ENVIRONMENTAL ASSESSMENT

RODENT DAMAGE MANAGEMENT IN IDAHO

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U. S. DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration

July 2003

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SUMMARY OF PROPOSED ACTION

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS) proposes to administer a rodent damage management program in Idaho. An Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce rodent damage to property and agricultural and natural resources, and to safeguard public health and safety. Rodent damage management would be conducted on private and/or public property in Idaho when the resource owners (property owners) or managers request assistance to resolve damage. Some of the types of damage that resource owners seek to alleviate are: flooding of agricultural lands and roads; prevention of road and irrigation impoundment structure damage; rodent consumption of row crops, hay and rangeland; protection of ornamental trees from cutting and gnawing; protection of commercial trees and tree plantations from cutting, gnawing and flooding; and protection of human health and safety. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, other species and the environment. Under this action, WS could provide technical assistance and operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, physical exclusion or habitat modification would be recommended and utilized to reduce rodent damage. In other situations, rodents would be removed as humanely as possible using body-gripping traps (e.g., conibear-type), snares, snap traps, foothold traps, rodenticides, glue boards/trays, shooting and administrating chemical euthanasia. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or there could be instances where application of lethal methods alone would be the most appropriate strategy.

Acronyms

ADC	Animal Damage Control
APHIS	Animal and Plant Health Inspection Service
ATF	Federal Bureau of Alcohol, Tobacco and Firearms
AVMA	American Veterinary Medical Association
BA	Biological Assessment
BE	Biological Evaluatioin
BHM	Idaho Bureau of Hazardous Materials
BLM	Bureau of Land Management
BOR	U. S. Bureau of Reclamation
BO	Biological Opinion
CDC	Centers for Disease Control and Prevention
CDFG	California Department of Fish and Game
CE	Categorical Exclusion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DEA	Drug Enforcement Administration
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FR	Federal Register
FY	Fiscal Year
HPS	Hantavirus Pulmonary Syndrome
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDHW	Idaho Department of Health and Welfare
IDL	Idaho Department of Lands
IDPR	Idaho Department of Parks and Recreation
IDWR	Idaho Department of Water Resources
ISDA	Idaho State Department of Agriculture
ITD	Idaho Transportation Department
IWDM	Integrated Wildlife Damage Management
LMRP	Land and Resource Management Plan
MFP	Management Framework Plan
MIS	Management Information System
MOU	Memorandum (or Memoranda) of Understanding
NEPA	National Environmental Policy Act
NFS	National Forest Service
NHPA	National Historic Preservation Act
NOA	Notice of Availability
NPS	National Park Service
NRCS	Natural Resources Conservation Service
OSHA	Occupational Safety and Health Administration
RMP	Resource Management Plan
SHPO	State Historic Preservation Office
SLN	Special Local Needs
SOP	Standard Operating Procedure
SRBPCA	Snake River Birds of Prey Conservation Area
T/E	Threatened and Endangered Species
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WNV	West Nile Virus
WS	Wildlife Services

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.0 INTRODUCTION

Across the United States, wildlife habitat has been altered as human populations expand and land is used for human needs. Sometimes these human uses and needs compete with wildlife which increase the potential for conflicting human/wildlife interactions. In addition, certain segments of the public strive for protection for all wildlife which, at times, creates localized conflicts between humans and wildlife, thus creating the need for wildlife damage management. The *Animal Damage Control Program Environmental Impact Statement* (EIS) for the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program (USDA 1994) summarizes the relationship in American culture of wildlife values and wildlife damage in this way:

> *"Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife generally is regarded as providing economic, recreational and aesthetic benefits . . . , and the mere knowledge that wildlife exists is a positive benefit to many people. However, . . . the activities of some wildlife may result in economic losses to agriculture and damage to property . . . Sensitivity to varying perspectives and values is required to manage the balance between human and wildlife needs. In addressing conflicts, wildlife managers must consider not only the needs of those directly affected by wildlife damage but a range of environmental, sociocultural, and economic considerations as well."*

Wildlife damage management is the alleviation of damage or other problems caused by or related to the habits of wildlife and is recognized as an integral component of wildlife management (The Wildlife Society 1992). WS uses an Integrated Wildlife Damage Management (IWDM) approach, commonly known as Integrated Pest Management where a combination of methods may be used or recommended to reduce wildlife damage. IWDM is the application of safe and practical methods for the prevention and reduction of damage caused by wildlife based on local problem analysis and the informed judgement of trained personnel. IWDM includes methods such as localized habitat and behavioral modification, or may require that the offending animal(s) be removed or that local populations or groups be reduced through lethal methods. Therefore, wildlife damage management is not based on punishing offending animals but is a means of reducing future damage and implemented using the WS' Decision Model (Slate et al. 1992). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated and the need for rodent damage management is derived from the specific threats to resources.

WS is the Federal agency directed by Congress to conduct wildlife damage management to protect American agricultural, industrial and natural resources, property and human health and safety from damage associated with wildlife (Act of March 2, 1931 as amended 46 Stat. 1486; 7 USC 426-426c). In 1988, Congress passed the Rural Development, Agriculture, and Related Agencies Appropriations Act which strengthened the Act of March 2, 1931 (Public Law 100-202). 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 private and public 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 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."*

In 2001, Congress passed the Fiscal Year (FY) 2001 Agricultural Appropriations Bill, which further amends and strengthens the Act of March 2, 1931 and 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."

WS' mission, developed through its strategic planning process (USDA 2000a), is: 1) *"to provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and 2) to safeguard public health and safety."* WS' Policy Manual[1] reflects this mission and provides guidance for engaging in wildlife damage management through:

- 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;
- Informing and educating the public on how to reduce wildlife damage;
- Providing data and a source for limited-use management materials and equipment, including pesticides (USDA 1989).

WS is a cooperatively-funded, service-oriented program that provides assistance to requesting public and private entities and governmental agencies[2]. Before WS conducts any wildlife damage management, a request must be received and an *Agreement for Control* must be signed by the landowner/administrator for private lands and other comparable documents are in place for public lands. WS responds to requests for assistance when valued resources are damaged, or threatened by wildlife. Responses can be in the form of technical assistance or operational damage management, depending on the complexity of the wildlife problem and the funding that is available. WS activities are conducted in accordance with applicable Federal, State, and local laws; Cooperative Agreements, Agreements for Control, Memoranda (or Memorandum) of Understanding (MOU) and other applicable documents (WS Directive 2.210). These documents establish the need for the requested work, legal authorities allowing the requested work, and the responsibilities of WS and its cooperators.

This Environmental Assessment (EA) documents the analysis of the potential environmental effects of WS' proposed beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), jackrabbit (*Lepus* spp.), marmot (*Marmota* spp.), ground squirrel (*Ammospermophilus leucurus, Spermophilus mollis idahoensis, S. m. mollis, S. m. artemisiae, S. armatus, S. columbianus, S. elegans* and *S. beldingi*), porcupine (*Erethizon dorsatum*), pocket gopher (*Thomomys* spp.), vole (*Microtus, Clethrionomys, Phenacomys* and *Lemmiscus* spp.) and deer mouse (*Peromyscus* spp.) and field mouse damage management program (hereafter referred to as rodent damage management). This analysis relies on existing data contained in published documents and other information (Appendix B), and the USDA, APHIS, WS programmatic EIS (USDA 1994). USDA (1994, Appendix P) contains a detailed discussion and risk assessment of potential environmental affects for the methods that are used for wildlife damage management in Idaho. The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) authorize agencies to eliminate repetitive discussions of issues addressed in USDA (1994) (Code of Federal Regulations (CFR) 1500.4(i), 1502.20); thus, pertinent analyses in USDA (1994) are incorporated by reference by integrating relevant discussions and analysis. USDA (1994) may be obtained by contacting the USDA, APHIS, WS Operational Support Staff at 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

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

[2]The State of Idaho has the primary responsibility for wildlife management and could conduct wildlife management related activities without WS assistance (Idaho Code §§ 25-2601, §§25-2603, §§25-2604, §§25-2606, §§25-2612A). This rodent damage management effort would be facilitated by WS providing assistance to ensure more timely response to damaging rodents and complaints.

1.1 SCOPE AND PURPOSE OF THIS EA

The scope and purpose of this EA is to evaluate the potential impacts from WS rodent damage management to protect agricultural and natural resources, property, and public health and safety in Idaho. Damage problems can occur throughout the State, resulting in requests for WS assistance. Under the Proposed Alternative, rodent damage management could be conducted on private, Federal, State, Tribal, County, and municipal lands in Idaho. Idaho encompasses about 53.5 million acres; during FY02 (October 1, 2001 to September 30, 2002) WS had 291 *Agreements for Control* to conduct rodent damage management on 452,483 acres. However, Idaho WS generally only conducts rodent damage management on a small portion of the properties under Agreement in any one year. In FY02, 219 rodent damage management actions were conducted on properties containing an area of about 46,673 acres or about 10% of the area under written Agreement and about 0.09% of the land area of Idaho (Management Information System (MIS) 2002).

Normally, according to the APHIS procedures implementing NEPA, individual wildlife damage management actions considered in this analysis could each be afforded a Categorical Exclusion (CE) (7 CFR §372.5(c), 60 Federal Register (FR) 6,000, 6,003). To evaluate and determine if any potentially significant or cumulative impacts from WS' current and planned damage management program occur, this EA has been prepared to facilitate planning, interagency coordination, streamlining program management, and to clearly communicate to the public the analysis of cumulative affects of the alternatives. All WS, wildlife damage management that would take place in Idaho would be undertaken according to relevant laws, regulations, policies, orders and procedures, including the Endangered Species Act (ESA). Notice of the availability of this document will be published in newspapers, consistent with the agency's NEPA procedures.

1.2 RODENT DAMAGE AND EFFECTS TO THE ENVIRONMENT AND RESOURCES

1.2.1 Beaver. Beaver (Figure 1-1) are widely distributed and a part of the wildlife heritage in the United States and Idaho. Populations historically were kept under control by subsistence and commercial hunting and trapping (Hill 1976, Woodward 1983, Novak 1987). It is difficult to place a dollar value on beaver activities because they can be beneficial or detrimental depending on the type of activity and location. 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. Some of these benefits are hunting and trapping, water source for livestock, and the value of beaver ponds in the natural environment. Habitat modification by beaver, primarily dam building and tree cutting, can sometimes benefit wildlife (Jenkins and Busher 1979, Medin and Clary 1990, 1991), however, it can also destroy other habitat types (e.g., free-flowing water, riparian areas, and bird roosting and nesting areas) which are important to many species. Beaver cut large trees along rivers, lakes and reservoirs that are used as roosting/nesting trees by bald eagles (*Haliaeetus leucocephalus*) or other bird species.

Figure 1-1. Beaver.

Beaver probably once occupied stream valleys and other suitable habitat in Idaho at a maximum carrying capacity prior to European settlement. Population fluctuations of beaver in the pre-European era were determined by plant succession and its influence on the amount and quality of habitat. Between 1800 and 1850, the major explorations beyond civilization were made solely for the purpose of discovering new beaver trapping areas. About midway through this 50 year period, the steel trap was invented enabling the trapper to operate with much greater efficiency than had been possible before and fur trapping was at its peak (Seton 1937). The low point of beaver populations was reached between 1890 and 1900 (Seton 1937). As a result of this decline, most western States gave complete protection to beaver. By the time trapping seasons were reopened, not only were beaver trappers scarce, but demands for short-haired fur

were low. Consequently, little beaver trapping was done. The absence of an adequate beaver harvest in conjunction with insignificant non-human predation and an abundance of suitable habitat resulted in beaver populations dramatically increasing, reaching levels where the animals were considered pests (Woodward 1983). 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 United States. A Beaver Cooperative Association formed in Mississippi in 1977 showed promise for reducing beaver damage in the southeast by increasing the marketability of beaver pelts, but eventually failed due to low pelt values on international markets (Woodward 1983). In addition, a cooperative program between various agencies in North Carolina attempted to reduce beaver damage by allowing trappers to harvest more valuable furs (Woodward 1983). This program also showed promise but failed due to the decline in the fur markets in the early 1980's. Currently, WS in Mississippi and North Carolina have cooperative beaver damage management programs that include State highway officials, soil and water conservation districts, municipalities, and private landholders.

Benefits of Beaver Activities. Although beaver may cause extensive damage, there are also benefits associated with their activities depending on the type of activities and location. Beaver ponds create valuable wetland habitat that provides habitat for many species of fish and wildlife (Arner and Hepp 1989, Hill 1982, Novak 1987). 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). According to the U. S. Environmental Protection Agency (EPA), wetlands can provide aesthetic and recreational opportunities for wildlife observation, nature study, hunting, fishing, trapping, wildlife photography, livestock water, and environmental education and added an estimated $59.5 million to the national economy in 1991 (EPA 1995, Woodward 1983, Wade and Ramsey 1986). 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 soils (Hill 1982). Silt-laden waters, particularly carrying eroded soils from cultivated, logged, excessively grazed, farmed, mountainous, or developed areas, slow as they pass through a series of beaver ponds and the heavier particles and colloidals are able to settle out before the water flows into larger streams (Hill 1982). Aquatic and early successional plant species may become established in the newly deposited sediment, allowing conditions to become favorable for the stabilization of the flood plain by more permanent woody vegetation (Hill 1982). The Minnesota Department of Natural Resources has computed a cost of $300 to replace, on average, each acre-foot of flood water storage that wetlands can provide (EPA 1995). Producing wetlands/marsh habitat through beaver management in New York was far less costly than developing either small or large manmade marshes, assuming the quality is equal in each case (Ermer 1984).

Beaver ponds may also improve soil quality and provide improved habitat for some fish and invertebrates. The anaerobic conditions caused by beaver impoundments may result in the accumulation of ammonium, so that soil storage of inorganic nitrogen is nearly tripled by beaver impoundments during a 50 year period (Johnston 1994). Arner et al. (1969) found that the bottom soils of beaver ponds in Mississippi were generally higher in phosphate, potash and organic matter than the bottom soils of feeder streams. Greater biomass of invertebrates and healthier fish were also found in beaver ponds than in feeder streams (Arner and DuBose 1982).

Habitat modification by beaver, primarily dam building and tree cutting, can benefit many species of wildlife (Jenkins and Busher 1979, Arner and DuBose 1982, Arner and Hepp 1989, Hill 1982, Medin and Clary 1990, 1991). 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 some 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). When

the ponds are abandoned, they progress through successional stages which improve feeding conditions for deer, swamp rabbits (*Sylvilagus aquaticus*), and woodcock (*Philoela minor*) (Arner and DuBose 1982). In addition, beaver ponds may be beneficial to threatened and endangered (T/E) species because the United States Fish and Wildlife Service (USFWS) estimates that up to 43% of the T/E species rely directly or indirectly on wetlands for their survival (EPA 1995).

Waterfowl use beaver pond wetland habitats extensively (Arner and Hepp 1989, Speake 1955, Arner 1964, Novak 1987, Hill 1982). In particular, wood ducks (*Aix sponsa*), mallards (*Anas platyrhynchos*), black ducks (*Anas rubripes*), and other dabblers benefit from the increased interspersion of cover and food found in flooded beaver ponds (Novak 1987, Arner and Hepp 1989). Also, the attraction of a beaver pond to waterfowl varies with age and vegetation (Arner and DuBose 1982). In Mississippi, beaver ponds more than 3 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). However, 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 1987).

Harm Caused by Beaver Activity. Patterson (1951) and Avery (1992) reported that the presence of beaver dams can negatively affect fisheries. Beaver dams adversely affect stream ecosystems by increasing sedimentation in streams affecting wildlife that depend on clear water such as certain species of fish and mussels.

Increased soil moisture both within and surrounding beaver flooded areas can also result in reduced timber growth and mast production and a decrease in bank stabilization. These habitat modifications can also conflict with human land or resource management objectives and can oppress some plants and animals, including T/E species. Such conflicts, which are viewed as *"damage,"* result in adverse affects that often outweigh benefits (Miller and Yarrow 1994).

Most of the damage caused by beaver is a result of dam building, bank burrowing, tree cutting, obstructing water overflow structures and spillways or flooding, and identifying beaver damage generally is not difficult. Some cases of beaver damage include flooding of State highways and other roads, reservoir dams damaged by bank den burrows, and train derailments caused by continued flooding and burrowing (Miller and Yarrow 1994). Housing developments have been threatened by beaver dam flooding, and thousands of acres of cropland and young timber plantations have been flooded by beaver dams. Road ditches, drain pipes and culverts have been plugged-up so badly that they had to be dynamited out or culverts replaced. Some bridges have been destroyed because of beaver dam-building activity. Miller (1983) estimated that the annual damage in the United States was $75-$100 million. The value of beaver damage is perhaps greater than that of any other single wildlife species in the United States -- economic damage was estimated to have exceeded $4 billion in the southeastern United States over a 40-year period (Arner and Dubose 1982). To complicate the problem of beaver damage, beaver only have a few natural predators aside from humans, including coyotes, bobcats, river otters, and mink, who prey on young beaver (Miller and Yarrow 1994). In other areas, bears, mountain lions, wolves and wolverines occasionally feed on beavers.

Beaver damage reported to WS in Idaho has primarily come from the southern half of the State. An Eagle, Idaho resident requested assistance from WS after beavers had cut down several expensive ornamental trees in his yard. Damage was assessed at $1,500. An [redacted]stimated that beavers caused $8,000 in damages to trees that he planted near an irrigation ditch for soil and wind erosion control and $2,000 to irrigation structures. Beaver damming activity can also result in damage to residential buildings. In 2000, a Boise, Idaho resident reported to WS that beavers had dammed a small stream near his house, which flooded his property. The resident estimated that damages to his pump house and a storage shed and contents was more than $5,000. When beavers plug highway or road culverts, damage from flooding can be extensive, and standing water can be hazardous to motor vehicles. In Bonner County,

beavers routinely plug drainage culverts that underpass highways and County roads. In July and September, 2000, Bonner County Highway Department reported that beavers caused estimated damages of $2,500 to 2 roads. The U. S. Bureau of Reclamation (BOR) in Minidoka County reported in December, 2001 that beavers constructed a dam that flooded a newly completed road and caused $5,000 in estimated damages. However, the majority of beaver damage complaints come from farmers and ranchers where beaver plug irrigation ditches, resulting in flooding to crops, hay fields and pastures. A [redacted] rancher reported damages of $1,000 to his pasture after beavers constructed 5 dams on a small creek that ran through his property and an alfalfa farmer from [redacted] estimated damages of $2,000 to his hay crop after a beaver dammed an irrigation ditch. During FY00 through FY02, beaver were responsible for $77,379 of damage reported to WS. This represents only a small portion of the actual beaver damage that is believed to occur, because most complaints of beaver damage are probably reported to Idaho Department of Fish and Game (IDFG) (MIS 2000, 2001, 2002)(Table 1-1 and Table 1-2).

Table 1-1. Agricultural and Natural Resources Damage (MIS 2000, 2001,2002)[1].

FY	Species	Number of Incidents	Timber[2] ($)	Field Crops[3] ($)	Range/Pasture ($)
00	Beavers	10	900	3,350	500
	Ground squirrels	1			100
	Yellow-bellied marmots	14	100	6,900	300
	Porcupines	4	1,200		
	Fox squirrels	1		100	
01	Beavers	8	1,950	1,200	500
	Ground squirrels	5		500	210
	Yellow-bellied marmots	19		2,800	2,150
	Pocket gophers	2	100		100
02	Beavers	8	8,100	500	250
	Ground squirrels	3		100	1,000
	Yellow-bellied marmots	14		9,600	1,650
	Pocket gophers	2		100	100
	Voles	1			500

[1]These losses represent only a portion of the total losses and serve more as an indicator of the existence of these types of damage rather than an indicator of the total magnitude of the damage.
[2] Commercial forestry.
[3] Includes grain, hay and row crops in the field, and stored livestock grains, ration and hay.

1.2.2 Muskrat. Muskrat (Figure 1-2) damage is usually not a major problem, but can be significant locally in particular situations (Wade and Ramsey 1986). Damage caused by muskrats is primarily due to their burrowing (Miller 1994), which may not be evident until serious damage has already occurred. One way to observe early burrowing in ponds or reservoirs is to walk along the edge of the shore-line when the water is clear and look for "runs" or trails. The types of damage for which assistance could be requested include burrowing in dams or banks. The burrows can cause washouts which result in loss of irrigation water or flooding 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).

Figure 1-2. Muskrat.

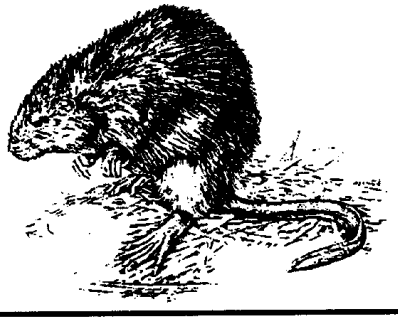


Table 1-2. Property Damage (MIS 2000, 2001, 2002)[1].

FY	Species	Number of Incidents	Landscaping[2] ($)	Structures[3] ($)	Other[4] ($)
00	Beavers	65	2,650	13,550	3,200
	Field mice[4]	3			
	Ground squirrels	1	100		
	Yellow-bellied marmots	62	100	17,200	17,211
	Muskrats	4		800	
	Pocket gophers	7	750		
	Porcupines	1	300		
	Voles	7	85		600
	Other rodents and rabbits[5]	25	850	900	1,200
01	Beavers	80	1,529	17,210	1,450
	Ground squirrels	2	500		60
	Yellow-bellied marmots	31	1,450	3,100	3,115
	Muskrats	1	300		
	Pocket gophers	1	100		
	Porcupines	2	450		
	Voles	1			10
	Other rodents[6]	21	800	1,850	300
02	Beavers	84	3,600	13,800	3,140
	Field mice	3	200	25	100
	Ground squirrels	8	1,050		800
	Jackrabbits	1	100		
	Yellow-bellied marmots	50	600	3,500	6,115
	Muskrat	6	75	500	
	Pocket gophers	10	250	100	1,650
	Voles	5	200		200
	Other rodents and rabbits[7]	25	720	585	501

[1]These losses represent only a portion of the total losses and serve more as an indicator of these types of damage rather than an indicator of the total magnitude of the damage.
[2]Includes landscaping, trees, turf and gardens.
[3]Structures include buildings, dikes, earthen dams, irrigation, roads, bridges, etc.
[4]Other property such as farm equipment and machinery, motor vehicle, soiling, nuisance, etc.
[5]Includes rats, packrats, fox squirrels and cottontail rabbits.
[6]Rats and fox squirrels.
[7]Packrats, fox squirrels and cottontail rabbits.

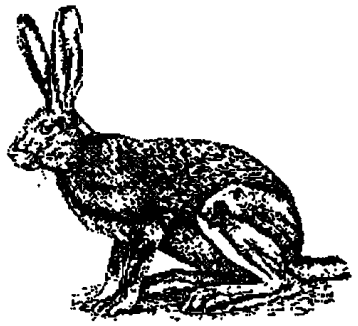
Where damage is occurring to a crop, plant cutting is generally evident. In aquaculture reservoirs, generally maintained without lush aquatic vegetation, muskrat runs and burrows or remains of mussels, crayfish or fish along with other muskrat signs are generally easy to observe. In such limited cases, the value of the muskrat as a furbearer may outweigh the cost of the damage. Muskrat meat has been used for human consumption and in some areas muskrats are called "marsh rabbit." However, care should be taken when cleaning muskrats because of disease problems (Miller 1994).

Economic loss from muskrat damage, however, can be very high, 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 pond banks or dams. Muskrat damage reported to WS in Idaho has been primarily to landscaping and structures (MIS 2000, 2001, 2002). Damage to ponds and water retention impoundments occur when muskrats burrow in the dike or dam, weakening the structural integrity, or in severe cases, breakage or leakage. In 1998, a Southern Idaho College reported that repairs to a water retention dike that occurred from muskrat burrowing activity was estimated at costing $1,000. A [redacted] farmer reported estimated damages in 1999 of $500 to a pond after several muskrats burrowed in to the dam and a Twin Falls County resident reported damages estimated at $1,000 after muskrats burrowed under his boat dock causing it to overturn. During FY00 through FY02, muskrats were responsible for $1,675 of damage reported to WS (Table 1-2).

1.2.3 Jackrabbit[3]. There are 2 species of jackrabbits in Idaho; the black-tailed jackrabbit (*Lepus californicus*) (Figure 1-3) and the white-tailed jackrabbit (*L. townsendii*). Both species can cause damage to agriculture and natural resources.

Figure 1-3. Black-tailed Jackrabbit



Jackrabbits consume ½ to 1 pound of green vegetation daily and significant damage can occur when jackrabbit are attracted to orchards, gardens, ornamentals, or agricultural crops (Knight 1994). Most damage to gardens, landscapes, or agricultural crops occurs in areas adjacent to habitats used by jackrabbits. The damage may be temporary and usually occurs when jackrabbit populations are high or when natural vegetation is dry, thus damage to green vegetation may be severe during these dry or cool periods. Competition between cattle and jackrabbits seems to be greatest in early spring (Hansen and Flinders 1969). Orchards and ornamental trees and shrubs are usually damaged by over-browsing, girdling, and stripping of bark.

Fagerstone et al. (1980) reported that jackrabbit densities in their southern Idaho study area were highest in July on the mixed barley and alfalfa fields, where there were about 100 jackrabbits/mi^2. Conversely, rangeland showed consistently low densities throughout their study, averaging about 1.6 jackrabbits/mi^2. Fagerstone et al. (1980) concluded that cultivated crops are a large part of the spring and summer jackrabbit diet. MacCracken and Hansen (1982) and Fagerstone et al. (1980) both reported that jackrabbit densities were highest where there was a greater biomass of vegetation.

Black-tailed jackrabbit populations in southern Idaho cycle about every 7 to 12 years. The most recent peak occurred during 1990-1992 (S. Knick, U. S. Geological Survey (USGS), pers. comm., 2003). Knick and Dyer (1997) estimated that the density of jackrabbits in the Snake River Birds of Prey Conservation Area (SRBPCA) ranged from 51 to 64 jackrabbits/mi^2 during the summers of 1990, 91 and 92, and 23 to 41 jackrabbits/mi^2 in the winters of 1990-91 and 1991-92. During that population peak, damage to bitterbrush seed, alfalfa, turf, flowers and pinto beans were reported to WS with estimated damages totaling $10,524 (WS 1990, 1991, 1992). About 70% of the reported damage occurred in FY90. In response to the 1991 population peak, WS assisted a hay farmer who sustained damage to this crop from jackrabbits. Zinc phosphide treated baits were applied to an area of about 7 acres to remove an undetermined number of jackrabbits during FY92 (WS 1992). Knick and Dyer (1997) recorded a crash in the SRBPCA population during the winter of 1994-95 where densities of 5.2 jackrabbits/mi^2 were estimated.

[3]Although jackrabbits are not true rodents, they have been included in this EA due to their similarity to rodents and damage they may cause.

Rangeland over-browsing and over-grazing can occur any time jackrabbit densities are high. Currie and Godwin (1966) reported that six black-tailed jackrabbits consume as much forage as one sheep. Similarly, Vorhies and Taylor (1933) estimated that 148 black-tailed jackrabbits ate as much as one cow.

Jackrabbits do not cause substantial damage problems in Idaho unless their population densities are very high and when natural vegetation is lacking or dry. During FY00, FY01 and FY02, very little agricultural or natural resource damage from jackrabbits was reported to WS (one incident with estimated damage of $100) (Table 1-2).

1.2.4 Marmot. Marmots (Figure 1-4) can become significant pests by consuming growing crops, including grains, alfalfa, clover and hay grasses (Marsh 1984) and their burrowing habits conflict with human interests. Three species of marmots can be found in Idaho. The most common and widely distributed and destructive marmot is the yellow-bellied marmot (*Marmota flaviventris*). The other 2 species of marmots, the hoary marmot (*M. caligata*) and woodchuck (*M. monax*), inhabit remote and isolated areas of Idaho and do not cause significant agriculture damage. However, damage from yellow-bellied marmots can be serious, and normally is restricted to local sites (Marsh 1984). In regions where marmot populations are adjacent to crops, extensive damage can occur, and while making trails they trample additional plants, which cannot be harvested (Lee and Funderburg 1982). They are also occasionally serious problems to home gardens and in some areas damage fruit trees (Lee and Funderburg 1982). Marmots have also been known to gnaw on underground power cables and potentially cause electrical outages. Mounds of earth from the excavated burrow systems and holes formed at burrow entrances also present a hazard to farm equipment, horses and riders, and bury vegetation.

Figure 1-4. Marmot.

In 1992, the U. S. Army Corps of Engineers (USACE) requested assistance from WS after yellow-bellied marmots burrowed into and compromised the levee core on the Clearwater and Snake rivers that protects Lewiston, Idaho and Clarkston, Washington from flooding (Bangerter 1993). Other water impoundment structures, such as canal banks, ponds, dams and irrigation ditches, can sustain damage from marmots resulting in leaks or causing breaks (Lee and Funderburg 1982). The BOR reported in 2000 that marmots were burrowing in to an earthen dam and civil engineers were concerned that the digging activity might weaken the structure. Repairs to the dam were estimated at $6,000.

Marmot damage reported to WS in Idaho has been primarily to agricultural resources (MIS 2000, 2001, 2002) in the southern half of the State. In areas where marmot populations are concentrated, damage to crops can be extensive. A [redacted] farmer reported in 2001, that approximately 150 marmots caused estimated damages of $1,000 to his barley field and a [redacted] farmer reported losses of $1,500. Another grain grower from [redacted] reported $4,000 in damages. Reports from 2 farmers raising sugar beets and pinto beans reported marmot damage estimated at $3,000 and $500, respectively, to their crops. During FY00 through FY02, marmots were responsible for $75,891of reported damage (Table 1-1 and Table 1-2).

1.2.5 Ground Squirrel. High populations of ground squirrels (Figure 1-5) may pose a serious damage problem on rangelands. Ground squirrels compete with livestock for forage; destroy food/cereal crops, turf and lawns, and can be reservoirs for diseases such as plague (Marsh 1984, Askham 1994). Their burrow systems have been known to weaken and collapse ditch banks, undermine foundations, and alter irrigation

systems (Askham 1994). The mounds of soil excavated from their burrows not only cover and kill vegetation, but can damage farming machinery. Unquestionably, losses due to ground squirrels can be serious to many ranchers (Marsh 1984). In addition, some ground squirrels may prey on the eggs and young of ground-nesting birds or feed on new shoots and buds in orchards.

Figure 1-5. Columbian Ground Squirrel.

Most ground squirrels cut and store large quantities of food in burrow caches. It has been estimated that 355 Columbian ground squirrels in 1 day could consume an amount equivalent to that eaten by 1 sheep (Marsh 1984). In an assessment of damage to alfalfa production in northern California, 123 Belding's ground squirrels/acre over the growing season destroyed 1,790 lbs of alfalfa/acre (Sauer 1977).

A City park grounds-keeper from a southern Idaho town reported to WS in 2001 that Piute ground squirrels were damaging valuable landscaping and replacement cost for plants alone was $500. Damages of $300 were reported from a [redacted] farmer after ground squirrels were digging-up freshly planted sweet corn seed and consuming it. In 2000, an estimated 164 acres of an Idaho military installation contained high concentrations of Piute ground squirrels and damage to recreational sites such as picnic areas, baseball fields and golf course, and lawns were significant. The amount of irrigation water that was lost through ground squirrel burrows was also a major concern for military officials. Although monetary damages were not recorded by WS when the assessment was conducted, it is conceivable that damages could have exceeded $30,000 (G. Graves, Assistant State Director, USDA, APHIS, Wildlife Services, pers. comm., 2003). Estimated damage from ground squirrels reported to WS during FY00 through FY02 (MIS 2000, 2001, 2002) was $4,420. The majority of damage was to turf, alfalfa, pastures and other agricultural resources and property from Piute and Columbian ground squirrels (Table 1-1 and Table 1-2).

1.2.6 Porcupine. Economic losses can be considerable from porcupines (Figure 1-6) feeding on forest plantings, ornamental plants, and orchards as well as on leather and other human items (Schemnitz 1994). Wild porcupines probably do not normally exceed 5-7 years (Dodge 1982), however, Lawerence (1957) estimated that during a porcupine's life-time, 1 porcupine was capable of inflicting $6,000 of damage to the forest industry. Van Deusen and Meyers (1962) reported that thinning tends to produce timber stands more favorable to porcupines and felt that control should be expected in those stands. With current high-yield forestry practices of chemical thinning, aerial fertilization, and even-aged stand management, porcupine damage can inflict considerable economic loss and require control (Dodge 1982). In western Oregon, most damage occurs in thinned stands, 10-30 years old, and dominant trees are selected by porcupines (Dodge and Canutt 1969). Damage to buildings and signs, especially those made of plywood, and other objects such as vehicular synthetic fuel and hydraulic lines, tires, steering wheels, seat coverings and electrical wiring have all been gnawed on by porcupines (Dodge 1982). Electrical companies are sometimes troubled by power outages due to porcupines gnawing on cables or monitoring lines, and ski resorts often report damaged electrical and communications cables and some have found the plastic shock bumpers on lift towers damaged by porcupines (Dodge 1982).

Figure 1-6. Porcupine.

Porcupines do not cause substantial damage problems in Idaho, or at least they haven't been reported to WS, however, porcupines can sometimes cause significant damage to orchards or tree nurseries if it goes undetected for a prolonged period of time. During FY00, FY01 and FY02, $1,950 in damages to trees were reported to WS (Table 1-1 and Table 1-2).

1.2.7 Pocket Gopher. According to Ward (1973), where pocket gophers (Figure 1-7) are abundant, rangelands may have herbage yields reduced 20% or more by pocket gophers harvesting and burying vegetation, and pocket gophers may be the primary cause of exposure of bare soil. The abundance of gophers on rangelands can drastically reduce ground cover and herbage productions as a result of burrowing, mound building, and foraging (Turner et al. 1973). As many as 1,200 to 1,500 mounds per acre may occur on a field of average infestation (Scheffer 1931) and where gopher densities are particularly high, displaced soil may cover up to ¼ of the surface area within 1 year (Turner 1973).

Figure 1-7. Northern Pocket Gopher.

The reduction of grasses and forbs by uncontrolled populations of pocket gophers results in less plant material for livestock grazing, and on over-grazed rangeland the combination of pocket gophers and livestock can create severe erosion problems (Laycock and Richardson 1975).

Pocket gophers may be beneficial to foresters by working the soil, but they also feed on tree roots, girdle stems and when under snow, damage stems and branches a meter or more high (Dingle 1956, Hooven 1971, Barnes 1973). Agriculturalist first recognized the significance of gopher problems in many root, fruit, and bulb crops (Lantz 1909, Crouch 1933). Early literature documented canal breaks costing thousands of dollars in crop losses and repairs because of gophers burrowing in the banks (Day 1931, Scheffer 1931, Downhower and Hall 1966). In irrigated areas, gopher tunnels can channel water runoff, causing loss of surface irrigation water and their tunnels in ditch banks and earthen dams can weaken these structures, causing water loss by seepage and piping through a bank or the complete loss or washout of a canal bank (Case and Jasch 1994).

Damage by gophers also includes destruction of underground utility cables and irrigation pipes, and change in species composition on rangelands by providing seed beds (mounds) for invading annual plants (Case and Jasch 1994). One or more pocket gophers can be costly in orchards, vineyards, and truck gardens (Chase et al. 1982), and be the principal wildlife damage problem in reforestation (Capp 1976). Reforestation efforts are often severely hindered on sites that contain high populations of pocket gophers (USDA 2000b) and efforts to establish tree seedlings on sites infested with pocket gophers can be futile unless protective measures are implemented (Nolte and Dykzeul 2002). Pocket gophers commonly prune roots of seedlings and girdle or clip seedling stems at or near ground level. Pocket gophers also prune the roots and girdle the stems of larger trees; extensive above-ground girdling is fairly easy to detect, however below ground pruning is difficult to detect. However, damage to roots may go unnoticed until seedlings tip over or become discolored. Implementing only non-lethal gopher damage management can cause poor over-all growth, shortened needles, reduced internodes, cause premature needle drop, and needle discoloration (Nolte and Dykzeul 2002).

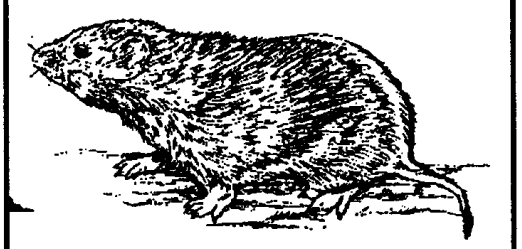
In a study of conifer plantations in northern and central Idaho that recorded causes of mortality and damage to tree seedlings over a 6 year period, pocket gophers were responsible for 71% of all mortality and caused the most reduction in height growth (Graham and Kingery 1990). Borecco and Black (1990) surveyed all National Forests in 1988 and managers reported that pocket gophers were the single most destructive group

of species on National Forest System lands. Survey results also indicated that pocket gopher control was conducted on 208,000 acres of reforestation and older stands, nearly all in the West, at a cost of about $9 million. Sixty-two percent of the total acreage treated was in the Pacific Northwest Region (Oregon and Washington). Graham and Kingery (1990) reported that the majority of 92% mortality to grand fir seedlings after 3 years in grazed study sites on the Clearwater National Forest was caused by pocket gophers. The Nez Perce National Forest estimated that the cost per acre for reforestation is $306, and that pocket gophers are the primary cause of regeneration failures (USDA 2000b). An EA prepared by the Nez Perce National Forest estimated that the majority of 3,309 acres of reforestation, valued at more than $1 million, could be lost if pocket gopher control was not implemented (USDA 2000b).

Pocket gopher damage reported to WS in Idaho has been primarily to gardens, pastures, alfalfa, dikes and other property (MIS 2000, 2001, 2002). During FY00 through FY02, pocket gophers were responsible for $3,250 of reported damage to WS (Table 1-1 and Table 1-2).

1.2.8 Vole. Voles (*Microtus* spp.) (Figure 1-8) can cause extensive damage to orchards, ornamental trees, and tree plantings due to their girdling of seedlings and mature trees. Field crops (i.e., alfalfa, clover, grain, potatoes, and sugar beets) may be damaged or completely destroyed by voles (O'Brien 1994). In areas used for pasture and for raising hay, grain, or root crops, there is frequently a continual drain on the productivity caused by voles, and there is also measurable damage to natural vegetation used by either grazing livestock or native herbivores (Johnson and Johnson 1982). However, damage is little noticed during most years, and typically evident only during periods of peak populations. Damage consists of directly eating the succulent crowns of clover and other grasses, so whole fields may be ruined (Johnson and Johnson 1982). Additionally, growing grass, hay and grains (i.e., wheat, oats, barley, sage and buckwheat) are attacked by directly eating early sprouts, but more importantly, by cutting mature stalks. Early peas, cabbage, celery, and other surface crops, and potatoes and other root crops (i.e., beets, turnips, carrots, parsnips, and sweet potatoes) may be destroyed (Johnson and Johnson 1982).

Figure 1-8. Vole.



Severe damage to agriculture from voles usually occurs during population irruptions. The worst vole outbreak in the United States probably occurred in Nevada in 1908 and 1909 when 10,000 acres of alfalfa were completely destroyed. Vole populations were estimated at 25,000 per acre (O'Brien 1994). Johnson (1958) calculated that 100 California voles destroyed about 4% of an alfalfa crop, which amounted to about 1,000 pounds per acre over 7 months.

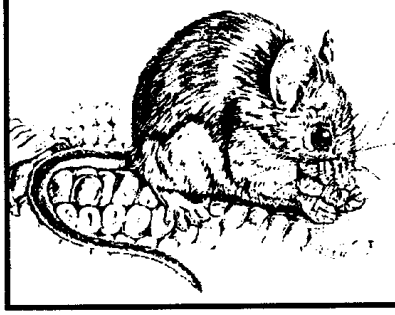
As a result of localized vole population irruptions, extensive damage from "field mice" occurred during the past 8 years. To reduce this damage, the Idaho State Department of Agriculture (ISDA) sought and obtained Federal Insecticide, Fungicide and Rodenticde Act (FIFRA), Section 18, Crisis Exemption registrations beginning in 1996 for the use of zinc phosphide to protect potatoes and sugar beets in affected Idaho counties. In 2000, the Section 18 registration was expanded to include wheat and barley crops and in 2002 alfalfa hay was added to the list of crops and uses (G. Robinson, ISDA, pers. comm., 2003). A University of Idaho economic model estimates that for every 1% of damage caused by "field mice" to potato, sugar beet, wheat, and barley crops, $1.5 million, $1 million, $2 million, and $0.7 million, respectively, is realized in direct economic losses to commodity producers and an estimated 10-15% of crops would be damaged by voles and field mice, with some areas ranging up to 80% (Robinson 1999).

Vole damage reported to WS in Idaho has been primarily to turf, gardens and pastures (MIS 2000, 2001, 2002), however when population irruptions occur, local farmers and ranchers can have significant damage

to crops. During FY00 through FY02, voles were responsible for $1,595 of damage reported to WS (Table 1-1 and Table 1-2).

1.2.9 Deer Mice and Other Field Mice. Occasionally, deer mice (*Peromyscus* spp.) (Figure 1-9) consume newly-planted seeds and cause frequent failures in crop plantings. During the early 1990s in Idaho, damage caused by deer mice, particularly depredation to grass seed crops, increased dramatically and resulted in the ISDA issuing a Special Local Needs (SLN) 24(c) registration (SLN No. ID-930005) in 1993 to protect grass fields (grass seed crops). In a letter to the ISDA (Pennington 1993), losses from mice (*Microtus* spp. and *Peromyscus* spp.) to 3 individual grass seed crop growers in [redacted] in 1990 was assessed at $480, $650, and $850/acre, with a combined total loss of $123,000.

Figure 1-9. Deer Mouse.



As a result of localized deer mice population irruptions, extensive damage occurred during the past 8 years. To reduce this damage, the ISDA sought and obtained a FIFRA, Section 18 registration for zinc phosphide to protect potatoes, sugar beets, wheat and barley crops and alfalfa hay in affected Idaho counties (see Section 1.2.8 Vole for additional economic losses).

Deer mice and other field mice do not cause substantial damage problems in Idaho unless population irruptions occur, and then local farmers and ranchers can have significant damage. During FY00, FY01 and FY02, $325 in damage to turf and buildings was reported to WS (Table 1-2). However, the vast majority of mouse damage goes unreported.

1.2.10 Public Health and Safety Risks from Rodents. Occasionally, WS responds to requests for assistance to address health and safety risks to the public that are directly and indirectly caused by rodents. Rodents can be hosts for several ectoparasites such as fleas, mites and ticks, and internal parasites including nematodes, trematodes, and coccidians. Beaver are known carriers of the intestinal parasite *Giardia lamblia,* which can contaminate water supplies used for human consumption and recreation (Beach and McCulloch 1985). Giardiasis is an enteric protozoal disease associated with ingesting contaminated water. In 2001, 172 cases of Giardia were reported to the Division of Health of the Idaho Department of Health and Welfare (IDHW) (IDHW 2002).

Deer mice are known hosts for hantavirus. Following several human deaths in the Four Corners area of the U.S., the deer mouse (*Peromyscus maniculatus*) was implicated as a potential reservoir responsible for Hantavirus Pulmonary Syndrome (HPS), an adult respiratory distress disease (Timm and Howard 1994). Transmission usually occurs when someone disturbs an area contaminated with rodent droppings or nesting materials. If those materials are swept or shaken into the air, the virus may be inhaled and produce an infection. Childs et al. (1994) reported that 30.4% of 813 white-food mice tested in the southwestern U.S. were infected with hantavirus. As of September 18, 2002, 31 States where deer mouse and/or white-footed mouse (*P. leucopus*) occur have verified 328 cases of HPS (Centers for Disease Control and Prevention (CDC) 2002a). Approximately 37% of HPS cases are fatal. In Idaho, 17 cases of HPS have been documented from 1978 to 2002, resulting in 6 human deaths (IDHW 2002). The most recent fatal case was reported to the State Office of Epidemiology in June 2002. The individual, who owned a pest control company in the Sun Valley area, had a history of extensive occupational rodent exposure.

Rabies is a disease that is most often associated with wildlife, and any mammal can contract rabies. It occurs most often in skunks, bats, raccoons, and canids, but it has also been found in deer, moose, antelope, squirrels, muskrats, rats and mice (IDFG 2003a).

Beaver damming activity can create conditions favorable for mosquitoes and can result in population increases of these insects (Wade and Ramsey 1986). West Nile Virus (WNV), a disease that is carried by

birds, but is spread by mosquitoes, was first identified in the United States in 1999 in New York State. WNV is thought to have come from Africa and/or the Middle East. By the end of 2002, 44 States confirmed the presence of WNV. In only 4 years, hundreds of people have been infected with WNV and 263 people have died (IDFG 2003b). Horses are particularly susceptible to WNV and more than 14,000 horses have been reported as having WNV, and of these, nearly 35-40% have died (IDFG 2003b). The IDHW (Dr. L. Tengelsen, IDHW, pers. comm., 2002) and IDFG (Dr. M. Drew, IDFG, pers. comm., 2002) are expecting to confirm cases of WNV in Idaho during the summer of 2003. The public is concerned about contracting the disease from mosquito bites, and any body of water that may harbor mosquitoes might be viewed as a risk to public health. The CDC recommends that people should avoid maintaining mosquito-breeding sites on their property (CDC 2002b)

Beaver activity can increase water levels in urban areas and can lead to unsanitary conditions and potential health problems by flooding septic systems and sewage treatment facilities (DeAlmeida 1987, Loeb 1994). Beaver (Miller 1983, Woodward 1983) and marmot 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).

Some rodents can be aggressive towards people and pets, and may bite in self-defense if disturbed, harassed or surprised. Injured or sick rodents are more prone to exhibit aggression and bite if approached or handled by people. The IDFG discourages people from approaching abnormally acting wildlife and to avoid handling such animals (IDFG 2003a).

The potential for exposure to wildlife transmissible diseases and parasites are ever present, especially to wildlife and natural resources agency personnel, including WS, and others who routinely handle or are exposed to wildlife and rodents. The IDFG and IDHW, along with many other health related agencies strongly discourage the public from handling any wildlife unless the person is experienced with that particular species and has the necessary protective equipment and clothing to reduce risks. According to State law, MOU, and various Agreements, when requested, Idaho WS may assist the IDFG or IDHW and other agencies to monitor and reduce the risk of disease transmission.

Voles pose no major public hazard because of their infrequent contact with humans, however, they are capable of carrying disease organisms, such as plague and tularemia (O'Brien 1994). Porcupines, too, pose no major public disease threats, however, their quills are unique defense weapons. Porcupine quills have proven fatal to many predators and inquisitive animals, including dogs, owls, cattle, horses and even people (McDade and Crandall 1958). A human death was reported by Dodge (1982) as a indirect result of eating a porcupine meat sandwich containing a quill.

In FY00, populations of Piute ground squirrels at a major southern Idaho airport were identified by WS as attracting birds-of-prey and small carnivores to the runways. Coyotes, badgers, house cats, red-tailed hawks, ravens and other predators on or near runways presented serious threats to the safety of airline passengers should an aircraft strike one of those animals or if a bird-of-prey was ingested into a jet engine or strike a propeller. Badgers created additional problems by throwing soil and rocks onto the landing surface and in the path of landing or departing aircraft when burrowing near a landing strip searching for ground squirrels. At this same airport, black-tailed jackrabbits were verified in FY00 as posing potential "strike"or "collision" hazards to aircraft landing at night (WS 2001). In FY00 and FY01, the Division of Aeronautics, Idaho Transportation Department (ITD), requested assistance with controlling badgers that were excavating large holes in search of ground squirrels on 3 individual dirt airstrips. The airstrips were located in Custer and Twin Falls Counties. The badger's digging activity and the ground squirrel burrows presented a very serious hazard to landing and departing aircraft.

Marmots may act as reservoirs for diseases such as tularemia and sylvatic plague, and harbor ticks that may be vectors of spotted fever (Eadie 1954). A city zoo in eastern Idaho requested WS' assistance with live-

trapping marmots because zoo officials were concerned that diseases or ectoparasites from the marmots might be transmitted to visitors. The marmots were also burrowing under buildings and leaving unsightly droppings along boardwalks. Table 1-3 provides the number of heath and safety incidents reported to WS or where WS provided assistance. Threats to public safety and health are sometimes difficult or impossible to assess and to quantify in terms of monetary damage.

Table 1-3. Public Health and Safety Risks (MIS 2000, 2001, 2002)[1].

FY	Species	Number of Incidents	Damage ($)
00	Field mice[2]	2	0*
	Ground squirrels	1	0*
	Jackrabbits	1	0*
	Rats[3]	1	0*
01	Ground squirrels	1	0*
	Yellow-bellied marmots	2	0*
02	NR[4]		

[1]These losses represent only a portion of the total losses and serve more as an indicator of these losses of damage rather than an indicator of the total magnitude of the damage.
[2] Represents deer mice and house mice.
[3] Species unknown, but probably Norway or roof rats.
[4] None recorded for FY02.
*Unable to assess damage for health and safety risks.

1.3 NEED FOR ACTION

Rodent populations can have a negative economic impact and threaten public health and safety in Idaho. Beaver cut and girdle trees, and their dam building can cause flooding on forest and farm land, plug culverts, and wash out roads and railroad beds (Miller 1983, DeAlmeida 1987), muskrats and marmots burrow into dikes and embankments causing them to weaken, and jackrabbits and other field rodents feed on crops causing economic losses. Unfortunately, very few comprehensive surveys of rodent damage in Idaho have been conducted. However, Idaho WS compiled estimates of the types and value of damage reported by property and resource owners or managers who requested WS assistance, and public health and safety risks caused by rodent damage for FY00 through FY02 (Tables 1-1, 1-2 and 1-3). These data represent only a very small portion of the total damage caused by rodents because most people who experience damage do not request assistance from WS. Of the species of rodents found in Idaho, beaver and marmots are responsible for most of the damage reported to or verified by WS and for most of the requests for assistance.

Wywialowski (1994) reported that 19% of field crop producers, 20% of vegetable, fruit, or nut producers, and 19% of farmers or ranchers who store commodities (whole grain, feed or seed) cited damage from rodents and rabbits. Ground squirrels, woodchucks, and gophers were reported by vegetable, fruit, or nut producers as the primary species causing damage (Wywialowski 1994). Of 49 State wildlife agencies that responded to a survey conducted by Conover and Decker (1991), 94% and 79% reported that beaver and muskrats, respectively, were causing problems in their State. Rodent and rabbit damage along with control costs was considered by Nevada alfalfa hay growers to be the second-highest management cost to alfalfa operations (Lewis and O'Brien 1990). A survey of the National Forests in 1988 cited that pocket gophers were the single most destructive group of species to forest stands. More than half the forests reported animal damage to structures and campgrounds or animal-related health hazards such as rodent-borne diseases (Borrecco and Black 1990).

1.4 PROPOSED ACTION

The proposed action (Proposed Alternative) is to implement an Idaho WS integrated rodent damage management program for the protection of agricultural and natural resources, property and public health and safety on all lands in Idaho where a need exists and a request is received[4],[5]. An IWDM approach would be used implementing the WS' Decision Model[6] (Slate et al. 1992), which would consider all legally available and appropriate methods either used singly or in combination to meet the requester needs for reducing damage[7]. Managers and property owners would continue to be provided technical assistance regarding the use of non-lethal methods. Technical assistance includes: instructional sessions, consultations, demonstrations, information about exclusion devices, and for beaver, pond drainage devices. Non-lethal methods include, but are not limited to, environmental/localized habitat modification/management including beaver dam breaching, exclusion, animal behavior modification, foothold and cage/live traps, snares, abrasives, taste and odor repellents, and immobilization drugs. Lethal methods used by WS may potentially include zinc phosphide and strychnine grain/vegetable baits, anticoagulants, aluminum phosphide, gas cartridges, shooting, glue boards/trays, body-gripping traps, snap traps and foothold traps and snares (if set purposely to result in a lethal capture) and euthanasia methods. Rodent damage management would be allowed in the State, when requested, on private or public property where under an *Agreement for Control* or other comparable document has been completed. All rodent damage management 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 and Tribal governments. No ground squirrel control operations would be conducted in identified ranges of the northern and southern Idaho ground squirrel without first conferring with the USFWS. (See Chapter 3 for a more detailed description of the prosed action).

1.5 RELATIONSHIP OF THIS EA TO OTHER MANAGEMENT AND ENVIRONMENTAL DOCUMENTS

1.5.1 WS Programmatic EIS. WS has issued a final EIS (USDA 1994) on the National APHIS-WS program. Pertinent portions of USDA (1994) are incorporated by reference.

1.5.2 National Forest Land and Resource Management Plans (LRMPs). The National Forest Management Act requires that each National Forest prepare a LRMP for guiding long range management and direction of National Forest System administered lands. LRMP documents and the decision made from this EA would be consistent.

1.5.3 Bureau of Land Management (BLM) Resource Management Plans (RMP) and Management Framework Plans (MFPs). The BLM currently uses RMPs or MFPs to guide management on lands they administer. RMPs generally replace older land use plans known as MFPs. Any decision made because of this analysis would be consistent with guidance in the RMPs regarding WS activities on BLM administered lands in Idaho.

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[4]Actions to reduce rodent damage are within the control of Idaho agencies; however, WS may provide assistance to State and County agencies in their management efforts. Therefore, Idaho and County agencies could take action independent of WS or other Federal agency. Primary control for wildlife management resides with the State of Idaho, thus calling into question the value of any Federal process in planning and decision making for rodent damage management.

[5]WS' mission is to reduce wildlife damage and safeguard public health and safety.

[6]The WS Decision Model is not a written process but rather a mental problem solving process similar to other professions to determine appropriate management actions to take.

[7]It is entirely possible that an urgent need, such as threats to human or pet health and safety could require that action be taken prior to reaching a decision. None of the planners and decision makers involved in this effort is precluded from considering comments filed in this process at any time (even after actions to deal with the threat have begun) and making appropriate adjustments to ongoing program operations.

1.5.4 IDFG Management Plans. The IDFG Wildlife Depredation Plan clarifies the legal roles and responsibilities of the IDFG and other agencies regarding wildlife damage management. Specific guidance for predators and furbearers (beaver and muskrats) outline management goals and objectives for these species. Any decision made as a result of this EA process would be consistent with guidance in these plans.

1.5.5 Idaho State Animal Damage Control (ADC) Board. Establishment of the Idaho ADC State Board was provided for under Idaho Code 25-128. The Board is composed of the Chairman of the [redacted] s, a representative of the [redacted], the Director of the IDFG, and the Chairpersons of the 5 ADC Districts in the State of Idaho. The Board is charged with coordinating and giving general direction to, *"Programs to prevent and control damage or conflicts on federal, state, or other public or private lands caused by predatory animals, rodents, or birds injurious to animal husbandry, agriculture, horticulture, forestry, wildlife and public health and safety . . . "* Under provisions of an MOU between the State ADC Board and the WS program, WS cooperates with the Board in carrying out rodent damage management.

1.6 RELATIONSHIP OF AGENCIES DURING PREPARATION OF THIS EA

Based on agency relationships, MOU and legislative authorities, Idaho WS is the lead agency for this EA, and therefore responsible for the scope, contents and decisions made. The BLM, USACE, USFWS, BOR, U. S. Department of Transportation (USDOT), Craters of the Moon National Monument (National Park Service (NPS)), Natural Resources Conservation Service (NRCS), Idaho's U. S. National Forests (NFS), ISDA, IDFG, ITD, IDHW, Idaho Department of Lands (IDL), Idaho Department of Environmental Quality (IDEQ), Idaho Department of Water Resources (IDWR), Idaho Department of Parks and Recreation (IDPR) and Idaho Bureau of Hazardous Materials (BHM) were given opportunities for input during the EA preparation to ensure an interdisciplinary approach in compliance with NEPA, agency mandates, policies, and regulations (see Appendix C for agency responsibilities or mission statements).

1.7 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

1.7.1 Actions Analyzed. This EA evaluates planned rodent damage management to protect: 1) agricultural and natural resources, 2) property, and 3) public health and safety in Idaho. Protection of other resources or other program activities will be addressed in other NEPA analysis, as appropriate. This analysis is limited to the rodent and lagomorph species that Idaho WS has conducted or reasonably expects to conduct operational damage management on, and not to species where WS provides technical assistance only.

1.7.2 Wildlife Species Potentially Protected by Idaho WS. Idaho WS assistance such as breaching beaver dams to re-establish stream flow could conceivably be requested to achieve management objectives for fish such as spawning rainbow trout (*Oncorhynchus mykiss*) or other fish species, including T/E species. If other needs are identified, the determination for additional NEPA analysis would be made on a case-by-case basis.

1.7.3 Resources Not Currently Protected by WS Rodent Damage Management. The current program operates on a small percentage of the area of Idaho (see Section 1.1) and provides assistance wherever requested and when a need is identified. This EA analyzes impacts not only at the current program level, but at increased program levels (e.g., increased protected resources) should individuals or agencies request assistance. Any increase is anticipated to be small.

1.7.4 American Indian Lands and Tribes. Currently, Idaho WS has no MOU with American Indian Tribes. If WS enters into an agreement with a Tribe for rodent damage management, this EA would be reviewed and supplemented, if appropriate, to insure compliance with NEPA. MOU, agreements and

NEPA compliance would be conducted, as appropriate, before conducting any rodent damage management on Tribal lands.

1.7.5 Period for Which This EA is Valid. This EA would remain valid until Idaho 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 supplemented pursuant to NEPA. Review of the EA would be conducted each year to ensure that the EA is sufficient.

1.7.6 Site Specificity. This EA analyzes the potential impacts of rodent damage management and addresses activities on all lands in Idaho under MOU, Cooperative Agreement, *Agreements for Control,* or other comparable document and in cooperation with the appropriate management agency. It also addresses the impacts of rodent damage management on areas where additional agreements may be signed in the future. Because the Proposed Alternative is to implement an IWDM program and reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional rodent damage management efforts could occur. Thus, this EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program. This EA emphasizes major issues as they relate to specific areas whenever possible, however, many issues apply wherever rodent damage and resulting management occur, and are treated as such. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions and activities conducted by WS in Idaho (see Chapter 3 for a description of the Decision Model and its application). Decisions made using the model would be in accordance with mitigation and Standard Operating Procedures (SOPs) described herein and adopted or established as part of the decision.

1.7.7 Summary of Interdisciplinary Development of This EA. Issues related to the Proposed Alternative were developed after soliciting comments from 19 Offices of Federal Natural Resources agencies and other agencies with regulatory responsibilities (i.e., USFWS, BLM, NFS, USACE, BOR, USDOT, NRCS, and Craters of the Moon National Monument), 15 Offices of State Agencies (i.e., ISDA, IDFG, IDHW, IDEQ, IDL, ITD, IDPR, IDWR and BHM), and 5 American Indian Tribes (i.e., Nez Perce, Shoshone-Bannock, Shoshone-Paiute, Coeur d' Alene, and Kootenai Tribe of Idaho). No initial pubic involvement or scoping was conducted, however, the public will be given an opportunity to review and comment on this EA and to identify any new issues. As part of this reviewing and commenting process, and as required by CEQ and APHIS NEPA Implementing Regulations, this document will be made available to the public through a "Notice 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 public review of the EA will be fully considered to determine whether this EA should be revisited and, if appropriate, amended. All Federal and State Agencies, American Indian Tribes, and public comments will be maintained in an administrative file located at the Idaho WS State Office, 9134 W. Blackeagle Drive, Boise, ID 83709-1572.

1.8 PREVIEW OF THE REMAINDER OF THIS EA

The remainder of this EA is composed of 3 Chapters and 4 Appendices. Chapter 2 discusses the issues, issues used to develop mitigation measures and SOPs, issues not analyzed in detail, and affected environment. Chapter 3 describes each alternative, alternatives not considered in detail, mitigation measures, and SOPs, and Chapter 4 analyzes the environmental impacts. Appendix A provides a list of preparers, consultants and reviewers, Appendix B is the literature cited, Appendix C lists the legal responsibilities and/or mission statements of Federal and State agencies in Idaho, and Appendix D provides a description and information on the methods used by Idaho WS for rodent damage management.

CHAPTER 2: ISSUES

2.0 INTRODUCTION

Chapter 2 discusses the issues, including issues that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences), issues used to develop mitigation measures and SOPs, and issues that will not be considered in detail, with the rationale. Pertinent portions of the affected environment will be addressed in this Chapter in the discussion of issues used to develop mitigation measures and SOPs. Potential environmental impacts of the Proposed Alternative and the other Alternatives in relation to these issues are discussed in Chapter 4. Additional affected environments will be incorporated into the discussions of the environmental impacts in Chapter 4.

Issues are concerns of the public and/or professional communities about potential environmental impacts that may occur from the proposed rodent damage management program. Such issues must be considered in the NEPA decision making process. Issues relating to the management of wildlife damage were raised during the scoping process in preparing USDA (1994) and during the interdisciplinary approach used in preparing this EA.

2.1 ISSUES ANALYZED IN DETAIL IN CHAPTER 4

Issue 1 - Concerns About the Cumulative Effects of WS Rodent Damage Management on Target Rodent Populations.

Issue 2 - Concerns About the Effects of WS Rodent Damage Management on Non-target Species Populations, Including T/E Species.

Issue 3 - Concerns About the Risks Posed by WS Rodent Damage Management Methods to the Public and Domestic Pets.

Issue 4 - Concerns About the Efficacy and Selectivity of Rodent Damage Management Methods.

Issue 5 - Effects of Beaver Dam Breaching on Wetland Wildlife Habitat Areas.

2.2 ISSUES USED TO DEVELOP MITIGATION AND SOPs

2.2.1 Effects of WS Rodent Damage Management on Non-target Species Populations, Including T/E Species. A common concern among members of the public and wildlife professionals, including WS personnel, is the effect of damage management on non-target species, particularly T/E species. WS' mitigation measures and SOPs (Table 3-1) are designed to reduce adverse effects on non-target species' populations. Idaho WS rodent damage management activities have not killed or harmed any T/E species, nor have these activities adversely modified wildlife habitats.

Section 7 of the ESA requires Federal agencies to assure that their actions are not likely to jeopardize the continued existence of T/E species. If it is determined that a listed species or critical habitat is likely to be adversely affected by the Proposed Alternative, the ESA requires a formal Section 7 consultation. To reduce the risks of adverse effects to non-target species, WS selects rodent damage management methods that are target selective or applies such methods in ways to reduce the likelihood of adversely affecting non-target and T/E species populations. To avoid jeopardizing T/E species, the National WS program initiated formal consultation with the USFWS by preparing a Biological Evaluation (BE) to assess potential effects and to establish mitigation measures and SOPs. In response to the BE, the USFWS issued WS a Biological Opinion (BO) in 1992 (United States Department of the Interior (USDI) 1992).

Idaho WS initiated informal consultation with the USFWS by preparing a Biological Assessment (BA) that evaluates potential effects of WS' Proposed Alternative on T/E species. The BA was forwarded to the USFWS, Ecological Services, Snake River Fish and Wildlife Office in Boise in April 2003 for concurrence of findings.

2.2.2 Risks from Idaho WS Rodent Damage Management to the Public and Domestic Pets. The risks from Idaho WS rodent damage management to public health or safety are generally limited to the WS Specialists associated with implementing the methods. There is little risk to human and pet health and safety from WS' use of chemical methods used while conducting rodent damage management. The primary pesticide proposed for use by Idaho WS is zinc phosphide, although aluminum phosphide could occasionally be used as a burrow fumigant to reduce rodent damage. Zinc phosphide and aluminum phosphide are regulated by the EPA through FIFRA, by Idaho State Pesticide Laws and by WS Directives. Based on a thorough Risk Assessment, APHIS concluded that, when WS program chemical methods are used according to label directions, they are highly selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1994). The Idaho WS program properly disposes of unusable pesticides, pesticide products and containers according to the EPA label instructions or through the ISDA Pesticide Disposal Program.

Shooting with shotguns and other firearms is selectively used to remove target species. The use of firearms does pose certain risks. However, to reduce these risks, WS personnel who use firearms to conduct official duties are required to attend an approved firearms safety and handling training, including proficiency training within the last year prior to using firearms on the job and continuing education training on firearm safety and handling every 2 years afterwards (WS Directive 2.615). WS employees who carry firearms as a condition of employment, are also 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.

There may be some degree of risk to the safety of pets from WS' use of snares for beaver damage management, however any pet captured in a snare and accompanied by a human could be immediately released. WS limits the use of foothold traps and snares on public lands during bird hunting seasons, and warning signs are posted in those few areas where these devices are set on public or private lands. During FY00 through FY02, there were no reported injuries to WS personnel or members of the public related to WS' use of any of the techniques described in this EA. WS' mitigation measures (Table 3-1) and SOPs address safety concerns about use of rodent damage management methods.

2.2.3 Effects of Beaver Dam Breaching on Wetland Wildlife Habitat Areas. Some people are concerned about potential effects of the alternatives on wetland ecosystems and that the removal of beaver or breaching beaver dams from an area will result in the loss of wetland habitat and the plant and animal species in those wetlands. Beaver dams obstruct the normal flow of water and typically change the pre-existing wetlands' hydrology from flowing or circulating waters to slower, deeper, more expansive waters that accumulate bottom sediment. The depth of the 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 is primarily conducted to alleviate damages to agricultural crops, timber resources, and public property such as roads, irrigations structures, bridges and water management facilities. Activities may also be conducted to enhance or reclaim wildlife and stream fishery habitats. WS operations may incorporate beaver population reduction with dam breaching or installation of temporary water levelers or exclusion devices. Dams can be breached by hand[1], where possible, or with small charges

[1]No heavy equipment such as backhoes or bulldozers are used by WS in these damage reduction and wildlife enhancement activities, but can be by private individuals.

of binary explosives. These activities take place on small watershed streams, tributary drainages, and ditches and can best be described as small projects conducted to restore water flow through previously existing channels. Only that portion of the dam blocking the stream or ditch channel is breached. Projects involving the use of binary explosives are conducted by trained WS Specialists who are 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 site. Considerably less than 5 cubic yards of material is removed during each of these project activities.

Beaver dams in time can establish new and different wetlands. The USACE's and EPA's 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.*

Therefore, per this definition, a site needs to meet 3 qualifications to be considered a wetland:

- It must contain soils saturated by surface or ground water during a specific period of the growing season. Hydric soils are those soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part. In general, hydric soils form much easier where wetlands preexisted.

- The site must exhibit evidence of wetland hydrology. An area has wetland hydrology if it is inundated or saturated to the surface for at least 5% of the growing season in most years.

- The site must be dominated by hydrophytic vegetation which are those species tolerant of and specially adapted to live in saturated soil conditions. 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 a beaver dam is not breached and water is allowed to stand, hydric soils and hydrophytic vegetation eventually form. This process, though, can take years depending on pre-existing conditions.

The pre-existing habitat and the altered habitat have different ecological values to fish and wildlife. Some species will flourish by the addition of a beaver dam, while others will diminish (see Section 1.2.1). For example, some species of darters listed as Federally endangered require fast moving waters over gravel or cobble beds which beaver dams can eliminate, thus reducing the habitat's value for these species. On the other hand, beaver dams can potentially be beneficial to some species of wildlife such as river otter and waterfowl. Since a potential exists for rodent damage management to impact wildlife habitat, this is being considered as an issue.

The intent of most beaver dam breaching is not to drain old or established wetlands. With few exceptions, requests from public and private individuals and entities that WS receives involve dam breaching for impoundments that are considerably less than 3 years old and to return an area back to its pre-existing condition. Most requests are actions allowed under Section 404 of the Clean Water Act (see Appendix D). WS personnel determine the proper course of action upon inspecting a beaver dam impoundment and require that the landowner contact the USACE to question if a Section 404 permit is needed if a beaver dam is more than 1 year old, otherwise, dam breaching is generally in compliance with Section 404.

2.2.4 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 people of all races, income and culture with respect to the development, implementation and enforcement of environmental laws, regulations and policies. 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. EJ, also known as Environmental Equity is the equal treatment of all individuals, groups or communities regardless of race, ethnicity, or economic status from environmental hazard.

EJ is a priority both within 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 health and environmental effects of Federal programs, policies and activities on minority and low-income persons or populations. To meet this, WS developed a strategy that: 1) identifies major programs and areas of emphasis to meet the intent of the Executive Order, 2) minimizes any adverse effects on the health and environment of minority 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 non-discrimination in APHIS programs. In addition, APHIS plans to implement Executive Order 12898 principally 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. It is not anticipated that the Proposed Alternative would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations.

2.2.5 Protection of Children from Environmental Health and Safety Risks (Executive Order 13045). Children may suffer disproportionately from environmental health and safety risks for many reasons, including their physical and mental development. Because WS makes it a high priority to identify and assess environmental health and safety risks that may disproportionally affect children, WS has considered the impacts that this proposal might have on children. The proposed rodent damage management would occur by using only legally available and approved methods where it is not likely 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 Alternative.

2.2.6 Public's Concern About the Use of Chemicals. Much of the public concern over the use of chemicals for rodent damage management is based on an erroneous perception that WS uses non-selective, outdated chemical methodologies. However, pesticides used and proposed for use by WS have a high degree of selectivity. Currently, the use of pesticides by WS in all instances is regulated by the EPA through the FIFRA, by MOU with other agencies, 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 for target individuals or populations, and such use has negligible impacts on the environment (USDA 1994, Appendix P). A decision to ban pesticides is outside of WS' authority. WS could elect not to use pesticides, but those registered for use in Idaho are an integral part of IWDM and their selection for use would follow criteria in the Decision Model (Slate et al. 1992).

2.2.7 Humaneness and Animal Welfare Concerns Regarding Methods Used by WS. 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 . . .*" (American Veterinary Medical Association (AVMA) 1987). 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 . . .* " (California Department of Fish and Game (CDFG) 1999), such as shooting.

Defining pain as a component in humaneness of WS' methods appears to be a greater challenge than that of suffering. 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 1987). However, pain experienced by individual animals probably ranges from little or no pain to significant pain (CDFG 1999).

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 1999).

Thus, 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 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 suffering with the constraints imposed by current technology and funding.

WS has improved the selectivity and humanness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some rodent damage management methods are used in situations where non-lethal damage management methods are not practical or effective.

Idaho WS personnel are experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology, workforce and funding. Mitigation measures/SOPs (See Chapter 3, Table 3-1) are used to maximize humaneness.

2.3 ISSUES NOT CONSIDERED IN DETAIL, WITH RATIONALE

2.3.1 WS' Impact on Biodiversity. No Idaho WS rodent damage management would be conducted to eradicate a native wildlife population. WS operates according to international, Federal and State laws, and regulations enacted to ensure species viability. Idaho statutes direct agencies to consider biological sustainability when making management decisions (Defenders of Wildlife and Center for Wildlife Law 1996). Idaho does not have a formal biodiversity policy, although it has policies related to wildlife habitat and preservation. For instance, the Idaho Forest Practices Act states that it is the policy of the State to encourage forest practices that maintain and enhance *"habitat for wildlife and aquatic life."* (Idaho Code §§38-1302) (Defenders of Wildlife and Center for Wildlife Law 1996). 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 current WS program on biodiversity are minor and not significant nationwide or Statewide (USDA 1994). WS conducts rodent damage management on an extremely small percentage of the land area of the State (see Section 1.1), and the WS take of any wildlife species analyzed in this EA is a small proportion of the total population and insignificant to the viability and health of the population (Chapter 4).

2.3.2 Rodent Damage Management Should Not Occur at Taxpayer Expense, but Should be Fee Based. Funding for WS comes from many sources besides Federal appropriations. Non-Federal sources include State general appropriations, local government funds (County or City), agricultural producers, and private funds which are all applied toward program operations. WS was established by Congress as the program responsible for providing wildlife damage management to the people of the United States. Federal, State and local officials have decided that WS should be conducted by appropriating funds. Additionally, wildlife damage management is an appropriate sphere of activity for government programs, since managing publicly owned wildlife is a governmental responsibility. A commonly voiced argument for publicly funded wildlife damage management is that the public should bear responsibility for damage to private property caused by public wildlife. The protection of agricultural and natural resources, property, and public health and safety will always be conducted by someone because of the need for such a service. A Federal WS program provides a service to agricultural producers, property owners, natural resource managers and public health and safety officials, and conducts an environmentally and biologically sound program in the public's interest.

2.3.3 Human Affectionate-Bonds with Individual Wild Animals. The human attraction to animals has been well documented throughout history which started when humans began domesticating animals. The American public is no exception and today a large percentage of 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.

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/damage and threats to public health or safety caused by rodents insist upon their removal from the property or public location when the rodent populations 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 strongly support removal. Individuals not directly affected by the harm or damage may be supportive, neutral or totally opposed to any removal of wildlife from specific locations or sites. Some people totally opposed to rodent damage management want WS to teach tolerance for rodent damage and threats to public health or safety, and that wildlife should never be killed. Some of the people who oppose removal of wildlife do so because of human-affectionate bonds with individual wildlife. These bonds can be similar to attitudes of a pet owner and result in aesthetic enjoyment.

Idaho WS only conducts rodent damage management at the request of the affected home/property owner or resource manager. If WS received requests for rodent damage management, WS would address the issues/concerns and consideration would be made to explain the reasons why the individual rodent damage management actions would be necessary. Management actions would be carried out in a compassionate and professional manner.

2.3.4 Live-capture and Relocation (Rather Than Killing) of Problem Rodents. Live-capture and relocation may be appropriate in some situations (i.e., if the problem species' population is at very low levels, there is a suitable relocation site, and the additional dollars required for relocation can be obtained.) However, those species that often cause damage problems (i.e., beaver, muskrats, marmots, ground squirrels, pocket gophers, voles and deer mice and other field mice) are relatively abundant in much of the suitable habitat in Idaho, and relocation is not necessary for the maintenance of viable populations. Any decisions on relocating rodents are normally coordinated with IDFG officials. Although relocation is not necessarily precluded, it would in many cases be logistically impractical.

2.3.5 American Indian and Cultural Resource Concerns. 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 to cultural resources on Tribal properties. As required by the National Historic Preservation Act (NHPA) and in consideration of American Indian cultural and archeological interests, the WS program solicited input from the Shoshone-Bannock, Nez Perce, Shoshone-Paiute, Coeur d' Alene, and Kootenai Tribe of Idaho. Each Tribe was requested to identify any cultural concerns relating to the proposed rodent damage management action. None of the Tribes identified any such concerns. The Idaho State Historical Preservation Office (SHPO) indicated that none of the rodent damage management methods constitute "undertakings" as defined by the NHPA (36 CFR Part 800) (S. Neitzel, SHPO, memorandum of concurrence, June 12, 1997).

2.3.6 Rodent Damage Should Be an Accepted Loss -- a Threshold of Loss Should Be Reached Before WS Provides Rodent Damage Management Services. WS is aware of concerns that Federal rodent damage management should not be allowed until economic losses become unacceptable. Although some loss of resources to rodents can be expected and tolerated, WS has the legal direction to respond to requests for assistance, and it is WS' Program policy to aid each requester to minimize losses. WS uses the Decision Model (Slate et al. 1992) discussed in Chapter 3 to determine an appropriate strategy.

In a ruling for *Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie National Forest, et al.*, the United States District Court of Utah upheld the determination that a wildlife damage management program (including rodent damage) may be established based on threatened damage. In part, the court found that a forest supervisor need only show that damage (from predators) is threatened to establish a need for wildlife damage management (United States District Court of Utah, Civil No. 92-C-0052A January 20, 1993). Thus, there is precedent for conducting rodent damage management when damage has not yet occurred but is only threatened.

CHAPTER 3: ALTERNATIVES

3.0 INTRODUCTION

This Chapter consists of 4 parts: 1) an introduction, 2) description of Alternatives considered and analyzed in detail including the Proposed Alternative (Alternative 1), 3) a description of Alternatives considered, but eliminated from detailed analysis, and 4) a table that provides mitigation measures and SOPs for each Alternative.

Alternatives were developed for consideration using the WS Decision Model (Slate et al. 1992), *"Methods of Control"* (USDA 1994, Appendix J) and the *"Risk Assessment of Wildlife Damage Control Methods Used by the USDA Animal Damage Control Program"* (USDA 1994, Appendix P). Five alternatives were recognized, developed, and analyzed in detail and 3 Alternatives (Section 3.5) were considered but not analyzed in detail with rationale. The 5 Alternatives analyzed in detail are:

Alternative 1 - Continue the Current Idaho WS Rodent Damage Management Program: (No Action) (Proposed Alternative). This Alternative consists of the current program of technical assistance and operational rodent damage management by Idaho WS personnel on Federal, State, County, City, Tribal and private lands under Cooperative Agreement and Agreement for Control. The current program direction is primarily for the protection of agricultural resources and property.

Alternative 2 - Continue the Current Rodent Damage Management Program, but Non-lethal Required Before Lethal Control. Before lethal control could be used, non-lethal methods must be implemented and determined to be ineffective in reducing or stopping damage.

Alternative 3 - Continue the Current Rodent Damage Management Program, but Without the use of Rodenticides or Other Chemicals. This Alternative would preclude WS' use of rodenticides, repellents, binary explosives and other chemicals. Other damage management methods would be allowed as long as they were not a chemical compound.

Alternative 4 - Idaho WS Technical Assistance Rodent Damage Management Program Only. Under this Alternative, Idaho WS would not conduct operational rodent damage management in Idaho. The entire program would consist of only technical assistance/recommendations to requesters.

Alternative 5 - No Idaho WS Rodent Damage Management Program. This Alternative would terminate WS' role in rodent damage management in Idaho.

3.1 DESCRIPTION OF THE ALTERNATIVES

3.1.1 Alternative 1 - Continue the Current Idaho WS Rodent Damage Management Program: (No Action) (Proposed Alternative).

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 CEQ (1981).

Overview: The No Action Alternative (Proposed Alternative) would continue the current Idaho WS rodent damage management program primarily for the protection of agricultural resources and property, but also to safeguard public health and safety. The current program is a collection of cooperative programs with private individuals and associations. Idaho WS conducts technical assistance and operational preventive rodent damage management (as indicated by potential threats to aviation resulting from the presence of rodents or lagomorphs or disease threats to humans, animals or wildlife) and corrective rodent damage management (in response to current loss) on private lands under Cooperative Agreements and Agreements for Control. All damage management is based on interagency relationships, which require close

coordination and cooperation because of overlapping authorities and responsibilities. Idaho WS has MOUs with the BLM, NFS, IDFG and IDL and Cooperative Agreements with Federal, State, County, and City governments, and individuals to conduct rodent damage management.

Before rodent damage management would be conducted on private lands, *Agreements for Control on Private Property* are signed with the landowner or manager that describe the methods to be used and the species to be managed. For Federal, State, County, City and Tribal lands, Idaho WS would coordinate damage management with the appropriate land management agency. Damage management would be directed toward localized populations or groups and/or individual animals, depending on the circumstances.

3.1.2 Alternative 2 - Continue the Current Rodent Damage Management Program, but Non-lethal Required Before Lethal Control.

This Alternative would not allow for the use of lethal methods by WS until non-lethal methods have been employed in a given damage situation and found to be ineffective or inadequate. No preventive lethal damage management would be allowed. The public and cooperators, however, would still have the option of implementing their own lethal rodent damage management measures.

3.1.3 Alternative 3 - Continue the Current Rodent Damage Management Program, but Without the use of Rodenticides or Other Chemicals.

This Alternative would preclude WS' use of aluminum and zinc phosphide, gas cartridges and other rodenticides, chemical repellents, euthanasia and immobilization drugs, and binary explosives used to breach beaver dams. Other damage management methods would be allowed as long as they were not a rodenticide or chemical in nature.

3.1.4 Alternative 4 - Idaho WS Technical Assistance Rodent Damage Management Program Only.

This Alternative would eliminate WS operational rodent damage management in Idaho. Idaho WS personnel would only provide technical assistance and make recommendations when requested. However, private landowners, contractors, or others could conduct their own damage management on federal, State, county and private lands.

The *"technical assistance only"* Alternative would place the immediate burden of operational damage management work on other Federal, State or County agencies and property owners. Individuals experiencing rodent damage would, independently or with Idaho WS recommendations, carry out and fund damage management activities. Individuals or agencies could implement damage management as part of the cost of doing business or assume a more active role in providing operational damage management. If this Alternative were selected, Idaho WS could not direct how State or County agencies or property owners would implement damage management. Some agencies or property owners may choose not to take action to resolve damage while other situations may warrant the use of legally available management methods because of public demands.

3.1.5 Alternative 5 - No Idaho WS Rodent Damage Management Program.

This Alternative would eliminate all WS rodent damage management (operational and technical assistance) in Idaho. However, rodent damage management activities would continue to be conducted in Idaho because of the need for this type of expertise and service. Federal, Idaho, County and City Governments, State and/or County Agricultural organizations, private pest control operators and contractors, the public and possibly other entities, would fill the void left by WS and would continue or begin implementing rodent damage management. Idaho WS would not be available to provide technical assistance or make recommendations to these groups or organizations. Due to interest in this Alternative, an analysis has been included. A *"No Program"* Alternative was also evaluated in USDA (1994).

3.2 RODENT DAMAGE MANAGEMENT METHODOLOGIES AND STRATEGIES USED BY IDAHO WS

Rodent damage management methods and strategies vary according to the resource being protected, species involved, location of the damage, time of year, and other factors. A management strategy designed to protect agricultural or natural resources could differ significantly from one designed to protect property or public health and safety. However, WS damage management efforts are site specific and targeted to a specific or a documented damage problem.

The strategies and methodologies described in this Chapter are common to Alternatives 1 and 2 based on practical and legal strategies supported by the WS Decision Model (Slate et al. 1992). Under Alternative 3, WS personnel could conduct rodent damage management, but only by using mechanical methods. No use of pesticides, repellents, binary explosives or other chemicals would be permitted. Alternative 4 would only allow WS personnel to provide technical assistance and recommendations to requesters based on practical and legal strategies supported by the WS Decision Model (Slate et al. 1992). Alternative 5 would terminate both WS technical assistance and operational rodent damage management in Idaho.

3.2.1 Integrated Wildlife Damage Management.

During more than 80 years of resolving wildlife damage problems, WS has considered, developed and used numerous methods of managing damage problems (USDA 1994). 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 to reduce damage using the WS Decision Model (Slate et al. 1992) to develop damage management strategies (see page 3-4).

The philosophy behind IWDM is to implement effective management techniques, in a cost-effective manner while minimizing the potentially harmful effects to 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 each specific situation. IWDM may incorporate cultural practices, localized habitat and animal behavior modification, removal of individual animals, local population reduction, or any combination of these, depending on the characteristics of the specific damage problem.

3.2.2 Integrated Rodent Damage Management Strategies Used by WS.

- **Technical Assistance Recommendations** (implementation is the responsibility of the requester): WS personnel provide information, instructional sessions, demonstrations and advice on available rodent damage management techniques. Technical assistance includes demonstrations on the proper use of management devices (cage traps, foothold traps, exclusionary devices, etc.) and information on wildlife habits, habitat management and animal behavior modification. Technical assistance is generally provided following an on-site visit or verbal consultation with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems; these strategies are based on factors such as need and practical application. Technical assistance may require substantial effort by WS personnel in the decision making process, but the field application is the responsibility of the requester.

- **Operational Damage Management Assistance** (management conducted or supervised by WS personnel): Operational damage management assistance is implemented when the problem cannot be resolved through technical assistance and when agreements provide for WS operational assistance. The initial investigation explores and defines the nature and history of the problem, extent of damage and the species or individuals responsible for the damage. Professional skills of WS personnel are often required to resolve problems effectively and safely, especially if restricted-use 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 (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 information, conduct demonstrations, or take action to prevent additional losses from recurring.

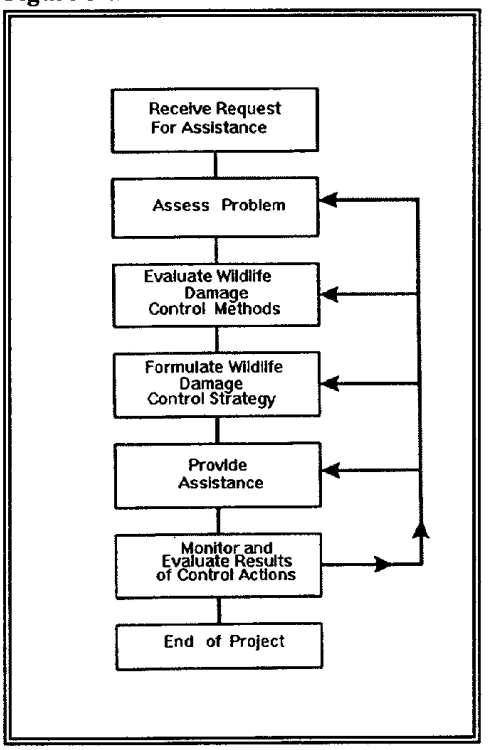
3.2.3 Decision Making.

The decision making procedures used by WS personnel to determine management strategies or methods applied to specific damage problems can be found in USDA (1994, Appendix N).

The WS Decision Model (Figure 3-1) 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
- Costs of damage management option[1]

Figure 3-1. WS Decision Model.



The decision making[2] process is a procedure for evaluating and responding to damage complaints. WS personnel are frequently contacted after requesters have tried non-lethal techniques and found them to be inadequate for reducing damage to an acceptable level. Personnel assess the problem, methods are evaluated for their availability (legal and administrative) and suitability based on biological, economic and social considerations. Following this evaluation, the methods deemed to be practical for the situations are formed into a management strategy. After the management strategy has been implemented, monitoring and evaluation of the strategy is conducted to assess the effectiveness of the strategy. If the strategy is effective, the present need for management is ended.

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

[2]WS Decision making is not a written process but a mental problem-solving process common to most, if not all professionals to determine appropriate actions to take.

When damage continues intermittently over time, WS personnel and the requester monitor and re-evaluate the situation. If one method or combination of methods fail to stop damage, a different strategy is implemented. In terms of the WS Decision Model (Slate et al. 1992), most damage management efforts consist of a continuous feedback loop between receiving the request and monitoring the results, with the damage management strategy re-evaluated and revised as needed.

3.3 RODENT DAMAGE MANAGEMENT METHODS USED OR RECOMMENDED BY IDAHO WS

USDA (1994, 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 rodent damage to agricultural and natural resources, property and public health and safety. A listing and more detailed description of the methods used by Idaho WS for rodent damage management is found in Appendix D.

3.3.1 Mechanical Rodent Damage Management Methods.

Non-lethal methods are those which do not normally cause the direct death of the target animal. WS endorses the use of non-lethal methods and preference is given to non-lethal methods then practical and effective.

Habitat Management refers to localized vegetation/habitat manipulation to reduce the carrying capacity or attractiveness of an area for rodents. Habitat management may also involve manipulating beaver impoundment water levels to reduce damage or conflict caused by flooding.

Cultural Methods are similar to habitat management/environmental manipulation, but differ in that the manipulation is directed towards domestic plants/crops and stored foods/grains. Selecting and planting crops that are less susceptible to rodent damage or modifying planting schedules during low rodent populations can sometimes help lessen potential damage from rodents.

Exclusion involves placing or constructing a structure, barrier or device that prevents rodents from gaining access to protected resources.

Abrasives are materials or substrates that can discourage, reduce or prevent gnawing behavior of rodents.

Cage Traps are generally constructed of wire mesh and are live capture traps. They pose minimal risk to humans, pets and other non-target animals, and they allow for on-site release or relocation of animals.

Hancock Traps are a specific type of cage trap designed to live-capture beaver for relocation or later disposition.

Foothold Traps can be modified by padding the jaws and reducing the gripping tension to effectively live-capture a variety of mammals, including larger-sized rodent species. Effective trap placement and use of appropriate lures by trained WS personnel contribute to the foothold trap's selectivity.

Snares are capture devices consisting of a cable loop and a locking device that is placed in travel ways. Most snares are also equipped with a swivel to minimize cable twisting and breakage.

Pond Levelers are installed in beaver dams to regulate and reduce the volume of water the pond will hold and can be effective in reducing flooding in certain situations.

Beaver Dam Breaching involves the removal of debris deposited by beavers that impedes the flow of water. Beaver dams can be breached using a hand implement such as a potato rake or shovel, or sometimes heavy equipment such as a backhoe can be used. For information on the use of binary explosives to breach dams, see the CHEMICAL METHODS section below.

Lethal methods, when applied, are devices or techniques developed or designed that result in the death of the target rodent.

Shooting is selective for the target species and may involve the use of spotlights and either a shotgun, rim or center-fire rifle, or air rifle.

Sport Hunting and Trapping are sometimes recommended by WS as a viable damage management method when the target species can be legally hunted or harvested by the public.

Body-Gripping/Quick-kill and Snap Traps are kill-style traps designed to cause the quick death of the animal that activates the trap.

Glue Boards/Trays are widely used indoors by homeowners, food processors and pest management professionals in attempts to control rodents, particular mice.

Foothold Traps and Snares are often considered non-lethal capture devices because they can be used to restrain a captured animal until it can be euthanized through the use of other methods or released. However, foothold traps and snares can be set in a manner that produces death to the captured animal, such as incorporating a drowning rig to a trap or snare for beaver, placing a "kill pole" near a snare, or by purposely catching a small rodent to the neck.

3.3.2 Chemical Rodent Damage Management Methods.

Chemicals used by Idaho WS are registered under FIFRA and administered by the EPA and the ISDA, and are approved by the Food and Drug Administration (FDA) or regulated by the Federal Bureau of Alcohol, Tobacco and Firearms (ATF) and Drug Enforcement Administration (DEA) or Occupational Safety and Health Administration (OSHA). All WS personnel in Idaho who apply or supervise the application of restricted-use pesticides are certified as "Professional Applicators" by the ISDA. WS personnel who utilize chemical immobilization and euthanasia drugs are certified in the appropriate categories of compounds and agents. No chemicals are used on public or private lands without authorization from the land management agency or property owner/manager. Chemical methods currently authorized for use for rodent damage management in Idaho are rodenticides (e.g., zinc phosphide, various anticoagulants, strychnine); fumigants (e.g., gas cartridges, aluminum phosphide); binary explosives; euthanasia agents (e.g., sodium pentobarbital, potassium chloride, CO_2) and immobilization drugs (e.g., Telazol, ketamine, xylazine), and repellent compounds. A complete risk assessment (including exposure assessment, risk characterization, environmental fate, toxicology, etc.) for rodenticides used by WS can be found in Appendix P of USDA (1994).

Non-lethal methods are products and chemicals, that when applied, do not normally result in the direct death of the target animal. WS endorses the use of non-lethal methods and preference is given to non-lethal methods then practical and effective.

Repellents are chemical formulations that discourage or disrupt particular behaviors in rodents.

Binary Explosives are sometimes used by WS to breach beaver dams after beaver have been removed or moved from a damage situation.

Immobilization Drugs are FDA and DEA registered and regulated chemicals authorized for immobilization by WS should a beaver, porcupine or other rodent need sedating during relocation or transporting.

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

Grain/Vegetable Bait Rodenticides are a group of chemical rodenticides that normally require the target animal to ingest the toxicant. To encourage ingestion, toxicants are introduced to the rodent in baits or foods that are attractive to the rodent.

Fumigants are lethal gases that are introduced to rodent burrows or cavities and inhaled by the target rodent.

Carbon Dioxide (CO_2) gas is sometimes used to euthanize individual rodents which are captured in live traps and when relocation is not a feasible option.

Chemical Drug Euthanasia are FDA approved chemicals administered to rodents to induce humane death.

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

3.4.1 Harassment Activities have generally proven ineffective in resolving rodent damage problems. 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 under field conditions, removal of food supplies to discourage rodent activity is generally not economically feasible nor ecologically desirable.

3.4.2 Electromagnetic and Ultrasonic Repellents and Electronic Frightening Devices have been researched, developed and marketed over the past 30 years (Shumake 1997). Electromagnetic repellents are advertised as capable of generating their own magnetic fields or distorting the earth's magnetic fields in such a manner that animal pest species stop eating, drinking, and reproducing. There are no efficacy data that exist to support the electromagnetic pest control concept or theory (Shumake 1997) and the EPA (1980) has indicated definitively that such devices have no effect on feeding, drinking, mating or infestation patterns. Ultrasonic devices operate above the human-hearing frequency range and have been commercially marketed to prevent rodent invasions, repel rodents in existing infestations, or used to enhance the effectiveness of conventional methods. Controlled efficacy test protocols have indicated only marginal repellency effects with 6 commercial ultrasonic devices. Test results indicated that only a 30-50% reduction in rodent movement activity was recorded with no significant repellency effects beyond 3 to 7 days. Rapid habituation was also noticed (Shumake 1997). Electronic frightening devices (artificial light and auditory tapes) rarely work for more than a few days or at most a week (Koehler et al. 1990, Nolte et al. 2003).

3.4.3 Reproductive Control by chemical or surgical induction to inhibit reproduction as a method for controlling nuisance beaver populations has been reviewed and is contained in Novak (1987). 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. Surgical sterilization would also be impractical for other rodents analyzed in this EA. Currently, no chemical reproductive inhibitors are legally available for use on any of the species covered by this EA. For these reasons, this method will not be considered further by Idaho WS.

3.4.4 Biological Control is the introduction of a species or disease to control another species' population and has occurred throughout the world. Unfortunately many of the introduced species become pests themselves. For example, in Hawaii, the Indian mongoose (*Herpestes auropunctatus*) was brought in to control rats (*Rattus* spp.), but wound up causing declines in many native Hawaiian bird species. In some cases where chronic rodent problems persist, farmers are encouraged to attract predator species, such as raptors, to their property by constructing perch poles or modifying surrounding habitat. However, this method is normally not feasible or practical because: 1) the number of rodents potentially consumed by these predators may only have a small impact on the overall population, and 2) raptors may select prey species which are desirable and beneficial to the resource owner rather than preying exclusively on the species causing damage.

3.5 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL, WITH RATIONALE

3.5.1 Compensation for Rodent Damage Losses would require the establishment of a system to reimburse resource owners for damages. Under such an Alternative, WS would not provide any operational damage management control or technical assistance. Aside from lack of legal authority, analysis of this Alternative in USDA (1994) indicates that the concept has many drawbacks such as: 1) it would require larger expenditures of money and manpower to investigate and validate all losses, and to determine and administer appropriate compensation, 2) it would be difficult, if not impossible, to assess and confirm losses in a timely manner for all requests, and, therefore, many losses could not be verified and would go uncompensated, 3) compensation would give little incentive to resource owners to limit damage by implementing rodent damage management strategies and methods, 4) not all resource owners would rely completely on a compensation program and rodent damage management activities including lethal damage management would likely continue as permitted by State law, 5) compensation would not be practical for public health and safety problems, and 6) full market value of the damaged resource would not likely be compensated.

3.5.2 Bounties are payment of funds for killing rodents suspected of causing economic losses have not been supported by most wildlife professionals for many years (Latham 1960). WS concurs with these agencies and wildlife professionals because of several inherent drawbacks and inadequacies in the payment of bounties, including: 1) bounties are generally ineffective at controlling damage, especially over a wide area such as Idaho, 2) circumstances surrounding the take of animals are typically arbitrary and completely unregulated, 3) it is difficult or impossible to assure that the animals claimed for bounty were taken from the damage management area, and 4) WS does not have the authority to establish a bounty program.

3.5.3 Eradication and Long Term Population Suppression would direct all WS Program efforts toward total long term elimination of select rodents in entire areas in Idaho. The eradication of rodents is not a desired goal of State agencies, although these species may be taken by the general public in areas where they are causing damage. Eradication as a general objective for rodent damage management, will not be considered by WS in detail because: 1) WS opposes eradication of any native wildlife species, 2) IDFG and ISDA oppose eradication of any native Idaho wildlife species, 3) the eradication of a native species or local population would be extremely difficult, if not impossible to accomplish, and cost-prohibitive in most situations, and 4) eradication is not acceptable to most members of the public.

Suppression would direct Idaho WS efforts toward managed reduction of certain problem populations or groups. When a large number of requests for rodent damage management are generated from a localized area, WS would consider suppression of the local population or groups of the offending species, if appropriate. However, it is not realistic, practical or allowable under present WS policy to consider large-scale population suppression as the basis of the WS Program. Typically, WS activities in Idaho are conducted on a small portion of the area inhabited by rodents, and on a very small Statewide area (< 0.1%, see Section 1.1).

3.6 MITIGATION AND SOPs FOR RODENT DAMAGE MANAGEMENT

Mitigation measures are any feature of an action that serves to prevent, reduce or compensate for impacts that otherwise might result from that action. The current WS program, nationwide and in Idaho, uses many such mitigation measures and these are discussed in detail in Chapter 5 of USDA (1994). The following mitigating measures apply to some or all of the Alternatives, as indicated by an "X" in the column on the right side of Table 3-1.

Table 3-1. Mitigation Measures.

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 WS Decision Model (Slate et al. 1992) is used to identify effective biologically and ecologically sound rodent damage management strategies and their impacts.	X	X	X	X	
Captured non-target animals are released unless it is determined by the Idaho WS personnel that the animal would not survive.	X	X	X		
The use of traps and snares conform to current laws and regulations administered by IDFG and Idaho WS policy.	X	X	X		
Euthanasia procedures approved by the AVMA that cause minimal pain are used.	X	X	X		
Drugs are used according to the DEA, FDA and WS program policies and directives and procedures are followed that do not cause pain.	X	X			
All cage traps would be maintained with food and/or water, as appropriate, if left unattended and unchecked for more than 48 hours.	X	X	X		
The use of newly-developed, proven, non-lethal methods would be encouraged when appropriate.	X	X	X	X	
Safety Concerns Regarding WS' Rodent Damage Management Methods					
All rodenticides are registered with the EPA and ISDA.	X	X		X	
EPA-approved label directions would be followed by WS employees.	X	X			
The WS Decision Model (Slate et al. 1992), designed to identify the most appropriate rodent damage management strategies and their impacts, is used to determine management strategies.	X	X		X	
Most rodenticides and live traps would be restricted to private lands.	X	X			
Rodent damage management conducted on public lands would be coordinated with the management agency.	X	X	X		
WS employees that use rodenticides are trained to use each material and are certified to use pesticides under EPA approved certification programs.	X	X			

MITIGATION MEASURES	ALTERNATIVES				
	1	2	3	4	5
WS employees, who use rodenticides, participate in ISDA approved continuing education to keep abreast of developments and maintain their certifications.	X	X			
Foothold traps and snares would be placed so that captured animals would not be readily visible from any road or public area.	X	X	X		
Rodenticide use, storage and disposal conforms to label instructions and other applicable laws and regulations, and Executive Orders 12898 and 13045.	X	X			
Material Safety Data Sheets for rodenticides are provided to all WS personnel involved with specific rodent damage management activities.	X	X			
Concerns about Affects on T/E Species, Species of Special Concern and Non-target Species.					
WS has consulted with the USFWS regarding the nation-wide program and would continue to implement all applicable measures identified by the USFWS to ensure protection of T/E species.	X	X	X	X	
Idaho WS' kill is considered with the Statewide "*Total Harvest*" (Idaho WS take and fur harvest) when estimating the impact on wildlife species.	X	X	X		
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		
Snares equipped with break-away locks would be used on land for beaver in areas identified by the USFWS as "occupied gray wolf range."	X	X	X		
No ground squirrel control operations would be conducted in identified ranges of northern and southern Idaho ground squirrels without first conferring with the USFWS.	X	X	X		
All foothold traps equal to or larger than the #3 set on dry land would be checked at least daily in areas identified by the USFWS as "occupied gray wolf range."	X	X	X		
WS personnel are trained and experienced to select the most appropriate method for taking targeted animals and excluding non-target species.	X	X	X	X	

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

Chapter 4 provides information for making informed decisions on the Idaho rodent damage management program outlined in Chapter 1 and the issues discussed in Chapter 2. This Chapter consists of: 1) consistent assessment of the Alternatives with existing management plans, 2) analyses of the environmental consequences for each Alternative, and 3) analyses of each Alternative against the issues considered in detail.

4.0.1 Issues Driving the Analysis

The IDFG, ISDA, IDHW, DEQ, USACE and other cooperating agencies helped determine that the below issues should be considered in the decision-making process for this EA to help compare the impacts of the various damage reduction strategies.

4.0.1.1 Cumulative Effects of WS Rodent Damage Management on Target Rodent Species Populations. Would there be potential adverse impacts on target species populations in Idaho from WS rodent damage management activities?

4.0.1.2 Efficacy and Selectivity of Damage Management Strategies. What is the relative effectiveness of the proposed strategies to reduce rodent damage to agricultural and natural resources, property and human health and safety? Do they meet the objectives of the proposal?

4.0.1.3 Impacts on Non-target Species. Would there be potential impacts to other species not targeted in a rodent damage management program?

4.0.1.4 Impacts on T/E Species. Would there be adverse or beneficial impacts on Federally protected species?

4.0.1.5 Public or Pet Health and Safety. How might the action Alternatives adversely affect public or pet health and safety?

4.0.1.6 Impacts of Beaver Dam Breaching on Wetland Wildlife Habitat Areas. Would there be potential adverse affects to wetland habitats from breaching beaver dams?

4.1 EVALUATION OF SIGNIFICANCE

Each Alternative will be evaluated under each major issue and the direct, indirect and cumulative impacts will be analyzed. NEPA describes the elements that determine whether or not an impact is *"significant."* Significance is dependent upon the context and intensity of the action. The following factors were used to evaluate the significance of impacts in this EA that relate to context and intensity (adapted from USDA 1994) for this proposal:

4.1.1 Magnitude of the Impact. The *"magnitude"* analysis for this EA follows the process described in USDA (1994). Magnitude is defined in USDA (1994) as *". . . a measure of the number of animals killed in relation to their abundance."*

4.1.2 Duration and Frequency of the Impact The duration of any impact is measured by the length of time (number of hours or days, seasonal, year round, etc.) any given control method is exposed to the environment with the intent of capturing or killing a target animal. The frequency of impact is the predicted number of times any given control method is placed and exposed to the environment with the intent of capturing or killing a target animal.

4.1.3 Likelihood of the Impact. This factor evaluates any given set of circumstances against the probability of occurrence. Experience in rodent damage management, knowledge of the biology, ecology, behavior, etc. of the target and non-target animals and their environments, and applying professional judgement are utilized in predicting the intensity and frequency of impact.

4.1.4 Geographic Extent. Actions are generally limited to the immediate project area, and under *"Agreement for Control,"* MOU or other comparable document. However, implementation of effective strategies could occur in other areas in Idaho adversely affected by rodent damage.

4.1.5 Legal Status. This element evaluates the legal status of target species that rodent damage management would be directed and considers Federal and State laws, regulations and policies that protect the species and affected resource. Two rodent species analyzed in this EA are managed as furbearers, but most rodents are classified as "unprotected" species with no closed season or bag limit. In most situations where rodents are causing damage, there is no legal protection and they can be taken anytime by any legal means. However, Idaho citizens experiencing problems with rodents should be familiar with Federal, State, County, Tribal and local laws, regulations, policies, guidelines and other applicable legal statues, ordinances, etc.

4.2 ALTERNATIVE CONSISTENCY WITH FOREST SERVICE LRMPs AND BLM RMPs

Currently, no rodent damage management is conducted by WS on Forest Service or BLM lands. Before an Alternative can be considered for implementation on Federal lands, it must be consistent with land management and/or resource management plans. In the Forest Service, these management plans are termed LRMPs or more commonly "*Forest Plans*," and on BLM lands, the equivalent documents are called RMPs or in some older documents, MFPs. If the selected Alternative is consistent with LRMPs, RMPs or MFPs no further action would be necessary.

If an Alternative that is inconsistent with LRMPs, RMPs or MFPs is selected in the decision process, the land management agency could amend their plans to be consistent with this EA. The Decision would not be implemented on Federal lands until all inconsistencies are resolved either through amendment of the plans or modification of the selected Alternative(s).

4.3 ENVIRONMENTAL CONSEQUENCES

This section analyzes the environmental consequences using Alternative 1 (the current program) as the baseline to compare to the other Alternatives in determining if the real or potential impacts are low, moderate, high or the same. Table 4-12 (page 4-30) summarizes a comparison of the issues and impacts of each Alternative.

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

4.3.1 Social and Recreational Concerns are discussed within this document as they relate to the issues and are also discussed in USDA (1994).

4.3.2 Cumulative and Unavoidable Impacts are discussed in relationship to each of the key 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. It is not anticipated that the Proposed Alternative will result in any adverse cumulative impacts to any wildlife or T/E species populations (see Section 4.4.1 and 4.4.2). The areas that would receive rodent damage management are areas where WS has been requested by a second party (e.g., the landowner or manager) to provide damage management and a signed Cooperative Agreement, Agreement for Control, or other

comparable document is in place. Currently, WS has Agreements to conduct rodent damage management on about 452,483 acres. However, Idaho WS generally only conducts rodent damage management on a small portion or acreage of the properties under Agreement in any one year. In FY02, 219 rodent damage management projects were conducted on properties covering an area of about 46,673 acres or about 10% of the area under Agreement and about 0.09% of the land area of Idaho (MIS 2002) and impacts to target species populations would be minor (see Section 1.1). WS also consults with the IDFG and USFWS concerning classified wildlife in Idaho, including T/E species, to insure that WS activities do not adversely affect non-target wildlife populations. Analysis of the Idaho WS "*take*" during FY00, FY01 and FY02 in combination with other mortality, indicates that cumulative impacts are not significant (see Section 4.4). It is not anticipated that the Idaho WS program would result in any adverse cumulative impacts to T/E species and as analyzed in this EA, rodent damage management does not jeopardize public health and safety.

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

4.4 ISSUES ANALYZED IN DETAIL

Issues that will be analyzed in detail will be limited primarily to those rodent species most often taken during WS' rodent damage management activities. This includes marmots, beaver and ground squirrels. Potential impacts to muskrats, jackrabbits, porcupines, pocket gophers, deer mice and field, and voles will also be analyzed in detail in should WS have to respond to increased amount of damage management directed at these species or in the event WS be requested to respond to a human health hazard, disease or safety emergency.

NEPA requires Federal agencies to determine whether their actions would have a *"significant impact on the quality of the human environment."* A declining population of a resident wildlife species does not necessarily equate to a *"significant impact"* as defined by NEPA if the decline is collectively condoned or desired by the people that live in the affected human population. It is reasonable and proper to rely on the representative form of government within a State as the established mechanism for determining the *"collective"* desires or endorsements of the people of a State. WS abides by this philosophy and defers to the collective desires of the people of the State of Idaho by complying with State laws and regulations that govern the take or removal of resident wildlife. Although the analysis herein indicates rodent populations are not being impacted to the point of causing a population decline, if at some point in the future they are, then such a decline would not necessarily constitute a *"significant"* impact as defined by NEPA so long as the actions that cause the decline are in accordance with State law, and with the desires of the people of Idaho.

4.4.1 Concerns about the Cumulative Effects of WS Rodent Damage Management on Target Rodent Species Populations

In assessing the overall impacts and cumulative effects, empirical and reasonable sources of mortality of the target species were used in analyzing this issue[1]. Data from these sources will rely on the most current and best available information. For some sources of species' mortality, quantifying the individual number of mortalities is estimated, but at a minimum, the absolute number of target species taken or killed by WS will be used.

Quantifying wildlife densities is not a precise science. Wildlife biologists and managers must estimate densities by applying experience and professional judgement to account for unknowns and variables, such

[1]It is recognized that other mortality (e.g., disease, predation, starvation, etc.) occurs throughout Idaho but there are no reliable systems that exist for recording this information.

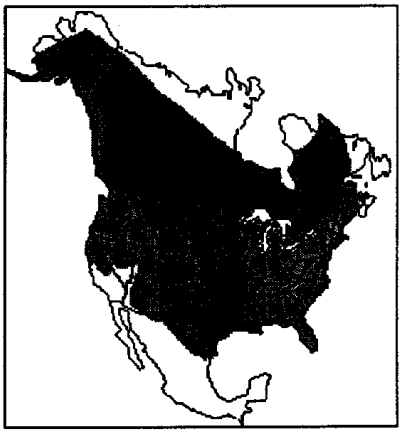
as the ability of habitats to support populations and recruitment. The IDFG believes that wildlife populations in Idaho can fluctuate considerably from year to year due to factors such as weather, disease, food resources, predation, etc. As a result, any population estimate made for any given point in time could change rapidly if conditions change. Population assessments used in analyzing this issue are based on population trends and/or local population status and impact assessments provided from Federal and State natural resource agency personnel and university faculty to insure that no adverse rodent population impacts occur.

4.4.1.1 Alternative 1 - Continue the Current Idaho WS Rodent Damage Management Program: (No Action) (Proposed Alternative).

BEAVER

Biology and Population Information. In Idaho, the beaver population has exhibited a similar growth pattern found in many States and Canadian provinces. This beaver population expansion has had a negative economic impact in North America (Novak 1987). Prior to the 1970s, Idaho WS received few requests for assistance regarding beaver damage, but, since that time, requests for WS assistance have increased.

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



Beavers have only a few natural predators aside from humans, including coyotes, bobcats, river otters, and mink, who prey on young beaver (Miller and Yarrow 1994). In some areas of Idaho, bears, mountain lions, wolves, Canada lynx and wolverines may occasionally prey on beaver.

The beaver is the sole representative of the family *Castoridae* in North America, occupying a wide range of aquatic habitats and is widely distributed (Figure 4-1). Water is the most important feature in the daily life for beaver. Ideal beaver habitats include ponds, small lakes with muddy bottoms, and meandering streams although they occupy artificial ponds, reservoirs and drainage ditches if food is available. Home range is greatly affected by the water system where the beaver family lives. Small ponds and potholes may contain only one family, whereas, rivers, lakes and reservoirs may contain several family units. Home range on streams has been reported to be about 0.5 mi of stream (Busher et al. 1983, Bergerud and Miller 1977).

Beaver occur mostly in family groups that consist of two adult parents, offspring from the current breeding season and yearlings from the previous breeding season, generally totaling 2-6 individuals (Novak 1987). Beaver generally mate during January to March, with a gestation period from 105-107 days. Male and female beaver do not reach sexual maturity until about 21 months (Woodward 1977) with each breeding female producing 1 litter per year (Novak 1977, Wigley et al. 1983). Average litter size in North America is 3-4 offspring, however litter size can vary because of food availability (Longley and Moyle 1963, Huey 1956, Gunson 1970), elevation (Rutherford 1964, Harper 1968), weight of female (Wigley et al. 1983, Gunson 1970) and age (Henry and Bookout 1969, Gunson 1970, Payne 1984a). Gunson (1970) and Payne (1984a) concluded that beaver fecundity was also density-dependent.

An important factor about beavers is their territoriality. A colony generally consists of 4-8 related beaver, who resist additions or outsiders to the colony. Sub-adult beaver commonly disperse from the colony shortly after they become sexually mature, at about 2 years old. They often move to another area to begin a new colony and claim that territory. However, some beaver become solitary inhabiting old abandoned ponds, farm ponds or other water ways, if available.

The total number of beaver in an area depends on the number of families (colonies) found there and the average number of individuals per family. Beaver abundance has been reported in terms of families per mile of stream or per square mile of habitat. Novak (1987) reported beaver family abundance as ranging from 0.5-2.4 families/mi. of stream. Densities reported in terms of families/mi^2 have been reported to range from 0.24-6.3 (Novak 1987).

There have been few studies of adult beaver mortality factors, but some of the mortality factors that have been identified are trapping (Henry and Bookout 1969, Novak 1977, Boyce 1981, Payne 1984b), severe winter weather (Lyons 1979), under ice starvation and malnutrition (Aleksiuk 1968, Bergerud and Miller 1977, Payne 1984b), water fluctuations and floods (Kennelly and Lyons 1983), and falling trees (Ellarson and Hickey 1952, Hitchcock 1954). Seven-18% of the beaver found by Payne (1984b) had shotgun wounds. Estimates of trapping mortality on various beaver populations were 25-70% (Hendry 1966), 13-19% (Henry and Bookout 1969), 43% (Novak 1977), 20% (Boyce 1981) and 13-25% (Payne 1984b). Estimated beaver fur harvest reported by the IDFG from 1976 (1976-1977 winter harvest dates) to 2001 (2001-2002 harvest season) shows a average annual harvest of 4,924 beaver (IDFG 1990, 1997, 1998, 1999, 2000, 2001, 2002a, 2002b) (1976-1983 data are based on histogram estimates), with a low of 2,163 beaver harvested in 1999 to a high of 10,800 beaver harvested in 1980. During this time period, fluctuation in estimated annual harvest is directly linked to the average pelt price. When fur prices are high, increased harvest occurs, conversely, when prices are weak, low levels of harvest result. In 1990, the average beaver pelt harvested in Idaho sold for $8.40, whereas in 1980, the average beaver pelt sold for around $28.00. The past 10-year annual average price paid for Idaho beaver pelts was $14.29 each.

Tularemia has also periodically reduced beaver populations across areas of their range. The effect of predators on beaver populations is variable and dependent on the species of predator and alternate prey bases.

Legal Status. Beavers are classified as "furbearers" by the IDFG, and harvest is regulated. A valid trapping license is required by the public. Controlling beaver damage by the public on lands they own or lease is allowed by the IDFG through the issuance of a "depredation permit." Idaho Code 36-1107, provides an exception for control of damage to property by beaver. An MOU between IDFG and Idaho State Animal Damage Control Board authorizes WS to respond to requests for assistance with beaver damage and to take protected wildlife to prevent or reduce damage to agriculture, natural resources and property and to minimize threats to human health and safety.

Population Impact Analysis. Yeager and Rutherford (1957) gave various harvest rates depending on habitat conditions and management objectives. Annual harvest quotas in Ontario, after many years of study, are set at 30% of the population regardless of habitat type (Novak 1977). Henry and Bookout (1969) calculated a net rate of potential population increase in beavers at 49% annually, and determined that about 33% of the beaver population could be harvested annually with the population maintaining itself at the current level. USDA (1994) determined that up to 30% of the beaver population could be removed and maintain a stable population if water conditions remained favorable.

D. Kemner (IDFG, Furbearer Biologist, pers. comm., 2003) estimates that the 2003 statewide beaver population is "stable" when compared with the 2002 population, and that it remains healthy and viable throughout the State where water is sufficient. Other IDFG biologists (Table 4-1.) report that the beaver population trend has increased for the previous 3 years. IDFG et al. (1997) describes the beaver population in Idaho as "demonstrably widespread, abundant and secure." Based on the number of beaver killed by WS in FY00, FY01 and FY02 (54, 93 and 119 beaver, respectively), the impact on the statewide beaver population, including "beaver taken during trapping season" and "other estimated take" is minimal. Therefore, WS' impact on the Idaho beaver population, even with possible under-estimated "*Other Take*," would not adversely affect the overall beaver population in Idaho. The cumulative impact on the beaver population is therefore of a low magnitude.

Table 4-1. Idaho Beaver Population and Harvest Data (MIS 2000, 2001, 2002).

Beaver Population Statistics	FY 2000	FY 2001	FY 2002
Population Trend[1]	Increasing	Increasing	Increasing
WS Kill	54	95[2]	119
Estimated Beaver Taken During Sport Trapping	2,163[3]	2,257[3]	2,780[3]
WS' Kill as a % of the Sport Trapping	2.5%	4.2%	4.3%
Estimated Other Take[4]	200	200	200

[1]Population trends provided by the IDFG (W. Melquist, Wildlife Biologist, IDFG, pers. comm., 2000 and 2001, and G. Patton, Wildlife Biologist, IDFG, pers. comm., 2002) and the [redacted], pers. comm., 2001 and 2002). Trend data are for calendar year.

[2] Two beaver were live-captured, relocated and released unharmed.

[3] Data provided for 2000, 2001 and 2002 are from harvest records compiled during the regular sport trapping seasons for 1999-00 and 2000-01 and 2001-02, respectively (IDFG 2001, 2002a, 2002b). Includes only the reported number of beaver harvested during the legal trapping season.

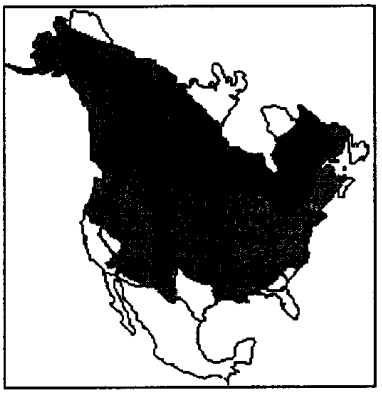
[4] "Other Estimated Take" includes the estimated number of beaver killed through depredation permits and nuisance/commercial permits issued by IDFG to individuals and businesses for removing beavers causing damage or nuisances during periods outside the legal trapping season (D. Kemner, IDFG, pers. comm., 2003).

MUSKRAT

Biology and Population Information. The muskrat is a native North American aquatic rodent and is the largest microtine rodent in the United States. Muskrats are considered the most prolific of the exploited North American furbearers (Smith et al. 1981). It is one of the most widely distributed (Figure 4-2) rodents and they have extremely flexible habitat requirements and can be found in freshwater and brackish marshes, ponds, sloughs, lakes, ditches, irrigation canals, streams and rivers and feed primarily on cattails, bullrushes and aquatic grasses (Boutin and Birkenholz 1987).

The muskrat 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 18-24 inches.

Figure 4-2. Distribution of Muskrats in North America.



Breeding generally occurs when ponds and streams become ice-free (Olsen 1959). The gestation period is 28-30 days, and females can re-mate immediately after giving birth (Wilson 1955), thus having the potential to produce a litter every month, but the number of litters per female in any breeding season is generally about 3-4 litters (Wade and Ramsey 1986). Average litter size varies from 3-9 and litter size tends to be larger in more northern populations (Danell 1978). These characteristics help make them relatively immune to over-harvest (Boutin and Birkenholz 1987).

Harvest rates of 3-8 muskrats per acre have been reported to be sustainable in muskrat populations (Boutin and Birkenholz 1987). It has historically been the most heavily exploited furbearer in North America with 6-20 million harvested annually since about 1935 (Boutin and Birkenholz 1987). Clearly, any mortality because of fur harvest or damage reduction would have virtually imperceptible effect on the population.

In Idaho, estimated muskrat fur harvest from 1976 (1976-1977 winter harvest season) to 2001 (2001-2002 harvest season) averaged 60,568 muskrats annually (IDFG 1990, 1997, 1998, 1999, 2000, 2001, 2002a, 2002b) (1976 to 1983 data are based on histogram estimates), with a range of 8,563 in 2000, to a high of 152,000 muskrats harvested in 1980. The fluctuation in estimated annual harvest is directly linked to the average pelt price. When fur prices are high, increased harvest normally occurs, conversely, when prices are weak, low levels of harvest occur. In 1991, the average muskrat pelt harvested in Idaho sold for $1.00, whereas in 1981, the estimated average muskrat pelt sold for around $5.50. The current 10-year average (1992 to 2001) price of muskrat pelts is $2.16 each. Estimated harvest data since 1976, reflects that the muskrat harvest peaked in 1980 with 152,000 muskrats harvested, while another peak occurred in 1985 with 110,000 muskrats reportedly harvested.

Errington (1963) stressed the density-dependent nature of muskrat population dynamics, but observed 2 external factors, drought and disease, that regulated pronounced changes in muskrat numbers. O'Neil (1949) proposed that muskrats were regulated by food supply with high densities of muskrats associated with cattail.

Legal Status. Muskrats are classified as "furbearers" by the IDFG and harvest is regulated. A valid trapping license is required by the public prior to take. Controlling damage caused by muskrats "out-of-season" is allowed by the IDFG through the issuance of a "depredation permit." Idaho Code 36-1107, provides an exception for control of damage to irrigation systems by muskrats, in that muskrats may be taken at any time in or along the banks of irrigation ditches, canals, reservoirs or dams, by the owners, their employees, or those in charge of said irrigation ditches or canals. In addition, an MOU between IDFG and Idaho State Animal Damage Control Board authorizes WS to respond to requests for assistance with wildlife (muskrat) damage and to take protected wildlife to prevent or reduce damage to agriculture, natural resources and property and to minimize threats to human health and safety.

Population Impact Analysis. IDFG et al. (1997) reports that the Idaho muskrat population is "demonstrably widespread, abundant and secure." Using the most current available data, the combined estimated muskrat "*Take*" by sport trapping and WS was 13,763 during 2000, 8,563 during 2001 and 11,069 during 2002 and the "*Estimated Other Take*" is estimated at 200 muskrats each year (Table 4-2). Smith et al. (1981), using a model, determined that muskrats could sustain an annual harvest of 74% of the fall population. Because muskrat population in Idaho are "demonstrably widespread, abundant and secure," in spite of current and past levels of all combined mortalities, the total cumulative impacts are likely of a low magnitude.

JACKRABBIT

Biology and Population Information. Jackrabbits are actually hares and not true rabbits. They belong to the genus *Lepus* and differ from rabbits because their young are precocial, meaning that the newly born are fully furred with their eyes open and are able to move about at birth. Nor are jackrabbits rodents. The primary difference being that hares (and rabbits) have 4 upper incisors where rodents have only 2. Prior to giving birth, female jackrabbits prepare little or no nest, although the young are kept hidden for 3-4 days. There are 2 species of jackrabbits in Idaho, the black-tailed jackrabbit (*Lepus californicus*) (Figure 4-3) and white-tailed jackrabbit (*L. townsendii*), the former being the most common in Idaho.

Table 4-2. Idaho Muskrat Harvest and Population Data (MIS 2000, 2001, 2002).

Muskrat Population Statistics	FY 2000	FY 2001	FY 2002
Population Trend[1]	Stable	Stable	Stable
WS Kill	21	0	4
Estimated Muskrats Taken During Sport Trapping	13,742[2]	8,563[2]	11,065[2]
WS' Kill as a % of the Sport Trapping	0.15%	0%	0.04%
Estimated Other Take[3]	200	200	200

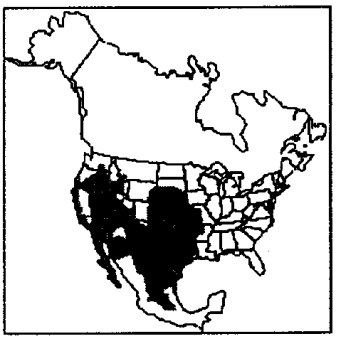
[1]Population trends provided by the IDFG (W. Melquist, Wildlife Biologist. IDFG pers. comm., 2000 and 2001, and G. Patton, Wildlife Biologist, IDFG, pers. comm., 2002) and the [redacted], pers. comm., 2001 and 2002). Trend data are for calendar year.

[2]Includes only the reported number of muskrats harvested during the legal trapping season. Information provided for 2000, 2001 and 2002 is from harvest records compiled during the fur trapping seasons in 1999-00, 2000-01 and 2001-02, respectively (IDFG 2001, 2002a, 2002b).

[3] "Other Estimated Take" includes the estimated number of muskrats killed through depredation permits and nuisance/commercial permits issued by IDFG to individuals and businesses for removing muskrats causing damage or nuisances during periods outside the legal trapping season (D. Kemner, IDFG, pers. comm., 2003).

Black-tailed jackrabbits can be distinguished from the white-tailed by its large tail with a black middorsal stripe extending onto the back and by the black-edged ears and the less pronounced area of white on the sides of the body (Hall and Kelson 1959).

Figure 4-3. Range of Black-tailed Jackrabbits.



The black-tailed jackrabbit is the most widely distributed jackrabbit species in North America (Hall and Kelson 1959) and has been described as flexible in habitat requirements, however the species has definite habitat preferences (Wagner and Stoddart 1972, Fagerstone et al. 1980, Porth et al. 1994). Where food and shelter are available in one place, no major daily movement of jackrabbits occurs. When food and shelter areas are separated, morning and evening movements may occur. Daily movements of 1-2 miles each way are fairly common. In dry seasons, 10-mile round trips from desert to crop fields have been reported (Knight 1994).

The black-tailed jackrabbit inhabits open plains, fields and deserts, and open country with scattered thickets or patches of shrubs. In Idaho, they are found at lower elevations rangeland associated with shrub steppe communities of the southern part of the State (IDFG et al. 1997). They adapt well to areas of agricultural development and significant damage can occur when jackrabbit populations are high and they feed on agricultural crops. Fagerstone et al. (1980) reported that black-tailed jackrabbit densities in their southern Idaho study area were highest in July on the mixed barley and alfalfa field, where there were about 100 jackrabbits/mi^2. Conversely, rangeland showed consistently low densities throughout their study, averaging about 1.6 jackrabbits/mi^2. Fagerstone et al. (1980) concluded that cultivated crops are a large part of the spring and summer jackrabbit diet. MacCracken and Hansen (1982) and Fagerstone et al. (1980) both reported that jackrabbit densities were highest where there was a greater biomass of vegetation.

Jackrabbit populations are cyclic, reaching peak levels about every 7-10 years (Wagner and Stoddart 1972, Gross et al. 1974). Estimates of jackrabbit populations run as high as 400 jackrabbits/mi^2 extending over

several hundred mi^2. Porth et al. (1994) estimated the peak jackrabbit population in winter in their Idaho study area to be about 2000 over a 1.5 mi^2 area and observed a drastic overwinter decline (around 100% mortality). Smith and Nydegger (1985) determined the jackrabbit population on their Snake River Birds of Prey Conservation Area (SRBPCA) study area to range between 26-384 jackrabbits/mi^2, depending on the year and vegetation type, and that populations retained their relative densities from year-to-year in the same habitat type. Knick and Dyer (1997) estimated that the density of jackrabbits in the SRBPCA ranged from 51-64 jackrabbits/mi^2 during the summers (1990-92) and 23-41 jackrabbits/mi^2 in the winters (1990-91 and 1991-92). Females may produce up to 4 litters per year with 2-8 young per litter however reproductive rates may vary from year to year depending on environmental conditions.

The white-tailed jackrabbit is the second most abundant jackrabbit in the United States and also in Idaho. Its range extends from the prairies of the midwestern States and southern Canada westward through the sagebrush to the high mountain slopes of the Rockies, Cascades, and Sierras (Dunn et al. 1982). In Idaho, it is distributed throughout the State with the exception of portions of the Snake River valley that's associated with agriculturally developed areas. It can be found in open grasslands and montane shrub lands generally above shrub steppe. At higher elevations, they are found in open areas in pine forests and in alpine tundra but prefers grass and scattered shrub between sagebrush and mountain forest zones (IDFG et al. 1997). The white-tailed jackrabbit is the only jackrabbit that exhibits 2 annual molts. The summer pelage is grayish brown on the upper parts with the tail all white or with a buffy mid-dorsal stripe. The winter pelage is paler than that in the summer, with individuals in the northern range turning completely white (Dunn et al. 1982). Because of this winter characteristic, they are commonly mis-identified by the public as snowshoe hares (*Lepus americanus*). The summer diet of the white-tailed jackrabbit consists of grasses, forbs and grains, and they may feed on cultivated crops. In winter, they browse on twigs, buds and bark (IDFG et al. 1997). White-tailed jackrabbits breed from late February to mid-July and females produce up to 4 litters per year ranging from 1-11 young per litter.

Stoddart (1985) reported that jackrabbit populations can experience drastic population fluctuations. During a study in northern Utah, radio-tracked jackrabbits declined by 34% over a 68-hour period during a severe winter storm. Mortalities were 13 times greater during this 68-hour period than that observed during the rest of January and February and mortalities were not restricted to jackrabbits with transmitters. Smith and Nydegger (1985) also reported that populations can abruptly decline because of natural causes.

Legal Status. Jackrabbits are classified by the IDFG as "predators" and can be taken throughout the year without any limit of take or possession (IDFG 2002c). The use of artificial light is allowed for hunting unprotected and predatory animals on private property with written permission from the landowner or on public lands with a permit authorized by the Director of IDFG (IDFG 2002c). An MOU between IDFG and Idaho State Animal Damage Control Board states that complaints of damage caused by predators and unprotected wildlife will ordinarily be handled by WS.

Population Impact Analysis. The WS program has had few jackrabbit complaints during the FY00-02 reporting period, and has taken very few jackrabbits (12 in FY00, none in FY01 or FY02) (Table 4-3). The amount of human-related jackrabbit mortality attributed to other causes is unknown, but recreational shooters probably account for several hundred to several thousand jackrabbits annually. IDFG et al. (1997) ranks Idaho's jackrabbit population as "demonstrably widespread, abundant and secure" and the ISDA report that jackrabbit populations are "locally common" in areas that contain suitable habitat and adjacent to urban properties, agricultural or range lands in Idaho (G. Robinson, ISDA, pers. comm., 2003). Therefore, no adverse impacts have occurred to the jackrabbit population from WS damage management activities. Idaho WS jackrabbit damage management would only be conducted when jackrabbits are causing or have the potential to cause damage or threats to human health and safety, and if WS killed as many as 500 jackrabbits in a year, the potential impact to the statewide jackrabbit population would be considered low.

Table 4-3. Idaho Jackrabbit Harvest and Population Data (MIS 2000, 2001, 2002).

Jackrabbit Population Statistics	FY 2000	FY 2001	FY 2002
Population Status	Locally Common[1]	Locally Common[1]	Locally Common[1]
WS Kill	12	0	0
Estimated Other Take[2]	UN[3]	2[4]	13[5]

[1] "Locally Common" population status refers to areas that contain suitable habitat that may support or have viable populations of jackrabbits near urban properties, agricultural or range lands in Idaho (G. Robinson, ISDA, pers. comm., 2003).
[2] IDFG or ISDA does not collect sport hunting or any other harvest data for jackrabbits.
[3] The "Estimated Other Take"from human-related caused in Idaho is unknown.
[4] Non-target "rabbits" reported by licensed fur trappers during the 2000-01 trapping season (IDFG 2002a). Since the species of "rabbits" reported by trappers is unknown, WS will include these as jackrabbits in analyzing the impacts.
[5] Nine of the 13 were reported as non-target "rabbits" taken by licensed sport trappers during the 2001-02 trapping season (IDFG 2002b) while 4 jackrabbits were reported as non-targets taken by WS during predator control activities. Since the species of "rabbits" reported by trappers is unknown, WS will include these as jackrabbits in analyzing the impacts.

YELLOW-BELLIED MARMOT

Figure 4-4. Range of Yellow-bellied Marmots.

Biology and Population Information. The marmot, a member of the squirrel family, is also known as the *"rockchuck," "ground hog"* or *"whistle pig"* and has a compact, chunky body supported by short strong legs. The yellow-bellied marmot is the most widely distributed statewide (Figure 4-4) and common of the 3 marmot species in Idaho. It is also the most destructive to agriculture. The other 2 species of marmots found in Idaho are the hoary marmot and woodchuck. In Idaho, hoary marmot distribution is primarily restricted to high elevations of east-central Idaho (Yensen and Sherman 2003), but IDFG et al. (1997) reports possible populations in the panhandle of Idaho. Although hoary marmots have limited distribution in Idaho, their entire North American distribution extends through most of the mountain ranges of British Columbia, Canada, and Alaska (Lee and Funderburg 1982). The woodchuck is the widest ranging North American marmot with populations in most of the eastern States and much of Canada, excluding the Northwest Territories and Nunavut Provinces (Lee and Funderburg 1982). In Idaho, distribution of woodchucks is limited to the northern Counties of the panhandle, however, Yensen and Sherman (2003) report that the existence of woodchucks in Idaho is uncertain. Neither the hoary marmot or woodchuck are considered major agricultural pests in Idaho or threats to public health and safety and their populations will not be analyzed in detail.

Both sexes of yellow-bellied marmots are similar in appearance, but the male is slightly larger, weighing an average of 5-10 pounds. The total length of the head and body averages 14-19 inches. Their eyes, ears and nose are located toward the top of the head, which allows them to remain concealed in their burrows while they check for danger over the rim or edge. Although they are slow runners, marmots are alert and scurry to their dens when they sense danger. Marmots are primarily active during daylight hours and prefer to feed in the early morning and evening. They are strict herbivores and feed on a variety of grasses and forbs, and relish alfalfa. When not feeding, they sometimes bask in the sun during the warmest periods of the day. In

general, marmots prefer rocky situations, talus slopes, valleys and foothills, up to about 12,000 feet in elevation.

Marmots may go into estivation in summer and are among the few mammals that enter into hibernation in winter (Armitage 1975). Hibernation generally starts in late fall and continues until late February and March. Adult males usually come out of hibernation before females and subadults. Males may travel long distances, and occasionally at night, in search of a mate; yellow bellied marmots are polygymous (Downhower and Armitage 1981). They usually den near large boulders or rocky out-croppings, which are used as scent and lookout posts. A burrow system serves as home to the marmot for mating, weaning young, hibernating in winter, and protection when threatened. A single litter of 3-6 young is generally born in March and April after a gestation period of about 32 days. The young are born blind and hairless, but emerge from the den at about 30 days of age. The primary predators of marmots include hawks, owls, fox, coyotes, bobcats, weasels, dogs and humans; many marmots are killed on roads by motor vehicles.

Legal Status. Marmots are classified as "unprotected" wildlife by the IDFG and can be taken in any amount at any time by holders of the appropriate valid Idaho hunting, trapping or combination hunting licenses, or by the application of EPA and ISDA registered rodenticides by licensed applicators, provided such taking is not in violation of State, County, or City laws, ordinances or regulations. Marmots are one of the most frequently hunted unprotected animals (IDFG 2002c). An MOU between IDFG and Idaho State Animal Damage Control Board provides that damage complaints caused by unprotected wildlife will ordinarily be handled by WS.

Population Impact Analysis. The amount of human-related yellow-bellied marmot mortality attributed to other causes is unknown, but recreational shooters, County Weed and Pest Control Programs, private pest control companies and irrigation and canal maintenance employees/contractors probably account for several thousand yellow-bellied marmots annually. Yensen and Sherman (2003) report that yellow-bellied marmots in the Pacific northwest are abundant in suitable habitat, but note that population surveys have not been conducted. IDFG et al. (1997) ranks Idaho's yellow-bellied marmot population as "demonstrably widespread, abundant and secure." Using the FY00, FY01 and FY02, estimated "*Kill*" by WS (Table 4-4) and based on the estimated population trend/status data provided by IDFG, WS' impact to the marmot population is determined to be low.

Table 4-4. Idaho Marmot Harvest and Population Data (MIS 2000, 2001, 2002).

Marmot Population Statistics	FY 2000	FY 2001	FY 2002
Population Trend	Stable[1]	Stable[1]	Stable[1]
WS Estimated Kill[2]	1,397[3]	710	543
Estimated Other Take[4, 5]	UN[6]	UN[6]	UN[6]

[1]Trend data provided by the IDFG (W. Melquist, Wildlife Biologist, IDFG, pers. comm., 2000 and 2001, and G. Patton, Wildlife Biologist, IDFG, pers. comm., 2002). Trends are estimated for calendar year and not fiscal year.
[2] Yellow-bellied marmots.
[3] Two marmots were live-captured, relocated and released unharmed.
[4] IDFG does not collect sport hunting harvest or any other take of marmots.
[5] ISDA does not collect information on the number of marmots killed from the use of rodenticides.
[6] The "Estimated Other Take" by human-related causes in Idaho is unknown.

GROUND SQUIRREL

Biology and Population Information. Several ground squirrel species inhabit various areas and habitats in Idaho, from open grassy plains and valleys to agricultural croplands (Figures 4-5 and 4-6) (Marsh 1984). The ground squirrel species most commonly targeted for control efforts by WS is the Piute ground squirrel[2]. This species of ground squirrel was formerly classified as the Townsend's ground squirrel, but was recently recognized as a separate species.

Figure 4-5. Range of Franklin's (dark) and Townsend's and Piute ground squirrels (light) in North America. Neither Townsend's or Piute ground squirrels occur to any extent in Oregon as depicted by the map.

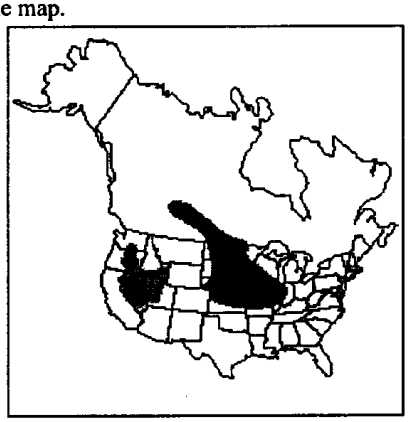
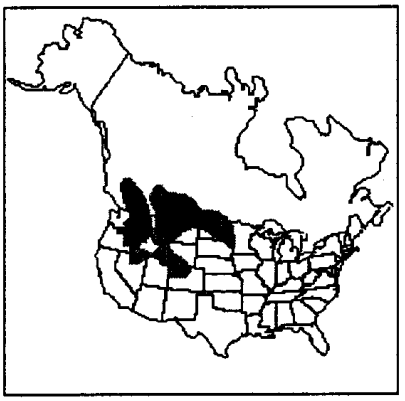


Figure 4-6. Range of Richardson's (light), Columbian (medium) and Washington (dark) ground squirrels.



There are 3 subspecies of Piute ground squirrels that occur in Idaho. *Spermophilus mollis idahoensis* occur north of the Snake River from Payette to Glenns Ferry, Idaho, *S. m. artemisiae* are found north of the Snake River from about Bliss, Idaho eastward, whereas, *S. m. mollis* are found south of the Snake River ([redacted] pers. comm., 2003). All 3 subspecies are very similar in appearance and using their geographic distribution is one of the most accurate ways to distinguish their populations. Piute ground squirrels are small, with a total length of 6½-10½ inches and adults weigh range from 4½-11 ½ ounces. It is a plain gray color with a whitish to buff belly. It has a short reddish tail with a white edge, and the face and hindlegs are reddish (National Audubon Society 1996). Piute ground squirrels emerge from hibernation in late January, with adult males emerging first. Breeding occurs when adult females emerge about 2 weeks after males. The young are born after a 4-5 week gestation period with 2-10 young per litter (Marsh 1984, Askham 1994). Generally only one litter is produced each year. Densities of ground squirrel populations can be as high as 50 or more/acre (Marsh 1984). Therefore, it is critically important to determine estivation and hibernation whenever conducting any damage management activities. In June or July, ground squirrels begin estivation that continues right into winter hibernation. According to IDFG (2002c), Piute and Columbian ground squirrels are some of the most frequently hunted unprotected animals in Idaho.

[2]Due to recent reclassification, suitable distribution maps showing Piute ground squirrel range were not available. Townsend's ground squirrels now occur only in Oregon and Washington.

The Columbian (*Spermophilus columbianus*), Belding's (*S. beldingi*), Wyoming (*S. elegans*) and Uinta (*S. armatus*) ground squirrels are other species that occasionally cause damage. The Columbian ground squirrel can be found in most parts of Idaho north of the Snake River above 2,500 feet in elevation. Its distribution extends from central Idaho north into Washington and Montana and continuing into northern British Columbia (National Audubon Society 1996) (Figure 4-6). The Columbian ground squirrel is larger and heavier than the Piute ground squirrel, with a length from 13-16 inches and weights from 12-29 ounces. It has a bushy tail that is mostly reddish and the back and sides are grayish mixed with black above, with distinct buff spotting. Most ground squirrels feed on green vegetation during the spring and summer, and store large quantities of food in burrow caches. Columbian ground squirrels also feed on insects, bulbs, tubers, birds and other small vertebrates when available. Insects and other animal tissue may comprise up to 25% of their diet.

Belding's ground squirrels are smaller than Columbian ground squirrels, but are a little larger in body size than Piute ground squirrels. Their back is gray brown flecked with buff, darker chestnut color down the middle with a buffy belly. Body has a buffy wash in the shoulder area that may extend along the flanks to the hind legs and tail is flat and frosted with grayish-tipped hairs and the underside is brick red with the upper side dark toward the black tip (Yensen and Sherman 2003). The Belding's ground squirrel occur in central and eastern Oregon, except part of the Blue Mountains and Columbia Basin, and in Idaho south of the Snake River as far eastward as Cassia County (Yensen and Sherman 2003). They feed on succulent green leaves of grasses and forbs in the spring, and grass, flowers, seeds and bulbs in summer; and will occasionally eat insects, vertebrates, and carrion (Yensen and Sherman 2003). Grassy meadows, bottomlands and sagebrush that are close to water are preferred habitats (Yensen and Sherman 2003).

Two subspecies of Wyoming ground squirrels can be found in Idaho (Yensen and Sherman 2003). Historically, *S. e. nevadansis* occurred in southeastern Oregon and southern Idaho (Owhyee and Twin Falls Counties) into Nevada, however, Yensen and Sherman (2003) report that populations may only occur in 3 localities in Idaho. *S. e. aureus* is more widespread and occurs in east-central Idaho into Montana (Yensen and Sherman 2003). Both subspecies prefers productive habitats such as bottomland meadows and pastures, sagebrush and talus slopes. The Wyoming ground squirrel has large ears and is similar in size to the Belding's ground squirrel. Their back is buff brown to gray with buffy flecks giving the appearance of spots from a distance. Belly is buff and nose is cinnamon. Their tails are relatively long with orange below and black above with a black tip. They feed on succulent green leaves of grasses and forbs in spring and grass, flowers, seeds and bulbs in summer, occasionally eating insects small vertebrates and carrion (Yensen and Sherman 2003).

The Uinta ground squirrel is medium-sized and are very similar in appearance and size to the Wyoming ground squirrel. Uinta ground squirrels occur in Idaho south of the Snake River Plain from Cassia County eastward to Wyoming, and north of the Snake River Plain from the Big lost River northeast into Montana (Yensen and Sherman 2003) and south into northwestern Utah. They prefer montane meadows, pastures and dry sagebrush-grasslands, lawns and irrigated turf. Uinta ground squirrels are all gray in color and do not have flecks or the appearance of spots on its back that Wyoming ground squirrels have. The belly is normally lighter than the back. Its tail is about half the length of its body, dark in color with white-tipped hairs. The nose is slightly rusty. They feed on succulent green leaves of grasses and forbs in spring, and grass, flowers, seeds and bulbs in summer, occasionally eating insects, small vertebrates and carrion (Yensen and Sherman 2003).

Legal Status. Ground squirrels, with the exception of the northern Idaho ground squirrel (*Spermophilus brunneus brunneus*), southern Idaho ground squirrel (*S. b. endemicus*) and golden-mantled ground squirrel (*S. lateralis*), are classified as "unprotected" wildlife by the IDFG and can be taken in any amount at any time by holders of the appropriate valid Idaho hunting, trapping or combination hunting licenses, or by the application of EPA and ISDA registered restricted-use or general-use rodenticides, provided such taking is not in violation of State, County, or City laws, ordinances or regulations. However, *S. canus vigilis*

(subspecies of the Merriams ground squirrel) and *S. elegans nevadensis* (subspecies of the Wyoming ground squirrel) populations are probably endangered in Idaho, but they have no official status at this time ([redacted], pers. comm., 2003). An MOU between IDFG and Idaho State Animal Damage Control Board provides that damage complaints caused by unprotected wildlife will ordinarily be handled by WS.

Population Impact Analysis. The amount of human-related ground squirrel mortality in Idaho attributed to other causes is unknown, but recreational shooters, private pest control companies, farmers and ranchers, turf producers and irrigation and canal maintenance employees probably account for tens-of-thousands to several hundreds of thousands of ground squirrels annually. IDFG et al. (1997) ranks Idaho's Piute and Columbian ground squirrel populations as "demonstrably widespread, abundant and secure," and ranks Idaho's Belding's, Uinta and Wyoming ground squirrel populations as "not rare, and apparently secure, but with cause for long-term concern," but notes that the Belding's and Uinta ground squirrel populations throughout their range are ranked as "demonstrably widespread, abundant and secure." Yensen and Sherman (2003) report that the Pacific northwest populations of the Columbian and Belding's ground squirrels as "abundant in suitable habitat" and that the Piute ground squirrel populations are probably of conservation concern, but notes that no population surveys have been conducted for any of the 3 ground squirrel species. Using the FY00, FY01 and FY02, estimated "*Kill*" by WS (Table 4-5) and based on the estimated population trend/status data provided by IDFG and Yensen and Sherman (2003), WS' impact to ground squirrel (*Ammospermophilus leucurus, Spermophilus armatus, S. columbianus, S. beldingi, S. mollis idahoensis, S. m. mollis* and *S. m. artemisiae*) populations is determined to be low. However, if WS would be requested to conduct ground squirrel damage management on a total of 1,000 acres or less, while removing as many as 50,000 ground squirrels, the potential impact to the overall ground squirrel population is determined to be low.

Table 4-5. Idaho Ground Squirrel Harvest and Population Data (MIS 2000, 2001, 2002).

Ground Squirrel Population Statistics	FY 2000	FY 2001	FY 2002
Population Trend/Status	Stable[1]	Stable[1]	[2, 3, 4]
Estimated WS Kill	728[5]	5,665[5]	20[6]
Estimated Other Take[7, 8]	UN[9]	20[10]	5[10]

[1] Trend data provided by the IDFG (W. Melquist, Wildlife Biologist, IDFG, pers. comm., 2000 and 2001). Trend data only for the Piute ground squirrel (all 3 species).

[2] *Spermophilus mollis idahoensis* population is considered unstable and may be declining and *S. m. mollis* can not be described as abundant ([redacted], pers. comm., 2003).

[3] Columbian ground squirrels populations are declining, but locally abundant ([redacted], pers. comm., 2003).

[4] *S. canus vigilis* (subspecies of the Wyoming ground squirrel) populations in Idaho are probably endangered, but have no official status at this time ([redacted], pers. comm., 2003).

[5] Piute ground squirrels (*S. m. idahoensis).*

[6] Columbian ground squirrels.

[7] IDFG does not collect harvest data on sport hunting or other take of ground squirrels.

[8] ISDA does not collect data on the number of ground squirrels killed from the use of rodenticides.

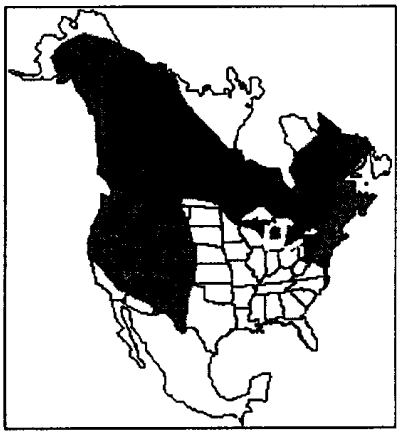
[9] The "Estimated Other Take" by human-related causes is unknown.

[10] Non-target "squirrels" reported taken by licensed sport trappers during the 2000-01 and 2001-02 trapping seasons (IDFG 2002a, 2002b). Since it is unknown which species of "squirrels" were reported by trappers, WS will include these as "ground squirrels" in analyzing impacts, although most ground squirrels are hibernating during trapping season.

PORCUPINE

Biology and Population Information. The porcupine is the second largest native North American rodent. It is found in the coniferous forests of Canada and Alaska, and southward down through the timbered areas of the West and as far east as the Dakotas and northwestern Texas (Figure 4-7). It is also found in the north woods of the eastern States, around the Great Lakes, and as far south as West Virginia (Murie 1974). It can be found in all of Idaho, but less abundant in the drier desert areas. Porcupines are solitary animals and active year-round. They are primarily nocturnal and may rest by day in a hollow tree or log, underground borrow, abandoned building, brush pile, or treetop. It has a relatively small face, blunt muzzle, shoe-button eyes, no discernable neck, and a short, muscular, club-like tail. The feet are bear-like with naked soles and posses long prominent claws and have 4 toes on its front feet and 5 toes on the hind feet (Dodge 1982). Adult porcupines normally weigh from 9-13 lbs. and some have been reported to weigh more than 38 lbs.

Figure 4-7. Range of the Porcupine in North America.



The porcupine is the only North American mammal possessing hairs modified as quills which covers most of the body, with the exception of the nose, belly and foot pads. After gestation of nearly 7 months, a single young is born in May or June. Porcupines feed on leaves, twigs, and green plants such as skunk cabbage, lupines and clover. In winter, it chews through the rough outer bark of various trees including pines, fir, cedar, and hemlock to get at the inner bark on which it mainly subsists. Taylor (1935) reported densities of 2.7/mi^2 in Arizona, and Kelker (1943) reported 34.2/mi^2 in northeastern Wisconsin. Densities tend to shift with food availability. Higher populations are found near maturing agricultural crops such as corn, alfalfa, and other legumes or, during dry periods, in riparian-associated habitats (Dodge 1982). IDFG et al. (1997) states Idaho's porcupine population is widespread, abundant and secure.

Legal Status. Porcupines are classified as "unprotected" and can be hunted and taken all year. These species may be taken in any amount, throughout the year, by holders of the appropriate valid Idaho hunting, trapping, or combination hunting licenses, provided such taking is not in violation of State, County, or City laws, ordinances or regulations. An MOU between IDFG and Idaho State Animal Damage Control Board provides that complaints of damage caused by predators and unprotected wildlife will ordinarily be handled by WS.

Population Impact Analysis. The amount of human-related porcupine mortality attributed from all causes is unknown, but recreational shooters, private pest control companies, farmers and ranchers, rural home-owners, pet owners, timber companies and porcupines killed by automobiles on Idaho's highways and roads probably account for several hundred to several thousand porcupines annually. Based on the abundance of porcupines in Idaho and that Idaho porcupine population is "demonstrably widespread, abundant and secure" (IDFG et al. 1997), and that WS did not kill any porcupines during rodent damage management (Table 4-6), WS' impact on the porcupine population is determined to be low. However, if WS would be requested to conduct a porcupine damage management project and killed as many as 100 porcupines in a year, the potential impact to the porcupine population would be considered low.

Table 4-6. Idaho Porcupine Population and Harvest Data (MIS 2000, 2001, 2002).

Porcupine Population Statistics	FY 2000	FY 2001	FY 2002
Population Trend/Status	[1]	[1]	[1]
Targeted WS Kill	0	0	0
Estimated Other Take[2]	4[3]	4[3]	4[3]

[1] IDFG could not provide population trend, but stated that porcupines are classified as "unprotected" species in Idaho. IDFG et al. (1997) reports that Idaho populations are "demonstrably widespread, abundant and secure."

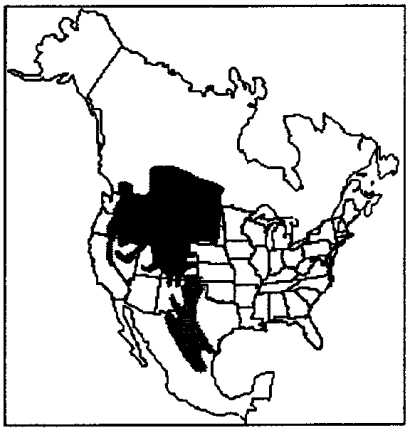
[2] IDFG does not collect harvest or take data for porcupines.

[3] Reported by WS as non-targets taken during predator control activities.

POCKET GOPHER

Biology and Population Information. Pocket gophers occur only in Central and North America (National Audubon Society 1996). There are 3 genera and 18 species found in the United States and Canada. The northern pocket gopher (*Thomomys talpoides*) (Figure 4-8) has the widest distribution of all pocket gophers, extending from central Alberta to northern New Mexico (Chase et al. 1982) and is the most common pocket gopher in Idaho, with distribution Statewide (IDFG et al. 1997). The Idaho pocket gopher (*T. idahoensis*) is found in eastern Idaho and in Montana, Utah and Wyoming, while the Townsend's pocket gopher (*T. townsendii*) is distributed in southwestern and east central Idaho (IDFG et al. 1997). Townsend's pocket gophers are also distributed in parts of Oregon, California, Montana and Nevada (National Audubon Society 1996). The Townsend's pocket gopher is the largest of the 3 species. Adult males can reach lengths of 14 inches, where as northern pocket gopher and Idaho pocket gopher adult males seldom exceed 9 and 6 inches, respectively, in total length. Of the 3 pocket gopher species, the northern pocket gopher, followed by Townsend's pocket gopher, are considered as major pests of cultivated agriculture, hay crops and timber. The Idaho pocket gopher causes lessor damage to crops and hay because its habitat normally doesn't include irrigated agricultural lands. All of Idaho's pocket gophers are active throughout the year, but activity may decrease in winter and midsummer for short periods.

Figure 4-8. Range of the northern pocket gopher (dark) and yellow-faced pocket gopher (*Pappogeomys castanops*) (light) in North America.



Primarily as a result of pronounced adaptation to their almost completely subterranean existence, all the members of pocket gophers are very similar in structure and habits. They have thick bodies with short necks, short fur, small ears and eyes, a naked or sparsely haired tail, and large, external, fur-lined cheek pouches (National Audubon Society 1996). As with moles, the fur can lie either forward or backward, enabling the animal to move about in its burrow equally well in both directions. The lips of pocket gophers close behind the large incisors, which serves to keep dirt from entering the mouth during underground gnawing. As with all rodents, the chisel-like incisors grow throughout the gopher's life. Pocket gophers are solitary animals for most of their life, except in spring when males find and enter a female burrow system where mating occurs. There are usually 1-2 litters per year of 2-11 young each. At 2 months, young leave their natal area and start to dig their own tunnels. They become sexually mature at 3 months of age.

Pocket gophers make 2 kinds of burrow: those near the surface for food gathering, and deeper ones for storage and shelter. The passages slant toward the ground surface. Pocket gophers usually forage underground for roots and tubers, or cut off stems belowground and pull plants into the burrow from below. What is not eaten immediately is stored in side chambers for later use.

The population density of pocket gophers is greatly influenced by the local climate, suitability of the soil, kind and amount of soil drainage, altitude, land use and other habitat factors (Chase et al. 1982). Densities of 16-20 per acre are common for *Thomomys* spp., but they may attain densities up to 62 per acre (Case and Jasch 1994).

Legal Status. Pocket gophers are classified as "unprotected" by the IDFG and can be hunted and taken all year. These species may be taken in any amounts and at any time by holders of the appropriate valid Idaho hunting, trapping, or combination hunting licenses, or when using EPA and ISDA registered restricted-use and general-use rodenticides, provided such taking is not in violation of State, County, or City laws, ordinances or regulations. An MOU between IDFG and Idaho State Animal Damage Control Board provides that damage complaints caused by unprotected wildlife will ordinarily be handled by WS.

Population Impact Analysis. IDFG et al. (1997) reports that the 1) northern pocket gopher population in Idaho is "demonstrably widespread, abundant and secure," 2) Townsend's pocket gopher population in Idaho is ranked as "not rare, apparently secure, but with cause for long-term concern," and 3) Idaho pocket gopher population as "vulnerable," but also ranks it as "demonstrably widespread, abundant and secure" throughout its range. Data on human-related mortality rates on pocket gophers for Idaho is extremely scarce because ISDA or IDFG do not collect harvest or kill data on pocket gophers, but some data do exist (Table 4-7). The Ada County Weed and Pest Control program, which provides limited operational pocket gopher control in that County, maintains records on the number of acres they annually treat. During FY93-00, Ada County residents requested pocket gopher damage management on an average of 59,396 acres annually. Based on densities of 16-62 pocket gophers per acre (Case and Jasch 1994) (16 will be used in the calculation to ensure the most conservative estimate), assuming a kill-rate of 70-75% (B. Wilbur, Director, Ada County Weed and Pest Control Program, pers. comm., 2003), and assuming that a minimum 35% or 20,789 acres were treated, approximately 233,000-249,000 pocket gophers were estimated killed

Table 4-7. Idaho's Pocket Gopher Population and Mortality Data (MIS 2000, 2001, 2002).

Pocket Gopher Population Statistics	FY 2000	FY 2001	FY 2002
Population Status	Locally Common[1]	Locally Common[1]	Locally Common[1]
WS Kill	0	0	0
Ada County Weed and Pest Control	233,000-249,000 (7 year average annual estimate)	NA	NA
Canyon County Weed and Pest Control	90,000	100,000	100,000
Estimated Other Take[2]	UN[3]	UN[3]	UN[3]

[1] "Locally Common" population status refers to urban properties or agricultural, range and timber lands of Idaho that contain adequate vegetation or suitable habitat to support or have viable pocket gopher populations (G. Robinson, ISDA, pers. comm., 2003).
[2] IDFG and ISDA do not collect harvest or take data for northern pocket gophers.
[3] "Estimated Other Take" from human-related causes in Idaho is unknown.

annually by the Ada County Weed and Pest Control program during the past 7 years. Canyon County has a pocket gopher control program and about 85% of its annual budget is put toward a bounty system where a bounty of $1.00 per pocket gopher tail is paid to County residents (J. Martell, Director, Canyon County Gopher Control Program, pers. comm., 2003). During FY00-02, approximately $290,000 (or 290,000 pocket gophers) was paid to County residents collecting the bounty. Cassia, Elmore and Washington Counties also have pest (rodent) control programs (M. Mahone, Idaho Association of Counties, pers. comm. 2003), but data on estimated numbers of pocket gophers and other rodents killed annually is not available.

The WS program has received few pocket gopher complaints during the FY00-02 reporting period, and has not killed any pocket gophers while conducting rodent damage management. The amount of pocket gopher mortality attributed to other causes is unknown, but County Pest Control agents, irrigation and canal maintenance employees/contractors, private pest control operators, farmers and ranchers, National Forests and home/garden owners probably account for several hundred thousand or more pocket gophers annually. Since WS has not killed any pocket gophers, no adverse impacts have occurred to the pocket gopher population from WS damage management activities. However, if WS is requested to conduct northern pocket gopher and Townsend's pocket gopher damage management on a total of 1,000 acres or less, while removing as many as 10,000 pocket gophers; and Idaho pocket gopher damage management on 50 acres or less, while removing 500 gophers, the potential impact to the overall gopher population is determined to be very low.

VOLE

Biology and Population Information. Voles are compact rodents with stocky bodies, short legs and tails. They are sometimes referred to as "meadow mice." Their eyes are small and ears are partially hidden and nose is blunt with vibrissae that are generally inconspicuous compared to other rodents (Johnson and Johnson 1982). Home range is usually 1/4 acre in size or less, but varies with season, population density, habitat, food supply and other factors. Many vole species are excellent swimmers, while most are not agile climbers. The water vole escapes predators by swimming and diving.

Voles are semifossorial and construct many tunnels and surface runways with numerous burrow entrances. A single burrow system may contain several adults and young (O'Brien 1994). Voles may breed throughout the year, but most commonly in spring and summer. In the field, they have 1-5 litters per year, but under laboratory conditions, they have produced up to 17 litters per year. Litter sizes range from 1-11, but usually average 3-6. Young are weaned by the time they are 21 days old, and females mature in 35-40 days. Life spans are short, probably ranging from 2-16 months and mortality is high in wild populations.

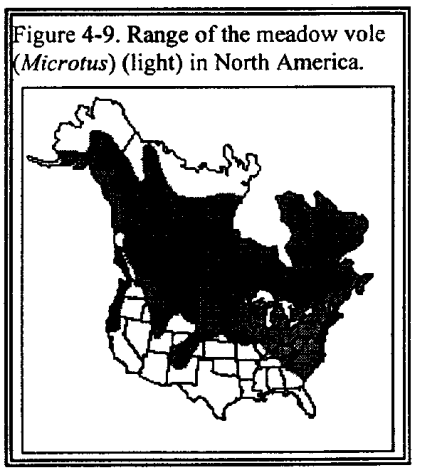


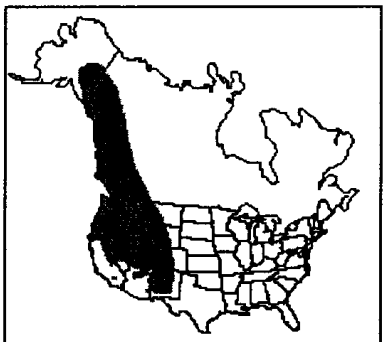
Figure 4-9. Range of the meadow vole (*Microtus*) (light) in North America.

Large population fluctuations are characteristic of voles and levels generally peak every 2-5 years, however, cycles are not predictable. Smolen and Keller (1987) list densities of long-tailed voles in California that ranged from about 2-7 voles per acre and a New Mexico population ranged from 8-49 voles per acre. In Klamath Basin, Oregon, montane vole densities ranged from 200-500 per acre and may have reached 4,000 per acre in some instances during a 1957-1958 irruption.

There are 7 vole species found in Idaho. Four species belong to the genus *Microtus*; meadow vole (*Microtus pennsylvanicus*) (Figure 4-9), long-tailed vole (*M. longicaudus*) (Figure 4-10), montane vole (*M. montanus*) (Figure 4-11) and water vole (*M. richardsoni*). The 3 remaining voles belong to the genus *Clethrionomys* (southern red-backed vole) (*C. gapperi*), *Phenacomys* (heather vole) (*P. intermedius)* and

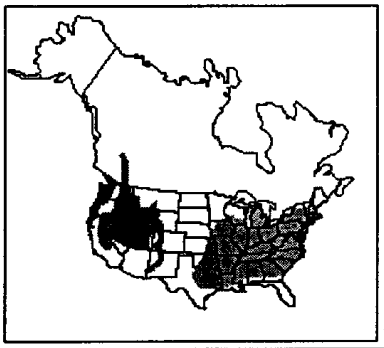
Lemmiscus (sagebrush vole) (*L. curtantus*). All voles are active day and night throughout the year and at any one time, 50% of the population is active (IDFG et al.1997). The meadow vole is the most widely distributed *Microtus* species in the United States (Figure 4-9) and are often abundant in grassy locations feeding on green vegetation in warmer months, and roots and tubers in winter (National Audubon Society 1996). It is also the primary vole species that causes the greatest economic impacts to agriculture. Its total length is 5½-7½ inches and its fur is gray to yellow-brown, obscured by black-tipped hairs (O'Brien 1994).

Figure 4-10. Distribution of the long-tailed vole in North America.



Legal Status. Voles are classified as "unprotected" and may be taken in any amount, throughout the year, by holders of the appropriate valid Idaho hunting, trapping, or combination hunting licenses, or when using EPA and ISDA registered restricted-use and general-use rodenticides, provided such taking is not in violation of State, County, or City laws, ordinances or regulations. An MOU between IDFG and Idaho State Animal Damage Control Board provides that damage complaints caused by unprotected wildlife will ordinarily be handled by WS.

Figure 4-11. Distribution of the pine (light), montane (medium), and Oregon voles (dark) in North America.



Population Impact Analysis. The amount of human-related vole mortality is unknown, but grain and hay growers, commercial grass seed producers, ranchers, private pest control companies, orchardists and rural home-owners probably account for several hundred thousand or more voles annually. Based on population status information from IDFG et al. (1997), Idaho's populations of meadow vole, montane vole, southern red-backed vole and long-tailed vole are described as "demonstrably widespread, abundant and secure" while the heather vole, water vole and sagebrush voles are described as "not rare, apparently secure, but with cause for long-term concern." ISDA describes Idaho's vole population as "locally common" to geographic areas having adequate and suitable vole habitat where adjacent to or near urban properties, agricultural or range lands (G. Robinson, ISDA, pers. comm., 2003). During FY00, FY01 and FY02, WS did not kill any voles, therefore, WS had no impact on Idaho's vole population, however, if WS did conduct vole damage management on 1,000 acres or less and removed an estimated 50,000 individuals, the potential impact to the vole population is determined to be low.

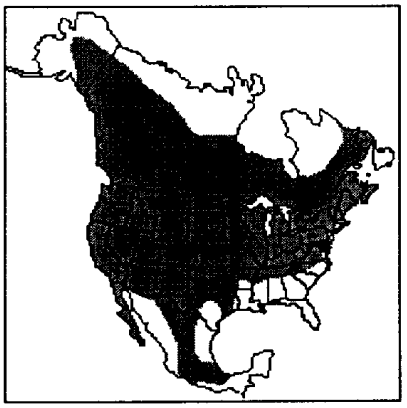
DEER MICE and other FIELD MICE

Biology and Population Information. Collectively, all species of *Peromyscus* are often referred to as "deer mice" or "white-footed mice," and often are confused with other non-members of *Peromyscus* such as house mice, kangaroo rats and voles. All *Peromyscus* species have white feet, usually white undersides, and brownish upper surfaces. Their tails are relatively long, sometimes as long as the head and body and are furred. In comparison to house mice, deer mice have larger eyes and ears. They are considered by most people to be more "attractive" than house mice, and they do not have the characteristic mousy odor that house mice have. All species of *Peromyscus* cause similar problems and require similar solutions.

Deer mice and field mice are mostly nocturnal with a home range of ⅓-4 acres or larger (Timm and Howard 1994). A summer density may reach a high of about 15 mice/acre. Deer mice are found

throughout most of North America (Figure 4-12) in a variety of habitats and are distributed throughout Idaho. They feed on various foods, including seeds, nuts, small fruits and berries, insects, centipedes, subterranean fungus, green plant material, worms, snails, wheat and corn (National Audubon Society 1996, IDFG et al. 1997). Deer mice cache food for winter use, routinely storing seeds and small nuts in hollow logs or other protected areas. They have a tendency to enter homes, cabins and other structures and construct nests, store food, and damage upholstered furniture, mattresses, clothing, paper, or other materials they find suitable for nest-building (Timm and Howard 1994). Some populations may breed year-round, but the breeding season is shorter in northern range and at high elevations. Gestation is about 23 days and litter size averages 1-8 young, but 5-6 is more common. Females may have from 2-4 litters per year, depending on species and climate (Timm and Howard 1994). The deer mouse has the greatest potential of causing damage to agriculture and threatening human health and safety as compared to the other species of "field mice."

Figure 4-12. Range of the deer mouse (*Peromyscus maniculatus*) in North America.



Other field mice such as the western harvest mouse (*Reithrodontomys megalotis*), great basin pocket mouse (*Perognathus parvus*), and northern grasshopper mouse (*Onychomys leucogaster*) are found in Idaho. The western harvest mouse and great basin pocket mouse prefer weed and grass seeds, and leaves of sagebrush and grasses. They will occasionally feed on insects in the spring and summer, whereas the diet of the northern grasshopper mouse is 70-90% animal matter, such as grasshoppers, beetles and spiders, but will eat some plant material and other small rodents during winter (IDFG et al. 1997). These 3 species are less likely to be involved in large scale problems with agriculture or human health and safety.

Legal Status. Deer mice and other field mice are classified by IDFG as "unprotected" and can be hunted and taken all year. These species may be taken in any amount, throughout the year, by holders of the appropriate valid Idaho hunting, trapping, or combination hunting licenses, or when using EPA and ISDA registered restricted-use or general-use rodenticides, provided such taking is not in violation of State, County, or City laws, ordinances or regulations. An MOU between IDFG and Idaho State Animal Damage Control Board provides that complaints of damage caused by unprotected wildlife will ordinarily be handled by WS.

Population Impact Analysis. The amount of human-related deer mouse and other field mouse mortality is unknown, but grain and hay growers, commercial grass seed producers, ranchers, private pest control companies, grain storage operators, orchardists and home-owners probably account for several hundred thousand or more deer mice and field mice annually. ISDA describes the population status of deer mice and other field mice as "locally common" to geographic areas of Idaho having adequate ground cover and/or suitable habitat adjacent or near urban properties, agricultural or range lands (G. Robinson, ISDA, pers. comm., 2003). Based on population status from IDFG et al. (1997), Idaho's deer mouse, western harvest mouse and great basin pocket mouse populations as ranked as "demonstrably widespread, abundant and secure" and northern grasshopper mouse populations are ranked as "not rare, apparently secure, but with cause for long-term concern," but notes that the northern grasshopper mouse is "demonstrably widespread, abundant and secure" throughout its range in the United States and Canada. During FY00, FY01 and FY02, WS did not kill any deer mice or other field mice, therefore, WS had no impact on those populations. However, if WS did conduct damage management activities directed towards deer mice or field mice on a total of 1,000 acres or less and removed an estimated 10,000 individuals in a year, the potential impact to the population is determined to be low.

4.4.1.2 Alternative 2 - Continue the Current Rodent Damage Management Program, but Non-lethal Required Before Lethal Control.

Under this Alternative, WS take of rodents would probably be less than that of the Proposed Alternative because lethal actions by WS would be restricted to situations where non-lethal controls had been tried, in most cases by the requestor, or would require WS to implement non-lethal before lethal control could be considered. For many individual damage situations, this Alternative would be similar to the current program because many producers have tried one or more non-lethal methods such as dam breaching or barriers without success or have considered them and found them to be impractical in their particular situations prior to requesting WS' assistance. In cases where non-lethal methods used under similar damage circumstances have been ineffective, damage could be expected to be greater under this alternative than if lethal control could be used immediately. Therefore, it is likely that private efforts would increase, leading to potentially similar cumulative impacts as those of Alternative 1. Likewise, for the same reasons shown in the population impacts analysis for Alternative 1, it is highly unlikely that Statewide rodent populations would be impacted significantly by implementation of this Alternative. Impacts and hypothetical risks of illegal chemical toxicant use under this Alternative would be less than Alternative 3, 4 or 5, but probably more than under Alternative 1.

4.4.1.3 Alternative 3 - Continue the Current Rodent Damage Management Program, but Without the use of Rodenticides and Other Chemicals.

Under Alternative 3, only mechanical damage management methods would be used by WS to alleviate rodent damage. The number of rodents taken by WS would probably decrease under this Alternative because mechanical methods are generally less effective, more time consuming, and therefore add costs to conducting rodent damage management. In addition, removal effects to rodent populations could be reduced or could increase depending on others' actions. WS' take of rodents under the current program results in a low magnitude of impact, but WS' impact on rodent populations resulting from implementation of Alternative 3 would likely be even lower than that of the current program.

4.4.1.4 Alternative 4 - Idaho WS Technical Assistance Rodent Damage Management Program Only.

Alternative 4 would result in no Idaho WS operational program and no impacts to rodent populations would occur because of WS operational actions. Some type of damage management would most likely be conducted by other entities, possibly by various State or local governmental agencies, private individuals or other combinations. The impacts on rodent populations might vary considerably from those described in Alternative 1, because of the potential for improper or inappropriate selection and use of rodent damage management methods, emphasis on lethal methods, duplication of effort, and possible misuse of chemicals.

How rodent damage management would be handled without WS can only be speculated, although several obvious effects can be identified. State or County agencies, or private entities would not be subject to the restrictions and operating policies used by Idaho WS, such as WS Directives and NEPA, and coordination and planning with Federal, State and local agencies would probably be less than what is currently occurring in Alternative 1. Any State agency assumption of rodent damage management would probably dilute resources needed for other wildlife management and State functions. This Alternative could have greater or lesser adverse impacts on wildlife populations than the current program because of the actions of others.

4.4.1.5 Alternative 5 - No Idaho WS Rodent Damage Management Program.

Alternative 5 would result in no Idaho WS program and no impacts to rodent populations would occur because of WS actions. Some type of damage management would most likely be conducted by other entities, possibly by various State or local governmental agencies, private individuals or other combinations. The impacts on rodent populations may vary considerably from those described in Alternative 1, because of

the potential for improper or inappropriate selection and use of rodent damage management methods, emphasis on lethal methods, duplication of effort, and possible misuse of chemicals.

A thorough review of the potential impacts of this Alternative can be found in USDA (1994) which summarizes the biological impacts of the no WS program Alternative as follows:

"Biological impacts that would be expected under the No Action Alternative (No ADC Program Alternative in this EA) include all impacts that occur under the Current Program Alternative (No Action Alternative in this EA) plus impacts that relate to the reasons listed previously. Taking of target species would be more variable (i.e., lower for some species in some areas and higher in other areas). However, taking of non-target species probably would be higher, and for some small populations, could become biologically significant. This would be especially important if the species was threatened or endangered. Species diversity could be significantly affected. The indirect impacts on non-target species affected through the food chain or by uncontrolled releases of toxicants into the environment also could increase. In some areas, people could use unapproved chemical methods. Misuse of chemicals could increase and thereby adversely affect certain wildlife populations and public health and safety."

How rodent damage management would be handled without WS can only be speculated, although several obvious effects can be identified. State or County agencies, or private entities would not be subject to the restrictions and operating policies used by Idaho WS, such as WS Directives and NEPA, and coordination and planning with Federal, State and local agencies would probably be less than what is currently occurring in Alternative 1.. Any State agency assumption of rodent damage management would probably dilute resources needed for other wildlife management and State functions. This Alternative could have greater or lesser adverse impact on wildlife populations than the current program because of the actions of others.

4.4.2 Concerns about the Effects of WS Rodent Damage Management on Non-target Species Populations, including T/E Species.

4.4.2.1 Alternative 1 - Continue the Current Idaho WS Rodent Damage Management Program: (No Action) (Proposed Alternative).

Idaho WS has initiated informal ESA consultation with the USFWS regarding the potential impacts of the current rodent damage management program (Proposed Alternative). Although informal consultation has not concluded, it is expected that the USFWS will concur with WS' evaluation that the Proposed Alternative is not likely to adversely affect any T/E species that may occur within Idaho. Mitigation measures to address concerns about impacts to T/E species are listed in the mitigation measures (Table 3-1).

4.4.2.2 Alternative 2 - Continue the Current Rodent Damage Management Program, but Non-lethal Required Before Lethal Control.

Under this Alternative, WS take of non-target animals would probably be similar to the Proposed Alternative. Mitigation measures to avoid T/E species impacts were described in Chapter 3 and those measures should assure that adverse impacts are not likely to occur to T/E species by implementing Alternative 2. However, if cooperators were not satisfied by non-lethal control operations by WS, or non-lethal results were not successful, then private efforts to reduce or prevent depredations could increase. This could result in less experienced persons implementing control methods including the hypothetical use of illegal toxicants/pesticides and could lead to greater take of non-target wildlife than the Proposed Alternative.

4.4.2.3 Alternative 3 - Continue the Current Rodent Damage Management Program, but Without the use of Rodenticides and Other Chemicals.

There may be direct negative effects on T/E species from this Alternative. Without the use of rodenticides or other chemicals by WS to reduce rodent damage, resource owners my take actions themselves or contract with private pest control businesses. Additionally, in the absence of WS assistance with chemical methods, some resource owners may attempt to reduce damage or hire others with little or no experience with chemical methodologies. These resource owners would be more likely than WS personnel, to kill or harm non-target species, including T/E species, and not report the take.

4.4.2.4 Alternative 4 - Idaho WS Technical Assistance Rodent Damage Management Program Only.

Alternative 4 would result in no Idaho WS operational program, and hence no risks to T/E species from WS would occur because of WS operational actions. Under this Alternative, WS would make recommendations but implementation of the recommendation would be by some other entity. Some type of rodent damage management would most likely be implemented by entities experiencing damage from rodents and these activities could pose greater risks to T/E species than WS activities. Damage management efforts by individuals with limited training and experience would be more likely to take non-target species, including T/E species. Without operational assistance available from WS, some entities may be motivated to consider use of more economical forms of control than those practiced by WS. Illegal use of toxicants represents one of the cheapest techniques to kill rodents, but it also presents the greatest environmental risks. Risks to T/E species would probably be greater under this Alternative than for Alternatives 1, 2 or 3, but probably less than Alternative 5.

4.4.2.5 Alternative 5 - No Idaho WS Rodent Damage Management Program.

Alternative 5 would result in no Idaho WS program, and hence no risks to T/E species from WS activities. Some type of rodent damage management would most likely be implemented by entities experiencing damage from rodents and these activities could pose greater risks to T/E species than WS activities. Without the Federal assistance available from WS, some entities may be motivated to consider use of more economical and less effective forms of control than those practiced by WS. Illegal use of toxicants represents one of the cheapest techniques to kill rodents, but it also presents the greatest environmental risks. Risks to T/E species would probably be greater under this Alternative than for Alternatives 1, 2, 3 or 4.

4.4.3 Concerns about the Risks Posed by WS Rodent Damage Management Methods to the Public and Domestic Pets

Rodent damage management conducted by WS in Idaho is directed by WS Directives, cooperative agreements, MOU, and Federal and State laws. Effects on public health and safety include potential benefits caused by WS fostering a safer environment (i.e., reduced disease risks) and potential negative effects that might result from the exposure of the public to damage management methods. The potential benefits from the Idaho WS Program include increased public health and safety on roadways, railroad beds, reduced disease threats to humans and domestic pets (e.g., giardia, plague, tularemia), and protection of agricultural and natural resources.

WS uses chemical and non-chemical methods that are appropriate to minimize a variety of damage problems and WS personnel are aware of the potential risks to humans and pets. WS' use of rodenticides in all instances is regulated by the EPA through the FIFRA, and the use of other chemicals is regulated by ATF, State law and by WS Directives. Along with effectiveness, cost and social acceptability, risk is an important criterion for selection of an appropriate damage management strategy. Determination of potential risks to non-target animals, the public and WS personnel is thus an important prerequisite for successful

application of the IWDM approach. Based on a thorough Risk Assessment, (USDA 1994, Appendix P), APHIS concluded that when WS program methods are used according to WS Directives, policies and laws, and when chemicals are used according to label directions, they are selective for target individuals or populations, and such use has negligible impacts on the environment.

4.4.3.1 Alternative 1 - Continue the Current Idaho WS Rodent Damage Management Program: (No Action) (Proposed Alternative).

The current Idaho WS rodent damage management is based on protecting agricultural resources and property on private lands as described in Chapter 3 of this EA. Based on the risk assessment (USDA 1994, Appendix P), environmental and public health and safety risks associated with WS damage management are low. Only 3 rodenticides used in rodent damage management (aluminum and zinc phosphide and strychnine) posed possible risks, and USDA (1994) noted that the risks associated with these methods were mitigated through specific direction provided by WS program policies and EPA label restrictions. Risks identified in the evaluation process for these rodenticides were primarily environmental risks addressed by the EPA rather than safety or health risks to the public. The greatest risks to public health and safety from WS' use of chemical methods are incurred by WS personnel who use the methods.

Of the non-chemical wildlife damage management methods used by WS, foothold and body-gripping traps and snares pose the greatest risk to non-target species, however any pet captured in a foothold trap or snare, and accompanied by a human can be released. WS limits the use of foothold and body-gripping traps and snares on public lands and warning signs are posted in those few areas where these devices are set on public or private lands. WS posts warning signs in areas wherever these devices are set. From FY00 through FY 02, there were no reported injuries to WS personnel or members of the public or their pets related to WS' use of any rodenticide or mechanical damage management methods described in this EA. Mitigation measures that address safety concerns about WS' use of management methods are listed in Table 3-1.

The Idaho WS program administers an explosive safety program to facilitate beaver damage management and dam breaching. 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 before obtaining certification. All blasting activities under this program are conducted by well trained, certified blasters and supervised by professional wildlife biologists or technicians. Explosive handling and use procedures employed by WS 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 follows all transportation and storage regulations from Federal and State agencies such as the OSHA, ATF, USDOT and ITD.

4.4.3.2 Alternative 2 - Continue the Current Rodent Damage Management Program, but Non-lethal Required Before Lethal Control.

Impacts under this Alternative would be similar to those described in Alternative 1 once the non-lethal before lethal requirement has been met. However, if WS' non-lethal attempts to stop or reduce damage were unsuccessful, or the use of non-lethal methods prolongs the control efforts and damage to resources continues, the cooperators might become impatient and implement lethal methods themselves. This action could increase risks to the public or domestic pets as compared to the Proposed Alternative, but probably less than Alternatives 3, 4 and 5.

4.4.3.3 Alternative 3 - Continue the Current Rodent Damage Management Program, but Without the use of Rodenticides and Other Chemicals.

This Alternative would preclude WS' use of aluminum and zinc phosphide, gas cartridges and other rodenticides and repellents, euthanasia drugs and other products, and binary explosives used to breach beaver dams. Much of the public concern over WS' use of rodent damage management chemicals is based

on erroneous perceptions that WS uses non-selective, outdated chemical methodologies. Currently, WS' use of chemicals, in all instances, is regulated by the EPA through the FIFRA; by ATF, FDA and DEA; by MOU with other agencies; and by WS Directives (WS Directives 2.210, 2.401, 2.415, 2.420, 2.425). 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 that such use has negligible impacts on the environment (USDA 1994).

Without the use of rodenticides and other chemicals, the risks to the public and pets from WS' use of mechanical methods to reduce rodent damage may increase. Without the use of rodenticides or chemicals to reduce rodent populations to alleviate some damage situation, resource owners my take actions themselves or contract with private pest control businesses who have little or no experience with chemical methodologies. These resource owners would be more likely than WS personnel to kill or harm non-target species, including pets, and not report the take.

4.4.3.4 Alternative 4 - Idaho WS Technical Assistance Rodent Damage Management Program Only.

Alternative 4 would result in no WS operational rodent damage management program in Idaho, therefore the use of methods would be at the discretion of individuals or agencies that conduct the activity. The risks associated with the WS rodent damage management program would be nonexistent under this Alternative. Under this Alternative, WS would make recommendations but implementation of the recommendation would be by some other entity. However, increased use of the same methods by less skilled individuals and greatly reduced restrictions on how rodent damage management is conducted may result in an increased risk to the public. This Alternative would likely result in increased risks to public health and safety over those identified in Alternatives 1, 2 and 3.

4.4.3.5 Alternative 5 - No Idaho WS Rodent Damage Management Program.

This Alternative would result in no WS rodent damage management program in Idaho, therefore the use of rodent damage management methods would be at the discretion of individuals or agencies that conduct the activity. The risks associated with the WS rodent damage management program would be nonexistent under this Alternative. Alternative 5 would result in no Federal WS Program to provide technical assistance or any other type of assistance to entities experiencing rodent damage problems. No program would be available for the protection of public health and safety, and the IDFG and IDHW would not have access to Idaho WS personnel if there is a zoonosis outbreak. This Alternative would likely result in increased risks to public health and safety over those identified in Alternatives 1, 2, 3 and 4.

4.4.4 Concerns about the Efficacy and Selectivity of Rodent Damage Management Methods

Appendix D includes discussion of the various methods used by Idaho WS and that discussion will not be repeated here. Under the current program, all methods are used as selectively and effectively as possible, in conformance with the WS Decision Model (Slate et al. 1992) and WS Program Directives. The selectivity of each method is based, in part, on the application of the method and the skill of Idaho WS personnel, and the direction provided by WS Directives and policies. Idaho WS personnel are trained in the use of each method and are certified as pesticide applicators by the ISDA for pesticides used during rodent damage management. Efficacy of the various methods may vary depending on local circumstances at the time of application. Some methods may be more or less effective or applicable depending on weather conditions, time of year, biological considerations, economic considerations, legal and administrative restrictions, or other factors. Because these various factors may at times preclude use of certain methods, maintaining the widest possible selection of wildlife damage management tools to most effectively resolve rodent damage problems is important. Damage management actions can be effective as reported by Allred (1981) who concluded that there were no new beaver settlements within 0.6 miles of areas that received damage management for at least the next full year.

4.4.4.1 Alternative 1 - Continue the Current Idaho WS Rodent Damage Management Program: (No Action) (Proposed Alternative).

Several methods employed under the current rodent damage management program are very selective for target species and efficient. These methods include cage traps, aluminum and zinc phosphide, gas cartridges and shooting. Other methods such as foothold traps and snares are somewhat less selective, however, non-target animals without significant injuries can be released from these capture devices. Binary explosives are not used to remove target animals, but to breach beaver dams causing damage or a damage threat.

Most target animals captured are euthanized, while captured non-target species are released if judged capable of surviving. Traps are considered moderately expensive due to initial cost, maintenance, trap-check requirements, increased travel time, and the need for a larger workforce to use traps effectively.

The current program uses the preceding methods to reduce rodent damage in Idaho. Non-capture methods (shooting and use of rodenticides) accounted for an estimated 9,035 rodents taken during rodent damage management in Idaho or 96% of the total taken in FY00 through FY02 (Table 4-10). Capture methods (i.e.,

Table 4-10. Rodents Taken by WS While Conducting Rodent Damage Management Activities During FY00-02 (MIS 2000, 2001, 2002).

FY	Species	Cage Trap	Body-gripping Trap	Shooting	Aluminum Phosphide[1]	Zinc Phosphide[1]	Gas Cartridge[1]	Foothold Trap	Snare	Target	Non-target
00	Beavers		25	8				17	4	54	
	Ground Squirrels			8	720					728	
	Jackrabbits			12						12	
	Muskrats		10	10				1		20	1
	Yellow-bellied Marmots	2[2]		11		1,344		41		1,398	
01	Beavers		31	1				39	24[3]	95	
	Ground squirrels				5,315	350				5,665	
	Yellow-bellied Marmots	1	8	63		622	4	12		710	
02	Beavers		36	12				30	41	119	
	Ground squirrels			20						20	
	House Mouse					1				1	
	Muskrats		4							4	
	Yellow-bellied Marmots		1	1	18	515		8		543	

[1] Number killed are estimates
[2] Two marmots live-captured, relocated and released unharmed.
[3] Two beavers live-captured in snares were relocated and released unharmed.

foothold traps, cage traps, body-gripping traps and snares) accounted for 335 animals captured or less than 4% of the rodents taken in FY00 through FY02. Only 1 non-target animal (muskrat) was killed in FY00 through FY02, and it was taken in a body-gripping trap set in water intended for beaver. Non-target animals taken by WS accounted for 0.01% of all estimated rodents taken during rodent damage management over the 3-year period.

4.4.4.2 Alternative 2 - Continue the Current Rodent Damage Management Program, but Non-lethal Required Before Lethal Control.

Under this Alternative, the efficacy of the WS program would be reduced, but selectivity would be similar to the Proposed Alternative because requesters have generally tried one or more non-lethal methods without success or have considered and found them to be impractical for their situations. This Alternative would not preclude requesters the option of implementing their own lethal damage management measures, which could decrease the efficacy and selectivity of rodent damage management methods.

4.4.4.3 Alternative 3 - Continue the Current Rodent Damage Management Program, but Without the use of Rodenticides and Other Chemicals.

This Alternative would preclude the use of aluminum and zinc phosphide, gas cartridges and other rodenticides, and binary explosives used to breach beaver dams and would be less efficient than Alternative 1. Traps are selective as employed by WS Specialists because of the mitigation measures and WS policy restrictions. In FY00 through FY02, 335 target animals were captured, and only 1 non-target animal was captured with mechanical methods. Traps (cage, foothold and body-gripping traps) and snares are considered moderately expensive to use due to increased travel time required to check and service equipment and larger workforce required to effectively use them. Additional time is required to use these methods because locations and sites where these devices are used must be selected carefully to reduce exposure to non-target animals. WS' rodent damage management would decrease and/or become less efficient because traps, snares and shooting may not be the most appropriate method to use to reduce damage or threats from rodents.

4.4.4.4 Alternative 4 - Idaho WS Technical Assistance Rodent Damage Management Program Only.

Under Alternative 4, no WS operational rodent damage management would exist, therefore no methods would be employed by WS personnel and selectivity and effectiveness of methods used by WS would not be an issue. WS would only make recommendations under this Alternative, but implementation of the recommendations would be the responsibility of some other entity. Private entities or State and local agencies would likely conduct rodent damage management, and possibly the use of methods under these programs would be less efficient and selective due to their lack of training, experience, adequate time to devote to rodent problems, and fewer regulation. Illegal use of pesticides could occur, along with indiscriminate trapping. Without the WS operational program, non-lethal methods use by individuals would likely decrease, as entities focus their attention on lethal methods.

4.4.4.5 Alternative 5 - No Idaho WS Rodent Damage Management Program.

Alternative 5, no WS program would exist, therefore no methods would be employed by WS personnel and selectivity and effectiveness of methods used by WS would not be an issue. Rodent damage would continue and management of such damage would be conducted by private entities or State and local agencies, and possibly the use of methods under these programs would be less efficient and selective due to their lack of training, experience, adequate time to devote to rodent problems, and fewer regulation. Illegal use of pesticides could occur, along with indiscriminate trapping. Without the WS program non-lethal methods would likely decrease, as entities focus their attention on lethal methods.

4.4.5 Effects of Beaver Dam Breaching/Removal on Wetland Wildlife Habitat Areas.

4.4.5.1 Alternative 1 - Continue the Current Idaho WS Rodent Damage Management Program: (No Action) (Proposed Alternative).

Under this Alternative, beaver impounded areas would be removed by hand or with binary explosives for the purpose of returning streams, channels, dikes, culverts, and irrigation canals to their original function. WS only removes beaver dams after a request is received, when the dam is relatively new and when the dam results in flooding to roads, crops, timber, pastures, and other types of property or resources. In FY00, a total of 5 dams were breached by Idaho WS, in FY01, 17 dams were breached, and in FY02, 8 dams were breached using 20, 86.7 and 75 pounds, respectively, of binary explosives (Table 4-11) (MIS 2000, 2001, 2002). The dams that were breached were a result of recent beaver activity because WS personnel receive the majority of requests soon after the affected resource owner discovers the damage and becomes aware of the WS program. Dams were removed under nationwide permits granted under Section 404 of the Clean Water Act (Appendix D). The majority of beaver dams that WS breaches are less than 1 year-old and therefore are not considered true wetland habitat and do not possess the same wildlife habitat values that established wetlands do. Thus, adverse impacts on established wetland wildlife habitat areas are avoided.

Table 4-11. Number of Beaver Dams Breached and Pounds of Binary Explosives Used (MIS 2000, 2001, 2002).

	FY 2000	FY 2001	FY 2002
Number of Dams Breached	5	17	8
Total Pounds of Explosives Used	20	86.7	75
Pounds of Explosives Used Per Dam	4	5.1	9.4

4.4.5.2 Alternative 2 - Continue the Current Rodent Damage Management Program, but Non-lethal Required Before Lethal Control.

Under this Alternative, the effects of WS program on wetland wildlife habitats would be very similar to the Proposed Alternative. However, if non-lethal methods to remove beaver from dam sites were prolonged and damage to resources continued, the cooperators might become impatient and breach the beaver dam themselves or by other members of the public who might be less trained and less experienced individuals than WS, resulting in possible adverse impacts to wetland wildlife habitats.

4.4.5.3 Alternative 3 - Continue the Current Rodent Damage Management Program, but Without the use of Rodenticides and Other Chemicals.

Under this Alternative, beaver dams would be breached by hand or with heavy equipment[3] for the purpose of returning streams, channels, dikes, culverts, and irrigation canals to their original function. In FY00, FY01 and FY02, a total of 5, 17 and 8 dams, respectively, were breached using binary explosives (Table 4-11) (MIS 2000, 2001, 2002). If binary explosives were not available, WS would have to depend on other

[3]WS would not operate any heavy equipment, however, private landowners might choose to breach dams or remove debris with a backhoe or other similar type equipment.

methods to breach dams. Impacts from hand tools or mechanical devices would be similar to Alternative 1. Dams would be removed under nationwide permits granted under Section 404 of the Clean Water Act (Appendix D). Rodendicides are not used to breach beaver dams.

4.4.5.4 Alternative 4 - Idaho WS Technical Assistance Rodent Damage Management Program Only.

Alternative 4 would result in no WS operational rodent damage management program in Idaho, therefore, no beaver dams would be breached by WS. Instead, the need for beaver dam breaching would be met by private, State, or local government entities and WS would only provide advice on the methods available. Impacts to established wetlands could be greater than in Alternatives 1, 2 or 3 because cooperators and/or members of the public or local governments who might be requested to breach beaver dams might be less trained and less experienced than WS. Some beaver dams or impounded areas that WS would advise against draining might be drained under private or local government management, which could have adverse impacts on wetland habitats in limited circumstances.

4.4.5.5 Alternative 5 - No Idaho WS Rodent Damage Management Program.

Alternative 5 would result in no beaver dam breaching by WS, nor would technical assistance be provided by WS since there would be no WS program in Idaho. As such, the need for beaver dam breaching 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 impacts on wetland habitats in limited circumstances.

4.5 SUMMARY OF IDAHO WS' IMPACTS

Comparison of the Alternatives and environmental consequences (impacts) are provided in Table 4-12. The comparisons of Alternatives is based on the above analysis and rated as: Low, Moderate or High. Based on the diversity and distribution of the affected environment, the analysis in this EA failed to identify any cumulative impacts nor are any significant impacts to the human environment expected because of rodent damage management conducted by the Idaho WS program. Any localized reduction of beaver, muskrat, jackrabbit, marmot, ground squirrel, porcupine, pocket gopher, vole, deer mouse or other field mouse populations would soon be restored and habitats re-occupied as Idaho WS personnel could only conduct damage management on areas with Agreements for Control, Cooperative Agreements or other comparable documents. The cumulative effects (*"Other Take + Idaho WS Take"*) on target and non-target populations from Idaho WS are low and do not have long-term adverse impacts on any species.

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Table 4-12. Relative Comparison of Anticipated Impacts From Alternatives*.

ISSUES	IMPACTS				
	Alternative 1 Current Program, Proposed Alternative	**Alternative 2** Current Program, Non-lethal Before Lethal Control	**Alternative 3** Current Program Without Rodenticides or Chemicals	**Alternative 4** Technical Assistance Only	**Alternative 5** No Program
Cumulative Impacts to Rodent Populations	Low Impacts to Populations	Low Impacts to Populations	Low Impacts to Populations	Low to Moderate Impacts to Populations	Low to Moderate Impacts to Populations
Cumulative Impacts to Non-target Wildlife Populations	Low Impacts to Populations	Low Impacts to Populations	Low Impacts to Populations	Low to Moderate Impacts on Populations	Low to Moderate Impacts on Populations
Adverse Impacts to T/E Species	Low Impacts	Low Impacts	Low to Moderate Impacts	Low to Moderate Impacts	Low to High Impacts
Risks to the Public and Pets	Low Risks	Low Risks	Low to Moderate Risks	Low to High Risks	Low to High Risks
Efficacy of Control Methods	High Efficacy	Moderate to High Efficacy	Low to Moderate Efficacy	Low to Moderate Efficacy	Low to Moderate Efficacy
Selectivity of Control Methods	High Selectivity	Moderate to High Selectivity	Low to Moderate Selectivity	Low to High Selectivity	Low to High Selectivity
Effects of Dam Breaching on Wetland Wildlife Habitat	Low Impacts on Wetlands	Low to Moderate Impacts on Wetlands	Moderate to High Impacts on Wetlands	Low to High Impacts on Wetlands	Low to High Impacts on Wetlands

* Evaluated on the use of rodent damage management methods and not on perceptions because of a wide range of human perceptions on the issue.

APPENDIX A

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APPENDIX B

LITERATURE CITED

Aleksiuk, M. 1968. Scent-mound communication, territoriality, and population regulation in the beaver (*Castor canadensis* Kuhl). Journal of Mammalogy 49:759-762.

Allred, M. 1981. The potential use of beaver population behavior in beaver resource management. Journal of Idaho Academy of Science 17:14-24.

Armitage, K. B. 1975. Social behavior and population dynamics of marmots. Oikos 26:341-354.

Arner, D. H. 1964. Research and a practical approach needed in management of beaver and beaver habitat in the southeastern United States. Transactions of the North American Wildlife Conference 29:150-158.

Arner, D. H., and J. S. Dubose. 1982. The impact of the beaver on the environment and economics in southeastern United States. Proceedings of the International Wildlife Conference 14:241-247.

Arner, D. H., and G. R. Hepp. 1989. Beaver pond wetlands: a southern perspective. Pages 117-128 *in* L. M. Smith, R. L. Pederson, and R. M. Kaminiski, editors. Habitat management for migrating and wintering waterfowl in North America. Texas Tech University Press, Lubbock, USA.

Arner, D. H., J. Baker, D. Wesley, and B. Herring. 1969. An inventory and study of beaver impounded water in Mississippi. Proceedings of the Annual Conference of Southeastern Association of Game and Fish Commisioners 23:110-128.

Askham, L. R. 1994. Franklin, richardson, Columbian, Washington and townsend ground squirrels. Pages B159-B163 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

Avery, E. L. 1992. Effects of removing beaver dams upon a northern Wisconsin brook trout stream. Final Report. Wisconsin Department of Natural Resources, Madison, USA.

AVMA (American Veterinary Medical Association). 1987. Panel report on the colloquium on recognition and alleviation of animal pain and distress. Journal of the American Veterinary Medical Association 191:1186-1189.

Bangerter, L. R. 1993. A cooperative approach to resolving a marmot damage problem in an urban recreational site. Proceedings of the Eastern Wildlife Damage Control Conference 6:30-32.

Barnes, V. G., Jr. 1973. Pocket gophers and reforestation in the Pacific northwest: a problem analysis. United States Fish and Wildlife Service Special Scientific Report, Wildlife 155. Washington, D.C., USA.

Beach, R., and W. F. McCulloch. 1985. Incidence and significance of *Giardia lamblia* in Texas beaver populations. Proceedings of the Great Plains Wildlife Damage Control Workshop 7:152-164.

Bergerud, A. T., and D. R. Miller. 1977. Population dynamics of Newfoundland beaver. Canadian Journal of Zoology 55:1480-1492.

Borrecco, J. E., and H. C. Black. 1990. Animal damage problems and control activities on national forest system lands. Proceedings of the Vertebrate Pest Conference 14:192-198.

APPENDIX B

Boutin, S., and D. E. Birkenholz. 1987. Muskrat and round-tailed muskrat. Pages 315-324 *in* M. Novak, J. A. Baker, M. E. Obbard, and B. Malloch, editors. Wild furbearer management and conservation in North America. Ministry of Natural Resources, Ontario, Canada.

Boyce, M. S. 1981. Beaver life-history responses to exploitation. Journal of Applied Ecology 18:749-753.

Busher, P. E., R. J. Warner, and S. H. Jenkins. 1983. Population density, colony composition, and local movements in two Sierra Nevadan beaver populations. Journal of Mammalogy 64:314-318.

Capp, J. C. 1976. Increasing pocket gopher problems in reforestation. Proceedings of the Vertebrate Pest Conference 7:221-228.

Case, R. M., and B. A. Jasch. 1994. Pocket gophers. Pages B17-B29 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

CDC (Centers for Disease Control and Prevention). 2002a. Hantavirus pulmonary syndrome cases by state of residence, United States - as of September 18, 2002. Centers for Disease Control and Prevention, Washington, D.C., USA. Available online at http://www.cdc.gov/ncidod/diseases/hanta/hps/noframes/casemap.htm (accessed 25 March 2003).

CDC (Centers for Disease Control and Prevention). 2002b. West nile virus. Centers for Disease Control and Prevention, National Center for Infectious Diseases, Division of Vector-Borne Infectious Diseases, Ft. Collins, Colorado, USA. Available online at http://www.cdc.gov/ncidod/dvbid/westnile/qa/wnv_squirrels.htm (accessed 5 June 2003).

CDFG (California Department of Fish and Game). 1999. California department of fish and game: final environmental document - bear hunting. Sections 265, 365, 366, 367, 367.5. Title 14 California Code of Regulation. California Department of Fish and Game, Sacramento, USA.

CEQ (Council for Environmental Quality). 1981. Forty most asked questions concerning CEQ's national environmental policy act regulations (40 CFR 1500-1508). Federal Register 46(55):18026-18038.

Chase, J. D., W. E. Howard, and J. T. Roseberry. 1982. Pocket gophers. Pages 239-255 *in* J. A. Chapman, and G. A. Feldhamer, editors. Wild mammals of North America. The Johns Hopkins University Press, Baltimore, Maryland, USA.

Childs, J. E., T. G. Ksiazek, P. E. Rollin, J. W. Krebs, S. Zaki, S. T. Nichol, C. J. Peters, and G. E. Glass. 1994. Hantavirus and their rodent reservoirs in the United States. Proceedings of the Vertebrate Pest Conference 16:188-191.

Conover, M. R., and D. J. Decker. 1991. Wildlife damage to crops: perceptions of agricultural and wildlife professionals in 1957 and 1987. Wildlife Society Bulletin 19:46-52.

Currie, P. O., and D. L. Goodwin. 1966. Consumption of forage by black-tailed jackrabbits on salt desert ranges of Utah. Journal of Wildlife Management 30:304-311.

Crouch, W. E. 1933. Pocket gopher control. Farmer's Bulletin Number 1709. United States Department of Agriculture, Washington, D.C., USA.

Danell, K. 1978. Population dynamics of the muskrat in a shallow Swedish lake. Journal of Animal Ecology 47:697-709.

APPENDIX B

Day, A. M. 1931. Soil erosion is often caused by burrowing rodents. Yearbook for 1931. United States Department of Agriculture, Washington, D.C., USA.

DeAlmeida, M. H. 1987. Nuisance furbearer damage control in urban and suburban areas. Pages 996-1006 *in* M. Novak, J. A. Baker, M. E. Obbard, and B. Malloch, editors. Wild furbearer management and conservation in North America. Ministry of Natural Resources, Ontario, Canada.

Defenders of Wildlife, and the Center for Wildlife Law. 1996. Saving biodiversity: a status report on state laws, policies and programs. Defenders of Wildlife and Center for Wildlife Law, Washington, D.C., USA.

Dingle, R. W. 1956. Pocket gophers as a cause of mortality in eastern Washington pine plantation. Journal of Forestry 54:832-835.

Dodge, W. E. 1982. Porcupine. Pages 355-366 *in* J. A. Chapman and G. A. Feldhamer, editors. Wild mammals of North America. The Johns Hopkins University Press, Baltimore, Maryland, USA.

Dodge, W. E., and P. R. Canutt. 1969. A review of the status of the porcupine (*Erethizon dorsatum epixanthum*) in western Oregon. Bureau of Sport Fisheries and Wildlife Service, Washington D.C., USA

Downhower, J. F., and E. R. Hall. 1966. The pocket gopher in Kansas. Miscellaneous Publication Number 44. University of Kansas, Museum of Natural History, Lawrence, USA.

Downhower, J. F., and K. B. Armitage. 1981. Dispersal of yearling yellow-bellied marmots (*Marmota flaviventris*). Animal Behavior 29:1064-1069.

Dunn, J. P., J. A. Chapman, and R. E. Marsh. 1982. Jackrabbits. Pages 124-145 *in* J. A. Chapman and G. A. Feldhamer, editors. Wild mammals of North America. The Johns Hopkins University Press, Baltimore, Maryland, USA.

Eadie, R. W. 1954. Animal control in field, farm, and forest. Macmillian Company, New York, New York, USA.

Ellarson, R. S., and J. J. Hickey. 1952. Beaver trapped by tree. Journal of Mammalogy 33:482-483.

EPA (Environmental Protection Agency). 1980. Investigation of efficacy and enforcement activities relating to electromagnetic pest control devices. EPA 340/02-80-001. Pesticides and Toxic Substances, United States EPA Enforcement Division, Washington, D.C., USA.

EPA (Environmental Protection Agency). 1995. Facts about wetlands. EPA 843-F-95-001e. United States Environmental Protection Agency, Office of Water, Office of Wetlands, Oceans and Watersheds (4502F), Washington, D.C., USA.

Ermer, E. M. 1984. Analysis of benefits and management costs associated with beaver in western New York. New York Fish and Game Journal 31:119-132.

Errington, P. L. 1963. Muskrat populations. Iowa State University Press, Ames, USA.

Fagerstone, K. A., G. K. Lavoie, and R. E. Griffith, Jr. 1980. Black-tailed jackrabbit diet and density on rangeland and near agricultural crops. Journal of Range Management 33: 229-233.

Graham, R. T., and J. L. Kingery. 1990. Seedling damage and mortality of conifer plantations on transitory ranges in northern and central Idaho. Proceedings of the Vertebrate Pest Conference 14:209-213.

APPENDIX B

Gross, J. E., L. C. Stoddart, and F. H. Wagner. 1974. Demographics analysis of a northern Utah jackrabbit population. Wildlife Monographs 40:63.

Gunson, J. R. 1970. Dynamics of the beaver of Saskatchewan's northern forests. Thesis, University of Alberta, Calgary, Canada.

Hall, E. R., and K. R. Kelson. 1959. The mammals of North America. Volume 1. The Ronald Press Company, New York, New York, USA.

Hansen, R. M., and J. T. Flinders. 1969. Food habits of North American hares. Range Science Department, Science Service 1. Colorado State University, Ft. Collins, USA.

Harper, W. R. 1968. Chemosterilant assessment for beaver. Thesis, Colorado State University, Fort Collins, USA.

Hendry, G. M. 1966. Kapuskasing beaver study. Ontario Department of Lands and Forestry, Kapuskasing, Canada.

Henry, D. B., and T. A. Bookhout. 1969. Productivity of beaver in northeastern Ohio. Journal of Wildlife Management 33:927-932.

Hill, E. P. 1976. Control methods for nuisance beaver in the southeastern United States. Proceedings of the Vertebrate Pest Conference 7:85-98.

Hill, E. P. 1982. Beaver. Pages 256-281 *in* J. A. Chapman and G. A. Feldhamer, editors. Wild mammals of North America. The John Hopkins University Press, Baltimore, Maryland, USA.

Hitchcock, H. B. 1954. Felled tree kills beaver (*Castor canadensis*). Journal of Mammalogy 19:317-319.

Hooven, E. F. 1971. Pocket gopher damage on ponderosa pine plantations in Southwestern Oregon. Journal of Wildlife Management 35:346-353.

Huey, W. S. 1956. New Mexico beaver management. New Mexico Department of Game and Fish, Bulletin 4. Albuquerque, USA.

IDFG (Idaho Department of Fish and Game). 1990. Furbearer management plan 1991-1995. Idaho Department of Fish and Game, Boise, USA.

IDFG (Idaho Department of Fish and Game). 1997. Furbearers. Study III, Job 1, Project W-170-R-20 Progess Report. Idaho Department of Fish and Game, Boise, USA.

IDFG (Idaho Department of Fish and Game). 1998. Furbearers. Study III, Job 1, Project W-170-R-21 Progess Report. Idaho Department of Fish and Game, Boise, USA.

IDFG (Idaho Department of Fish and Game). 1999. Furbearers. Study III, Job 1, Project W-170-R-22 Progess Report. Idaho Department of Fish and Game, Boise, USA.

IDFG (Idaho Department of Fish and Game). 2000. Furbearers. Study III, Job 1, Project W-170-R-23 Progess Report. Idaho Department of Fish and Game, Boise, USA.

IDFG (Idaho Department of Fish and Game). 2001. Furbearers. Study III, Job 1, Project W-170-R-24 Progess Report. Idaho Department of Fish and Game, Boise, USA.

APPENDIX B

IDFG (Idaho Department of Fish and Game). 2002a. Furbearers. Study III, Job 1, Project W-170-R-25 Progess Report. Idaho Department of Fish and Game, Boise, USA.

IDFG (Idaho Department of Fish and Game). 2002b. Furbearers. Study III, Job 1, Project W-170-R-26 Progess Report. Idaho Department of Fish and Game, Boise, USA.

IDFG (Idaho Department of Fish and Game). 2002c. Idaho 2002 and 2003 upland game seasons and rules. Idaho Department of Fish and Game, Boise, USA.

IDFG (Idaho Department of Fish and Game). 2003a. Preventing wildlife damage - diseases. Idaho Department of Fish and Game, Boise, USA. Available online at http://www2.state.id.us/fishgame/Info/ProgramsInfo/wildlife&you/living/prevent5.htm (accessed 26 March 2003).

IDFG (Idaho Department of Fish and Game). 2003b. Wildlife disease roundup. Idaho Wildlife: February 2003. Idaho Department of Fish and Game, Boise, USA. Available online at http://www2.state.id.us/fishgame/incredid/Feb2003/disease.htm (accessed 26 March 2003).

IDFG (Idaho Department of Fish and Game), [redacted] Idaho Cooperative Fish and Wildlife Research Unit, University of Idaho, and United States Geological Survey. 1997. Atlas of Idaho's wildlife. Idaho Department of Fish and Game, Boise, USA.

IDHW (Idaho Department of Health and Welfare). 2002. Idaho disease bulletin, Volume 8, Number 3, August 2002. Idaho Department of Health and Welfare, Division of Health, Boise, USA.

Jenkins, S. H., and P. E. Busher. 1979. *Castor canadensis*. Mammalian Species 120:1-8.

Johnston, C. A. 1994. Ecological engineering of wetlands by beaver. Page 379 *in* W. J. Mitsch, editor. Global wetlands: Old world and new. Elsevier Science B.V.

Johnson, E. W. 1958. Consumption of alfalfa and wild oats by *Microtus californicus*. Journal of Wildlife Management 22:433-435.

Johnson, M. L., and S. Johnson. 1982. Voles. Pages 326-354 *in* J. A. Chapman and G. A. Feldhamer, editors. Wild mammals of North America. The John Hopkins University Press, Baltimore, Maryland, USA.

Kelker, G. H. 1943. A winter wildlife census in northeast Wisconsin. Journal of Wildlife Management 7:133-141.

Kennelly, J. J., and P. J. Lyons. 1983. Evaluation of induced sterility for beaver (*Castor canadensis*) management problems. Proceedings of the Eastern Wildlife Damage Control Conference 1:169-175.

Knick, S. T., and D. L. Dyer. 1997. Distribution of black-tailed jackrabbit habitat determined by GIS in southwestern Idaho. Journal of Wildlife Management 61:75-85.

Knight, J. E. 1994. Jackrabbits. Pages D81-D86 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

Koehler, A. E., R. E. Marsh, and T. P. Salmon. 1990. Frightening methods and devices/stimuli to prevent mammal damage - a review. Proceedings of the Vertebrate Pest Conference 14:168-173.

Lantz, D. E. 1909. Pocket gophers as enemies of trees. Yearbook for 1909. United States Department of Agriculture, Washington, D.C., USA.

APPENDIX B

Latham, R. M. 1960. Bounties are bunk. National Wildlife Federation, Washington, D.C., USA.

Lawrence, W. H. 1957. Porcupine control: a problem analysis. Forestry Research Notes. Centralia, Washington, USA.

Laycock, W. A., and B. Z. Richardson. 1975. Long-term effects of pocket gopher control on vegetation and soils of a subalpine grassland. Journal of Range Management 28:458-462.

Lee, D. S., and J. B. Funderburg. 1982. Marmots. Pages 176-191 *in* J. A. Chapman and G. A Feldhamer, editors. Wild mammals of North America. The Johns Hopkins University Press, Baltimore, Maryland, USA.

Lewis, S. R., and J. M. O'Brien. 1990. Survey of rodent and rabbit damage to alfalfa hay in Nevada. Proceedings of the Vertebrate Pest Conference 14:116-119.

Loeb, B. F., Jr. 1994. The beaver of the old north state. Population Government 18:23.

Longley, W. H., and J. B. Moyle. 1963. The beaver in Minnesota. Minnesota Department of Conservation, Technical Bulletin 6, Minneapolis, USA.

Lyons, P. J. 1979. Productivity and population structure of western Massachusetts beavers. Transactions of the Northeast. Section of the Wildlife Society 36:176-187.

MacCracken, J. G., and R. M. Hansen. 1982. Herbaceous vegetation of habitat used by jackrabbits and Nuttall cottontails in southeastern Idaho. American Midland Naturalist 107:180-184.

Marsh, R. E. 1984. Ground squirrels, prairie dogs and marmots as pests on rangeland. Proceedings of the Vertebrate Pest Conference 11:195-208.

McDade, H. C., and W. B. Crandall. 1958. Perforation of the gastrointestinal tract by unusual foreign body-a porcupine quill. New England Journal of Medicine 258:746-747.

Medin, D. E., and W. P. Clary. 1990. Bird populations in and adjacent to a beaver pond ecosystem in Idaho. Research Paper INT-432. United States Department of Agriculture, United States Forest Service, Intermountain Research Station, Boise, Idaho, USA.

Medin, D. E., and W. P. Clary. 1991. Small mammals of a beaver pond ecosystem and adjacent riparian habitat in Idaho. Research Paper INT-445. United States Department of Agriculture, United States Forest Service, Intermountain Research Station, Boise, Idaho, USA.

Miller, J. E. 1983. Control of beaver damage. Proceedings of the Eastern Wildlife Damage Control Conference 1:177-183.

Miller, J. E. 1994. Muskrats. Pages B61-B70 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service. University of Nebraska, Lincoln, USA.

Miller, J. E., and G. K. Yarrow. 1994. Beavers. Pages B1-B11 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

MIS (Management Information System). 2000. Idaho wildlife services statewide summary reports. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Boise, USA.

APPENDIX B

MIS (Management Information System). 2001. Idaho wildlife services statewide summary reports. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Boise, USA.

MIS (Management Information System). 2002. Idaho wildlife services statewide summary reports. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Boise, USA.

Murie, O. J. 1974. A field guide to animal tracks. Houghton Mifflin Company, Boston, Massachusetts, USA.

Naimen, R. J., J. M. Melillo, and J. E. Hobbie. 1986. Ecosystem alteration of boreal forest streams by beaver (*Castor canadensis*). Ecology 67:1254-1269.

National Audubon Society. 1996. Field guide to mammals. National Audubon Society. Chanticleer Press, Incorporated, New York, New York, USA.

Nolte, D. L., and M. Dykzeul. 2002. Wildlife impacts on forest resources. Pages 163-168 *in* Human conflicts with wildlife: economic considerations. Proceedings of the Third NWRC Special Symposium. National Wildlife Research Center, Fort Collins, Colorado, USA.

Nolte, D. L., M. W. Lutman, D. L. Bergman, W. M. Arjo, and K. R. Perry. 2003. Feasibility of nonlethal approaches to protect riparian plants from foraging beaver in North America. Pages 75-79 *in* G. A. Singleton, L. A. Hinds, C. J. Krebs, and D. M. Spratt, editors. Rats, mice, and people: rodent biology and management. Australian Centre for International Agricultural Research, Canberra, Australia.

Novak, M. 1977. Determining the average size and composition of beaver families. Journal of Wildlife Management 41:751-754.

Novak, M. 1987. Beaver. Pages 283-312 *in* M. Novak, J. A. Baker, M. E. Obbard, and B. Malloch, editors. Wild furbearer management and conservation in North America. Ministry of Natural Resources, Ontario, Canada.

O'Brien, J. M. 1994. Voles. Pages B177-B182 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

Olsen, P. F. 1959. Muskrat breeding biology at Delta, Manitoba. Journal of Wildlife Management 23:40-53.

O'Neil, T. 1949. The muskrat in the Louisiana coastal marshes. Louisiana Department Wildlife and Fish, New Orleans, USA.

Patterson, D. 1951. Beaver-trout relationships. Investigational Report Number 822. Wisconsin Conservation Department, Madison, USA.

Payne, N. F. 1984a. Reproductive rates of beaver in Newfoundland. Journal of Wildlife Management 48:912-917.

Payne, N. F. 1984b. Mortality rates of beaver in Newfoundland. Journal of Wildlife Management 48:117-126.

Pennington, L. 1993. A need for a 24(c) registration for zinc phosphide for mouse control (Letter to Ronda Hirnyck, Idaho Department of Agriculture from Jacklin Seed Company). Idaho State Department of Agriculture, Boise, USA.

Porth, A., N. Huntly, and J. E. Anderson. 1994. Effects of cyclically high populations of black-tailed jackrabbits *(Lepus californicus)* on sage-steppe vegetation and nitrogen budget. Bulletin of the Ecology Society American 75:185.

Reese, K. P., and J. D. Hair. 1976. Avian species diversity in relation to beaver pond habitats in the piedmont region of South Carolina. Proceedings of the Annual Conference of Southeastern Association of Fish and Wildlife Agencies 30:437-447.

Robinson, G. 1999. Section 18 emergency use of zinc phosphide bait to control meadow voles in potatoes, sugar beets, wheat and barley in Idaho, January 20, 1999 (Letter to Ms. Meredith Laws, United States Environmental Protection Agency, from the Idaho State Department of Agriculture). Idaho State Department of Agriculture, Boise, USA.

Rutherford, W. H. 1964. The beaver in Colorado: its biology, ecology, management and economics. Colorado Game, Fish and Parks, Technical Publication 17, Denver, USA.

Sauer, W. C. 1977. Exclusion cylinders as a means of assessing losses of vegetation due to ground squirrel feeding. Pages 14-21 *in* W. B. Jackson and R. E. Marsh, editors. Test methods for vertebrate pest control and management materials. American Society for Testing Materials, Philadelphia, Pennsylvania, USA.

Scheffer, T. H. 1931. Habits and economic status of the pocket gophers. Technical Bulletin 224. United States Department of Agriculture, Washington, D.C., USA.

Schemnitz, S. D. 1994. Porcupines. Pages B81-B83 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

Schmidt, R. H. 1989. Vertebrate pest control and animal welfare. Pages 63-68. *in* K. A. Fagerstone and R. D. Curnow, editors. Vertebrate pest control and management materials. Vol. 6, ASTM STP 1055. American Society for Materials and Testing, Philadelphia, Pennsylvania, USA.

Shumake, S. A. 1997. Electronic rodent repellent devices: a review of efficacy test protocols and regulatory actions. Pages 253-270 *in* J. R. Mason, editor. Repellents in wildlife management, symposium proceedings August 8-10, 1995. United States Department of Agriculture, Wildlife Services-National Wildlife Research Center, Ft. Collins, Colorado, USA.

Seton, E. T. 1937. Great historic animals. Charles Scriber's Sons, New York, New York, USA.

Slate, D. A., R. Owens, G. Connolly, and G. Simmons. 1992. Decision making for wildlife damage management. Transactions of North American Wildlife Natural Resources Conference 57:51-62.

Smith, G. W., and N. C. Nydegger. 1985. A spotlight, line-transect method for surveying jackrabbits. Journal of Wildlife Management 49:699-702.

Smith, H. R., R. J. Sloan, and G. S. Walton. 1981. Some management implications between harvest rate and population resiliency of the muskrat (*Ondatra zibethicus*). Pages 425-442 *in* J. A. Chapman and D. Pursley, editors. Worldwide Furbearer Conference, Frostburg, Maryland, USA.

Smolen, M. J., and B. L. Keller. 1987. *Microtus longicaudus*. Mammalian Species 27:1-7.

Speake, D. W. 1955. Seasonal abundance of waterfowl on sample areas in Lee County, Alabama. Thesis, Alabama Polytechnic Institute, Auburn, Alabama, USA.

Stoddart, C. L. 1985. Severe weather related mortality of black-tailed jackrabbits. Journal of Wildlife Management 49:696-698.

APPENDIX B

Taylor, W. P. 1935. Ecology and life history of the porcupine (*Erethizon epixanthum*) as related to the forests of Arizona and the southwestern United States. University of Arizona Bulletin 6:1-177.

The Wildlife Society. 1992. Conservation policies of The Wildlife Society: A stand on issues important to wildlife conservation. The Wildlife Society, Bethesda, Maryland, USA.

Timm, R. M., and W. E. Howard. 1994. White-footed and deer mice. Pages B47-B51 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

Turner, G. G. 1973. Responses of mountain grassland vegetation to gopher control, reduced grazing, and herbicide. Journal or Range Management. 22:377-383.

Turner, G. T., R. M. Hansen, V. H. Reid, H. P. Tietjen, and A. L. Ward. 1973. Pocket gophers and Colorado mountain rangeland. Bulletin 554S. Colorado State University, Agriculture Experiment Station, Fort Collins, USA.

USDA (United States Department of Agriculture). 1989. Strategic plan. United States Department of Agriculture, Animal and Plant Health Inspection Service, Animal Damage Control [Wildlife Services], Operational Support Staff, Riverdale, Maryland, USA.

USDA (United States Department of Agriculture). 1994. Animal damage control program final environmental impact statement. United States Department of Agriculture, Animal and Plant Health Inspection Service, Animal Damage Control [Wildlife Services], Operational Support Staff, Riverdale, Maryland, USA.

USDA (United States Department of Agriculture). 2000a. Strategic planning: internal and external perspectives. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Operational Support Staff, Riverdale, Maryland, USA.

USDA (United States Department of Agriculture). 2000b. Management for pocket gopher damage control, environmental assessment and decision notice/finding of no significant impact. United States Department of Agriculture, Nez Perce National Forest, Red River Ranger District, Elk City, Idaho, USA.

USDI (United States Department of the Interior). 1992. Biological opinion [July 28, 1992]. United States Fish and Wildlife Service, Washington D.C., USA.

United States District Court of Utah. 1993. Civil No. 92-C-0052A, January 20, 1993.

Van Deusen, J. L., and C. A. Meyers. 1962. Porcupine damage in immature stands of ponderosa pine in the Black Hills. Journal of Forestry 6:811-813.

Vorhies, C. J., and W. P. Taylor. 1933. The life histories and ecology of the jackrabbits *Lepus alleni* and *Lepus californicus* in relation to grazing in Arizona. University of Arizona, Agricultural Experiment Station, Technical Bulletin 49:1-117.

Wade, D. A., and C. W. Ramsey. 1986. Identifying and managing aquatic rodents in Texas: beaver, nutria and muskrats. Texas Agricultural Extension Service, Texas A&M University, College Station, USA.

Wagner, F. H., and L. C. Stoddart. 1972. Influence of coyote predation on black-tailed jackrabbit populations in Utah. Journal of Wildlife Management 36:329-342.

APPENDIX B

Ward, A. L. 1973. Food habits and competition. Bulletin 554S. Colorado State University, Agriculture Experiment Station, Fort Collins, USA.

Wigley, T. B., Jr., T. H. Roberts, and D. H. Arner. 1983. Reproductive characteristics of beaver in Mississippi. Journal of Wildlife Management 47:1172-1177.

Wilson, K. A. 1955. Effects of water level control on muskrat populations. Federal Aid Wildlife Restoration Project W-6-R, Completion Report. North Carolina Wildlife Resources Commission, Raleigh, USA.

Woodward, D. K. 1977. Status and ecology of the beaver (*Castor canadensis carolinesis*) in South Carolina with emphasis on the piedmont region. Thesis, Clemson University, Clemson, South Carolina, USA.

Woodward, D. K. 1983. Beaver management in the southeastern United States: a review and update. Proceedings of the Eastern Wildlife Damage Control Conference 1:163-165.

Woodward, D. K., J. D. Hair, and B. P. Gaffney. 1976. Status of beaver in South Carolina as determined by a postal survey of landowners. Proceedings of the Annual Conference of the Southeast Association of State Fish and Wildlife Agencies 30:448-454.

WS (Wildlife Services). 1990. Idaho wildlife services fiscal year 1990 annual tables. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Boise, USA.

WS (Wildlife Services). 1991. Idaho wildlife services fiscal year 1991 annual tables. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Boise, USA.

WS (Wildlife Services). 1992. Idaho wildlife services fiscal year 1992 annual tables. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Boise, USA.

WS (Wildlife Services). 2001. Wildlife hazard assessment for the Boise air terminal, Boise, Idaho. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Boise, Idaho, USA.

Wywialowski, A. P. 1994. Agricultural producers' perceptions of wildlife-caused losses. Wildlife Society Bulletin 22:370-382.

Yeager, L. E., and W. H. Rutherford. 1957. An ecological basis for beaver management in the Rocky Mountain region. Transactions of the North American Wildlife Conference 22:269-300.

Yensen, E., and P. W. Sherman. 2003. Ground-dwelling squirrels of the Pacific northwest. United States Fish and Wildlife Service and United States Bureau of Land Management, Boise, Idaho, USA.

APPENDIX C

LEGAL AUTHORITIES AND MISSION STATEMENTS OF FEDERAL AND STATE AGENCIES IN IDAHO

WS Legislative Authority

The primary, statutory authority for the WS program is the Animal Damage Control Act of March 2, 1931 (7 U. S. C. 426-426c; 46 Stat. 1468), as amended, which provides that:

The Secretary of Agriculture is authorized and directed to conduct such investigations, experiments, and tests as he may deem necessary in order to determine, demonstrate, and promulgate the best methods of eradication, suppression, or bringing under control on national forests and other areas of the public domain as well as on State, Territory or privately owned lands of mountain lions, wolves, coyotes, bobcats, prairie dogs, gophers, ground squirrels, jackrabbits, brown tree snakes and other animals injurious to agriculture, horticulture, forestry, animal husbandry, wild game animals, furbearing animals, and birds, and for the protection of stock and other domestic animals through the suppression of rabies and tularemia in predatory or other wild animals; and to conduct campaigns for the destruction or control of such animals. Provided that in carrying out the provisions of this Section, the Secretary of Agriculture may cooperate with States, individuals, and public and private agencies, organizations, and institutions.

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 authority of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (Public Law 100-202, Dec. 22, 1987, Stat. 1329-1331). 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. Fish and Wildlife Service

The USFWS has the responsibility and authority for management of all Federally listed T/E species. However, by the provisions of an MOU between the USDA and USDI, WS has the responsibility for protecting agricultural resources and other private property from certain T/E species.

U. S. Army Corps of Engineers

The USACE has the responsibility for administering the Clean Water Act, Section 404 permitting process. The Corps of Engineers, along with the EPA and various State agencies work together to protect the waters of the United States, including wetlands.

U. S. Bureau of Land Management

The mission of the BLM is to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

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U. S. Bureau of Reclamation

The BOR's mission is to manage, develop and protect water and related resources in an environmentally and economically sound manner in the interests of the American public.

U. S. Department of Transportation

U S DOT's mission is to serve the United States by ensuring a fast, safe, efficient, accessible and conventient transportation system the meets vital national interests and enhances the quality of the life of the American people, today and into the future.

Natural Resources Conservation Service

The NRCS provides leadership in a partnership effort to help people ensure, maintain, and improve our natural resources and environment.

Idaho State Animal Damage Control Board

Establishment of the Idaho ADC State Board was provided for under Idaho Code 25-128. The Board is composed of the Chairman of the [redacted], a representative of the [redacted], the Director of the IDFG, and the Chairmen of the 5 ADC Districts in the State of Idaho. The Board is charged with coordinating and giving general direction to, *"Programs to prevent and control damage or conflicts on federal, state, or other public or private lands caused by predatory animals, rodents, or birds injurious to animal husbandry, agriculture, horticulture, forestry, wildlife and public health and safety . . . "*

Under provisions of an MOU between the State ADC Board and the WS program, WS cooperates with the Board in carrying out wildlife damage management in Idaho.

Idaho Department of Fish and Game

The IDFG is charged with the management, preservation, and protection of all wildlife in Idaho (Title 36, Idaho Code). However, under the current MOU between IDFG and the State ADC Board, WS is delegated the responsibility for prevention and reduction of damage caused by predatory animals and other vertebrate pests, including T/E species within the State of Idaho as described in Section 25-128, Idaho Code. The MOU is WS' authorization by IDFG to take protected wildlife in order to prevent or reduce damage to agriculture, natural resources and property, and to minimize threats to human health and safety. Control of beaver damaging property or interfering with the delivery of irrigation is the responsibility of IDFG, however, WS will respond to requests for assistance with beaver damage problems as time and work schedules allow. WS will provide technical assistance on how landowners can deal with beaver problems themselves, and/or will remove beaver and their dams, when requested to do so, on a cost-sharing basis with property owners. Complaints of damage caused by "predators" and "unprotected" wildlife will ordinarily be handled by WS, which includes rodent species such as jackrabbits, marmots, porcupines, ground squirrels, fox squirrels, and other field rodents.

Under Idaho Code 36-1107, the IDFG Director may authorize by issuance of permit or "grant properly safeguarded permission" to landowners or their employees, or lessees to take any protected wildlife species, including beavers and muskrats, causing damage to property.

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Idaho State Department of Agriculture

Under the provisions of Idaho Code 22-103(24), the Director of ISDA is authorized, *"To take all steps that are deemed necessary to prevent and control damage or conflicts on federal, state, or other public or private lands caused by predatory animals, rodents, or birds, including threatened or endangered wildlife within the state of Idaho as are established by federal or state law, federal or state regulation, or county ordinance, that are injurious to animal husbandry, agriculture, horticulture, forestry, wildlife and public health and safety."*

Idaho Department of Environmental Quality, Division of Water Quality

The DEQ, Division of Water Quality, has regulatory authority for the Clean Water Act in Idaho and coordinates with the USACE to determine if activities could degrade water quality in Idaho. DEQ is further charged with the supervision and administration of a system to safeguard the quality of the waters of the State.

Idaho Department of Health and Welfare

The IDHW performs surveillance and monitors diseases that can be transmitted from wildlife to humans. IDAPA 16.02.10 requires licensed physicians to report diseases such as Giardiasis, Hantavirus Pulmonary Syndrome, Lyme Disease, Leptospirosis, Plague, Rabies (human and animal) Tularemia, West Nile Virus, etc. to the IDHW. IDHW and DEQ share several enforcement responsibilities of environmental and health-related Federal Laws and regulations.

Idaho Department of Lands

The IDL operates under authority of Idaho Code and Administrative Rules adopted by the Idaho Legislature and the State Board of Land Commissioners. IDL is charged with providing direction, control and disposition of the public lands of Idaho (IDAPA 58-104) and is responsible for managing Idaho endowment lands that total nearly 2.5 million acres, including 780,000 acres of commercial timberland. It also regulates and controls the use of State-owned lands as to provide for their commercial, navigational, recreational or other public purposes and establishes policies and strategic plans to coordinate the management of State lands with the investment goals of the permanent endowment funds and earnings reserve funds.

Idaho Transportation Department

ITD is the State agency responsible for ensuring that Idaho's highways and bridges are maintained and kept safe, reliable and efficient. Division of Aeronautics, ITD, plans and implements necessary and desired products, programs, services and projects to develop, encourage and foster an aviation system that meets the current and future needs of Idaho. As one of their responsibilities, Division of Aeronautics safeguards and maintains dirt, back-country landing strips in Idaho's U.S. National Forests.

Idaho Bureau of Hazardous Materials

The BHM is responsible for hazardous material response planning as well as for training and equipping 4 Regional Response Teams, and keeps records concerning hazardous material storage, transport and release within Idaho.

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COMPLIANCE WITH FEDERAL LAWS

Several other Federal laws authorize, regulate, or otherwise affect WS Rodent Damage Management. WS complies with these laws, and consults and cooperates with other agencies as appropriate.

National Environmental Policy Act (Public Law 91-190, 42 U. S. C. 4321, *et seq.*; Stat. 852), as amended.

NEPA is the basic national charter for protection of the environment. It has two objectives: 1) to consider significant environmental impacts because of a major proposed Federal action during decision making, and 2) to inform the public that the agency did consider environmental concerns in its decision making process. All WS activities, including Rodent Damage Management, are subject to NEPA, and NEPA requires WS to plan and coordinate with other agencies and the public on its EAs. This EA meets the NEPA requirement for rodent damage management in Idaho.

Endangered Species Act of 1973 (16 U. S. C. 1531, 1543; 87 Stat. 884), as amended.

It is Federal policy, under the 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 (ESA Sec.2(c)). WS conducted a Section 7 consultation 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*" (ESA Sec.7(a)(2)). WS has obtained a Biological Opinion from the USFWS describing potential effects on T/E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1994, Appendix F).

Federal Insecticide, Fungicide, and Rodenticide Act (7 U. S. C. 136 *et seq.*; 86 Stat. 975), as amended.

FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The EPA is responsible for implementing and enforcing FIFRA. All chemical methods used or recommended by the WS program in Idaho are registered with and regulated by the EPA and the ISDA, and used by WS in compliance with labeling procedures and requirements.

National Historic Preservation Act of 1966 (16 U. S. C. 470-470w-6), as amended.

The National Historic Preservation Act (NHPA), and its implementing regulations (36 CFR 800), require Federal agencies to: 1) determine whether activities they propose constitute *"undertakings"* that can result in changes in the character or use of historic properties, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the State Historical 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 has determined rodent damage management 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.

APPENDIX D

APPROVED RODENT DAMAGE MANAGEMENT METHODS

Resource owners and government agencies have used a variety of methods/techniques to reduce rodent damage. However, all non-lethal and lethal methods developed to date have limitations based on costs, logistics, selectivity and effectiveness. Below is a discussion of rodent damage management methods which could be recommended or used by the Idaho Wildlife Services (WS) Program, United States Department of Agriculture (USDA). The methods/techniques are grouped in 2 major categories: 1) Mechanical Methods, and 2) Chemical Methods. Each category is then subdivided in to 2 groups: 1) Non-lethal and 2) Lethal.

MECHANICAL METHODS

1.0 NON-LETHAL

1.0.1 Habitat Management for the reduction of rodent damage refers to vegetation and/or environmental manipulation to reduce the carrying capacity for rodents or to reduce the attractiveness of the area to rodents.

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 aspen and promote long-lived hardwoods and conifers 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, possibly increasing nuisance complaints.

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, by hand or with explosives, major dams. Water levels may sometimes also be lowered by use of a drain tube or leveler placed in the dam. However, application of this strategy has been virtually non-existent. Habitat management to reduce beaver populations has the greatest potential for application on Federal, State, and County forest lands. At present, there appear to be no large-scale and consistent programs dealing with this beaver damage management strategy.

Pond Levelers. These devices have been used for many years in several different States, with varying degrees of success. Various types of beaver pond levelers have been described (Arner 1964, Laramie and Knowles 1985, Roblee 1984). Installation of beaver pond levelers can be effective in reducing flooding in certain situations (Minnesota Department of Natural Resources (MDNR) 1994, Miller and Yarrow 1994). 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) (Figure 1.) can sometimes be used to regulate water levels in beaver ponds.

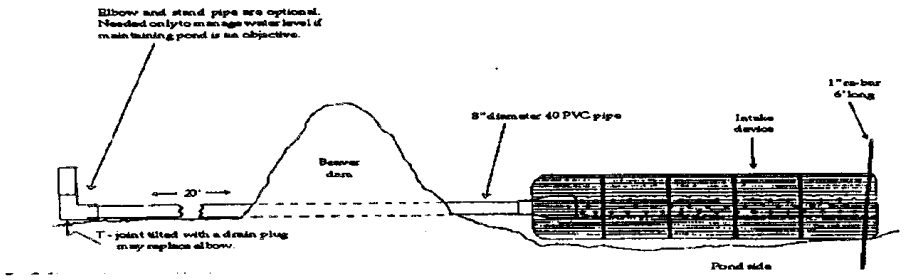

Figure 1. Clemson beaver pond leveler used to control water level and prevent flooding from beaver damming activity.

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 (small to medium sized rocks) or gravel. Habitat alterations to reduce cattail wetlands could reduce the density of muskrats. This type of management practice would be conducted by entities other than WS.

Ground Squirrel. Flood irrigation, as opposed to sprinkler or drip irrigation, discourages ground squirrels in orchards, fields and pasture lands. They are also limited by frequent tillage, especially deep discing or plowing. These practices, however, will not eliminate ground squirrels completely and they will compensate by living at the edges of fields. Another practice is to keep fence line vegetation free by discing as close as possible to them to limit the area where ground squirrels can thrive.

1.0.2 **Exclusion** involves physically preventing rodents from gaining access to protected resources by constructing a fence or erecting other barriers. 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 by burrowing aquatic rodent species. Rip-rap (small to medium sized rocks) can also be used on dams or levies at times, especially to deter rodent burrowing. Electrical barriers have proven effective in limited situations for rodents; 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 beaver 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, landscape, or fruit trees or other plants from rodent damage can sometimes be accomplished by using hardware cloth, similar screening, chicken wire, chain link fencing (or other materials) or grit paint. These methods are used most frequently by property and home owners. They are 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.

1.0.3 **Cultural Practices** are similar to habitat/environmental manipulation, but differ in that the manipulation is directed towards domestic plants/crops and stored foods/grains. Selecting and planting crops that are less susceptible to rodent damage or modifying planting schedules during low rodent populations can sometimes help lessen potential damage from rodents. Establishing food plots exclusively for rodents or providing supplemental food, mineral, or nutritional needs may help individual growers who suffer significant damage. However cultural practices are sometimes expensive, require considerable time and planning to implement, and may attract other unwanted species to the area. Cultural practices are normally implemented by the grower.

1.0.4 **Traps/Snares (Non-lethal)** can be used as a non-lethal or lethal capture device, depending on the style or manufacturer of the device, placement and mechanical adjustments (see discussion in "LETHAL" methods for information on the use of these devices when applied as lethal capture devices). Commonly used devices include foothold and cage-type traps, and snares. These devices are usually implemented by WS personnel because of the technical training and skill required to use such devices. A formal risk assessment of all trap and snare devices used by the WS program in Idaho can be found in USDA (1994, Appendix P).

Cage Traps can be used to capture rodents alive for relocation. This method is rarely, if ever, used to solve problems caused by rodents in Idaho because these species are abundant; in addition, moving damage-causing individuals to other locations would typically just result in damage at the new location or the translocated individuals moving from the relocation site to areas where they were unwanted. The

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American Veterinary Medical Association (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 (Centers for Disease Control and Prevention (CDC) 1990). Although relocation is not necessarily precluded in all cases, it would in many cases be logistically impractical and biologically unwise in Idaho.

Hancock Traps are designed to live-capture beaver for relocation or later disposition. 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 trap is the ease of release of beaver or non-target animals. Disadvantages are that the trap weighs about 25 pounds and is relatively bulky to carry and maneuver. It also presents more risk to the user than snares or foothold traps.

Foothold Traps can be effectively used to live-capture a variety of mammals. Foothold traps are typically placed next to, or in some situations, in travel ways or trails 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 use of appropriate lures and placement by trained WS personnel also contributes greatly to the foothold trap's selectivity. An additional advantage is that foothold traps can allow for the on-site release or the relocation of animals. The use of foothold traps requires more workforce than some methods, but they are indispensable in resolving many damage problems. Trapping, although labor intensive, can be used to reduce damage caused by beaver, muskrats, marmots or porcupines when only a small number of individuals are present.

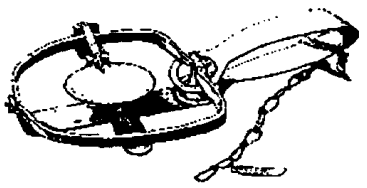

Figure 2. Single-spring foothold trap.

Snares are capture devices comprised of a 1/32nd.-3/32nd. inch diameter cable formed in a loop with an attached locking device that are placed in the travel ways of rodents. Smaller diameter cable is used for small rodents such as marmots whereas beavers and porcupines require larger diameter cable. 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 are typically a live-capture method. When snares are used to capture beaver, they are typically set to catch the beaver around the body.

1.0.5 Abrasives are materials that discourage, reduce or prevent gnawing behavior of rodents. Abrasives produce an unpalatable surface which irritates the teeth and mouth of rodents when they attempt to gnaw or chew on the surface. Flexible materials, such as sandpaper, grinder pads and fine-mesh stainless steel screening can be placed on or over objects (electrical wiring, plastic piping, fruit trees, etc) that are susceptible to rodent gnawing. Fine sand can be added and mixed with paint, glue or other suitable liquid adherents to formulate a paste or heavy mixture that can be brushed-on or applied to a surface to discourage rodent gnawing. This method has had limited success when applied or painted to tree trunks to discourage beaver from cutting down trees. Recent preliminary tests of applying a textural repellent (sand mixed in paint) by WS' National Wildlife Research Center (Nolte et al. 2003) suggest that this method may be more applicable for large diameter trees. However, additional research is needed to fully evaluate the efficacy and practicality of abrasives.

1.0.6 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 activities or drainage structures such as culverts.

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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 with a rake or power tools (e.g., a winch), or with explosives. Explosives are used only by WS personnel specially trained and certified to conduct such activities, and only binary explosives (see CHEMICAL METHODS) 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 Clean Water Act. Since hand removal of a dam normally results in much less disturbance to sediment and deposition of fill, a section 404 permit is not required. The use of binary explosives, though, may trigger Section 404 and require the landowner to get a permit. However, several activities are covered under nationwide permits which will be discussed below.

Wetlands are recognized by 3 characteristics: hydric soils, hydrophytic vegetation, and general hydrology. Hydric soils are either composed of, or have a thick surface layer of, decomposed plant materials (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 the smell of rotten eggs. 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 occur rapidly, 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.

Beaver dam removal 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 preexisting condition with similar flows and circulations. When a dam is removed, debris is discharged into the water. The debris that ends up in the water is considered *"incidental fallback"* or discharge fill. The Tulloch Rule Decision (Court Case No. 93 cv01754) determined that incidental fallback did not trigger Section 404. It was not determined if beaver dams fit into this category, but the United States Environmental Protection Agency (EPA) and the United States Army Corps of Engineers (USACE) issued guidance to their regulatory offices that beaver dam removal may not require permits under Section 404 (Wayland and Shaeffer 1997). However, most beaver dam removal operations in Idaho, if considered discharge, are covered under 33 Code of Federal Regulations (CFR) 323 or 330 and USACE (1996) and do not require a permit. A permit would be required if 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.

The following information explains Section 404 exemptions and conditions for removing beaver dams:

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

> **Part 323.4 Discharges Not Requiring Permits.** This section gives exemptions for certain types of discharge 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. Specifically part (a)(1)(iii)(C)(i), "*...fill material incidental to connecting upland drainage facilities* [i.e. drainage ditches] *to waters of the United States, adequate to effect the removal of excess soil moisture from upland croplands...*"; where drainage ditches in upland crops have been dammed by beavers, they can be removed. Moreover, (a)(1)(iii)(C)(iv) "*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 drainage ways 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 removal of beaver dams to restore drainage of agricultural lands within one year of discovery. These drainages do not include the immediate or gradual conversion of a wetland to a non-wetland.

Part 323.4 (a) (2) allows "*Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, rip-rap, 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 removed where they have damaged roads, culverts, bridges, and levees without a permit 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 NWPs are listed in Appendix A of 33 CFR 330 and permittees must satisfy all terms and conditions given in order to qualify for their use. Individual beaver dam removal activities by WS may be covered by any of the following NWPs if not already exempted from permit requirements by the regulations discussed above. WS complies with all conditions and restrictions placed on NWPs for any instance of beaver dam removal done under a specific NWP.

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 removal 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 removed in a special aquatic area, but normally the aquatic site will be returned to normal. However, if a wetland exists, and beaver dam removal is not allowed under another permit, then the District Engineer must be notified for a permit.

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 the United States Fish and Wildlife Service (USFWS) or the Natural Resources Conservation Service (NRCS) to conduct restoration; a voluntary wetland restoration project documented by NRCS; or notified the District Engineer according to "notification" procedures. On Federal lands, including the 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 removal of a beaver dam, as long as it was not a true

wetland (i.e. 5 or more years old for WS), and for non-Federal public and private lands, the appropriate agreement, project documentation, or notification is in place.

USACE Guidelines for Idaho WS. In addition to the above CFRs and exemptions, Idaho WS consulted with the USACE, Walla Walla District Office, Regulatory Branch to request written guidelines for removal of beaver dams in Idaho. The below Guidance was provided by the USACE, Chief, Regulatory Branch on September 16, 1996 (USACE 1996).

"1. The following guidance applies only to the regulation of the removal of beaver dams in the State of Idaho by the Walla Walla District, Corps of Engineers under the authority of Section 404 of the Clean Water Act.

2. In the August 25, 1993 Federal Register, the Corps of Engineers amended permit regulations defining discharges of dredged material. Under these amendments, commonly referred to as the "Excavation Rule," the definition of the phrase "discharge of dredged material" was revised to include mechanized landclearing, ditching, channelization, or other excavation activities which destroy or degrade waters of the United States.

3. The removal of beaver dams normally involves the incidental discharge of dredged material. Soil and debris imbedded in the dam to seal and solidify the structure are released downstream into the waterway. In addition, organic matter and soil which has accumulated in the pond upstream of the dam are released downstream. Furthermore, aquatic habitats including wetlands upstream of the dam are dewatered and lost.

4. The removal of beaver dams is normally considered to be an excavation activity which will destroy or degrade waters of the United States. Therefore, this activity is normally subject to regulation under Section 404 of the Clean Water Act and requires a Department of the Army permit.

5. Under the following circumstances, the removal of beaver dams will normally be considered to be an excavation activity which will not destroy or degrade waters of the United States. Therefore, under these circumstances, this activity will normally not be regulated and does not require a Department of the Army permit. However, we reserve the right to require a Department of the Army permit for the removal of a beaver dam on a case by case basis if we determine that the activity will destroy or degrade waters of the United States.

a. Recently constructed beaver dams (less than 1 year old). The removal of recently constructed beaver dams is normally considered to be an excavation activity which does not destroy or degrade waters of the United States and is not normally regulated. This is based on the observation that recently constructed beaver dams have not had sufficient time to trap much soil in the structure, to accumulate organic matter and soil in the pond, nor to develop important and valuable aquatic habitats upstream of the dam.

b. Beaver dams located on man-made irrigation delivery and return canals constructed in uplands. These waterways are not considered to be waters of the United States if constructed in uplands. A permit is not required to remove beaver dams located in these waterways. This does not include waterways which have been modified and/or relocated to carry both natural streamflows and irrigation water.

c. Beaver dams located on natural waterways in the immediate vicinity (generally within 100 feet) of an authorized irrigation diversion structure which are adversely affecting the operation of

that structure. This activity is considered exempt from permit regulations under 33 CFR 323.4(a)(3) as the maintenance of structures appurtenant and functionally related to irrigation ditches."

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 NWPs provide for the removal of the majority of beaver dams that Idaho WS 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 NWPs is important for the efficient and effective resolution of many beaver damage problems because damage can escalate rapidly the longer an area remains flooded.

Nationwide permits are allowed except in any component of the National Wild and Scenic River System such as the headwaters of the Snake River. Beaver dam removal by WS otherwise complies with all other conditions and restrictions placed on nationwide permits.

1.1 LETHAL

These methods involve damage management activities specifically designed to lethally remove certain rodents to a level that stabilizes, reduces, or eliminates damage. The level of population reduction necessary to achieve a reduction of beaver damage varies according to the resource protected, habitat, beaver population, the effectiveness of other damage management strategies, and other ecological factors. Specific methods of lethal population reduction involve removing beaver with conibear and foothold traps, neck snares, and shooting. These specific methods are further described in USDA (1994, Appendix J).

1.1.1 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 small numbers of individuals 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 utilized as one of the first lethal damage management options because it offers the potential of solving a problem more quickly and selectively than some other methods, but it does not always work. Shooting may sometimes be one of the only rodent damage management options available if other factors preclude setting of damage management equipment. WS personnel receive firearms safety training to use firearms while performing their duties.

1.1.2 Sport Hunting and Trapping is sometimes recommended by WS as a viable damage management method when the target species can be legally hunted or harvested for its fur value. A valid hunting or trapping license, or other licenses or permits may be required by the Idaho Department of Fish and Game. Permission from the property-owner/manager to trespass on private property may be required. This method provides sport and sometimes food for hunters and a valuable fur resource that can be marketed by trappers. This method requires no cost to the landowner. Sport hunting is occasionally recommended if it can be conducted safely for marmots, jackrabbits and ground squirrel damage management around agricultural crops and haystacks.

1.1.3 Glue Boards/Trays are widely used indoors by homeowners, food processors, and pest management professionals in attempts to control rodents, particularly mice. These devices have also been used to successfully capture rattlesnakes (Knight 1983) in human dwellings, in capturing other small reptiles (Whiting 1998) and assisting in sampling diversity of reptiles for research purposes (Glor et al. 2000). **Glue Boards** are constructed with thin levels of glue varying from 1-2 mm in thickness mechanically applied at the factory to thin cardboard platform, while **Glue Trays** are filled with glue to a thickness varying from 4-6 mm (Corrigan 1998). The type of glue used on a board or in a tray, and its formulation are considered trade secrets by the manufacturer. Glue boards and trays come in various sizes from 3 in. x 6 in. (mouse size intended for homeowner use for single catches) to 12 in. x 24 in. (industrial size intended for multiple catches). Captured rodents will normally die while still attached to the glue and can be disposed of in a trash receptacle. However, non-target animals can be released live by applying

an oil based liquid (vegetable oil) to the fur or skin that is attached to the glue. Glue boards or trays are not regulated or registered by the EPA.

1.1.4 Traps/Snares (Lethal)

Snap Traps are commonly used by homeowners and can be purchased at grocery, home and garden supply, and animal feed stores. The 2 commonly manufactured sizes are mouse and rat size which utilize a spring-set metal bar that is released after a rodent strikes or moves a trigger. Snap traps are specifically designed to quickly dispatch the rodent and some styles require a bait or other taste attractants to be fixed to the trigger, while others use only the weight of the rodent to release the striking bar or have triggers pre-baited with chemical attractants. Snap traps are normally used indoors, but outdoor applications around outbuildings and other dwellings are common for rat control.

Body-gripping/Quick-kill Traps and other kill-style traps are designed to cause the quick death of the animal that activates the trap. When set in water for beaver or muskrat they can be placed either submerged, partly submerged, or above water. 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. Use pattern data indicate that the conibear is used throughout the year, but greatest use is during the spring, summer and fall months. Safety hazards and risks to humans are usually related to setting, placing, checking, or removing the traps. Conibear traps (Figure 3.) represent a minor risk to non-target animals because of the placement in aquatic habitats trap and below the water surface. Other examples of body-gripping traps are pocket gopher traps set under ground, such as the Macabee gopher trap, Victor Gopher Getter and Guardian box-type gopher trap.

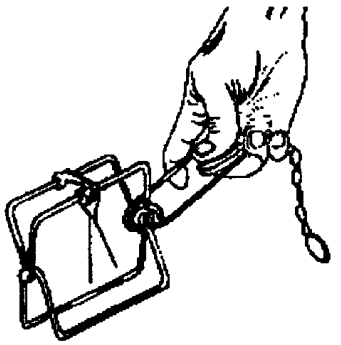

Figure 3. #110 Conibear.

Foothold Traps and Snares (Lethal) can be used as non-lethal or lethal capture devices, depending on the placement and how it is set (see discussion in NON-LETHAL methods for information on the use of these devices for non-lethal capturing). Foothold traps and snares are usually implemented by WS personnel because of the technical training and skill required to use such devices. A formal risk assessment of all mechanical devices used by the WS program in Idaho can be found in USDA (1994, Appendix P).

Foothold Traps can be effectively used to capture a variety of mammals. Despite the numerous damage management methods developed, trapping remains one the most effective methods of removing beaver (Hill 1976, Hill et al. 1977, Wigley 1981) 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). Trapping, although labor intensive, can also be used to reduce damage caused by marmots, jackrabbits or porcupines when only a small number of individuals are present.

Foothold traps are typically placed next to, or in some situations, in travel ways or trails 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 use of appropriate lures and placement by trained WS personnel also contributes greatly to the foothold trap's selectivity. Foothold traps can be set in a manner that produces death to the captured animal by incorporating a drowning rig to a trap or by purposely catching a small rodent by the body, head or neck. The use of foothold traps requires more workforce than some methods, but they are indispensable in resolving many damage problems.

Snares are capture devices comprised of a 1/32nd.-3/32nd. inch diameter cable formed in a loop with an attached locking device that are placed in the travel ways of rodents. Smaller diameter cable is used for small rodents such as marmots whereas beavers and porcupines require larger diameter cable. Most snares are equipped with a swivel to minimize cable twisting and breakage. Snares are set in a manner that produces death to the captured animal by 1) incorporating a drowning rig to the snare, 2) placing a "kill pole" near a snare set, or 3) purposely catching the rodent by the neck or thoracic cavity. They are easier than foothold traps to keep operational during periods of inclement weather.

CHEMICAL METHODS

All chemicals used by Idaho WS are either registered under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), administered by the EPA and the Idaho State Department of Agriculture (ISDA) or are approved by the Federal Drug Administration (FDA) or Drug Enforcement Administration. All WS field personnel in Idaho who apply restricted-use rodenticides are certified as restricted-use pesticide applicators by the ISDA. No chemicals are used on public 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 1994, Appendix P). The chemical methods used and/or currently authorized for use in Idaho are:

2.0 NON-LETHAL

2.0.1 Repellents are non-lethal chemical formulations used to discourage or disrupt particular behaviors of rodents. There are 3 main types of chemical repellents: olfactory, taste and tactile. Olfactory repellents must be inhaled to be effective. These are normally liquids, gases or granules, and require application to areas or surfaces needing protecting. Taste repellents are compounds (liquids, dusts, granules) that are normally applied to trees, shrubs and other materials that are likely to be ingested or gnawed by the target species. Tactile repellents are normally thick, liquid-based substances which are applied to areas or surfaces to discourage travel of rodents by irritating the feet or making the area undesirable for travel. Most repellents are ineffective or are short-lived in reducing or eliminating damage caused by rodents, therefore, are not used very often by WS. In 2003, there are 91 vertebrate repellents registered by ISDA for use in Idaho and many of these are registered for use on rodents. Information on chemical repellents can be obtained by accessing the ISDA web-site at www.agri.state.id.us.

2.0.2 Binary Explosives are defined as any chemical mixture, compound or device which serves as blasting agents and detonators. WS uses binary explosives to breach beaver dams after beaver have been removed or moved from a damage situation. The binary explosives consist of ammonium nitrate and nitromethane, and are not technically 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 that are used with binary explosives, 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. Re-certification is required every 2-years and Specialists must pass competency evaluations/exams administered by WS' Explosives Training Officers. All blasting activities are conducted by well trained, certified blasters and 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 Occupational Safety and Health Administration; Federal Bureau of Alcohol, Tobacco and Firearms; United States Department of Transportation; and Idaho Transportation Department.

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2.0.3 Chemical Immobilization Drugs are products available and/or approved for use on certain wildlife. WS personnel who utilize chemical immobilization drugs/products are certified in the appropriate categories of compounds and agents (WS 2001). No chemicals are used on public or private lands without authorization from the land management agency or property owner/manager.

Immobilization Drugs are registered chemicals authorized for immobilization by WS should a beaver, porcupine, or other rodent need sedating during relocation or transporting. The majority (93%) of Idaho WS personnel who conduct field duties have received training in the safe use of authorized immobilization chemicals and are certified by WS. This training involves hands-on application of state-of-the-art techniques and chemicals. Telazol™, ketamine and xylazine are immobilizing agents used by WS, and are approved by the FDA. Telazol, ketamine and xylazine are rapid acting, non-narcotic, non-barbiturate injectable anesthetic agents, having a wide margin of safety. All three drugs produce unconsciousness known as "dissociative" which in general terms means reflexes needed to sustain life (breathing, coughing, swallowing, etc.) are not affected by the drugs. As other drugs are approved by the FDA and WS, they could be incorporated into the program within the analysis area.

2.1 LETHAL

2.1.1 Grain/Vegetable Bait Rodenticides are a group of chemical rodenticides that normally require the target animal to ingest the toxicant. To encourage ingestion, toxicants are introduced to the rodent in baits or foods that are attractive to the rodent.

Zinc Phosphide was first used as a rodenticide by Italy in 1911. Extensive use of zinc phosphide in the United States did not occur until 1942, when the availability of strychnine became uncertain due to WWII. Zinc phosphide is a heavy, finely ground gray-black powder that is practically insoluble in water and alcohol. When exposed to moisture, it decomposes slowly and releases Phosphine (PH_3) gas. Zinc phosphide concentrate is a stable material when kept dry and hermetically sealed. Although zinc phosphide baits have a strong, pungent, phosphorous-like odor (garlic like), this characteristic seems to attract rodents, particularly rats, and apparently makes the bait unattractive to some other animals. For many uses of zinc phosphide formulated on grain or gain-based baits, prebaiting is recommended or necessary for achieving good bait acceptance (Timm 1994a). In general, zinc phosphide is less toxic than Compound 1080 or strychnine and is slower-acting than either of these compounds. In soil, zinc phosphide breaks down rapidly to PH_3, which is either released into the atmosphere or converted to phosphates and zinc complexes. The timing of bait application is critical if ground squirrel damage is to be effectively reduced (Marsh 1984). The use of zinc phosphide on various types of fruit, vegetable or cereal baits (apples, carrots, sweet potatoes, oats, barley) has proven to be effective at suppressing a local population. Specific bait applications are designed to minimize non-target hazards (Evans 1970). Zinc phosphide presents minimal secondary hazard to predators and scavengers, and is an emetic, so meat-eating animals such as mink, dogs, cats and raptors regurgitate rodents that are killed with zinc phosphide with little or no effect.

Zinc phosphide is registered in Idaho for use in rodent damage management. USDA, Animal and Plant Health Inspection Service (APHIS), has 3 products registered in Idaho under FIFRAs Section 3 rule. All are restricted-use. One registration, EPA Registration No. 56228-3 is zinc phosphide on wheat bait and can be used for mouse control, EPA Registration No. 56228-6 is zinc phosphide concentrate for rodent and lagomorph control, and the 3rd is EPA Registration No. 56228-14, zinc phosphide on oats for control of meadow and pine voles in orchards and groves. WS primarily uses the zinc phosphide concentrate label (registration) for the majority of applications. ISDA has a FIFRA "Section 18" (Emergency Use) registration for zinc phosphide on wheat baits for use in sugar beets, potatoes, wheat and barley for meadow vole control that was requested by farmers and ISDA to reduce damage to crops due to local

rodent population irruptions. EPA Registration No. 56228-3 is one of the base products for this use. Additionally, there are 23 zinc phosphide commercial formulations and products available for general-use and restricted-use applications to control various rodents in Idaho. To obtain information about these products, interested parties may contact the ISDA, Pesticide Product Registration section, or can access their web-site at www.agri.state.id.us.

Strychnine is a widely used toxicant registered for use in controlling certain rodents. In the past, strychnine was used for controlling rodents, birds and mammals such as skunks and coyotes. However, a 1988 court action halted its use in aboveground applications, thus, reducing its current use primarily for control of pocket gophers. Strychnine is one of the alkaloids processed from raw, dried ripe seed of a small tree native to India, North Australia, Vietnam and Ceylon. This alkaloid was discovered in 1817, however, the seeds of these trees were used to kill dogs, cats and birds in Europe as least as early as 1640 (Timm 1994b). Strychnine acts the quickest of the commonly used rodenticides. It is not stored in body tissues nor absorbed through normal intact skin. It is not assimilated into tissue or bone, however, residues in the gastrointestinal tract of animals poisoned with lethal doses are known to be potentially hazardous if the gastrointestinal tract is consumed. With its current belowground application pattern, secondary poisoning is unlikely. Strychnine has a very slight odor, very high toxicity, and acts somewhat variably on target animals. Strychnine enters the blood very rapidly and acts on the central nervous system. The time of action depends on whether the stomach is empty or full and the nature of the food present. Symptoms may appear from 5 to 30 minutes after ingestion (Timm 1994b). APHIS has 2 "restricted-use" strychnine products registered for use in Idaho for pocket gopher control. Those registrations are: EPA Registration No. 56228-11, 0.5% strychnine milo pocket gopher bait for use in burrow builders, EPA Registration No. 56228-12, 0.5% strychnine steam rolled oats pocket gopher bait for use in burrow builders. These products are available for use by the public, providing pesticide applicator's license requirements are met. APHIS also has 2 "non-restricted-use" strychnine products registered for pocket gophers. Those products are EPA Registration No. 56228-19, 0.5% strychnine milo for hand baiting pocket gophers, and EPA Registration No. 56228-20, 0.5% strychnine steam rolled oats for hand baiting pocket gopher. These products are available for use by the public. ISDA has an additional 10 strychnine rodenticides products registered. Information on these can be obtained by accessing the ISDA web-set at www.agri.state.id.us.

Anticoagulants are a group of widely used rodenticides. About 95% of all commensal rodent control is conducted with anticoagulants. They are separated into 2 functional groups, first-generation and second-generation anticoagulants. Those of the second-generation have the ability to control warfarin-resistant rats and house mice and they are also considered singe-feeding anticoagulants (Timm 1994c). Warfarin, the first anticoagulant rodenticide, had its beginning in 1943 when the Biochemistry Department of the University of Wisconsin, were attempting to determine the cause of "Sweet Clover Disease" in cattle. Moldy sweet clover hay was found to contain a powerful anticoagulant. In 1948, the first use of an anticoagulant compound to control rats under field conditions was applied. All first-generation anticoagulants, also known as multiple-dose rodenticides, relied on their cumulative toxic effect. Rodents would have to consume treated bait over a period of several days. Second-generation anticoagulant materials are much more potent for rodents, and have the ability to kill a high percentage of the rodent population in a single feeding (Timm 1994c).

All anticoagulants have 2 modes of actions; they reduce the clotting ability of the blood and cause damage to the capillaries. As in all anticoagulants, death is delayed for several days following the ingestion of a lethal dose. This delayed action has a decided safety advantage because it provides time to administer the antidote and save pets, livestock and people who may have accidentally ingested the bait (Timm 1994c).

Most of the anticoagulant baits used today are commercial ready-to-use baits; which increases the cost of rodent control, but avoids past problems of incorrect bait concentrations and poor bait formulation. Some

anticoagulants are available as tracking powders and others as sodium salts that are water-soluble, allowing their use as water baits.

The ISDA doesn't categorize rodenticides as "anticoagulants" but rather groups them with "single dose poisons" and "multiple dose poisons" products. In 2003, ISDA registered a total of 122 and 173, respectively, products for use in Idaho, many of which are anticoagulants and general-use pesticides. To obtain information about these products, interested parties may contact the ISDA, Pesticide Product Registration section, or can access their web-site at www.agri.state.id.us.

2.1.2 Fumigants are lethal gases that are introduced to rodent burrows or cavities and inhaled by the target rodent. Death in rodents is normally very quick and most rodent fumigants volatilize, evaporate or dilute to sublethal doses quickly, reducing the risks of exposure to carnivores and other animals which may excavate treated rodent burrows.

Aluminum Phosphide was introduced as a fumigant for stored products to control insects in the early 1930's. Its use as an effective rodenticide was explored by chemical companies and an EPA registration was granted in 1981, although this compound was used for this purpose in some other countries for a much longer time (Timm 1994d). Aluminum phosphide is used as a fumigant for control of burrowing rodents such as ground squirrels, yellow-bellied marmots, voles, etc. It is formulated into molded tablets or pellets. Aluminum phosphide reacts with atmospheric moisture to release PH_3 gas, the active ingredient. When applied to rodent burrows, the soil moisture and the rodent's respiration reacts with the tablets or pellets, producing a lethal dose of PH_3 gas. In porous or extremely sandy soil, it is sometimes not possible to obtain satisfactory results. But adding a few cups of water to the burrow normally provides enough moisture to cause the reaction. PH_3 is colorless and has a slight carbide-like odor and is a potent mammalian toxicant. Currently, there are 17 aluminum phosphide products registered for use in Idaho by ISDA, however, not all of these products may be registered for use in rodent control.

Gas Cartridge can be very effective, but fumigation is much more expensive than baiting (Marsh 1984). The gas cartridge (EPA Reg. No. 56228-2) consists of 35% charcoal and 65% sodium nitrate and is ignited, and placed in the burrow. The burrows are closed tightly with turf or soil to prevent the gases from escaping. After ignition, the cartridge burns in the den of an animal and produces large amounts of carbon monoxide, a colorless, odorless, tasteless, poisonous gas. The combination of carbon monoxide exposure and oxygen depletion kills the animal in the den. The gas cartridge may not be effective when animals are hibernating or in regions where the animals live in rocky soils or outcroppings, or along rock bluffs. Under these conditions, the gases cannot be contained within the burrow system.

2.1.3 Chemical Euthanasia products are available and approved for use on certain wildlife. WS personnel who utilize chemical euthanasia drugs/products are certified in the appropriate categories of compounds and agents (WS 2001). No chemicals are used on public or private lands without authorization from the land management agency or property owner/manager.

Carbon Dioxide (CO_2) is sometimes used to euthanize individual rodents which are captured in live traps and when relocation is not a feasible option. Live rodents are placed in a container such as a plastic 5-gallon bucket or chamber and sealed shut. CO_2 gas is released into the bucket or chamber and the rodent quickly dies after inhaling the gas. Normally, only the larger species of rodents, such as yellow-bellied marmots and fox squirrels are euthanized with CO_2.

Potassium Chloride is a common laboratory chemical and is used by WS personnel as a euthanizing agent (WS 2001). Potassium chloride may cause respiratory arrest before unconsciousness; therefore it should only be used with heavily sedated or anesthetized rodents. Potassium chloride is a powder that must first be reconstituted with water. The solution is administered by intravenous or intracardiac injection.

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Sodium Pentobarbital is a barbiturate that rapidly depresses the central nervous system to the point of respiratory arrest. Intravenous injection is the most rapid, reliable, and desirable euthanasia technique, however intraperitioneal injection may be used when it would cause less distress that intravenous injection (WS 2001, AVMA 1993).

Literature Cited

Arner, D. H. 1964. Research and a practical approach needed in management of beaver and beaver habitat in the southeastern United States. Transactions of the North American Wildlife Conference 29:150-158.

AVMA (American Veterinary Medical Association). 1993. Report of the AVMA panel on euthanasia. Journal of the American Veterinary Medical Association 202:229-249.

Beier, P., and R. H. Barrett. 1987. Beaver habitat use and impact in Truckee River Basin, California. Journal of Wildlife Management 51:794-799.

CDC (Centers for Disease Control). 1990. Morbidity and mortality weekly report. Compendium of Rabies Control, 39, No. RR-4: 6.

Corrigan, R. M. 1998. The efficacy of glue traps against wild populations of house mice, *Mus domesticus*, rutty. Proceedings of the 18th Vertebrate Pest Conference 18:268-275.

Evans, J. 1970. About nutria and their control. Bureau of Sport Fisheries and Wildlife, Denver Wildlife Research Center. Research Publication Number 86, Denver, Colorado, USA.

Forbus, K., and F. Allen. 1981. Southern beaver control. Georgia Forestry Research Paper Number 23.

Glor, R. E., T. M. Townsend, M. F. Benard, and A. S. Flecker. 2000. Sampling reptile diversity in the West Indies with mouse glue-traps. Herpetological Review 31:88-90.

Hill, E. P. 1976. Control methods for nuisance beaver in the southeastern United States. Proceedings of the Vertebrate Pest Conference 7:85-98.

Hill, E. P., D. N. Lasher, and R. B. Roper. 1977. A review of techniques for minimizing beaver and white-tailed deer damage in southern hardwoods. Proceedings of the Annual Symposium on Southeastern Hardwoods, Dothan, Alabama, USA. 2:79-93.

Knight, J. E. 1983. Removing rattlesnakes from human dwellings using glue boards. Proceedings of the Great Plains Wildlife Damage Control Workshop 6:111. (Abstract only).

Kolz, A. L., and R. E. Johnson. 1997. In-water electro-shock techniques to repel aquatic mammals and birds. Pages 203-215 *in* J. R. Mason, editor. Repellents in Wildlife Management, Symposium Proceedings August 8-10, 1995. United States Department of Agriculture, Wildlife Services-National Wildlife Research Center, Ft. Collins, Colorado, USA.

Laramie, H. A. Jr., and S. W. Knowles. 1985. Beavers and their control. Wildlife Fact Sheet 10. University of New Hampshire Cooperative Extension Service, Durham, New Hampshire, USA.

Marsh, R. E. 1984. Ground squirrels, prairie dogs and marmots as pests on rangeland. Proceedings of the Vertebrate Pest Conference 11:195-208.

APPENDIX D

Miller, J. E., and G. K. Yarrow. 1994. Beavers. Pages B1-B11 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

MDNR (Minnesota Department of Natural Resources). 1994. The Clemson beaver pond leveler. St. Paul, Minnesota, USA.

Nolte, D. L., M. W. Lutman, D. L. Bergman, W. M. Arjo, and K. R. Perry. 2003. Feasibility of nonlethal approaches to protect riparian plants from foraging beaver in North America. Pages 75-79 *in* G. A. Singleton, L. A. Hinds, C. J. Krebs, and D. M. Spratt, editors. Rats, mice, and people: rodent biology and management. Australian Centre for International Agricultural Research, Canberra, Australia.

Payne, N. F. 1989. Populations dynamics and harvest response of beaver. Proceedings of the Eastern Wildlife Damage Workshop 4:127-134.

Roblee, K. J. 1983. A wire mesh culvert for use in controlling water levels at nuisance beaver sites. Proceedings of the Eastern Wildlife Damage Control Conference 1:167-168.

Roblee, K. J. 1984. Use of corrigated plastic drainage tubing for controlling water levels at nuisance beaver sites. New York Fish and Game Journal 31:63-80.

Roblee, K. J. 1987. The use of the t-culvert guard to protect road culverts from plugging by beavers. Proceedings of the Eastern Wildlife Damage Control Conference 3:25-33.

Timm, R. M. 1994a. Zinc phosphide. Page G-57 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

Timm, R. M. 1994b. Strychnine. Page G-54 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

Timm, R. M. 1994c. Anticoagulants. Pages G-26-G-29 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

Timm, R. M. 1994d. Aluminum phosphide. Page G-25 *in* S. E. Hygnstrom, R. M. Timm, and G. E. Larson, editors. Prevention and control of wildlife damage. Cooperative Extension Service, University of Nebraska, Lincoln, USA.

USACE (United States Army Corps of Engineers). 1996. Branch guidance letter 96-01, 16 September 1996, subject: regulation of removal of beaver dams (Letter from A. Bradley Daly, Chief, Regulatory Branch). United States Army Corps of Engineers, Walla Walla District, Walla Walla, Washington, USA.

USDA (United States Department of Agriculture). 1994. Animal damage control program final environmental impact statement. United States Department of Agriculture, Animal and Plant Health Inspection Service, Animal Damage Control [Wildlife Services], Operational Support Staff, Riverdale, Maryland, USA.

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Wayland, R. H., III, and E. V. Shaeffer. 1997. Corps of engineers/environmental protection agency guidance regarding regulation of certain activities in light of American mining congress v. corps of engineers. Memorandum issued to the field April 11, 1997. United States Environmental Protection Agency, Washington, D.C., USA.

Whiting, M. J. 1998. Increasing lizard capture success using baited glue traps. Herpetological Review 29:34.

Wigley, T. B., Jr. 1981. A model of beaver damage and control. Dissertation, Mississippi State University, Mississippi State, USA.

WS (Wildlife Services). 2001. Wildlife services' field operations manual for the use of immobilization and euthanasia drugs. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, Operational Support Staff, Riverdale, Maryland, USA.