenge than that of suffering as pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would *". . . probably be causes for*

pain in other animals . . ." (AVMA 1986). However, pain experienced by individual animals probably ranges from little or no pain to significant pain (CDFG 1991).

Pain and suffering, as it relates to WS damage management methods, has both a professional and lay point of arbitration. Wildlife managers and the public would be better served to recognize the complexity of defining suffering, since *". . . neither medical or veterinary curricula explicitly address suffering or its relief"* (CDFG 1991).

Research suggests that with some methods, such as restraint in foothold traps, changes in the blood chemistry of trapped animals indicate "stress." Blood measurements indicated similar changes in foxes that had been chased by dogs for about five minutes as those restrained in traps (USDA 1997a). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness.

The American Veterinary Medical Association (AVMA) states *". . . euthanasia is the act of inducing humane death in an animal"* and *". . . the technique should minimize any stress and anxiety experienced by the animal prior to unconsciousness."* (Beaver et al. 2001).

Some people would prefer AVMA accepted methods of euthanasia to be used when killing all animals, including wild and feral animals. The AVMA states that *"For wild and feral animals, many of the recommended means of euthanasia for captive animals are not feasible"* (Beaver et al. 2001).

WS is very concerned about animal welfare and where possible, more humane methods are used to capture or kill animals. WS has been funding research to develop BMP's for the use of restraining traps since 1997 and funding trap research for decades (Phillips and Mullis 1996, Engeman et al. 1997). This includes the use of foothold and body-grip traps and snares. Traps and snares used by WS embrace many innovations reported in the scientific literature.

The decision making process involves tradeoffs between the above aspects of pain and humaneness. An objective analysis of this issue must consider not only the welfare of wild animals but also the welfare of humans if damage management methods were not used. Therefore, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. The challenge in coping with this issue is how to achieve the least amount of animal suffering within the constraints imposed by current technology and funding.

WS has improved the selectivity and humaneness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until such time as new findings and products are found to be practical, a certain amount of alleged animal suffering will occur if management objectives are to be met in those situations where non-lethal damage management methods are not practical or effective.

Alabama WS personnel are experienced and professional in their use of management methods. Consequently, damage management methods are implemented in the most humane manner possible under the constraints of current technology. Mitigation measures and SOP's used to maximize humaneness are listed in Chapter 3.

2.2.4.1 Humaneness of Using Drowning Sets for Euthanizing Beaver, Nutria, and Muskrat

Some are concerned about beaver, nutria, and muskrat that drown while restrained by foothold or colony traps and these people consider drowning inhumane. There is considerable debate and disagreement among animal interest groups, veterinarians, wildlife professionals, fur trappers,

and nuisance wildlife control specialists on this issue. The debate centers around an uncertainty as to whether the drowning animals are rendered unconscious by high levels of CO_2 and are thus insensitive to distress and pain (Ludders et al. 1999). The AVMA identifies drowning as an unacceptable method of euthanasia (Beaver et al. 2001), but provides no literature citations to support this position. Ludders et al. (1999) concluded drowning is not euthanasia based on the animals not dying from CO_2 narcosis and reported CO_2 narcosis does not occur until 95 millimeters of mercury in arterial blood is exceeded. Ludders et al. (1999) showed death during drowning is from hypoxia and anoxia, and thus animals experience hypoxemia and concluded that animals that drown are distressed because of stress related hormones, epinephrine and norepinephrine, and therefore drowning is not euthanasia.

Carbon dioxide (CO_2)causes death in animals by hypoxemia and some animals (cats, rabbits, and swine) are distressed before death (Beaver et al. 2001). Even though these animals are distressed, the AVMA (Beaver et al. 2001) states this death is an acceptable form of euthanasia. Thus, the AVMA does not preclude distress or pain in euthanasia. In fact, the AVMA supports inducing hypoxemia related distress when necessary to reduce total distress, because reducing total distress is a more humane death.

Death by drowning in the classical sense is caused by the inhalation of fluid into the lungs and is referred to as "wet" drowning (Gilbert and Gofton 1982, Noonan 1998). Gilbert and Gofton (1982) reported that all submerged beaver do not die from wet drowning, but die of CO_2 induced narcosis, and the AVMA has stated the use of CO_2 is acceptable (Gilbert and Gofton 1982, Noonan 1998). Gilbert and Gofton (1982) reported that after beaver were trapped and entered the water, they struggled for 2-5 minutes followed by a period of reflexive responses. Andrews et al. (1993) states that with some techniques that induce hypoxia, some animals have reflex motor activity followed by unconsciousness that is not perceived by the animal. Gilbert and Gofton (1982) state it is unknown how much conscious control actually existed at this stage and they stated anoxia may have removed much of the sensory perception by 5-7 minutes post submersion.

However, Gilbert and Gofton (1982) have been criticized because levels of carbon dioxide in the blood were not reported (Ludders et al. 1999) and there was insufficient evidence that the beaver in their study were under a state of CO_2 narcosis when they died (V. Nettles, Southeastern Cooperative Wildlife Disease Study, letter to W. MacCallum, Massachusetts Division of Fisheries and Wildlife, June 15, 1998). Adding to the controversy, Clausen and Ersland (1970) did measure CO_2 in the blood for submersed restrained beaver, yet none of the beaver in their study died, so Clausen and Ersland (1970) could not determine if beavers die of CO_2 narcosis. Clausen and Ersland (1970) demonstrated that CO_2 increased in arterial blood while beaver were submersed and CO_2 was retained in the tissues. While Clausen and Ersland (1970) did measure the amounts of CO_2 in the blood of submersed beaver they did not attempt to measure the analgesic effect of CO_2 buildup to the beaver (letter from V. Nettles, D.V.M., Ph.D., Southeastern Cooperative Wildlife Disease Study to W. MacCallum, MA Division of Fisheries and Wildlife, June 15, 1998).

When beaver are trapped using foothold traps with intent to "drown", the beaver are exhibiting a flight response. Gracely and Sternberg (1999) report that there is stress-induced analgesia resulting in reduced pain sensitivity during fight or flight responses. Environmental stressors that animals experience during flight or fight activate the same stress-induced analgesia (Gracely and Sternberg 1999).

The use of drowning trap sets has been a traditional wildlife management technique in trapping aquatic mammals such as beaver, nutria and muskrats. Trapper education manuals and other wildlife damage management manuals written by wildlife biologists recommend drowning sets for foothold traps set for beaver (Bromley et al. 1994, Dolbeer et al. 1994, Howard et al.1980, Miller and Yarrow 1994, Randolph 1988). In some situations drowning trap sets are the most appropriate and efficient method available to capture beaver, nutria, and muskrat. For example, a drowning set attachment should be used with foothold traps when capturing beaver to prevent the animal from injuring themselves while restrained, or from escaping (Miller and Yarrow 1994). Animals that drown die relatively quickly (e.g., within minutes) versus the possible stress of being restrained and harassed by people, dogs, and other wildlife before being euthanized. Drowning sets make the captured animal and trap less visible and prevents injury from the trapped animal (i.e., bites and scratches) to people who may otherwise approach a restrained animal. Furthermore, some people may be offended by the sight of dead animals. Drowning places the dead animal out of public view. Some sites may be unsuitable for body-gripping traps or snares because of unstable banks, deep water, or a marsh with a soft bottom (a.k.a., muck), but these sites would be suitable for foothold traps.

Given the short time period of a drowning event, the possible analgesic effect of CO_2 buildup to the beaver, the minimum if any pain or distress on drowning animals, the AVMA's acceptance of hypoxemia as euthanasia and the AVMA's acceptance of a minimum of pain and distress during euthanasia, the acceptance of catching and drowning muskrats approved by International Humane Trapping Standards (Fur Institute of Canada 2000), we conclude that drowning, though rarely used by WS, is acceptable. We recognize some people will disagree and are unswayed by WS decision to continue the use of this method.

2.2.5 Effects on Wetlands

Some people are concerned about the effects of the Proposed Action and Alternatives on wetland ecosystems and that removal of beaver or breaching beaver dams from an area will result in the loss of wetland habitat and the plant and animal species included in those wetlands.

Beaver build dams primarily in smaller riverine wetlands (intermittent and perennial streams and creeks) with dams consisting of mud, sticks and other vegetative materials. Their dams obstruct the normal flow of water and typically change the preexisting wetlands' hydrology from flowing or circulating waters to slower, deeper, more expansive waters that accumulate bottom sediment. The depth of bottom sediment depends on the length of time an area is covered by water and the amount of suspended sediment in the water.

WS beaver damage management activities are primarily conducted to alleviate damages to agricultural crops, timber resources, and public property such as roads, bridges and water management facilities. WS operations routinely incorporate beaver removal with dam breaching and/or installation of water leveler or exclusion devices. Dams are breached by hand where possible, or small charges of binary explosives are used, as necessary. No heavy equipment such as backhoes or bulldozers are used by WS in these damage reduction and wildlife enhancement activities. These activities take place on small watershed streams, tributary drainages, and ditches and can best be described as small, exclusive projects conducted to restore water flow through previously existing channels. Only that portion of the dam blocking the stream or ditch channel is altered or breached. The U.S. Arms Corps of Engineers (USACE) have criteria that would be implemented by WS during dam breaching activities to minimize any impacts to the water course basin, adjacent riparian areas, or surrounding vegetation. Projects involving the use of binary explosives would be conducted by trained WS certified explosive specialists. After a blast, any remaining fill material still obstructing the channel is normally washed downstream by water current. The only

noticeable side effects from this activity are diluted mud, water, and small amounts of debris from the dam scattered around the blasting site. Considerably less than 10 cubic yards of material would be moved in each of these project activities.

Over time, beaver dams can establish new, but different wetlands. The USACE and EPA regulatory definition of a wetland (40 CFR 232.2) is: "*Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.*"

The preexisting habitat and the altered habitat have different ecological values to the fish and wildlife native to an area. Some species will abound by the addition of a beaver dam, while others will diminish. For example, some darter species listed as Federally endangered require fast moving waters over gravel or cobble beds which beaver dams can eliminate, thus reducing the habitats value for this species. In general, it has been found that wildlife habitat values decline around bottomland beaver impoundments in the southern U.S. because hardwoods are killed from flooding and mast production declines. On the other hand, beaver dams can potentially be beneficial to some species of wildlife such as river otter, neotropical birds, and waterfowl.

If a beaver dam is not breached and water is allowed to stand, hydric soils and hydrophytic vegetation eventually form. This process can take anywhere from several months to years depending on preexisting conditions. Hydric soils are those soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions. In general, hydric soils form much easier where wetlands have preexisted. Hydrophytic vegetation includes those plants that grow in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. If these conditions are met, then a wetland has developed that would have different wildlife habitat values than an area that has been more recently impounded by beaver dam activity.

The intent of most dam breaching is not to drain established wetlands. With few exceptions, requests from public and private individuals and entities that WS receives involve dam breaching to return an area back to its preexisting condition within a few years after the dam was created. If the area does not have hydric soils, it usually takes many years for them to develop and a wetland to become established. This often takes greater than 5 years as recognized by the Swampbuster provisions. Most beaver dam removal by WS is either exempt from regulation under Section 404 of the Clean Water Act (CWA) as stated in 33 CFR part 323 or may be authorized under the USACE Nationwide Permit System in 33 CFR part 330. However, the breaching of some beaver dams can trigger certain portions of Section 404 that require landowners to obtain permits from the USACE. WS personnel determine the proper course of action upon inspecting a beaver dam impoundment. Appendix C describes the procedures used by WS to assure compliance with the pertinent laws and regulations.

2.2.6 Economic Losses to Property

Some people are concerned about the negative economic impacts that beaver, nutria, or muskrat cause to property. These people are concerned as to whether the Proposed Action or any of the Alternatives would reduce such damage to acceptable levels. Although it currently is not measured under WS MIS reporting, assistance from the current WS ARDM program to property owners and managers has resulted in substantial cost savings. The Alabama WS program has estimated a cost savings to property and landowners they have assisted with beaver, nutria, and muskrat damage of $9.66 for every $1 spent or $666,600 in FY 2001. In a similar program, the North Carolina WS program has estimated an annual cost savings of $10.21 for every $1 spent or $9.4 million to property and landowners they have assisted with aquatic rodent (beaver, nutria, muskrat) damage in FY 2001 (J. Heisterberg, USDA/APHIS/WS,

personal communication). Assistance from WS under the Proposed Action would result in reduced damage to property almost immediately and would likely prevent or reduce future economic losses to property.

As discussed in Section 2.2.5, beaver dams can obstruct the normal flow of water causing flooding conditions. These floods may cause damage to housing developments and property, railroad beds and crossings, and vehicle roads and bridges. Additionally, beavers may cut down trees used for timber or crops and other vegetation. Those who oppose removal of beavers from areas causing damage may feel differently when it is their property that is affected. These people usually are not concerned how the damage and economic losses are stopped as long as they are resolved. However, there still may be a small minority of people who may oppose any action, even when their property is affected. Table 1-1 provides annual losses reported to WS in Alabama from FY 1998-2001.

2.2.7 Impacts to Stakeholders, including Aesthetics

The human attraction to animals has been well documented throughout history and started when humans began domesticating animals. The American public shares a similar bond with animals and/or wildlife in general, and today a large percentage of American households have pets. However, some people may consider individual wild animals and birds as "pets" or exhibit affection toward these animals, especially people who enjoy coming in contact with wildlife. Therefore, the public reaction is variable and mixed to wildlife damage management because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to manage conflicts/problems between humans and wildlife.

There is some concern that the Proposed Action or the Alternatives would result in the loss of aesthetic benefits to the public, resource owners, or neighboring residents. Wildlife generally is regarded 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. Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature, dependent on what an observer regards as beautiful.

Wildlife populations provide a range of social and economic benefits (Decker and Goff 1987). These include direct benefits related to consumptive and non-consumptive use (e.g., wildlife-related recreation, observation, harvest, sale, etc.), indirect benefits derived from vicarious wildlife related experiences (e.g., reading, television viewing, etc.), and the personal enjoyment of knowing wildlife exists and contributes to the stability of natural ecosystems (e.g., ecological, existence, bequest values) (Bishop 1987). Direct benefits are derived from a user's personal relationship to animals and may take the form of direct consumptive use (using parts of, or the entire animal) or non-consumptive use (viewing the animal in nature or in a zoo, photography) (Decker and Goff 1987). Indirect benefits or indirect exercised values arise without the user being in direct contact with the animal and come from experiences such as looking at photographs and films of wildlife, reading about wildlife, or benefitting from activities or contributions of animals such as their use in research (Decker and Goff 1987). Indirect benefits come in two forms: bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is merely knowledge that the animals exist (Decker and Goff 1987).

IWDM provides relief from damage or threats to public health or safety to people who would have no relief from such damage or threats if non-lethal methods were ineffective or impractical. Many people directly affected by problems and threats to public health or safety caused by beaver, nutria, or muskrat insist upon their removal from the property or public location when they cause damage. Some people have an idealistic view and believe that all wildlife should be captured and relocated to another area to alleviate damage or threats to public health or safety. Some people directly affected by the problems caused by wildlife support removal. Whereas, individuals not directly affected by wildlife damage may be

supportive, neutral, or totally opposed to any removal of wildlife from specific locations or sites. Wildlife damage management practices are controversial in nature because they may affect each individual differently. Some people totally opposed to beaver damage management want WS to teach tolerance for damage and threats to public health or safety, and that wildlife should never be killed. WS goals are to assist resource owners in reducing damages while considering all possible non-lethal and lethal methods and employing those methods in a caring, humane, and professional manner. In addition, Alabama WS would only conduct ARDM at the request of the affected property owner or resource manager.

2.3 ADDITIONAL ISSUES USED TO DEVELOP MITIGATION MEASURES

2.3.1 Environmental Justice and Executive Order 12898 - *"Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations"*

Environmental Justice (EJ) is a movement promoting the fair treatment of all races, income, and culture with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no person or group of people should endure a disproportionate share of the negative environmental impacts resulting either directly or indirectly from the activities conducted to execute this country's domestic and foreign policies or programs. EJ has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. (The EJ movement is also known as Environmental Equity - which is the equal treatment of all individuals, groups or communities regardless of race, ethnicity, or economic status, from environmental hazards).

EJ is a priority both within the USDA/APHIS and WS. Executive Order 12898 requires Federal agencies to make EJ part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies and activities on minority and low-income persons or populations. A critical goal of Executive Order 12898 is to improve the scientific basis for decision-making by conducting assessments that identify and prioritize environmental health risks and procedures for risk reduction. WS developed a strategy that: 1) identifies major programs and areas of emphasis to meet the intent of the Executive Order, 2) minimize any adverse effects on the human health and environment of minorities and low-income persons or populations, and 3) carries out the APHIS mission. To that end, APHIS operates according to the following principles: 1) promote outreach and partnerships with all stakeholders, 2) identify the impacts of APHIS activities on minority and low-income populations, 3) streamline government, 4) improve the day-to-day operations, and 5) foster nondiscrimination in APHIS programs. In addition, APHIS plans to implement Executive Order 12898 through its compliance with the provisions of NEPA.

All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to insure EJ. WS personnel use wildlife damage management methods as selectively and environmentally conscientiously as possible. All chemicals used by WS are regulated by the EPA through FIFRA; by the FDA; Clemson University-Department of Pesticide Regulation; by MOU's with Federal land management agencies; and by program directives. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used following label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997a - Appendix P). The WS operational program, discussed in this document, properly disposes of any excess solid or hazardous waste. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations. In contrast, WS aquatic rodent damage management activities may provide for a safer environment for minority or low-income persons by reducing public health and safety risks.

2.3.2 Protection of Children from Environmental Health and Safety Risks (Executive Order 13045)

WS prioritizes the identification and assessment of environmental health and safety risks that may disproportionately affect children. Children may suffer disproportionately from environmental health and safety risks for many reasons, including their physical and mental status. The proposed beaver damage management would occur by using only legally available and approved methods where it is highly unlikely that children would be adversely affected. For these reasons, WS concludes that it would not create an environmental health or safety risk to children from implementing this proposed action. In contrast, WS ARDM may provide for a safer environment for children by reducing public health and safety risks.

2.3.3 National Historic Preservation Act of 1966, as Amended, and The Native American Graves and Repatriation Act of 1990

The National Historic Preservation Act (NHPA) of 1966, and its implementing regulations (36 CFR 800), requires Federal agencies to: 1) determine whether activities they propose constitute "undertakings" that can result in changes in the character or use of historic properties, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the State Historic Preservation Office regarding the value and management of specific cultural, archaeological and historic resources, and 3) consult with appropriate American Indian Tribes to determine whether they have concerns for traditional cultural properties in areas of these Federal undertakings. WS actions on tribal lands are only conducted at the tribe's request and under signed agreement; thus, the tribes have control over any potential conflict with cultural resources on tribal properties. WS activities as described under the proposed action would be small and poses minimal ground disturbance nor do WS activities have the potential to significantly affect visual, audible, or atmospheric elements of historic properties and are thus not undertakings as defined by the NHPA. In those cases, the officials responsible for management of such properties would make the request and would have decision-making authority over the methods to be used. WS actions are not undertakings as defined by the NHPA because such actions do not have the potential to result in changes in the character or use of historic properties.

The Native American Graves and Repatriation Act of 1990 provides for protection of American Indian burial sites, human remains, funerary objects and sacred objects, and establishes procedures for notifying Tribes of any new discoveries.

In consideration of American Indian cultural and archeological interests, the Alabama WS program provided a NOA of this EA to all the tribes in Alabama. A copy of this EA will be provided to any American Indian tribe in the State of Alabama that expresses a concern or interest in the proposed WS action and/or prior to any WS activity proposed to be conducted on tribal lands. Additionally, a copy of this EA has been provided to the Alabama Historical Society.

2.4 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

2.4.1 Impact of WS Actions on Biodiversity

No Alabama WS beaver, nutria, muskrat damage management is conducted to eradicate a native wildlife population. WS operates according to International, Federal, and state laws and regulations enacted to ensure species viability. In addition, any reduction of a local population or group is frequently temporary because immigration from adjacent areas or reproduction replaces the animals removed. The impacts of the WS program on biodiversity are minor and not significant nationwide, statewide, or regionwide (USDA 1997a). WS operates on a relatively small percentage of the land area of the State, and the WS

take of any wildlife species analyzed in this EA is a small proportion of the overall population and insignificant to the viability and health of the population (see Section 4.3).

2.4.2 No Wildlife Damage Management at Taxpayer Expense; Wildlife Damage Management should be Fee Based

Funding for WS comes from a variety of sources in addition to Federal appropriations. Alabama agency funds, state funds, county funds, city funds, private funds, and other Federal agency funds are applied to the program under Cooperative Agreements. Federal, state, and local officials have decided that wildlife damage management should be conducted by appropriating funds. WS was established by Congress as the agency responsible for providing wildlife damage management to the people of the United States. Wildlife damage management is an appropriate sphere of activity for government programs, since aspects of wildlife damage management are a government responsibility and authorized and directed by law (Appendix B).

2.4.3 Beaver, Nutria, and Muskrat Damage should be Managed by Trappers and Nuisance Wildlife Control Agents

The jurisdiction for managing most resident wildlife rests with the ADCNR. Currently, ADCNR manages beaver, nutria, and muskrat as furbearers.

The number of recreational fur trappers in Alabama has drastically declined in the past few decades (Figure 2-1). According to beaver, nutria, and muskrat harvest data from the ADCNR, the number of trapping licenses sold annually decreased from a peak of 6434 licenses in 1980 to a low of 411 in 1995, with 414 sold in 2001 (Figure 2-1) (ADCNR unpublished data). Recreational fur trappers provide several societal services, including trapping beaver, nutria, and muskrat causing damage to property and assisting the ADCNR to manage beaver, nutria, and muskrat populations. One cause for the decline in recreational trapping has been lower prices paid for raw fur since the early 1980's. Subsequently, there is an insufficient number of trappers to manage expanding beaver, nutria, and muskrat populations. In addition, many beaver, nutria, and muskrat damage problems also occur in urban or developed areas where little or no recreational beaver trapping occurs.

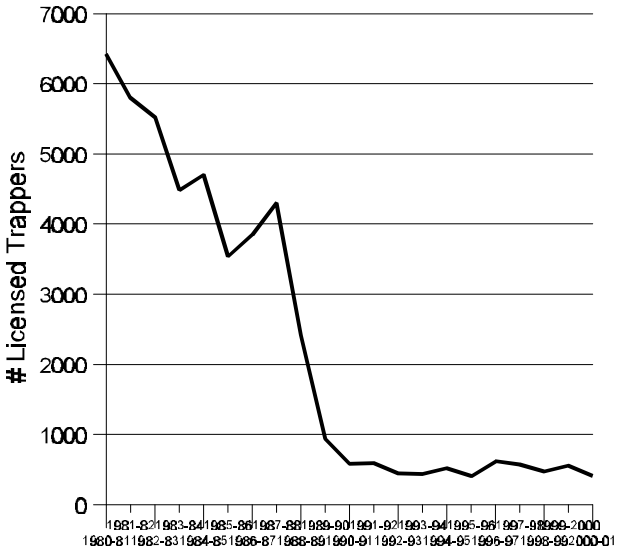

Figure 2-1. Number of licensed trappers in Alabama, 1980-2001.

Most private trappers cannot afford to provide year-round site-specific beaver, nutria, and muskrat damage management; however, that option remains open to landowners experiencing damage or the threat of damage. Private trappers, nuisance wildlife control agents, and landowners could trap beaver, nutria, and muskrat to alleviate damage during the regulated trapping season, or outside of the regulated season. However, some trappers are not willing to trap in urban areas for aesthetic reasons or for fear of trap theft. Trappers also may not be willing to trap beaver, nutria, or muskrat outside of the regular trapping season because the furs lack "primeness" and have little or no economic value.

Site-specific damage management has been necessary to protect property, roads, bridges, and agricultural and natural resources. It is the policy of WS to provide professional damage management upon request and verification of damage at site-specific locations. Assistance from Alabama WS may be requested to achieve management objectives. Typically, damage management involves removing a small number of beaver, nutria, or muskrat from a localized area. WS is not involved in statewide or large-scale beaver, nutria, or muskrat population reduction (see Section 1.3). Targeted beaver, nutria, or muskrat populations include those found near damage sites (i.e., site-specific areas, such as bridges, critical wildlife habitat, managed forests and ornamental trees and shrubs).

Some landowners may prefer that a government agency trap beaver, nutria, or muskrat instead of using private trappers or nuisance wildlife control agents, and large landowners with numerous damage sites (i.e., railroads or highway departments) may prefer to use WS because of reduced administrative burden. Some landowners may prefer to use private trappers or nuisance wildlife control agents instead of WS. Thus, WS beaver, nutria, and muskrat damage management activities would not eliminate opportunities for private trappers or nuisance wildlife control agents.

2.4.4 Wildlife Causing Damage should be Relocated

Relocation of nuisance wildlife species is a technique that is sometimes used to alleviate wildlife damage problems. However, the success of a relocation effort depends on the potential for the problem individuals to be captured efficiently and the existence of an appropriate relocation site (Nielsen 1988). While relocation may be appropriate in some situations when species populations are low, beaver, nutria, and muskrat are relatively abundant in much of the suitable habitat in Alabama and relocation is not necessary for the maintenance of viable populations. Because beaver are relatively abundant in Alabama, beaver relocated into suitable habitat are very likely to encounter other beaver with established territories. Beaver are highly territorial and the newly introduced beaver, which are disoriented and at a disadvantage, are often viciously attacked and sometimes killed from these encounters (McNeely 1995).

Relocated beaver may also disperse long distances from the release site (Novak 1987a). Hibbard (1958) in North Dakota recorded an average dispersal distance by 17 relocated beaver to be about 9 miles and Denney (1952) in Colorado reported an average dispersal of 10.4 miles and a maximum dispersal of 30 miles for 26 transplanted beaver. Beaver relocated on streams and later recaptured (N=200) moved an average distance of 4.6 miles, and in lake and pothole relocations (N=272) moved an average of 2 miles (Knudsen and Hale 1965). Only 12% of beaver relocated on streams and 33% of beaver relocated in the lake and pothole areas remained at the release site (Knudsen and Hale 1965).

The relocation of beaver, nutria, and muskrat that are causing damage could result in damage problems at the release site or dispersal site. In this case, the original damage problem has simply been shifted from one property to another. If WS relocated a nuisance animal, WS would be liable for any subsequent damage caused by that animal.

Live-trapping and relocating beaver and muskrats is not cost-efficient and is biologically unsound (Wade and Ramsey 1986). The AVMA, the National Association of State Public Health Veterinarians, and the Council of State and Territorial Epidemiologists all oppose the relocation of mammals because of the risk of disease transmission, particularly for small mammals (CDC 1990). Additionally, the survival of relocated animals is generally very poor due to the stress of relocation, so that in many cases an animal is released only to suffer mortality in a new environment (Craven 1992). Courcelles and Nault (1983) found that 50% (N=10) of radio-collared, relocated beaver died, probably from stress or predation resulting from the relocation. Among animal advocacy groups there appears to be disagreement about relocating wildlife to alleviate damage. The People for the Ethical Treatment of Animals opposes relocation of problem beaver because they believe relocation is cruel (Redmon 1999, 2000). The Humane Society of the

United States believes relocation is preferable to death, in some circumstances, but relocation could be stressful and result in suffering or death (Bridgeland et al. 1997).

WS did not consider this option in detail because of the unavailability of appropriate release sites for beaver, nutria, or muskrats and biological and humaneness concerns related to poor survivorship of relocated animals, competition with established colonies, and the potential for transmission of disease between populations. There is a high probability that damage problems would be transferred from one site to another through relocation of beaver, nutria, or muskrats. Also, WS would be liable for any damage relocated beaver, nutria, or muskrat may cause.

2.4.5 Beaver, Nutria, and Muskrat should be Live-captured and Euthanized Only

Live-capture and euthanasia of beaver, nutria, and muskrat may be used as part of WS IWDM approach to reduce aquatic rodent damage. Snares would be used to live-capture beaver. While snares are a legally effective and at times an efficient tool for capturing beaver, the use of additional methods (e.g., body-grip traps, shooting, foothold traps) could be necessary to reduce damage in a cost-effective manner. Also, snares are inappropriate to use in moving water because the current closes or disables the snare. Muskrats could be live-captured in floating colony traps, but these traps are cumbersome and more time consuming to set than body-grip traps and standard colony traps which lethally remove muskrats.

Hancock and Bailey live traps may be used in some urban situations for live-capturing beaver; however, the expense of these traps (>$300 each) and their size prohibits using a large number of these traps when smaller, less costly and more efficient traps are legal and available for use in Alabama.

2.4.6 Breaching of Dams or Use of Water Control Structures

This issue addresses attempts to alleviate flooding damage by controlling the water level at the site without removing the beaver. Dams would either be breached manually or with binary explosives, but these methods are usually ineffective because beaver will quickly repair or replace the dam (McNeely 1995). Installing and maintaining water control structures or removing beaver dams on a daily or weekly basis may be cost prohibitive, and would not alleviate damage from gnawing or felling of trees.

Water control devices and pond levelers have been used for many years in many different states, with varying degrees of success. Various types of beaver pond levelers have been described (Arner 1964, Laramie and Knowles 1985, Lisle 1996, Roblee 1984) and installation of beaver pond levelers can be effective in reducing flooding in certain situations (Minn. Dept. Nat. Res. 1994, Miller and Yarrow 1994, Organ et al. 1996). However, a survey of Clemson Beaver Pond Levelers installed by WS in Mississippi revealed that only about 45% of levelers were successful (Nolte et al. 2001). Another study reported water drainage pipes in beaver dams to be effective in only about 5% of flooding situations (Anonymous 1999). This is primarily because these structures were blocked by debris or siltation, and because the beaver often built a new dam nearby (McNeely 1995). If beaver are not removed, they may build dams upstream and downstream or block the device with mud and debris, rendering this method ineffective (B. Sloan, USDA/APHIS/WS, Stoneville, Mississippi, personal communication). Suppression or eradication of the local beaver population usually is required for this method to be effective (Nolte et al. 2001).

Water control devices are most effective on wetlands lacking in-stream flow (B. Sloan, USDA/APHIS/WS, Stoneville, Mississippi, personal communication), but may be ineffective in beaver ponds in broad, low-lying areas (Organ et al. 1996). They may not be appropriate in streams or ditches with continuous flow because the volume of water is too great for the device to handle, and debris is continuously carried to the site. Additionally, water control devices may not be effective during periods of

unusually high rainfall or increased water flow because the device cannot handle the increased volume of water (Anonymous 1999, Wood et al. 1994).

The use of pond levelers or water control devices may require frequent maintenance, depending on the type of water control device used. Continued maintenance is necessary for the device to remain operational because stream flow, leaf fall, floods, and beaver activity will continuously bring debris to the water control device. This maintenance of water control devices can be expensive. The Maine WS program estimated annual maintenance costs at about $350 per water control device (E. Butler, USDA/APHIS/WS, Augusta, Maine, personal communication). The Mississippi WS program reported the construction and installation cost of the Clemson beaver pond leveler (water control device) to cost approximately $700 (T. Aderman, USDA/APHIS/WS, Stoneville, Mississippi, personal communication). There also may be annual costs to suppress beaver populations to keep the devices operational (Nolte et al. 2001).

The Beaver Deceiver is a relatively recent water-level management device that attempts to prevent beaver from creating dams by eliminating environmental cues that stimulate damming at culverts and by making culverts less favorable as dam sites. This is accomplished by quieting, calming, and deepening the water in front of culverts and constructing an odd shaped fence that both excludes beaver from a large area around the upstream opening of the culvert and confuses them so that they do not construct a dam against the fence (Lisle 1996). Preservation of the wetland areas and fur resource for recreational trapping are benefits of using Beaver Deceivers (Lisle 1996).

WS could implement the use of water control devices as part of an integrated beaver management program at appropriate sites. The Maine WS program installed over 160 water control devices in 1998. The primary benefit of the use of these devices in Maine is to minimize flooding damage while leaving beavers for fur trappers to remove during the regulated trapping season each year (E. Butler, USDA/APHIS/WS, Augusta, Maine, personal communication). In Mississippi, the WS program commonly installs water control devices at sites where the landowner intends to hunt ducks or lease duck hunting rights on his land (B. Sloan, USDA/APHIS/WS, Stoneville, Mississippi, personal communication). Because there are few fur trappers in Mississippi, it is generally necessary to remove beaver annually at the site to maintain the effectiveness of the device (Nolte et al. 2001). Thus, in both Maine and Mississippi, the use of water control devices is supplemented by the continual removal of beaver from the site and an additional benefit is received which helps to justify the expense (i.e. reserving beaver for the fur harvest, providing duck hunting sites). Also, the construction, installation, and maintenance costs of water control devices in Maine and Mississippi are funded, in part, by sources such as state wildlife agencies, county governments, [redacted], or private organizations (E. Butler, USDA/APHIS/WS, Augusta, Maine, personal communication, B. Sloan, USDA/APHIS/WS, Stoneville, Mississippi, personal communication). Without such financial assistance and the existence of additional benefits, water control devices would generally be ineffective to reduce or prevent damage.

2.4.7 Effects on Legal Trapping

Some people may be concerned that WS-conducted beaver, nutria, and muskrat management activities would affect regulated trapping by reducing local beaver, nutria, and muskrat populations and that lethal and non-lethal damage management methods may interfere with legal regulated trapping.

WS annual take of beaver, nutria, and muskrat by lethal control methods would be minimal compared to the annual take by licensed trappers in Alabama (see Section 4.2.4). WS activities may result in reduced beaver, nutria, and muskrat densities on project area properties and on adjacent properties, hence slightly reducing the number of beaver, nutria, and muskrat that may otherwise be available to local licensed

trappers. Beaver, nutria, and muskrat densities on other properties outside the project area would likely not be affected, thus providing ample opportunities for trappers to harvest these animals.

2.4.8 Appropriateness of Preparing an EA (Instead of an EIS) for Such a Large Area

Some individuals might question whether preparing an EA for an area as large as the state of Alabama (32.48 million acres) would meet the NEPA requirements for site specificity. Wildlife damage management falls within the category of Federal or other agency actions in which the exact timing or location of individual activities cannot usually be predicted well enough ahead of time to accurately describe such locations or times in an EA or EIS. The WS program is analogous to other agencies or entities with damage management missions such as fire and police departments, emergency cleanup organizations, insurance companies, etc. Although WS can predict some of the possible locations or types of situations and sites where some kinds of wildlife damage will occur, the program cannot predict the specific locations or times at which affected resource owners will determine a beaver, nutria, or muskrat damage problem has become intolerable to the point that they request assistance from WS. Nor would WS be able to prevent such damage in all areas where it might occur without resorting to destruction of wild animal populations over broad areas at a much more intensive level than would be desired by most people, including WS and state agencies. Such broad scale population control would also be impractical, if not impossible, to achieve.

If a determination is made through this EA that the Proposed Action would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative impacts, one EA analyzing impacts for the entire state may provide a better analysis than multiple EA's covering smaller zones. In addition, Alabama WS only conducts ARDM in small areas throughout the state where damage is occurring or likely to occur.

CHAPTER 3: ALTERNATIVES

INTRODUCTION

Alternatives were developed for consideration using the WS Decision Model (Slate et al. 1992) as described in Chapter 2 (pages 20-35), Appendix J (Methods of Control), Appendix N (Examples of WS Decision Model), and Appendix P (Risk Assessment of Wildlife Damage Control Methods Used by USDA, Wildlife Services Program) of the ADC FEIS (USDA 1997a).

Chapter 3 of this EA contains a discussion of the project Alternatives, including those that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences), aquatic rodent damage management approaches used by WS, aquatic rodent damage methods authorized for use or recommended by WS, methodologies recommended but deemed impractical, ineffective, or unsafe at the present time, Alternatives considered but not analyzed in detail with rational, and a table of mitigation measures and SOP's for wildlife damage management techniques. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues used to develop mitigation measures. Evaluation of the affected environments will be discussed in more detail in Chapter 4.

The No Action Alternative is a procedural NEPA requirement (40 CFR 1502.14(d)) and 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, as defined here, is consistent with the Council on Environmental Quality (CEQ 1981).

ALTERNATIVES ANALYZED IN DETAIL

Alternative 1 - No Federal WS Beaver, Nutria, and Muskrat Damage Management in Alabama - This Alternative would result in no assistance from WS in reducing beaver, nutria, or muskrat damage in Alabama. WS would not provide technical assistance or operational damage management services.

Alternative 2 - Technical Assistance Only - Under this Alternative, WS would not conduct operational beaver, nutria, or muskrat damage management in Alabama. The entire program would consist of providing technical assistance only.

Alternative 3 - Non-lethal Beaver, Nutria, and Muskrat Damage Management Only - Under this Alternative, only non-lethal operational damage management and technical assistance would be provided by WS.

Alternative 4 - Integrated Beaver, Nutria, and Muskrat Damage Management for all Public and Private Land (No Action/Proposed Action) - This Alternative is the Proposed Action and is the preferred Alternative of WS. This Alternative incorporates an integrated approach to beaver, nutria, and muskrat damage management using components of the wildlife damage management techniques and methods addressed in Alternatives 2, 3, and 5 as deemed appropriate by WS and other participating entities in Alabama.

Alternative 5 - Lethal Beaver, Nutria, and Muskrat Damage Management Only - This Alternative would involve the use and recommendation of lethal management techniques only by WS.

3.1 DESCRIPTION OF THE ALTERNATIVES

3.1.1 Alternative 1 - No Federal WS Beaver, Nutria, and Muskrat Damage Management in Alabama

This Alternative would result in no assistance from WS in reducing beaver, nutria, or muskrat damage in Alabama. WS would not provide technical assistance or operational damage management services. All

requests for beaver, nutria, or muskrat damage management assistance would be referred to the ADCNR, local animal control agencies, or private businesses or organizations. Assistance may or may not be available from any of these entities.

3.1.2 Alternative 2 - Technical Assistance Only

This Alternative would only allow Alabama WS to provide technical assistance to individuals or agencies requesting beaver, nutria, or muskrat damage management in Alabama. WS would not remove beaver, nutria, or muskrat or beaver dams under this Alternative. Property owners and land managers could implement their own beaver, nutria, and muskrat damage management program, use contractual services of private businesses, use volunteer services, or take no action. This Alternative would place the immediate burden of operational damage management work on the property owners and other Federal, state, or county agencies.

3.1.3 Alternative 3 - Non-lethal Beaver, Nutria, and Muskrat Damage Management Only

Under this Alternative, only non-lethal operational damage management and technical assistance would be provided by WS for requests for beaver, nutria, and muskrat damage management in Alabama. Request for information regarding lethal management approaches would be referred to ADCNR, local animal control agencies, or private businesses or organizations. Individuals or agencies might choose to implement WS non-lethal recommendations, implement lethal methods or other methods not recommended by WS, contract for WS non-lethal damage management services, use contractual services or private businesses, use volunteer services, or take no action. WS could remove unwanted beaver dams by hand or with binary explosives under this Alternative. In some cases, management methods employed by others could be contrary to the intended use or in excess of what is necessary.

3.1.4 Alternative 4 - Integrated Beaver, Nutria, and Muskrat Damage Management for all Public and Private Land (No Action/Proposed Action)

Wildlife Services proposes to administer and continue the current aquatic rodent damage management program in the state of Alabama. An IWDM approach, including technical assistance and operational damage management services, would be implemented to reduce damage associated with beaver, nutria, and muskrat activities to property, agricultural and natural resources, and public health and safety on all lands in Alabama where a need exists and request is received. An IWDM strategy encompasses the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Non-lethal methods, such as physical exclusion or habitat modification, would be given first consideration in the formulation of each damage management strategy and would be recommended or implemented when practical and effective before recommending or implementing lethal methods, such as body-grip traps, snares, foothold traps, shooting, and zinc phosphide bait. However, non-lethal methods would not always be applied as a first response to each damage problem. The most appropriate response would often be a combination of non-lethal and lethal methods, or there may be instances where application of lethal methods alone would be the most appropriate strategy. Beaver, nutria, and muskrat damage management would be conducted in the state, when requested, on private or public property after an *Agreement for Control* or other comparable document has been completed and cooperator funding has been secured. All beaver, nutria, and muskrat damage management would be consistent with other uses of the area and would comply with appropriate Federal, state and local laws. Unwanted beaver dams could be breached by hand, or with binary explosives under this Alternative.

3.1.5 Alternative 5 - Lethal Beaver, Nutria, and Muskrat Damage Management Only

This Alternative would allow for lethal technical assistance recommendations and lethal operational beaver, nutria, and muskrat damage management by WS. Requests for information regarding non-lethal management approaches would be referred to ADCNR, local animal control agencies, or private businesses or organizations. WS would not remove beaver dams under this Alternative. Individuals or agencies might choose to implement WS lethal recommendations, implement non-lethal methods or other methods not recommended by WS, contract for WS damage management services, use contractual services of private businesses, use volunteer services, or take no action. In some cases, control methods employed by others could be contrary to the intended use or in excess of what is necessary.

Lethal methods of wildlife control are often very effective when used properly. Specific problem animals can be targeted and removed without negatively affecting the local population of a species (Bailey 1984). All control measures would be implemented in accordance with applicable Federal, state, and local laws, and WS policy.

3.2 AQUATIC RODENT DAMAGE MANAGEMENT APPROACHES USED BY WS

Wildlife damage management is defined as the alleviation of damage or other problems caused by or related to the presence of wildlife (USDA 1997a). The strategies and methodologies described below include those that could be used or recommended under Alternatives 2, 3, 4, and 5 described above. Alternative 1 would eliminate any assistance by WS. Appendix D is a more thorough description of the methods that could be used or recommended by WS.

3.2.1 Integrated Wildlife Damage Management (IWDM)

During more than 80 years of resolving wildlife damage problems, WS has considered, developed, and used numerous methods of reducing wildlife damage (USDA 1997a). WS efforts have involved the research and development of new methods, and the implementation of effective strategies to resolve and prevent wildlife damage.

Usually, the most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. IWDM is the implementation and application of safe and practical methods for the prevention and reduction of damage caused by wildlife based on local problem analyses and the informed judgement of trained personnel. The WS Program applies IWDM, commonly known as Integrated Pest Management (WS Directive 2.105), to reduce damage through the WS Decision Model (Slate et al. 1992).

The philosophy behind IWDM is to implement effective management techniques in a cost-effective manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM draws from the largest possible array of options to create a combination of techniques for the specific situations. IWDM may incorporate cultural practices, habitat modification, animal behavior modification, removal of individual offending animals, local population reduction, or any combination of these and other effective methods, depending on the characteristics of the specific damage problem. WS considers the biology and behavior of the damaging species and other factors using the WS Decision Model (Slate et al. 1992).

3.2.2 IWDM Strategies Used by the Alabama WS Program

3.2.2.1 Technical Assistance Recommendations (management decision and implementation is the responsibility of the requester)

"Technical assistance" as used herein is information, demonstrations, and advice on available and appropriate wildlife damage management methods. Technical assistance may require substantial effort by WS personnel in the decision making process, but 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 non-WS entities to use. Technical assistance may be provided following a personal or telephone consultation, or during an on-site visit with the requester.

WS personnel provide information, instructional sessions, demonstrations and advice on available beaver, nutria, and muskrat damage management techniques. Technical assistance includes demonstrations on the proper use of damage reduction devices (body-grip traps, foothold traps, tree-wraps, etc.), information on water-level control devices, wildlife habits and biology, habitat management, and animal behavior modification. Bulletins and leaflets on beaver, nutria, and muskrat biology could be sent to requesters to inform them about aesthetic values of these species, types of damage and damage management methods. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems, these strategies are based on factors such as need and practical application.

3.2.2.2 Operational Damage Management Assistance (assistance conducted or supervised by WS personnel)

Operational damage management assistance is implemented when the problem cannot be resolved through technical assistance and when Cooperative Agreements provide for WS operational assistance. The initial investigation explores and defines the nature and history of the problem, extent of damage, species or property directly and indirectly damaged, species responsible for the damage, and methods that would by available to resolve the problem. Professional skills of WS personnel are often required to effectively and safely resolve problems, especially if restricted pesticides are required or if the problem requires the direct supervision of a wildlife professional. WS considers the biology and behavior of the damaging species, and other factors using the WS Decision Model (Slate et al. 1992). The recommended strategy(ies) may include any combination of preventive actions, generally implemented by the property owner, and corrective actions, generally implemented by WS. Corrective damage management is applying management techniques to stop or reduce current losses. As requested and appropriate, WS personnel may provide non-lethal and lethal information, conduct demonstrations, or take action to prevent additional losses from recurring.

3.2.2.3 Educational Efforts in Alabama

Education is an important element of WS program activities because wildlife damage management is about finding "balance" or 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 and demonstrations are provided to producers, homeowners, state and county agents, and other interested groups. WS 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, laws and regulations, and agency policies. WS provides informational leaflets about identifying beaver, nutria, and muskrat damage; biology and ecology of the animal(s) involved; specific methods and products most effective in reducing losses; and sources for supplies/products.

Each year the WS program in Alabama provides leaflets and handouts to the public about beaver, nutria, and muskrat damage management. This information is disseminated by means of school programs, exhibits and calls from requesters.

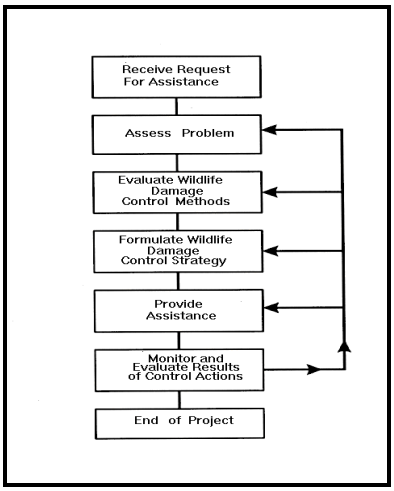

Figure 3-1. Wildlife Services Decision Model Process.

3.2.3 WS Decision Making

WS personnel use a thought process for evaluating and responding to damage complaints that is depicted by the WS Decision Model described by Slate et al. (1992) (Figure 3-1). This Decision Model considers the following factors before selecting or recommending damage management methods and techniques:

- Species responsible for the damage;
- Magnitude, geographic extent, frequency, historical damage and duration of the problem;
- Status of target and non-target species, including T&E species;
- Local environmental conditions;
- Potential biological, physical, economic, and social impacts;
- Potential legal restrictions; and
- Costs of damage management option[2].

WS personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate for reducing damage to an acceptable level. WS personnel assess the problem, evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, the methods deemed to be practical for the situation are developed into a management strategy. After the management 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 documented process, but a mental problem-solving process common to most if not all professions.

3.2.4 Local Decision Making Process

The WS program in Alabama follows the "Co-managerial approach" to solve wildlife damage or conflicts as described by Decker and Chase (1997). With this management model, WS provides technical assistance regarding the biology and ecology of beaver, nutria, and muskrat and effective, practical, and reasonable methods available to the requester to reduce wildlife damage. This includes non-lethal and lethal methods. Some technical assistance on alleviating damage caused by beaver, nutria, and muskrat is available from the ADCNR, County Extension Agents, county/city animal control, and private nuisance wildlife control agents. WS and other state and Federal wildlife or wildlife damage management agencies may facilitate discussions at local community meetings when resources are available, and make recommendations. Resource owners and others directly affected by beaver, nutria, or muskrat damage or conflicts in Alabama have direct input into the resolution of such problems. They may implement

[2] The cost of management may sometimes be secondary because of overriding environmental, legal, public health and safety, animal welfare, or other concerns.

management recommendations provided by WS or others, or may request management assistance from WS, other wildlife management agencies, local animal control agencies, or private businesses or organizations.

Local decision makers have the final decision on which available (legally and administratively) methods would be used to solve a human-wildlife conflict. They may also compare the benefits versus the damage when deciding which methods would be implemented. Local decision makers must also weigh the cost of implementing each method or a series of methods. These decision makers include community leaders, private property owners/managers, and public property owners/managers.

3.3 AQUATIC RODENT DAMAGE MANAGEMENT METHODS AUTHORIZED FOR USE OR RECOMMENDED BY WS

USDA (1997a - Appendix J) describes methods currently used by the WS program. Several of these were considered in this assessment because of their potential use in reducing beaver, nutria, and muskrat damage to roads and railroads, property, agricultural and natural resources, and public health and safety. A listing and more detailed description of the methods used by Alabama WS for beaver, nutria, and muskrat damage management is found in Appendix D of this EA.

3.3.1 Non-lethal Beaver, Nutria, and Muskrat Damage Management Methods

Habitat Modification is used whenever practical to attract or repel certain wildlife species. For beaver, nutria, and muskrat management, habitat modification generally refers to riparian vegetation manipulation to reduce the carrying capacity for these species. This would involve the removal of all or most of the woody and aquatic vegetation to eliminate beaver, nutria, and muskrat food resources. However, this method would be an extreme and impractical method in most situations. Habitat management may also involve manipulating beaver impoundment water levels to reduce damage or conflict caused by flooding. Water-level control devices are installed to regulate the volume of water and can be effective in reducing flooding in certain situations (Minn. Dept. Nat. Res. 1994). Water-level control devices are also utilized as a means of exclusion at road culverts.

Exclusion (tree wraps, fencing, grit paint) involves preventing beaver, nutria, or muskrats from gaining access to protected resources (e.g., trees, shrubs). Exclusion devices usually can be applied by the resource or land owner at minimal expense.

Beaver Dam Breaching involves the removal of debris deposited by beaver that impedes the flow of water. This debris would be removed either with the use of binary explosives, mechanically, or by hand.

3.3.2 Lethal Beaver, Nutria, and Muskrat Damage Management Methods

These methods involve damage management specifically designed to lethally remove beaver, nutria, or muskrat in certain situations to a level that stabilizes, reduces, or eliminates damage. The amount of removal necessary to achieve a reduction of beaver, nutria, or muskrat damage varies according to the resource protected, habitat, species population, the effectiveness of other damage management strategies, and other population factors.

It must be made clear that snares, foothold traps, colony traps, and Hancock or Bailey traps when set on land are not intended to dispatch the captured animal. The intent is to hold the animal until WS personnel can humanely dispatch the target animal or release a non-target animal. However, because the end result is lethal, these methods are included under lethal management methods.

Shooting is selective for the target species and may involve the use of spotlights and either a shotgun or rifle.

Body-grip (e.g., Conibear) Traps are traps designed to cause the quick death of the animal that activates the trap. The appropriate size trap would be used for beaver and nutria (Conibear 330, 220) and are used in aquatic habitats, with placement depths varying from a few inches to several feet below the water surface. Smaller body-grip traps (Conibear 110, 120) would be used for muskrats and can be set either in or out of the water.

Foothold Traps can be effectively used to capture a variety of mammals. Generally, all foothold traps used to capture aquatic rodents are set near adequate water depth and rigged with a drowning mechanism that will dispatch the animal immediately. Effective trap placement and adjustment and the selection and the placement of appropriate lures by trained WS personnel contribute to the foothold trap's selectivity. All beaver, nutria, and muskrats live-captured in foothold traps would be humanely euthanized.

Snares are live-capture devices consisting of a cable loop and a locking device and are placed in travel ways used by beaver. Most snares are also equipped with a swivel to minimize cable twisting and breakage. Beaver live-captured in snares would be humanely euthanized.

Colony Traps are multiple catch traps used to capture muskrats. Colony traps are usually set at the entrance to the den or in runways. Colony traps can be use as live-capture (on land) or kill traps (underwater) for muskrats. All muskrats live-captured would be humanely euthanized.

Hancock or Bailey Traps (suitcase/basket type cage traps) are designed to live-capture beaver. The trap is constructed of a metal frame that is hinged with springs attached and covered with chain-link fence. The trap's appearance is similar to a large clam when closed. When set, the trap is opened to allow an animal to enter the *clam shell*, when tripped the *clam shell* closes around the animal. All beaver caught in Hancock traps would be humanely euthanized.

3.3.3 Chemical Management Methods

All chemicals used by Alabama WS are registered under FIFRA and administered by the EPA and approved by the FDA. No chemicals are used on public or private lands without authorization from the land management agency or property owner/manager. There are currently no chemical methods available for beaver damage management.

Zinc phosphide is the only chemical method legal to use for nutria and muskrat damage management in Alabama. Zinc phosphide is used to reduce nutria and muskrat damage by applying to a bait. The maximum application rate is 10 pounds of bait (0.6% active ingredient) (EPA Reg. No. 56228-6).

3.4 METHODOLOGIES CONSIDERED BUT DEEMED IMPRACTICAL, INEFFECTIVE, OR UNSAFE AT THE PRESENT TIME

3.4.1 Harassment Activities

Harassment has generally proven ineffective in reducing beaver or muskrat damage problems (Jackson and Decker 1993). Destroying beaver dams and lodges without removing resident beaver rarely resolves damage problems as beaver usually rebuild in the same vicinity in a very short time. Also, removal of food supplies to discourage beaver, nutria, or muskrat activity is generally not feasible nor ecologically desirable.

3.4.2 Repellents

No effective repellents are registered for beaver, nutria, or muskrat damage management. However, recent research from the USDA, APHIS, WS, National Wildlife Research Center has suggested that painting trees with a mixture of 1 quart of sand to 1 gallon of exterior latex paint may prevent beaver and nutria from gnawing and cutting the painted trees. If this method is found to be effective and practical, and if it is classified as a "repellent" requiring registration under the FIFRA and state pesticide control laws, then WS would consider and use or recommend this repellent method once registered.

3.4.3 Reproduction Control

A review of research evaluating chemically induced and surgically induced reproductive inhibition as a method for controlling nuisance beaver populations is contained in Novak (1987a). Although these methods were effective in reducing beaver reproduction by up to 50%, the methods were not practical or were too expensive for large-scale application. Additionally, reproductive control does not alleviate current damage problems (Organ et al. 1996).

This method involves the use of chemicals or surgical procedures to inhibit reproduction of beaver, nutria, and muskrats to reduce populations levels. Chemical sterilants can be classified into one of three types: chemosterilants, immunocontraceptives, and temporary, short term contraceptives. Chemosterilants have been suggested as a means to managing beaver populations (Davis 1961, Arner 1964). Several reproductive inhibitors have been proposed for use in beaver population reduction, including quinestrol (17-alpha-ethynyl-estradiol - 3-cyclopentylether) and mestranol (Gordon and Arner 1976, Wesley 1978). While chemosterilants have been shown to reduce beaver reproduction in controlled experiments, there are no practical, effective methods for distributing chemosterilants in a consistent way to wild, free ranging beaver populations (Hill et al. 1977, Wesley 1978). There are no chemical reproductive inhibitors currently registered to use for beaver damage management in the United States.

As with chemical repellents and toxicants, a reproduction inhibitor could potentially affect non-target wildlife and the environment. Any material would have to be intensively tested and approved for use. Inhibition of reproduction may also affect behavior, physiological mechanisms, and colony integrity (Brooks et al. 1980). Additional research is needed before the environmental affects, and affects to populations and individual animals, from reproductive inhibitors are known. Should a technique or chemical become registered for use, it would be considered for incorporation into the ARDM program in Alabama.

3.5 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

3.5.1 Eradication and Suppression

An eradication and suppression Alternative would direct all Alabama WS ARDM efforts toward planned, total elimination or suppression of these species. Eradication of beaver, nutria, and muskrat in Alabama is not supported by Alabama WS or ADCNR. This Alternative was not considered in detail because:

- Alabama WS and ADCNR opposes eradication of any native wildlife species;
- The eradication of a native species would be extremely difficult if not impossible to accomplish, and cost prohibitive; and
- Eradication of native species is not acceptable to most members of the public or those in the scientific community.

Suppression would direct Alabama WS program efforts and resources toward managed reduction of certain problem wildlife populations or groups. To consider large-scale population suppression as a goal of the Alabama WS program is not realistic, practical or allowable under present WS policy.

3.5.2 Population Stabilization through Fertility Control

Under this Alternative, beaver, nutria, and muskrat populations would be managed through the use of contraceptives. Beaver, nutria, or muskrats would be sterilized or contraceptives administered to limit their ability to produce offspring. However, at present, there are no chemical or biological contraceptive agents for beaver, nutria, or muskrats. A beaver, nutria, or muskrat contraceptive, chemosterilant or immuno-contraceptive, if delivered to a sufficient number of individuals, may temporarily suppress local breeding populations by inhibiting reproduction. Reduction of local populations would result from natural mortality combined with reduced fecundity. No beaver, nutria, or muskrats would be killed directly with this method; however, and treated beaver, nutria, and muskrats would continue to cause damage. Populations of dispersing beaver, nutria, and muskrats would probably be unaffected.

Contraceptive measures for mammals can be grouped into four categories: surgical sterilization, oral contraception, hormone implantation, and immuno-contraception (the use of contraceptive vaccines). These techniques would require that beaver, nutria, or muskrat receive either single, multiple, or possibly daily treatment to successfully prevent conception. The use of this method would be subject to approval by Federal and state agencies. This Alternative was not considered in detail because: (1) it would take a number of years of implementation before the beaver, nutria, or muskrat population would decline, and, therefore, damage would continue at the present unacceptable levels for a number of years; (2) surgical sterilization would have to be conducted by licensed veterinarians and would be extremely expensive; (3) it is difficult to effectively live trap or chemically capture the number of beaver, nutria, or muskrat that would need to be sterilized in order to effect an eventual decline in the population; and (4) no chemical or biological contraceptive agents for beaver, nutria, or muskrats have been approved for use by state and Federal regulatory authorities.

The use of contraceptives is not realistic, at this point, since there are no effective and legal methods of delivering contraceptives to beaver, nutria, or muskrats.

3.5.3 Compensation for Wildlife Damage Losses

The compensation Alternative would direct all Alabama WS program efforts and resources toward the verification of losses from beaver, nutria, and muskrats and to providing monetary compensation for these losses. Alabama WS activities would not include any operational damage management or technical assistance.

This option is not currently available to Alabama WS because WS is directed and authorized by law to protect American agricultural and natural resources, property, and public health and safety (Act of 1931, as amended; and the Rural Development, Agricultural and Related Agencies Appropriation Act of 1988). Analysis of this Alternative in USDA (1997a) shows that compensation has many drawbacks:

- Compensation would not be practical for public health and safety problems;
- It would require larger expenditures of money to investigate and validate all losses, and to determine and administer appropriate compensation;
- Timely responses to all requests to assess and confirm losses would be difficult, and many losses could not be verified;
- Compensation would give little incentive to limit losses through other management strategies;

- Not all resources managers/owners would rely completely on a compensation program and unregulated lethal control would probably continue and escalate; and
- Neither Congress nor the State of Alabama has appropriated funds for a compensation program.

3.5.4 Bounties

There are no statewide bounties on beaver in the state of Alabama.

Payment of funds for killing beaver, nutria, or muskrats (bounties) suspected of causing economic losses is not supported by WS and the Alabama WS program does not have the authority to establish a bounty program. Bounties are not considered for a viable management method because:

- Bounties are generally not effective in managing wildlife or reducing damage;
- Circumstances surrounding take of animals is largely unregulated; and
- No process exists to prohibit taking of animals from outside the damage management area for compensation purposes.

3.5.5 Live-capture and Relocate

Relocation of problem wildlife species is a technique that is sometimes used to alleviate wildlife damage problems. However, the success of a relocation effort depends on the potential for the problem individuals to be captured efficiently and the existence of an appropriate relocation site (Nielsen 1988). Relocation of beaver, nutria, and muskrat in Alabama is discouraged by the ADCNR (M. Seivering, ADCNR, Northport, Alabama, personal communication). Relocation may be appropriate in some situations when the species population is low, but beaver, nutria, and muskrats are abundant in much of the suitable habitat in Alabama and relocation is not necessary for the maintenance of viable populations. Because beaver, nutria, and muskrat are abundant in Alabama, those relocated into suitable habitat are very likely to encounter other beaver, nutria, and muskrat with established territories. Beaver are highly territorial and the newly introduced beaver, which are disoriented and at a disadvantage, are often viciously attacked and sometimes killed from these encounters (McNeely 1995). The survival of relocated animals is generally very poor due to the stress of relocation, so that in many cases an animal is released only to suffer mortality in a new environment (Craven 1992). Courcelles and Nault (1983) found that 50% (n=10) of radio-collared, relocated beaver died, probably from stress or predation resulting from the relocation.

Relocated beaver may also disperse long distances from the release site (Novak 1987a). Hibbard (1958) in North Dakota recorded an average dispersal distance by 17 relocated beaver to be about 9 miles and Denney (1952) in Colorado reported an average dispersal of 10.4 miles and a maximum dispersal of 30 miles for 26 transplanted beaver. Beaver relocated on streams and later recaptured (n=200) moved an average distance of 4.6 miles, and in lake and pothole relocations (n=272) moved an average of 2 miles (Knudsen and Hale 1965). Only 12% of beaver relocated on streams and 33% of beaver relocated in the lake and pothole areas remained at the release site (Knudsen and Hale 1965).

The relocation of beaver, nutria, and muskrats that are causing damage could result in damage problems at the release site or dispersal site. In this case, the original damage problem has simply been shifted from one property to another. If Alabama WS relocated the problem animal, Alabama WS could possibly be held liable for any subsequent damage caused by that animal.

Live-trapping and relocating beaver is biologically unsound and not cost-efficient (Wade and Ramsey 1986). The AVMA, the National Association of State Public Health Veterinarians, and the Council of State and Territorial Epidemiologists all oppose the relocation of mammals because of the risk of disease

transmission, particularly for small mammals (CDC 1990). Among animal advocacy groups there appears to be disagreement about relocating wildlife to alleviate damage. The People for the Ethical Treatment of Animals opposes relocation of problem beaver because they believe relocation is cruel (Redmon 1999, 2000). The Humane Society of the United States believes relocation is preferable to death, in some circumstances, but point out that relocation could be stressful and result in suffering or death (Bridgeland et al. 1997).

For the above stated reasons, Alabama WS does not support the relocation of aquatic rodents and does not relocate aquatic rodents for the ARDM program within the State of Alabama.

3.6 MITIGATION AND SOP's FOR BEAVER, NUTRIA, AND MUSKRAT DAMAGE MANAGEMENT

3.6.1 Mitigation Measures and SOP's

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for impacts that otherwise might result from that action. The current WS program, nationwide and in Alabama, uses many such mitigation measures and these are discussed in detail in Chapter 5 of ADC FEIS (1997a). The following mitigation measures are incorporated into WS SOP's and Alternatives 2, 3, 4, and 5:

Alternative 1 - No Federal WS Beaver, Nutria, and Muskrat Damage Management in Alabama.
Alternative 2 - Technical Assistance Only.
Alternative 3 - Non-Lethal Beaver, Nutria, and Muskrat Damage Management Only.
Alternative 4 - Integrated Beaver, Nutria, and Muskrat Damage Management for all Public and Private Land (No action/Proposed Action).
Alternative 5 - Lethal Beaver, Nutria, and Muskrat Damage Management Only.

Table 3-1. Mitigation measures and standard operating procedures considered for the aquatic rodent damage management program in Alabama.

MITIGATION MEASURES	ALTERNATIVES				
	1	2	3	4	5
Animal Welfare and Humaneness of Methods Used by WS					
Research on selectivity and humaneness of management practices would be monitored and adopted as appropriate.		X	X	X	X
The Decision Model (Slate et al. 1992) would be used to identify effective biologically and ecologically sound beaver damage management strategies and their impacts.		X	X	X	X
Captured non-target animals would be released unless it is determined by the Alabama WS personnel that the animal would not survive.				X	X
The use of traps and snares would conform to current laws and regulations administered by ADCNR and Alabama WS policy.				X	X
Where practical, euthanasia procedures approved by the AVMA that cause minimal pain would be used for live animals.				X	X

MITIGATION MEASURES	ALTERNATIVES				
	1	2	3	4	5
The use of newly-developed, proven, non-lethal methods would be encouraged when appropriate.		X	X	X	X
Safety Concerns Regarding WS Beaver Damage Management Methods					
All pesticides that are used by WS would be registered with the EPA.				X	X
EPA-approved label directions would be followed by WS employees.				X	X
The Decision Model (Slate et al. 1992), designed to identify the most appropriate damage management strategies and their impacts, would be used to determine damage management strategies.		X	X	X	X
Beaver, nutria, and muskrat damage management conducted on public lands would be coordinated with the management agency.			X	X	X
WS employees who use pesticides would be trained to use each material and would be certified to use pesticides under EPA approved certification programs.				X	X
WS employees who use pesticides would participate in approved continuing education to keep abreast of developments and maintain their certifications.				X	X
Pesticide use, storage, and disposal conforms to label instructions and other applicable laws and regulations, and Executive Order 12898.				X	X
Material Safety Data Sheets for pesticides would be provided to all WS personnel involved with specific damage management activities.				X	X
Live traps would be placed so that captured animals would not be readily visible from any road or public area.				X	X
Concerns about Impacts of Damage Management on T&E Species, Species of Special Concern, and Non-target Species.					
WS consulted with the USFWS regarding the nation-wide program and the Alabama program and would continue to implement all applicable measures identified by the USFWS to ensure protection of T&E species.			X	X	X
Alabama WS's take would be considered with the statewide *"Total Harvest"* (Alabama WS take and fur harvest) when estimating the impact on wildlife species.				X	X

MITIGATION MEASURES	ALTERNATIVES				
	1	2	3	4	5
Management actions would be directed toward localized populations or groups and/or individual offending animals, dependent on the magnitude of the problem.			X	X	X
WS personnel would be trained and experienced to select the most appropriate method for taking targeted animals and excluding non-target species.			X	X	X
WS would initiate informal consultation with the USFWS following any incidental take of T&E Species.			X	X	X

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

Chapter 4 provides information needed for making informed decisions on the beaver, nutria, and muskrat damage management program objectives outlined in Chapter 1 and the issues and affected environment discussed in Chapter 2.

4.1 ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the environmental consequences of each Alternative in relation to the issues identified for detailed analysis in Chapter 3. This chapter analyzes the environmental consequences of each Alternative in comparison with the No Action/Proposed Action (Alternative 4) to determine if the real or potential impacts would be greater, lesser, or the same. The No Action Alternative is a procedural NEPA requirement (40 CFR 1502.14(d)) and is a viable and reasonable Alternative that could be selected and serves as a baseline for analysis and the comparison of expected impacts among the Alternatives. The analysis also takes into consideration WS mandates, directives, and the procedures used in the WS decision process (USDA 1997a). The No Action Alternative, as defined here, is consistent with the Council on Environmental Quality (CEQ 1981).

The following resource values within Alabama are not expected to be significantly impacted by any of the Alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. These resources will not be analyzed further.

4.1.1 Social and Recreational Concerns

Social and recreational concerns are discussed throughout this document as they relate to issues raised during public involvement and they also are discussed in USDA (1997a).

4.1.2 Cumulative and Unavoidable Impacts

Cumulative and unavoidable impacts are discussed in relationship to each of the wildlife species and the environmental impacts are analyzed in this chapter. This EA recognizes that the total annual removal of individual animals from wildlife populations by all causes is the cumulative mortality. Analysis of the Alabama WS "*takes*" during 1998-2001, and anticipated future WS take, in combination with other mortality, indicates that cumulative impacts are not adversely affecting the viability and health of wildlife populations. It is not anticipated that the Alabama WS program would result in any adverse cumulative impacts to T&E species, and beaver, nutria, and muskrat damage management activities do not jeopardize public health and safety.

4.1.3 Irreversible and Irretrievable Commitments of Resources

Other than minor uses of fuels for motor vehicles and electrical energy for office maintenance, there are no irreversible or irretrievable commitments of resources. Based on these estimates, the Alabama WS program produces very negligible impacts on the supply of fossil fuels and electrical energy.

4.2 DETAILED ANALYSIS OF ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES

This section presents the expected consequences of each Alternative on each of the issues analyzed in detail.

4.2.1 Alternative 1 - No Federal WS Beaver, Nutria, and Muskrat Damage Management in Alabama

Effects on Beaver, Nutria, and Muskrat Populations

Some beaver, nutria, and muskrat populations would continue to increase where trapping and shooting pressure was low and may decline or stabilize where trapping and shooting pressure was adequate. Some resource owners experiencing damage may trap or shoot beaver, nutria, and muskrats or hire private trappers, but would receive no guidance from WS regarding these options. Other resource owners experiencing damage may take illegal or unsafe action against local populations of beaver, nutria, and muskrats out of frustration of continued damage resulting in unknown impacts to these populations. Overall impacts on statewide beaver, nutria, and muskrat populations may be similar to or greater than Alternative 4, since affected resource owners would likely lethally remove the damaging beaver, nutria, and muskrats that would no longer be removed by WS.

Effects on Plants and Other Wildlife Species, including T&E Species

In the absence of WS assistance, some resource owners may attempt to trap beaver, nutria, and muskrat or hire private trappers with little or no trapping experience. These resource owners or trappers would be more likely than WS personnel to trap non-target species and not report non-target take to regulatory authorities. Other resource owners experiencing damage may take illegal or unsafe action against local populations of beaver, nutria, and muskrats out of frustration of continued damage resulting in unknown impacts to plant and wildlife populations.

One anticipated outcome of no WS beaver, nutria, and muskrat damage management program, is a likely increase in damage and associated beaver created impoundments if resource owners did not remove beaver dams. These impoundments would likely have an impact on other wildlife and plant species. The extent and nature of the impacts would depend upon the size of the beaver created impoundment and the diversity of plant and animal species in the area. Some species would flourish in the newly created environment, while others would diminish. The positive effect of beaver, nutria, and muskrat activities, including affected species have been summarized in section 1.3.1-1.3.3. The negative effects of beaver, nutria, and muskrats, including affected species, are described in section 1.3.4-1.3.6.

Effects on Public and Pet Health and Safety

If resource owners did not implement an effective beaver, nutria, and muskrat damage management program in the absence of WS, there is the potential for increased risks to public health and safety from unresolved damage situations. For example, burrowing into or flooding of roadways and railroad beds can result in serious accidents (Woodward 1983, Miller and Yarrow 1994). Beaver are also carriers of the intestinal parasite *Giardia lamblia*, which can contaminate water supplies and cause outbreaks of the disease Giardiasis in humans (Woodward 1983, Wade and Ramsey 1986, Miller and Yarrow 1994). Additionally, resource owners inexperienced in the safe and proper use of management tools may attempt to resolve beaver, nutria, and muskrat damage problems. Without professional assistance or proper training in the use of damage management tools, there is the potential for increased risks to public and pet safety. These increased risks are associated with the improper or inexperienced use of damage management methods such as trapping, shooting, pesticides, and dam removal with explosives.

Humaneness of Methods to be Used

This Alternative would be considered humane by people that do not believe that WS should use lethal control methods. However, resource/property owners could use lethal and non-lethal methods to reduce beaver, nutria, and muskrat damage in the absence of WS, with impacts on humaneness dependent upon the experience of the person implementing the control method. Some resource/property owners may take illegal action against localized populations of beaver, nutria, and muskrat out of frustration of continued damage. These illegal actions may be less humane than methods used by experienced WS personnel.

Effects on Wetlands

Under this Alternative, beaver dam breaching needs would be met by private, state, or local government entities. Some beaver impounded areas that WS would advise against draining might be drained under private or local government management, which could have adverse effects on wetland habitats in limited circumstances.

Economic Losses to Property

Beaver, nutria, and muskrat populations would continue to increase unless an effective damage management program was implemented by non-WS personnel. This increase in population would likely result in increased occurrences of flooding, gnawing and feeding damage to property.

Impact to Stakeholders, including Aesthetics

The impacts of this Alternative to stakeholders would be variable depending on their values towards wildlife and compassion for their neighbors. Resource owners receiving damage from beaver, nutria, and muskrat would likely strongly oppose this Alternative because they would bear the damage caused by beaver, nutria, and muskrats. Animal activists and a minority of environmental activists would prefer this Alternative because they believe it is morally wrong to kill or use animals for any reason. Some people would support this Alternative because they enjoy seeing beaver, nutria, and muskrat, or having them nearby. However, while WS would take no action under this Alternative, other individuals or entities could, and likely would, conduct damage management activities resulting in impacts similar to Alternative 4.

4.2.2 Alternative 2 - Technical Assistance Only

Effects on Beaver, Nutria, and Muskrat Populations

WS would provide technical advice to those persons requesting assistance. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical assistance. Overall impacts would be similar to Alternative 1.

Effects on Plants and Other Wildlife Species, including T&E Species

Negative impacts to plant and wildlife species should be less than Alternative 1 when WS technical advise is requested and followed. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical assistance.

Effects on Public and Pet Health and Safety

WS would provide technical advice to those persons requesting assistance. Negative impacts to public and pet safety should be less than Alternative 1 when WS technical advise is requested and followed. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical assistance.

Humaneness of Methods to be Used

The issue of humaneness as it relates to WS under this Alternative is not applicable because resource owners or others would be responsible to implement the damage management methods. WS would provide technical advice to those persons requesting assistance. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical

assistance. Overall impacts should be less than Alternative 1 when WS technical advise is requested and followed.

Effects on Wetlands

WS would provide technical advice to those persons requesting assistance. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical assistance. Overall impacts to wetlands should be less than Alternative 1 when WS technical advise is requested and followed.

Economic Losses to Property

WS would provide technical advice to those persons requesting assistance. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical assistance. Overall economic losses to property would be similar to Alternative 1.

Impact to Stakeholders, including Aesthetics

WS would provide technical advice to those persons requesting assistance. Resource owners could use the information provided by WS or implement their own damage reduction program without WS technical assistance. Overall impacts would be similar to Alternative 1.

4.2.3 Alternative 3 - Non-lethal Beaver, Nutria, and Muskrat Damage Management Only

Effects on Beaver, Nutria, and Muskrat Populations

No beaver, nutria, or muskrats would be killed by WS under this Alternative. Beaver, nutria, and muskrat populations could decrease, stay the same or increase depending on actions taken by others. The use of water control devices or the removal of dams by WS would have little or no effect on beaver populations. If WS non-lethal methods and recommendations are effective in reducing beaver, nutria, and muskrat damage to acceptable levels, beaver, nutria, and muskrat would not likely be lethally removed by affected resource owners. However, in those situations where damage is not reduced to acceptable levels by non-lethal methods, resource owners would likely implement their own lethal damage management program resulting in impacts similar to Alternative 1.

Effects on Plants and Other Wildlife Species, including T&E Species

WS impacts would be similar to Alternative 4, except the potential take of non-target species by WS lethal control methods would not occur under this Alternative. However, in the absence of integrated damage management program by WS that includes the option of lethal removal of beaver, nutria, and muskrat from damage sites, some resource owners may attempt to trap and shoot beaver, nutria, and muskrat or hire private trappers with little or no trapping experience resulting in impacts similar to Alternative 1.

Effects on Public and Pet Health and Safety

Non-lethal methods, including exclusion and habitat modifications, would not be efficient or successful in resolving many beaver, nutria, and muskrat damage situations. In those situations were WS non-lethal methods and recommendations are ineffective at reducing damage to acceptable levels impacts would be similar to Alternative 1. In those situations where they are effective, impacts would be similar to Alternative 4.

WS occasionally uses binary explosives to breach beaver dams. WS personnel that use explosives are required to take and pass in-depth training, and must be able to demonstrate competence and safety in their use of explosives. They adhere to WS policies as well as regulations from ATF, OSHA, and the USDOT with regards to explosives use, storage, and transportation. Binary explosives require two components to be mixed before they can be actuated which virtually eliminates the hazard of accidental detonation during storage and transportation. Storage and transportation of mixed binary explosives is illegal. When explosives are used, signs are placed to stop public entry, much like dams that are near roads, police or other road officials are used to stop traffic and public entry. Therefore, no adverse effects to public safety are expected from the use of explosives by WS.

Humaneness of Methods to be Used

Under this Alternative, only non-lethal beaver, nutria, and muskrat damage management methods would be implemented by WS. Some animal activists may perceive this approach as humane because they oppose all lethal methods of damage management. However, when non-lethal methods are ineffective at reducing damage to acceptable levels, resource owners may implement their own lethal damage management program or take illegal action against some local populations of beaver, nutria, and muskrat out of frustration of continued damage resulting in impacts similar to Alternative 1.

Effects on Wetlands

WS would implement or recommend the breaching of beaver impounded areas by hand or with explosives for the purpose of returning streams, channels, dikes, culverts, and irrigation canals to their original channel under this Alternative. Overall impacts would be similar to Alternative 4.

Economic Losses to Property

This Alternative would not be favored by most resource owners who are receiving damage when non-lethal methods do not reduce damage to acceptable levels. Damage to property would be expected to increase when non-lethal methods are ineffective at reducing damage. Beaver, nutria, and muskrat populations would continue to increase unless an effective damage management program was implemented by non-WS personnel. This increase in population would likely result in increased occurrences of flooding, gnawing and feeding damage to property.

Impact to Stakeholders, including Aesthetics

While WS would provide non-lethal assistance under this Alternative, other individuals or entities could conduct lethal damage management. The impacts of this Alternative to stakeholders would be variable depending on the effectiveness of WS non-lethal methods and actions taken by resource owners. This Alternative would not be favored by most resource owners who are receiving damage when non-lethal methods do not reduce damage to acceptable levels. Most stakeholders without damage would prefer this Alternative to Alternatives 4 or 5, because non-lethal methods would be implemented to resolve damage problems. Some animal activists and a minority of environmental activists would strongly support this Alternative because they believe it is morally wrong to kill or use animals for any reason or they believe that the benefits from beaver, nutria, and muskrats outweigh the associated damage. However, if resource owners reject WS non-lethal control methods and implement their own control program impacts would be similar to Alternative 1.

4.2.4 Alternative 4 - Integrated Beaver, Nutria, and Muskrat Damage Management for all Public and Private Land (No Action/Proposed Action)

Effects on Beaver, Nutria, and Muskrat Populations

The current WS program removes only a very small number of beaver, nutria, and muskrat from the statewide Alabama population (Table 4-1) (see Section 1.3). Unlike Alternative 5, the use of exclusion, habitat modification, water control devices, etc., could be used as part of an IWDM approach. The use of water control devices or the removal of dams would have little or no effect on beaver populations. The amount of time until new beaver, nutria, or muskrats move into the area would vary depending on the habitat type, time of year, and population densities in surrounding areas. In our experience in Alabama, some areas are re-colonized by beaver, nutria, and muskrats in 1-12 months. The following is an analysis of potential impacts on beaver, nutria, and muskrat populations in Alabama.

The authority for management of resident wildlife species is the responsibility of the ADCNR. Beaver, nutria, and muskrat are classified as furbearers, that have a regulated harvest season. ADCNR provided information on the number of pelts purchased by Alabama fur dealers from 1991-2000.

The ADC FEIS (USDA 1997a) determined using qualitative information (population trend indicators and harvest data) that is WS beaver, nutria, or muskrat kill is greater than 33% but less that or equal to 66% of the total harvest and the beaver, nutria, and muskrat populations are stable or increasing, the magnitude is considered low. Magnitude is defined as a measure of the number of animals killed in relation to their abundance. Using limited harvest data from fur dealer sales (ADCNR unpublished data) and the fact that there is an unlimited take and season for harvesting beaver in Alabama, the annual take of 1,000 beaver, 100 nutria, and 100 muskrat by WS, the magnitude is considered low for WS take of beaver, nutria, and muskrat in Alabama. Thus, cumulative take appears to be beneath the level that would begin to cause a decline in the beaver, nutria, or muskrat populations.

The ADCNR provided the number of pelts purchased by Alabama fur dealers (Table 4-1), but was unable to provide any definitive estimates of population sizes or total harvest by licensed trappers and hunters for purposes of the following analyses on impacts to the population. The number of pelts purchased by Alabama fur dealers significantly underestimates the actual harvest, because pelts may be sold outside the state or not at all and many animals are removed for damage purposes outside of the regulated fur harvest season and are destroyed. In these cases, these animals are legally taken but are not required to be reported to the ADCNR.

Beaver Population Impact Analysis

Beaver occur mostly in family groups that are comprised of 2 adult parents with 2-6 offspring from the current or previous breeding season (Novak 1987a). Average family group size has been documented as ranging from 3.0 to 9.2 (Novak 1987a). Beaver abundance has been reported in terms of families per kilometer of stream or per square kilometer of habitat. Novak (1987a) summarized reported beaver family abundance as ranging from 0.31 to 1.5 families per kilometer of stream, which converts to 0.5 to 2.4 families per mile of stream. Densities reported in terms of families per square kilometer have been reported to range from 0.15 to 3.9 (Novak 1987a) which is the same as 0.24 to 6.3 per square mile. Novak (1987a) indicates that rates of beaver populations are density dependent, which means that rates of increase generally rise as a population is reduced and become less as a population increases toward its carrying capacity[3]. This is a natural function of most wildlife populations that helps to naturally mitigate population reductions. Logan et al. (1996), indicated that wildlife populations being held at a level below carrying capacity can sustain a higher level of harvest because of the compensatory mechanisms that cause higher rates of increase in such populations.

1 - Carrying capacity is the maximum number of animals that the environment can sustain and is determined by the availability of food, water, cover, and the tolerance of crowding by the species in question.

The number of beaver taken by WS and fur trappers is shown in Table 4-1 (MIS 1998-2001 and ADCNR, unpublished data). The FY 1998 take of 560 was the highest number ever removed by the Alabama WS program in one year and the second highest number of 526 beavers were taken in FY 2000. Based upon current and an anticipated increase in beaver damage management work in the future, it is not anticipated that more than 1,000 beaver would be killed annually by WS in Alabama.

The ADCNR, the state authority responsible for monitoring and managing beavers in Alabama, report that the statewide beaver population is stable or increasing and has concurred that WS ARDM program will not adversely affect the state-wide beaver population, non-target species, or species listed in the Alabama Threatened and Endangered Species Inventory (letter from K. Guyse, ADCNR to F. Boyd, USDA, APHIS, Wildlife Services, February 28, 2002). Recognizing that beaver are in abundance and cause damages to resources in Alabama, the ADCNR has established a year-round season for beaver with an unlimited harvest.

Table 4-1. Beaver, nutria, and muskrat pelts purchased by Alabama fur dealers and removed by USDA, Wildlife Services in Alabama, 1998-2001.

Trapping data (MIS) Trapping season	FY 1998 1997-98	FY 1999 1998-99	FY 2000 1999-00	FY 2001 2000-01
# beaver removed by WS	560	397	526	461
# beaver pelts purchased by Alabama fur dealers	540	242	144	178
# nutria removed by WS	0	4	2	3
# nutria pelts purchased by Alabama fur dealers	25	15	1	0
# muskrat removed by WS	12	9	9	3
# muskrat pelts purchased by Alabama fur dealers	4,873	175	1,028	398

1 - Fiscal year (October 1 - September 30)
2 - Trapping season (November - March)

Nutria Population Impact Analysis

Nutria are distributed throughout the entire state of Alabama, in surface water streams, rivers, reservoirs, wetlands, and coastal marsh, with slightly higher populations in the southern half of the state due to the milder winter temperatures.

Trapper harvest from 1998-2001 during the regulated trapping season (Table 4-1) was estimated from fur pelts purchased by fur dealers in Alabama (ADCNR unpublished data). Based upon current and an anticipated increase in future work, it is not anticipated that more than 100 nutria would be killed annually by WS in Alabama.

The ADCNR, the state authority responsible for monitoring and managing nutria in Alabama, report that the statewide nutria population is stable or increasing.

Muskrat Population Impact Analysis

Muskrats are considered abundant in Alabama and scattered in suitable habitat throughout the state. Muskrat can be found in marshes, ponds, sloughs, lakes, ditches, streams, and rivers

(Boutin and Birkenholz 1987). Muskrats are highly prolific and produce 3-4 litters per year that average 5-8 young per litter (Wade and Ramsey 1986) which are characteristics that make them relatively immune to over harvest (Boutin and Birkenholz 1987). Harvest rates of three to eight per acre have been reported to be sustainable in muskrat populations (Boutin and Birkenholz 1987).

Trapper harvest from 1998-2001 during the regulated trapping season (Table 4-1) was estimated from fur pelts purchased by fur dealers in Alabama (ADCNR unpublished data). Muskrats do not cause extensive damage problems in Alabama and WS only removed 33 muskrats for depredation purposes from FY 1998 - FY 2001. Based upon current and anticipated increase in future work, it is not anticipated that more than 100 muskrats would be killed annually by WS in Alabama.

The ADCNR, the state authority responsible for monitoring and managing muskrats in Alabama, report that the statewide muskrat population is stable or increasing.

Effects on Plants and Other Wildlife Species, including T&E Species

Non-target species, such as river otters, muskrats, and raccoons may occasionally be taken during beaver, nutria, or muskrat damage management in Alabama. Turtles and alligators may also be caught in some traps, but can generally be released unharmed. WS personnel would minimize non-target takes with careful placement of traps or variation in capture methods. Alabama WS has taken non-target animals (Table 2-1) during beaver, nutria, and muskrat management activities during FY 1998 - FY 2001.

WS does not expect the rate of non-target take to substantially increase above current program levels. The ADC FEIS (USDA 1997a) determined using qualitative information (population trend indicators and harvest data) that if WS kill is less than or equal to 33% of the total harvest, the *magnitude* is considered low. Magnitude is defined as a measure of the number of animals killed in relation to their abundance. Using available harvest data and the annual kill by WS, the magnitude is considered, and expected to remain, extremely low for WS take of all non-target animals in Alabama. Thus, cumulative take appears to be far beneath the level that would begin to cause a decline in these populations. Any other non-targets that may incidentally be taken by WS is expected to be minimal (less than 10 individuals per year) and should have no adverse affect on statewide populations.

The ADCNR concurs that Alabama WS activities would have no adverse effects on native wildlife populations in Alabama, including state listed T&E species (letter from K. Guyse, ADCNR to F. Boyd, USDA, APHIS, Wildlife Services, February 28, 2002).

WS consulted with the USFWS concerning potential impacts of WS methods on T&E species in Alabama. WS will contact the USFWS upon the discovery of any wood stork rookeries in those areas where WS ARDM services are requested. The USFWS concurred that Alabama WS beaver, nutria, and muskrat damage management methods “are not likely to adversely affect threatened or endangered species” in Alabama (L. Goldman, USFWS).

One anticipated outcome of this Alternative is a slight reduction in beaver, nutria, and muskrat damage and associated beaver created impoundments. This reduction in beaver created impoundments would likely have an impact on other wildlife and plant species. The extent and nature of the impacts would depend upon the size of the beaver created impoundment and the diversity of plant and animal species in the area. Some species would flourish, while others would diminish. Positive and negative impacts of aquatic rodents are discussed in section 1.3.

Effects on Public and Pet Health and Safety

WS may occasionally use binary explosives to breach beaver dams. WS personnel that use explosives are required to take and pass in-depth training, and must be able to demonstrate competence and safety in their use of explosives. They adhere to WS policies, as well as, regulations from ATF, OSHA, and USDOT with regards to explosives use, storage, and transportation. Binary explosives require two components to be mixed before they can be actuated which virtually eliminates the hazard of accidental detonation during storage and transportation. Storage and transportation of mixed binary explosives is illegal. When explosives are used, signs are placed to stop public entry. Where dams are near roads, police or other road officials are used to stop traffic and public entry. Therefore, no adverse effects to public safety are expected from the use of explosives by WS.

WS methods of shooting and trapping pose minimal or no threat to public and pet health and safety. All firearm safety precautions are followed by WS when conducting damage management and WS complies with all laws and regulations governing the lawful use of firearms. Shooting with shotguns or rifles is sometimes used to reduce beaver, nutria, and muskrat damage when lethal methods are determined to be appropriate. Shooting is selective for target species and may be used in conjunction with spotlights. WS also uses firearms to humanely euthanize beaver, nutria, and muskrats caught in live traps. WS traps are strategically placed to minimize exposure to the public and pets. Appropriate signs are posted on all properties where traps are set to alert the public of their presence. Body-grip (e.g., Conibear-type) traps are restricted to water sets, which further reduces threats to public and pet health and safety.

Firearm use is very sensitive and a public concern because of misuse. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within three months of their appointment and a refresher course every three years afterwards (WS Directive 2.615). WS employees who use firearms as a condition of employment, are required to certify that they meet the criteria as stated in the *Lautenberg Amendment*.

All chemicals used by APHIS-WS are regulated by the EPA through FIFRA and by WS Directives. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used according to label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997a - Appendix P).

This Alternative would allow WS to use or recommend all available and effective damage reductions strategies and methods to reduce threats to public health and safety caused by beaver, nutria, and muskrats, and beaver created dams. This Alternative would have the greatest possibility of successfully alleviating beaver damage such as flooding and burrowing, damage to roads and railroads, risks of Giardiasis outbreaks, and possible mosquito borne disease outbreaks.

Humaneness of Methods to be Used

WS personnel are experienced and professional in their use of management methods, and methods are applied as humanely as possible. Under this Alternative, beaver, nutria, and muskrats would be trapped as humanely as possible or shot by experienced WS personnel using the best and most appropriate method(s) available. Beaver, nutria, and muskrats live-captured in traps or snares would be humanely euthanized. Some animal rights activists may perceive this method as inhumane because they oppose all lethal methods of damage management. This Alternative allows WS to consider and use non-lethal methods for beaver, nutria, and muskrat damage management when appropriate and, therefore, would be preferred to Alternative 5 by those individuals that consider lethal control methods as inhumane.

Effects on Wetlands

Beaver impounded areas could be breached by hand or with explosives for the purpose of returning streams, channels, dikes, culverts, and irrigation canals to their original channel under this Alternative.

Dams are removed in according to Section 404 of the Clean Water Act. WS breaches most beaver impoundments because they have flooded areas such as residential yards, parks, roads, railroads, timberlands, crop lands, pastures, and other types of property or resources that were not previously flooded. Most dams that WS breaches are created as a result of recent beaver activity. These dams are typically less than one year in age because WS personnel receive most requests soon after affected resource owners discover damage and become aware of the WS ARDM program. These recently flooded sites do not possess wetland characteristics or the same wildlife habitat values as wetlands. WS only removes blockages and dams created by beavers under Nationwide Permits, Section 404 permits, or exemptions as permitted by the Clean Water Act. WS compliance with wetland protection laws and regulations assures that WS activities will not adversely affect wetland habitats. Appendix C describes the procedures used by WS to assure compliance with pertinent laws and regulations.

Economic Losses to Property

Damage to property would be expected to decrease under this Alternative since all available damage management methods and strategies would be available for WS use and consideration.

Impacts to Stakeholders, including Aesthetics

The impacts of this Alternative to stakeholders would be variable depending on their values and compassion towards wildlife. This Alternative would likely be favored by most resource owners who are receiving damage as it allows for an IWDM approach to resolving damage problems. Most stakeholders without damage would also prefer this Alternative to Alternative 5, because non-lethal methods could be implemented when appropriate to resolve damage problems. Some animal activists and a minority of environmental activists would strongly oppose this Alternative, because they believe it is morally wrong to kill or use animals for any reason or they believe that the benefits from beaver, nutria, and muskrats outweigh the associated damage. The ability to view and aesthetically enjoy beaver, nutria, and muskrat at a particular site could be limited if these animals are removed. However, beaver, nutria, and muskrats from adjacent areas would most likely use the site in the future, although the length of time until new animals arrive is variable, depending on the habitat type, time of year, and population densities of beaver, nutria, and muskrat in the area. If beaver, nutria, or muskrat do not return to areas where WS conducts ARDM, the opportunity to view them is available throughout other areas in Alabama.

4.2.5 Alternative 5 - Lethal Beaver, Nutria, and Muskrat Damage Management Only

Effects on Beaver, Nutria, and Muskrat Populations

This Alternative could result in a localized decrease in the beaver, nutria, and muskrat population at the specific site where the damage management occurs. Even if WS lethally removed beaver, nutria, or muskrat at all project sites, it is not anticipated that more than 1,000 beaver, 100 nutria, and 100 muskrat would be killed annually by WS. Therefore, the impacts on beaver, nutria, and muskrat populations are expected to be similar to those described in Alternative 4. Beaver, nutria, and muskrat from adjacent areas may re-inhabit the site where damage management has occurred as long as suitable habitat exists. The amount of time until new beaver, nutria, or muskrat move into an area would vary depending on the habitat type, time of year, and population densities in the area. Experience by WS employees in Alabama has found some areas are re-colonized by beaver, nutria, or muskrat in 1-12 months.

Effects on Plants and Other Wildlife Species, including T&E Species

Non-target species such as river otter, raccoons and turtles may occasionally be killed during beaver damage management. Turtles and alligators may be caught in some traps, but can usually be released alive. The removal of beaver, nutria, and muskrat may reduce gnawing and feeding on certain plants.

WS impacts on non-targets from capture methods would be similar to those described in Alternative 4. Because non-lethal management would not be implemented or recommended by WS under this Alternative, impacts related to beaver dam removal would be similar to Alternative 1.

Effects on Public and Pet Health and Safety

WS impacts on public and pet health and safety would be similar to those described in Alternative 4, except in those situations where health and safety risks would be reduced by the use of non-lethal methods, such as the removal of beaver dams or the installation of water control structures. Since WS would not implement or recommend non-lethal control methods under this Alternative, impacts related to non-lethal methods would be similar to Alternative 1.

Humaneness of Methods to be Used

WS personnel are experienced and professional in their use of management methods, and methods are applied as humanely as possible. Under this Alternative, beaver, nutria, and muskrat would be humanely trapped or shot by experienced WS personnel using the best and most appropriate method(s) available. Beaver, nutria, or muskrat live-captured in traps or snares would be humanely euthanized. Some animal activists could perceive these methods as inhumane because they oppose all lethal methods of damage management.

Effects on Wetlands

Under this Alternative, WS would remove beaver, nutria, or muskrat from a site but would not remove the beaver dam. Therefore, dam removal activities would be similar to Alternative 1.

Economic Losses to Property

Damage to property would be expected to decrease as the beaver, nutria, and muskrat causing damage are lethally removed from the site under this Alternative. Damage to property is expected to continue or increase in those situations where non-lethal methods, such as dam removal, would be necessary to reduce damage to acceptable levels unless non-lethal methods are implemented by non-WS personnel.

Impacts to Stakeholders, including Aesthetics

The impacts of this Alternative to stakeholders would be variable depending on their values and compassion towards wildlife. This Alternative would likely be favored by resource owners who are receiving damage if lethal methods reduced damage to acceptable levels. Animal activists and a minority of environmental activists would strongly oppose this Alternative because they believe it is morally wrong to kill or use animals for any reason or they believe the benefits from beaver, nutria, and muskrats would outweigh the associated damage.

The ability to view and aesthetically enjoy beaver, nutria, and muskrat at a particular site could be limited if they are removed. However, beaver, nutria, and muskrats from adjacent areas would most likely use the site in the future, although the length of time until new animals arrive is variable, depending on the habitat type, time of year, and population densities of beaver, nutria, and muskrat in the area. If beaver, nutria, or muskrat do not return to areas where WS conducts ARDM, the opportunity to view them is available throughout other areas in Alabama.

4.3 SUMMARY OF WS IMPACTS

Table 4-2 presents a relative comparison of the anticipated impacts of each of the Alternatives as they relate to each of the major issues identified in Chapter 2.

4.3.1 Cumulative Impacts

No significant cumulative environmental impacts are expected from any of the Alternatives including the Proposed Action (Table 4-2). Under the Proposed Action, the lethal removal of beaver, nutria, and muskrat would not have a significant impact on overall beaver, nutria, or muskrat populations in Alabama, but some local reductions may occur. Management activities will not negatively impact other protected flora and fauna in Alabama. The Proposed Action is supported by the ADCNR, the agency responsible for managing beaver, nutria, and muskrat and other flora and fauna in the State. No T&E species or critical habitat would be adversely impacted by the Proposed Action. Therefore, WS with concurrence from the ADCNR and USFWS, has determined that the Proposed Action would not likely adversely affect any species protected under the ESA. No risk to public or pet health and safety is expected by WS activities since only trained and experienced wildlife biologists and wildlife specialists would conduct and recommend management methods for beaver, nutria, and muskrat damage. There is a slight increased risk to public and pet safety when control activities are conducted by persons that reject WS assistance and recommendations, but not to the extent that they would be significant. Although some persons will likely be opposed to WS participation in management activities to reduce beaver, nutria, and muskrat damage, the analysis in this EA indicates that WS ARDM program will not result in significant cumulative adverse impacts on the quality of the human environment.

Table 4-2. Summary of the potential effects of the Alternatives as it pertains to the identified Issues. Potential effects include both positive and negative, when applicable.

Issues	Alternative 1: No Program	Alternative 2: Technical Assistance	Alternative 3: Non-lethal Only	Alternative 4: IWDM Program (Proposed Action)	Alternative 5: Lethal Only
Beaver, nutria, and muskrat populations	No impact from WS activities. Populations could increase unless resource owners seek private help.	No impact from WS activities. Populations could increase unless resource owners seek private help.	No impact from WS activities. Populations could increase unless resource owners seek private help.	Low impact to beaver populations regionally or statewide; however, local impacts may be larger than Alternatives 1-3.	Low impact to beaver populations regionally or statewide; however, local impacts may be larger than Alternatives 1-3.
Non-target Species, Including T&E Species	No impact from WS activities. However, non-target and T&E species could be impacted adversely from inexperienced resource owners without assistance from WS.	No impact from WS activities. However, non-target and T&E species could be impacted adversely from inexperienced resource owners without assistance from WS.	No adverse from WS activities. However, non-target and T&E species could be impacted adversely from inexperienced resource owners without assistance from WS.	No adverse impact to non-target and T&E species from WS activities.	No adverse impact to non-target and T&E species from WS activities.
Public and Pet Health and Safety	No risk from WS activities. Continued or increased risk from flooding, burrowing, and diseases.	No risk from WS activities. Continued or increased risk from flooding, burrowing, and diseases.	Low risk to public and pet health and safety from WS activities. Reduction of risks from flooding, burrowing, and diseases.	Low risk to public and pet health and safety from WS activities. Reduction of risks from flooding, burrowing, and diseases.	Low risk to public and pet health and safety from WS activities. Reduction of risks from flooding, burrowing and diseases.
Humaneness of Methods to be Used	No impact from WS activities. However, humane techniques may not be used by resource owners.	No impact from WS activities. However, humane techniques may not be used by resource owners.	No impact from WS activities. However, humane techniques may not be used by resource owners.	WS uses the most humane methods available. Some would oppose all lethal methods used by WS.	WS uses the most humane methods available. Some would oppose all lethal methods used by WS.
Effects on Wetlands	No impact from WS activities. However, wetlands may be adversely impacted by inexperienced resource owners.	No impact from WS activities. However, wetlands may be adversely impacted by inexperienced resource owners.	Low impact from WS activities.	Low impact from WS activities.	No impact from WS activities.
Economic Losses to Property	Losses would likely increase without assistance from WS.	Losses may be reduced or eliminated if resource owners take action.	Losses may be reduced, but not to the level of Alternatives 4.	Losses may be reduced or eliminated by WS ARDM program.	Losses may be reduced or eliminated by WS ARDM program, but not to the level of Alternative 4.
Impact to Stakeholders, including Aesthetics	No impact from WS activities. There may be positive or negative impacts on aesthetics depending on individuals viewpoint.	No impact from WS activities. There may be positive or negative impacts on aesthetics depending on individuals viewpoint.	Low impact from WS activities. Those receiving damage would probably favor this Alternative if damage could be reduced by non-lethal methods. Others may oppose this Alternative.	Low impact from WS activities. Those receiving damage would probably favor this Alternative if damage could be reduced by non-lethal methods. Others may oppose this Alternative.	Low impact from WS activities. Those receiving damage would probably favor this Alternative if damage could be reduced by lethal methods. Others may oppose this Alternative.

CHAPTER 5: LIST OF PREPARERS AND PERSONS CONSULTED

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APPENDIX A: LITERATURE CITED

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APPENDIX B: AUTHORITY AND COMPLIANCE

AUTHORITY OF FEDERAL AND STATE AGENCIES FOR BEAVER DAMAGE MANAGEMENT IN THE STATE OF ALABAMA

See Chapter 1 of USDA (1997a) for a complete discussion of Federal laws pertaining to WS.

U.S. Department of Agriculture, Wildlife Services Legislative Mandate

The USDA is directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for the Wildlife Services program is the Act of 1931 (7 U.S.C. 426-426c; 46 Stat. 1468), as amended in the Fiscal Year 2001 Agriculture Appropriations Bill, which provides that:

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

Since 1931, with the changes in societal values, WS policies and programs place greater emphasis on the part of the Act discussing *"bringing (damage) under control"*, rather than *"eradication"* and *"suppression"* of wildlife populations. In 1988, Congress strengthened the legislative mandate of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

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

U. S. Department of Agriculture, Forest Service Legislative Mandate

The U.S. Forest Service is subject to the Endangered Species Act which requires Federal agencies to take efforts to conserve T&E species. Under the Animal Damage Control Act of 1932, as amended, (7 U.S.C. 426-426c), the Forest Service and APHIS-WS, along with the States, cooperate to manage animal damage on National Forest System lands. Under the framework of a Master MOU between the Forest Service and WS, WS is designated as the lead agency concerning animal damage management activities involving predators on National Forest System lands. This includes a responsibility to maintain technical expertise in the science of animal damage management, control of tools and techniques, conducting management programs, and complying with NEPA for activities related to predator control. The Forest Service is responsible for the management of land and resources under its jurisdiction and for conducting non-predator control operations in National Forest System lands, including NEPA compliance on these activities. The MOU directs the Forest Service to coordinate with WS in the development and annual review of animal damage management work plans governing WS's activities on National Forest System lands and to cooperate in WS's NEPA processes.

U.S. Department of Interior, Fish and Wildlife Service Legislative Mandate

The USFWS authority for action is based on the Migratory Bird Treaty Act of 1918 (as amended), which implements treaties with the United States, Great Britain (for Canada), the United Mexican States, Japan, and the Soviet Union. Section 3 of this Act authorized the Secretary of Agriculture:

"From time to time, having due regard to the zones of temperature and distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, to determine when, to what extent, if at all, and by what means, it is compatible with the terms of the convention to allow hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg thereof, and to adopt suitable regulations permitting and governing the same, in accordance with such determinations, which regulations shall become effective when approved by the President."

The authority of the Secretary of Agriculture with respect to the Migratory Bird Treaty was transferred to the Secretary of the Interior in 1939 pursuant to Reorganization Plan No. II. Section 4(f), 4 Fed. Reg. 2731, 53 Stat. 1433.

CFR 50 Subchapter C - The National Wildlife Refuge System - Part 30 - Feral Animals - Subpart B-30.11 - Control of feral animals states: (a) Feral animals, including horses, burros, cattle, swine, sheep, goats, reindeer, dogs, and cats, without ownership that have reverted to the wild from a domestic state may be taken by authorized Federal or state personnel or by private persons operating under permit in accordance with applicable provisions of Federal or State law or regulation.

U.S. Army Corps of Engineers Legislative Mandate

The U.S. Arms Corps of Engineers (USACE) regulates and permits activities regarding waters of the United States including protection and utilization under Section 404 of the Clean Water Act.

U.S. Geological Survey, Natural Resource Conservation Service

The Natural Resource Conservation Service (NRCS) is responsible for certifying wetlands under the Wetland Conservation provisions of the Food Security Act (16 U.S.C. 3821 and 3822). Topographic maps are available through their offices that identify the presence of wetlands.

Mission of the Alabama Department of Conservation and Natural Resources, Wildlife and Freshwater Fisheries Division

The mission of the Wildlife and Fresh Water Fisheries Division is to manage, protect, conserve, and enhance the wildlife and aquatic resources of Alabama for the sustainable benefit of the people of Alabama.

Mission of the [redacted]

The [redacted] is authorized to enter into all contracts that are necessary to carry on highway construction and maintenance within the state. The [redacted] also has the authority to enter into agreements with other states and the Federal government when necessary. Personnel necessary to carry out the [redacted] operations are appointed by the [redacted] Director.

Some of the Director's more specific functions necessary to carry out the missions of the [redacted] are:

- Prescribe rules and regulations governing road construction, maintenance, and the placement of utilities along public highways.
- Determine the best method of road building for various geographical areas of Alabama.

- Designate the roads to be constructed, repaired, and maintained and direct the work.
- Issue rules concerning advertisement, markers, signs, and devices along state highways.
- Provide financial assistance to individuals or businesses displaced by certain highway projects, as specified in the Federal-aid Highway Act.
- Collect statistics relative to mileage, character and conditions of all state roads and prepare an annual report for the Governor. Maintain a current general highway map of Alabama.
- The [redacted] Director is Chairman of the Board of Directors of the [redacted].

WS currently has an MOU with the [redacted] to conduct beaver damage management along roadways owned and/or managed by the [redacted]. WS agrees: 1) to provide trained personnel to conduct site evaluations and damage control programs at problem sites identified by the [redacted]; 2) to train [redacted] personnel in beaver biology and control as requested by the [redacted]; and 3) to provide coordination with state and Federal wildlife agencies, secure and maintain proper permits, and prepare reports necessary under the provisions of such permits.

Mission of the Alabama Forestry Commission

Established as a state agency in 1924, the mission of the Alabama Forestry Commission is three-fold:

- to protect the forests from all harmful agents;
- to service and help landowners to carry out responsible forest management on their property, using professional technical assistance so as to benefit themselves, their land and society; and
- to educate the general public about the value of out forests in insuring both a healthy economy and environment.

These are done in the most efficient and cost effective way possible.

Mission of the Alabama Department of Agriculture and Industries

To provide timely, fair and expert regulatory control over product, business entities, movement, and application of goods and services for which applicable state and Federal law exists and strive to protect and provide service to Alabama consumers. Department personnel will actively work to initiate and support economic development activities and promote domestic and international consumption of Alabama products. It is the Department's goal to be recognized for its employee's integrity and professional performance.

COMPLIANCE WITH OTHER FEDERAL LAWS

Several other Federal laws authorize, regulate, or otherwise affect WS wildlife damage management. WS complies with these laws, and consults and cooperates with other agencies as appropriate.

National Environmental Policy Act

WS prepares analyses of the environmental impacts of program activities to meet procedural requirements of this law. This EA meets the NEPA requirement for the proposed action in Alabama. When WS operational assistance is requested by another Federal agency, NEPA compliance is the responsibility of the other Federal agency. However, WS could agree to complete NEPA documentation at the request of the other Federal agency.

Endangered Species Act

It is Federal policy, under the Endangered Species Act (ESA) that all Federal agencies shall seek to conserve T&E species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)) (Appendices C and D list Federal and State listed T&E species in Ohio). WS conducts Section 7 consultations with the USFWS to use the expertise of the 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)). WS obtained a Biological Opinion (BO) from the USFWS in 1992 describing potential effects on T&E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997a - Appendix F). WS initiated an informal Section 7 consultation with the USFWS for the proposed aquatic rodent damage management program.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) provides the USFWS regulatory authority to protect species of birds that migrate outside the United States. The law prohibits any “take” of the species, except as permitted by the USFWS or by Federal agencies within the scope of their authority.

Clean Water Act (Section 404)

Section 404 (33 U.S.C. 1344) of the Clean Water Act (CWA) prohibits the discharge of dredged or fill material into waters of the U.S. without a permit from the USACE unless the specific activity is exempted in 33CFR 323 or covered by a nationwide permit in 33 CFR 330. The breaching of most beaver dams are covered by these regulations (33 CFR 323 and 330).

Food Security Act

The Wetland Conservation provision (Swampbuster) of the 1985 (16 U.S.C. 3801-3862), 1990 (as amended by PL 101-624), and 1996 (as amended by PL 104-127) farm bills require all agricultural producers to protect wetlands on the farms they own. Wetlands converted to farmland prior to December 23, 1985 are not subject to wetland compliance provisions even if wetland conditions return as a result of lack of maintenance or management. If prior converted crop land is not planted to an agricultural commodity (crops, native and improved pastures, rangeland, tree farms, and livestock production) for more than 5 consecutive years and wetland characteristics return, the crop land is considered abandoned and then becomes a wetland subject to regulations under Swampbuster and Section 404 of the CWA. The Natural Resource Conservation Service is responsible for certifying wetland determinations according to this Act.

Federal Insecticide, Fungicide, and Rodenticide Act

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requires the registration, classification, and regulation of all pesticides used in the United States. The Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods used or recommended by the WS program in Alabama are registered with, and regulated by, the Alabama Department of Agriculture and Industries, Pesticide Management Division and are used by WS in compliance with labeling procedures and requirements.

COMPLIANCE WITH OTHER STATE LAWS

Open Trapping Season on Fur-bearers

220-2-.29 (1) *The open seasons during which fur-bearing animals may be trapped in Alabama during 2001-2002 are fixed by the Commissioner of Conservation and Natural Resources by virtue of the authority contained in the Code of Alabama 1975, Section 9-2-7 and 9-2-8, as follows:*

Bobcat, Spotted Skunk (Civet Cat), Coyote, Fox, Mink, Muskrat, Nutria, Opossum, Otter, Raccoon, and Skunk: ***November 17 - February 20***

Beaver: ***No Closed Season***

Coyote: ***No Closed Trapping Season on Private Lands with Landowner Permission***

Fur-bearing Animals Designated

220-2-.30 *The following shall be named and designated as fur-bearing animals in Alabama:*

Beaver, Bobcat, Civet Cat, Fox, Mink, Muskrat, Nutria, Opossum, Otter, Raccoon, Skunk, and Coyote.

(1) Fur Catchers - no land set leg-hold trap having a jaw width exceeding 6 inches, leg-hold trap having teeth or serrated edges along the inside of one or both jaws, conibear trap or killer type trap with jaw width exceeding 5 inches or snares (except powered foot snare with a maximum loop of 5 ½ inches) can be used to trap fur-bearing animals on land. Any person trapping fur-bearing animals in the State of Alabama must carry with him a choke stick while running traps. When legally trapped fur-bearing animals are dispatched with a firearm, only standard .22 caliber rimfire firearms may be used.

APPENDIX C: CRITERIA FOR BEAVER DAM BREACHING/REMOVAL

Beaver dam breaching is generally conducted to maintain existing stream channels and drainage patterns, and reduce flood waters. Beaver dams are made from natural debris such as logs, sticks, and mud that beaver take from the area. It is this portion that is dislodged during a beaver dam breaching operation. The impoundments that WS removes are normally from recent beaver activity and have not been in place long enough to take on the qualities of a true wetland (i.e., hydric soils, aquatic vegetation, preexisting function). Beaver dam breaching by hand or with binary explosives does not affect the substrate or the natural course of the stream and returns the area back to its pre-existing condition with similar flows and circulations. Because beaver dams involve waters of the United States, dam breaching is regulated under Section 404 of the Clean Water Act (CWA).

Wetlands are recognized by three characteristics: hydric soils, hydrophytic vegetation, and general hydrology. Hydric soils are either composed of, or have a thick surface layer of, decomposed plant materials (a.k.a., muck); sandy soils have dark stains or streaks from organic material in the upper layer where plant material has attached to soil particles. In addition, hydric soils may be bluish gray or gray below the surface or brownish black to black and have a sulfur smell. Wetlands also have hydrophytic vegetation present such as cattails, bulrushes, willows, sedges, and water plantains. The final indicator is general hydrology which includes standing and flowing water or waterlogged soils during the growing season; high water marks are present on trees and drift lines of small piles of debris are usually present. Beaver dams usually will develop a layer of organic material at the surface because siltation can rapidly occur, but aquatic vegetation and high water marks (a new high water mark is created by the beaver dam) are usually not present. However, cattails and willows can show up rapidly if they are in the vicinity, but most hydrophytic vegetation takes time to establish.

In most beaver dam breaching operations, the material that is displaced is exempt from permitting or included in a Nationwide Permit (NWP) in accordance with Section 404 of the CWA (33 CFR Part 323). A permit would be required if the impoundment caused by a beaver dam was not covered under a NWP or permitting exemption and was considered a true wetland. WS personnel survey the beaver dam site and impoundment and determine whether existing conditions suggest that the area may be a wetland as defined above. If such conditions exist, the landowner is asked the age of the dam or how long he/she has known of its presence to determine whether Swampbuster, Section 404 permit exemptions or NWP's allow breaching of the dam. If not, the landowner is required to obtain a Section 404 permit before the dam could be removed by WS personnel.

The following explains Section 404 exemptions and conditions that pertain to the breaching of beaver dams.

33 CFR 323 - Permits For Discharges of Dredged or Fill Material into Waters of the United States. This regulation provides guidance to determine whether certain activities require permits under Section 404.

> **Part 323.4 - Discharges not requiring permits.** This section establishes exemptions for discharging certain types of fill into waters of the United States without a permit. Certain minor drainage activities connected with normal farming, ranching, and silviculture activities where they have been established do not require a permit as long as these drainages do not include the immediate or gradual conversion of a wetland (i.e., beaver ponds greater than 5 years old) to a non-wetland. Specifically, part (a)(1)(iii)(C)(i) states, "*...fill material incidental to connecting upland drainage facilities* (e.g., drainage ditches) *to waters of the United States, adequate to effect the removal of excess soil moisture from upland crop lands...*". This indicates that beaver dams that block ditches, canals, or other structures designed to drain water from upland crop fields can be breached without a permit.
>
> Moreover, (a)(1)(iii)(C)(iv) states the following types of activities do not require a permit: "*The discharges of dredged or fill materials incidental to the emergency removal of sandbars, gravel bars, or other similar blockages which are formed during flood flows or other events, where such blockages close or constrict previously existing drainageways and, if not promptly removed, would result in damage to or loss of existing crops or would impair or prevent the plowing, seeding, harvesting or cultivating of crops*

on land in established use for crop production. Such removal does not include enlarging or extending the dimensions of, or changing the bottom elevations of, the affected drainageway as it existed prior to the formation of the blockage. Removal must be accomplished within one year of discovery of such blockages in order to be eligible for exemption."; this allows the breaching of beaver dams in natural streams to restore drainage of agricultural lands within one year of discovery.

Part 323.4 (a) (2) allows "*Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs in order to qualify for this exemption.*" This allows beaver dams to be breached without a permit where they have resulted in damage to roads, culverts, bridges, or levees if it is done in a reasonable amount of time.

33 CFR 330 - Nationwide Permit (NWP) Program. The USACE, Chief of Engineers is authorized to grant certain dredge and fill activities on a nationwide basis if they have minimal impact on the environment. The NWP's are listed in Appendix A of 33 CFR 330 and permittees must satisfy all terms and conditions established to qualify for their use. Individual beaver dam breaching by WS may be covered by any of the following NWP's if not already exempted from permit requirements by the regulations discussed above. WS complies with all conditions and restrictions placed on NWP's for any instance of beaver dam breaching done under a specific NWP.

Nationwide permits can be used **except** in any component of the National Wild and Scenic River System such as waterways listed as an "*Outstanding Water Resource*", or any water body which is part of an area designated for *"Recreational or Ecological Significance"*.

NWP 3 authorizes the rehabilitation of those structures, such as culverts, homes, and bridges, destroyed by floods and "discrete events," such as beaver dams, provided that the activity is commenced within 2 years of the date when the beaver dam was established.

NWP 18 allows minor discharges of dredged and fill material, including the breaching of beaver dams, into all waters of the United States provided that the quantity of discharge and the volume of excavated area does not exceed 10 cubic yards below the plane of the ordinary high water mark (this is normally well below the level of the beaver dam) or is in a "special aquatic site" (wetlands, mudflats, vegetated shallows, riffle and pool complexes, sanctuaries, and refuges). The District Engineer must be "notified" (general conditions for notification apply), if the discharge is between 10-25 cubic yards for a single project or the project is in a special aquatic site and less than $^{1}/_{10}$ of an acre is expected to be lost. If the values are greater than those given, a permit is required. Beaver dams rarely would exceed 2 or 3 cubic yards of backfill into the waters and probably no more than 5 cubic yards would ever be exceeded. Therefore, this stipulation is not restrictive. Beaver dams periodically may be breached in a special aquatic area, but normally the aquatic site will be returned to normal conditions. However, if a true wetland exists, and beaver dam breaching is not allowed under another permit, then a permit must be obtained from the District Engineer.

NWP 27 provides for the discharge of dredge and fill for activities associated with the restoration of wetland and riparian areas with certain restrictions. On non-Federal public and private lands, the owner must have: a binding agreement with USFWS or USDA, Natural Resource & Conservation Service (NRCS) to conduct restoration; a voluntary wetland restoration project documented by NRCS; or notify the District Engineer according to "notification" procedures. On Federal lands, including USACE and USFWS, wetland restoration can take place without any contract or notification. This NWP "*...applies to restoration projects that serve the purpose of restoring "natural" wetland hydrology, vegetation, and function to altered and degraded non-tidal wetlands and "natural" functions of riparian areas. This NWP does not authorize the conversion of natural wetlands to another aquatic use...*" If operating under

this permit, the breaching of a beaver dam would be allowed as long as it was not a true wetland (i.e., 5 or more years old), and for non-Federal public and private lands the appropriate agreement, project documentation, or notification is in place.

A quick response without delays resulting from permitting requirements can be critical to the success of minimizing or preventing damage. Exemptions contained in the above regulations or NWP's provide for the breaching of the majority of beaver dams that the Alabama WS program encounters. The primary determination that must be made by WS personnel is whether a beaver impounded area has become a true wetland or is just a flooded area. The flexibility allowed by these exemptions and NWP's is important for the efficient and effective resolution of many beaver damage problems because damage escalates rapidly in many cases the longer an area remains flooded.

APPENDIX D: METHODS USED OR RECOMMENDED BY ALABAMA WS FOR BEAVER, NUTRIA, AND MUSKRAT DAMAGE MANAGEMENT

Resource owners and government agencies have used a variety of techniques to reduce beaver, nutria, and muskrat damage. However, all lethal and non-lethal methods developed to date have limitations based on costs, logistics, or effectiveness. Below is a discussion of beaver, nutria, and muskrat damage management methods currently available to the Alabama WS Program. If other methods are proven effective and legal to use in Alabama, they could be incorporated into the Alabama WS program, based upon NEPA compliance.

NON-LETHAL DAMAGE MANAGEMENT METHODS:

Habitat Management for the reduction of beaver, nutria, and muskrat damage refers to vegetation manipulation to reduce the carrying capacity for beaver, nutria, and muskrats in an area.

Beaver - Habitat alteration through forest type conversion might be the most effective long-term method of reducing beaver density in some areas (Payne 1989). Forest management practices that discourage the establishment of willow, sweet gum and conifers and promote long-lived hardwoods within 200 - 400 feet of streams may reduce beaver populations on those streams. Payne (1989) suggested that reduced food availability might force beaver colonies to move more often, however, this movement could increase nuisance complaints. This type of management practice would be conducted by entities other than WS.

Physical factors may have a greater impact on beaver habitat use than food availability, and habitat alteration may have little effect on beaver populations (Beier and Barrett 1987). Habitat management to reduce or stabilize beaver populations has been a component of beaver management recommendations. Habitat management may also involve manipulating beaver impoundment water levels to reduce damage or conflict caused by flooding. Impoundments can be completely drained by breaching major dams by hand or with explosives. Water levels may sometimes also be lowered by use of a drain tube or leveler placed in the dam (Laramie and Knowles 1985, Lisle 1996, Miller and Yarrow 1994, Roblee 1983, Roblee 1984, Roblee 1987) (Figure D-1). However, application of this strategy has been limited. Habitat management to reduce beaver populations has the greatest potential for application on Federal, state, and county forest lands. At present, there appears to be no large-scale and consistent programs dealing with this beaver damage management strategy.

Continual breaching of dams and removal of dam construction materials on a daily basis sometimes will cause beaver to move to other locations. Water control devices such as the three-log drain (Roblee 1983), the T-culvert guard (Roblee 1987), wire mesh culvert (Roblee 1983), and the Clemson beaver pond leveler (Miller and Yarrow 1994) can sometimes be used to regulate water levels in beaver ponds. Additionally, the Beaver Deceiver is a water control system that attempts to quiet, calm, and deepen the water in front of culverts (to reduce the attractiveness to beaver) and exclude beaver from a wide area around the upstream opening of the culvert (Lisle 1996). However, the effectiveness of this method has not been evaluated in published documents.

Nutria - Land that is well drained and free of dense, weedy vegetation is generally unattractive to nutria. Use of other “good farming practices”, such as precision land leveling and weed management, can minimize nutria damage in agriculture areas. Any drainage that holds water can be used by nutria as a travel route or home site. On poorly drained soils, contour small ditches to eliminate low spots and sills and enhance rapid drainage. Grading and bulldozing can destroy active burrows in the banks of steep sided ditches and waterways. In addition, contour bank slopes less than 45° to discourage new burrowing. Eliminate brush, trees, thickets, and weeds from fence lines and turn rows that are adjacent to ditches, drainages, waterways and other wetlands to discourage nutria. Burn or remove cleared vegetation from the site. Brush piles left on the ground or in low spots can become ideal summer homes for nutria. This type of management practice would be conducted by entities other than WS.

Muskrat - The best ways to reduce habitat for muskrats are to eliminate aquatic or other suitable foods eaten by muskrats, and where possible, to construct pond dams to prevent muskrats from burrowing into the dams by drawing the water down in winter and filling the burrows with rip-rap. Habitat alterations to reduce cattail wetlands may also reduce the density of muskrats. This type of management practice would be conducted by entities other than WS.

Explosives are defined as any chemical mixture or device which serves as blasting agents and detonators, and these are generally used to breach beaver dams after beaver have been removed from a damage situation. The binary explosives consist of ammonium nitrate and nitromethane, and are not classified as explosives until they are mixed, therefore, are subject to fewer regulations and controls. However, once mixed, binary explosives are considered high explosives and subject to all applicable Federal requirements. Detonating cord and blasting caps are considered explosives and WS must adhere to all applicable state and Federal regulations for storage and handling. All WS explosive specialists are required to attend 30 hours of extensive explosive safety training and spend time with a certified explosive specialist in the field prior to obtaining certification. All blasting activities are conducted by well trained, certified blasters and closely supervised by professional wildlife biologists. Explosive handling and use procedures follow the rules and guidelines set forth by the Institute of Makers of Explosives, the safety arm of the commercial explosive industry in the United States and Canada. WS also adheres to transportation and storage regulations from state and Federal agencies such as OSHA, ATF, and the ALDOT and USDOT.

Beaver Dam Breaching involves the removal of debris deposited by beaver that impedes the flow of water and is generally conducted to maintain existing stream channels and drainage patterns, and reduce flood waters that have affected established silviculture, agriculture, and ranching/farming activities or drainage structures such as culverts. The impoundments that WS removes are normally from recent beaver activity that have not had enough time to take on the qualities of a true wetland (i.e., hydric soils, aquatic vegetation, preexisting function). Unwanted beaver dams can be removed by hand or with explosives. Explosives are used only by WS personnel specially trained and certified to conduct such activities, and only binary explosives are used (i.e., they are comprised of two parts that must be mixed at the site before they can be detonated as an explosive material). Because beaver dams involve waters of the United States, removal is regulated under Section 404 of the CWA.

Beaver dam breaching does not affect the substrate or the natural course of the stream and returns the area back to its preexisting condition with similar flows and circulations. Most beaver dam breaching operations, if considered discharge, are covered under 33 CFR 323 or 330. A permit would be required if the beaver dam breaching activity is not covered by a permitting exemption or NWP and the area affected by the beaver dam was considered a true wetland. WS personnel survey the site and determine the apparent age of the dam by conditions such as aquatic plants. If the area is over 5 years old or appears to be a wetland, the landowner is required to obtain a Section 404 permit before proceeding (See Appendix C for information that explains Section 404 exemptions, NWP's and conditions for breaching beaver dams).

Water control devices (pond levelers) have been used for many years in many different states, with varying degrees of success (Figure D-1). Various types of beaver pond levelers have been described (Arner 1964, Laramie and Knowles 1985, Lisle 1996, Roblee 1984) and installation of beaver pond levelers can be effective in reducing flooding in certain situations (Minn. Dept. Nat. Res. 1994, Miller and Yarrow 1994) if properly maintained. Water control devices generally are of two designs. One design is a perforated pipe passing through the beaver dam (Figure D-1) and the second design is a fence erected 15 - 90 feet in front of the culvert to prevent the beaver from blocking the culvert with debris (Lisle 1996, E. Butler, USDA/APHIS/WS, Augusta, Maine, personal communication). The second design may have a perforated pipe going from the fence to the culvert to allow water to flow since the fence may become clogged with debris.

The Beaver Deceiver is a water-level management device that attempts to prevent beaver from damming by eliminating environmental cues that stimulate damming at culverts and by making culverts less favorable as dam

sites. This is accomplished by quieting, calming, and deepening the water in front of culverts and constructing an odd shaped fence that both excludes beaver from a large area around the upstream opening of the culvert and confuses them so that they do not construct a dam against the fence. The Beaver Deceiver has been developing since 1996 and has been effective at controlling beaver flooding in some situations (Lisle 1996).

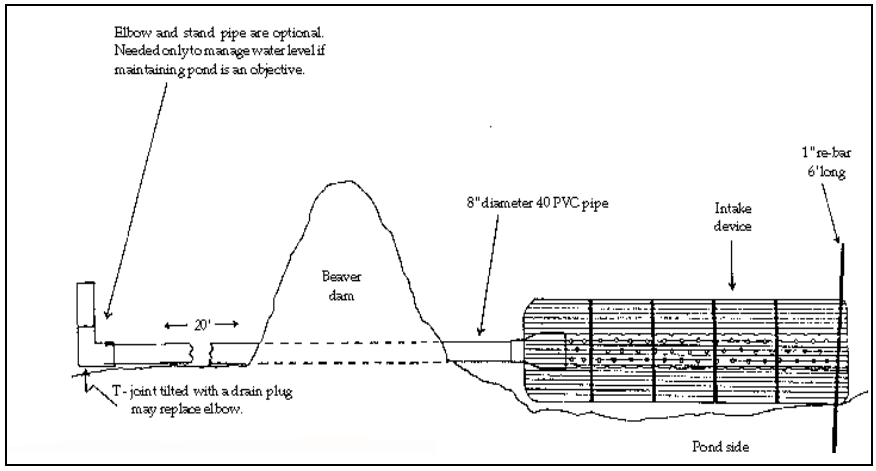

Figure D-1. Pond leveler for control of water levels where beaver activity is present.

The cost of water control devices is variable, depending on number of devices per dam, type of device, materials used, and labor. Dams may need multiple devices to accommodate the volume of water in the flowage. Materials and installation of water control devices can be relatively modest for a three-log drain (Arner 1964), $500 - $750 for a single modified Clemson leveler (B. Sloan, USDA/APHIS/WS, Stoneville, Mississippi, personal communication), $1050 - $2,300 for a single beaver stop (DCP Consulting, Calgary, Canada, 1996), or over $1,000 for a beaver deceiver. A modified Beaver Deceiver can be constructed for $250 -$300, however, annual maintenance costs were estimated at $350 (E. Butler, USDA/APHIS/WS, Augusta, Maine, personal communication).

The use of pond levelers or water control devices may require frequent maintenance, depending on the type of water control device used. Continued maintenance is necessary for the device to remain operational because stream flow, leaf fall, floods, and beaver activity will continuously bring debris to the water control device. This maintenance of water control devices can be expensive. There may be annual costs to suppress or eradicate beaver populations to keep the devices operational (Nolte et al. 2001).

Nolte et al. (2001) found that pond levelers placed in sites with high beaver activity without implementing local population control measures frequently failed. Ninety-five percent of the successful levelers in this study were at sites that had received some local population control measure either before, after, or before and after the leveler was installed (Nolte et al. 2001). Wood et al. (1994) also acknowledged that pond levelers do not negate the need for reduction of local beaver populations. Beaver may block the device or may build additional dams upstream or downstream, inhibiting the success or function of the device.

Water control devices are most effective on wetlands lacking in-stream flow (Nolte et al. 2001), but may be ineffective in beaver ponds in broad, low-lying areas (Organ et al. 1996). They may not be appropriate in streams or ditches with continuous flow because the volume of water is too great for the device to handle and debris is continuously carried to the site. Also, water control devices may not be effective during periods of unusually high rainfall or increased water flow because the device cannot handle the increased volume of water (Anonymous 1999; Wood et al. 1994).

One benefit of water control devices is that the beaver pond or wetland area can be maintained or improved, along with the ecological and recreational benefits derived from these areas (see Chapter 1, pages 3&4, of the EA), while the damage from beaver flooding is alleviated or at least reduced. However, water control devices are not applicable or efficient in all damage situations. Landowners consider many factors in determining the course of action to resolve beaver damage problems. For example, landowners must consider the cost of control, the probability that the method will resolve the problem, the amount of maintenance required, and whether the method is consistent with objectives for the property (Nolte et al. 2001).

If a water control device (fence or pipe system) is consistent with the landowners objectives, will alleviate the damage, and if funding is available for installation, then WS would use or recommend their use. WS would also provide technical assistance to landowners who want to install these devices on their own.

Exclusion involves physically preventing beaver, nutria and muskrats from gaining access to protected resources through fencing or other barriers. Fencing of small critical areas such as around culverts and drain pipes can sometimes prevent beaver from plugging them or it is used in situations where girdling or gnawing of trees or shrubs is a concern. In these situations hardware cloth, flashing, grit paint (D. Nolte, USDA/APHIS/WS/National Wildlife Research Center [NWRC], unpublished data) or chain links are wrapped around the plants to be protected. Recent preliminary tests by NWRC suggest that sand mixed in paint may be an effective barrier against beaver gnawing and cutting of trees or other objects (D. Nolte, USDA/APHIS/WS/NWRC, unpublished data). Exclusion has also been used to prevent beaver from plugging road culverts when a metal screen, grate, or fencing is secured in front of the opening. Construction of concrete spillways may reduce or prevent damage to dams from burrowing. Rip-rap can also be used on dams or levees at times, especially to deter burrowing. Electrical barriers have proven effective in limited situations for mammals and birds; an electrical field through the water in a ditch or other narrow channel, or hot-wire suspended just above the water level in areas protected from public access, have been effective at keeping mammals and birds out. The effectiveness of an electrical barrier is extended when used in conjunction with an odor or taste cue that is emitted because beaver will avoid the area even if the electrical field is discontinued (Kolz and Johnson 1997).

Protecting ornamental or landscape trees from beaver, nutria and muskrat damage by using hardware cloth, similar screening, grit paint or chain link fencing is frequently recommended by WS. This method is used most frequently by property and home owners. It is rarely, if ever, used to prevent large-scale timber or forest damage due to the high material cost and labor required to wrap hundreds or thousands of trees in a managed forest. A variety of road culvert screens or fences have been used by county and local highway departments. In most cases the screens do not solve a damage problem, as workforce is still required to remove beaver dam materials from the screen or fence itself. The main benefit of this technique is to prevent beaver dam materials from being deposited inside the culvert.

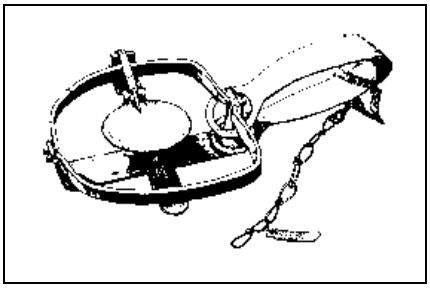

Figure D-2. Single long-spring foothold trap.

Foothold traps can be effectively used to capture a variety of mammals (Figure D-2). Foothold traps are either placed beside, or in some situations, in travel ways being actively used by the target species. Placement of traps is contingent upon the habits of the respective target species, habitat conditions, and presence of non-target animals. Effective trap placement and adjustment and the use and placement of appropriate baits and lures by trained WS personnel also contributes to the foothold trap's selectivity. An additional advantage is that foothold traps can allow for the on-site release of non-target animals. The use of foothold traps requires more skill than some methods, but they are indispensable in resolving many damage problems. Beaver, nutria, or muskrat live-captured in foothold traps would be humanely euthanized by WS personnel.

Snares are capture devices comprised of a cable formed in a loop with a locking device and placed in travel ways. Most snares are also equipped with a swivel to minimize cable twisting and breakage. Snares are also easier than foothold traps to keep operational during periods of inclement weather. Snares set to catch an animal around the body or foot are usually a live-capture method. Beaver, nutria, and muskrats captured in snares would be humanely euthanized by WS personnel.

Hancock/Bailey traps (suitcase/basket type cage traps) are designed to live-capture beaver. The trap is constructed of a metal frame that is hinged with springs attached and covered with chain-link fence. The trap's appearance is similar to a large clam when closed. When set, the trap is opened to allow an animal to enter the *clam shells*, when tripped the *clam shells* close around the animal. One advantage of using the Hancock or Bailey

trap is the ease of release of beaver or non-target animals. Beaver caught in Hancock or Bailey traps could also be humanely euthanized. Disadvantages are that these traps are very expensive (> $300 per trap), cumbersome, and difficult to set (Miller and Yarrow 1994). The trap weighs about 25 pounds and is relatively bulky to carry and maneuver. Hancock and Bailey traps can also be dangerous to set (i.e., hardhats are recommended when setting suitcase traps), are less cost and time-efficient than snares, footholds, or body-grip traps, and may cause serious and debilitating injury to river otters (Blundell et al. 1999). Beaver captured in Hancock traps would be humanely euthanized by WS personnel.

LETHAL DAMAGE MANAGEMENT METHODS

These methods involve damage management specifically designed to remove beaver, nutria, and muskrat in certain situations to a level that stabilizes, reduces, or eliminates damage. The level of removal necessary to achieve a reduction of beaver, nutria, and muskrat damage varies according to the resource protected, habitat, population, the effectiveness of other damage management strategies, and other ecological factors. Despite the numerous damage management methods developed, trapping remains the most effective method of removing beaver (Hill 1976, Hill et al. 1977, Wigley 1981, Weaver et al. 1985) nutria, and muskrats from specific damage areas. Intensive trapping can eliminate or greatly reduce the beaver populations in limited areas (Hill 1976, Forbus and Allen 1981). Specific methods of lethal population reduction involve removing beaver with body-grip (e.g., Conibear) and foothold traps, snares, and shooting. Beaver, nutria, and muskrats can also be live-captured with foothold traps, cage-type traps and snares. However, because WS does not relocate beaver, nutria, and muskrat in Alabama, beaver, nutria, and muskrats that are live-captured would subsequently be humanely euthanized. Muskrats and nutria may be removed with body-grip and foothold traps, colony or cage-type traps, shooting, or toxicants. These specific methods are described in USDA (1997a - Appendix J: 9 - 12). A formal risk assessment of all mechanical devices used by the WS program in Alabama can be found in USDA (1997a - Appendix P). These techniques are usually implemented by WS personnel because of the technical training required to use such devices.

Shooting is selective for target species and may involve the use of spotlights and either a shotgun or rifle. Shooting is an effective method to remove a small number of beaver, nutria, or muskrat in damage situations, especially where trapping is not feasible. Removal of specific animals in the problem area can sometimes provide immediate relief from a problem. Shooting is sometimes utilized as one of the first lethal damage management options because it offers the potential of resolving a problem more quickly and selectively than some other methods, but it is not always effective. Shooting may sometimes be one of the only beaver, nutria, or muskrat damage management options available if other factors preclude setting of damage management equipment. WS personnel receive firearms safety training to use firearms that are necessary for performing their duties.

Firearm use is very sensitive and a public concern because of safety issues relating to the public and misuse. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every 3 years afterwards (WS Directive 2.615). WS employees who carry firearms as a condition of employment, are required to certify that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

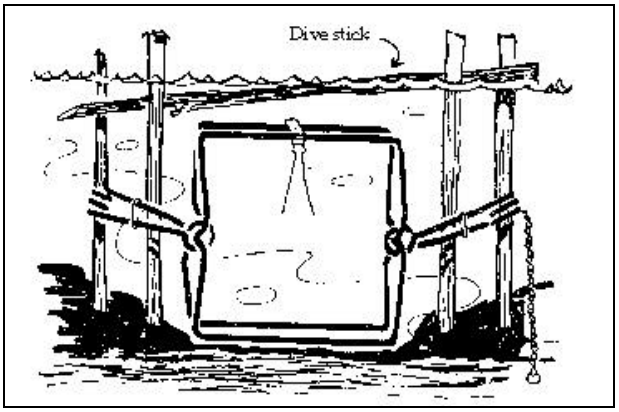

Figure D-3. Body grip trap set for beaver in a dive set.

Body-grip (e.g., Conibear-type) traps are designed to cause the quick death of the animal that activates the trap. The size 330 Conibear trap is generally used for beaver exclusively in aquatic habitats, with placement depths varying from a few inches to several feet below the water

surface (Figure D-3). Smaller Conibear traps, such as those used for muskrats, can be set either in or out of the water (Figure D-4). Placement is in travel ways or at lodge or burrow entrances created or used by the target species with the animal captured as it travels through the trap and activates the triggering mechanism. Safety hazards and risks to humans are usually related to setting, placing, checking, or removing the traps. Body-grip traps present a minor risk to non-target animals because of the placement in aquatic habitats and below the water surface.

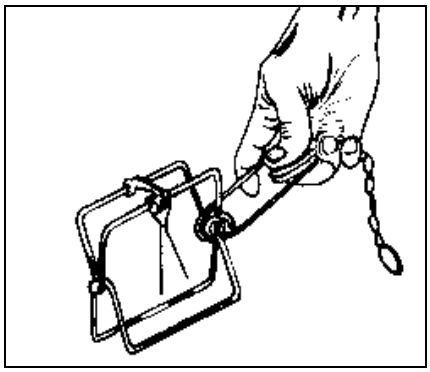

Figure D-4. Body grip trap used for muskrats.

Colony Traps are multi-catch traps used to either live-capture or capture and quickly drown muskrats. There are various types of colony traps. One common type of colony trap consists of a cylindrical tube of wire mesh with a one-way door on each end (Novak 1987b). The traps are set at the entrance to muskrat burrows or placed in muskrat travel lanes. Colony traps are effective and relatively inexpensive and easy to construct (Miller 1994). The stovepipe trap, a common type of colony trap, is usually made with sheet metal and may capture two to four muskrats on the first night (Miller 1994).

CHEMICAL MANAGEMENT METHODS:

All chemicals used by Alabama WS are registered under FIFRA and administered by the EPA and the Alabama Department of Agriculture and Industries. No chemicals are used on public or private lands without authorization from the land management agency or property owner/manager. The chemical methods used and/or currently authorized for use in Alabama are:

Zinc Phosphide is the only toxicant registered in Alabama for use in nutria and muskrat damage management. There currently are no toxicants registered for use on beaver. The use of zinc phosphide on various types of fruit, vegetable or cereal baits (e.g., apples, carrots, sweet potatoes, oats, barley) has proven to be effective at suppressing a local population. All chemicals used by WS are registered under FIFRA and administered by EPA and the Alabama Department of Agriculture and Industries, Plant Protection and Pesticide Management Division. Zinc phosphide is Federally registered by APHIS-WS. Specific bait applications are designed to minimize non-target hazards (Evans 1970). Zinc phosphide presents minimal secondary hazard to predators and scavengers. Zinc phosphide is an emetic, therefore, meat-eating animals such as mink, dogs, cats and raptors regurgitate animals that are killed with zinc phosphide with little or no effect. No T&E species occurring in Alabama would be affected by use of this formulated product (L. Goldman, USFWS). WS personnel that use chemical methods are certified as pesticide applicators by the Alabama Department of Agriculture and Industries, Plant Protection and Pesticide Management Division and are required to adhere to all certification requirements set forth in FIFRA and the Alabama pesticide control laws and regulations. No chemicals are used on Federal or private lands without authorization from the land management agency or property owner/manager. A quantitative risk assessment evaluating potential impacts of WS use of chemical methods when used according to the label concluded that no adverse effects are expected from the above (USDA 1997a - Appendix P).