Biological Assessment of the Potential Effects of Managing the Payette National Forest on the
Northern Idaho Ground Squirrel (threatened),
and
Canada Lynx (threatened)

Brownlee Section 7 Watershed

Volume 2

Ongoing and New Actions

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Prepared by:

Russ Richards, Wildlife Biologist — April 17, 2008 (Date)

Preparation assistance by:
Chris Hescock, Wildlife Biologist (East Zone)
John Almack, Wildlife Biologist (Council and Weiser RD)
Ana E. Dronkert Egnew, Forest Wildlife Biologist
Rodger L. Nelson, Forest Fisheries Biologist (Acting)

Conditional Concurrence by:

Ana E. Dronkert Egnew, Forest Wildlife Biologist — April 17, 2008 (Date)

Open Amendment

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I. INTRODUCTION

This Biological Assessment (BA) determines the effects of various Federal actions in the Brownlee Section 7 Watershed on the northern Idaho ground squirrel (*Spermophilus brunneus brunneus)* and Canada lynx (*Lynx canadensis)*. This BA is tiered to previous BAs and supplements conducted for the species above in the area of the Section 7 watershed defined as Brownlee (Figure 1, next page). These BAs are listed in a section in the references cited called "Previous BAs". Actions in this BA are "similar actions" as described in 50 CFR 402.12 (g).

Descriptive information in this BA covers the Brownlee Section 7 Watershed. Direction for the content and format of this BA was agreed to by the Fish and Wildlife Service, NOAA, and the Payette National Forest during consultation on the Forest's Land and Resource Management Plan (LRMP or Forest Plan). This "Framework" is a process for project level consultation that addresses multi-scale analysis and requires the tracking of an environmental baseline at an agreed upon scale. It allows the agencies to understand conditions on the land, especially for threatened and endangered species, at a scale between the Forest-wide and project specific. While the recommended scale in Forest Plan consultation was the 5th or 6th field hydrologic unit watershed, this BA includes all 5th HU watersheds within the Brownlee Section 7 Watershed. The Section 7 watershed is approximately the 4th HU scale and was established previous to the Forest Plan revision as the appropriate scale for consultation on listed fish species on the Payette National Forest. To maintain the integrity of the previous fisheries consultation, while meeting the direction of agreements made during the Forest Plan consultation, this document discusses baseline conditions and effects to listed species within 5th HU watersheds in the Brownlee Section 7 Watershed.

The baseline provides an assessment of watershed conditions, describes the status of all listed and proposed species and their habitats in the area, and includes information about social and resource issues that are pertinent to land management in that watershed. This watershed baseline document constitutes the next smaller scale for aggregation of information about conditions and conservation needs for listed species and serves as the foundation for consultation on all actions and programs in the watershed.

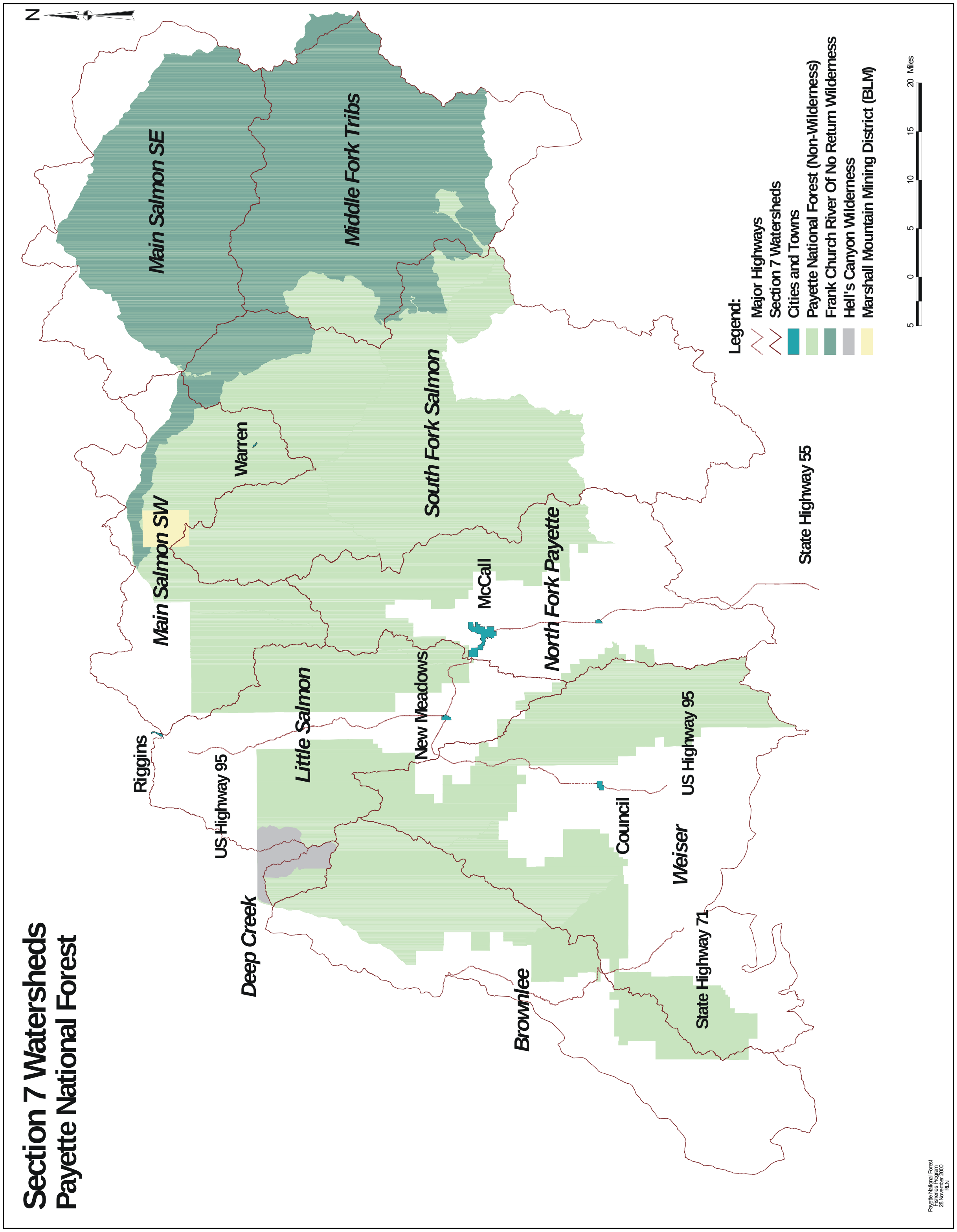

Figure 1.—Location of the Brownlee Reservoir Section 7 Watershed in relation to all Section 7 Watersheds on the PNF.

II. General Description of the Section 7 Watershed

The general description the Brownlee Section 7 Watershed can be found in Section II of the companion fish BA (BR Volume 7).

A. Listed Species and Critical Habitat

1. Overview

Wildlife species included in this BA are based on the biannual Forest-wide Species Lists prepared by the U.S. Fish and Wildlife Service for the Payette National Forest. In addition to the Forest-wide lists for threatened and endangered species, the yellow-billed cuckoo (*Coccyzus americanus*) and southern Idaho ground squirrel (*Spermophilus brunneus endemicus),* both candidate species, were evaluated. Actions considered in this BA were determined to have "No Effect" to the yellow-billed cuckoo. The southern Idaho ground squirrel is listed as a candidate species for the Weiser Ranger District, although the subspecies has not been documented on the district. Actions considered in this BA were determined to have "No Effect" to the southern Idaho ground squirrel, so no discussion of these species is included. In Idaho, populations of the gray wolf south of Interstate 90 are currently considered experimental/non-essential (USDI FWS 1994), hence these populations are evaluated similar to a proposed species. Actions considered in this BA were determined to "not jeopardize" the gray wolf, so no discussion of this species is included. The Brownlee Section 7 Watershed encompasses the southeast portion of the district.

Table 1.—Listed (Threatened and Candidate) Species on the Payette National Forest located by 5th Level HU watershed in the Brownlee Section 7 Watershed.

Common Name	Status	Section 7 Watershed	Critical Habitat Designated
Northern Idaho ground squirrel	Threatened	Brownlee	None
Canada lynx	Threatened		None
Southern Idaho ground squirrel	Candidate		None

2. Northern Idaho Ground Squirrel

a. Status and Distribution

The northern Idaho ground squirrel *(Spermophilus brunneus brunneus*) (NIDGS) is a threatened species under the Endangered Species Act of 1973, as amended (61 FR 7596). The Final Rule for this listing (65 FR 17779) is dated April 5, 2002. A Recovery Plan was completed in 2003 (USDI FWS 2003).

The northern Idaho ground squirrel has the most restricted geographical range of any *Spermophilus* taxa and one of the smallest ranges among North American land mammals (Gill and Yensen 1992). Originally considered to be one species, the Idaho ground squirrel is currently comprised of two subspecies - the northern (*S.b. brunneus*) and southern (*S.b. endemicus*) (Yensen 1991).

This subspecies is currently known from 43 isolated sites in Adams and Valley Counties, Idaho with a range of about 720 square miles (IDFG 2006) (Figure 2). In 1985, the total squirrel population at 18 known sites was about 5,000 individuals (USF&WS 1985). In 1995, the total population had declined to fewer than 1,000 individuals distributed through 19 colonies (Sherman and Gavin 1997). As of December 2006, the overall NIDGS adult/yearling population was conservatively estimated at 1,395 (IDFG 2006).

The historical distribution of NIDGS included parts of west-central Idaho in Adams and Valley Counties (Gill and Yensen 1992). Currently, the species has been documented to occur on a tableland between Cuddy and Seven Devils Mountains, in the valleys to the east (Lost Valley Reservoir and Price Valley), and in Long Valley further east and south (Yensen 1991). The main concentration of NIDGS occurs in a large meadow complex on private lands near the community of Bear in the Brownlee Watershed. The meadow complex measures approximately10 by 30 kilometers (km) (6.21 by 18.63 miles [mi]), but the squirrels occupy <500 hectares (< 1,235.5 acres) total area (Figure 2).

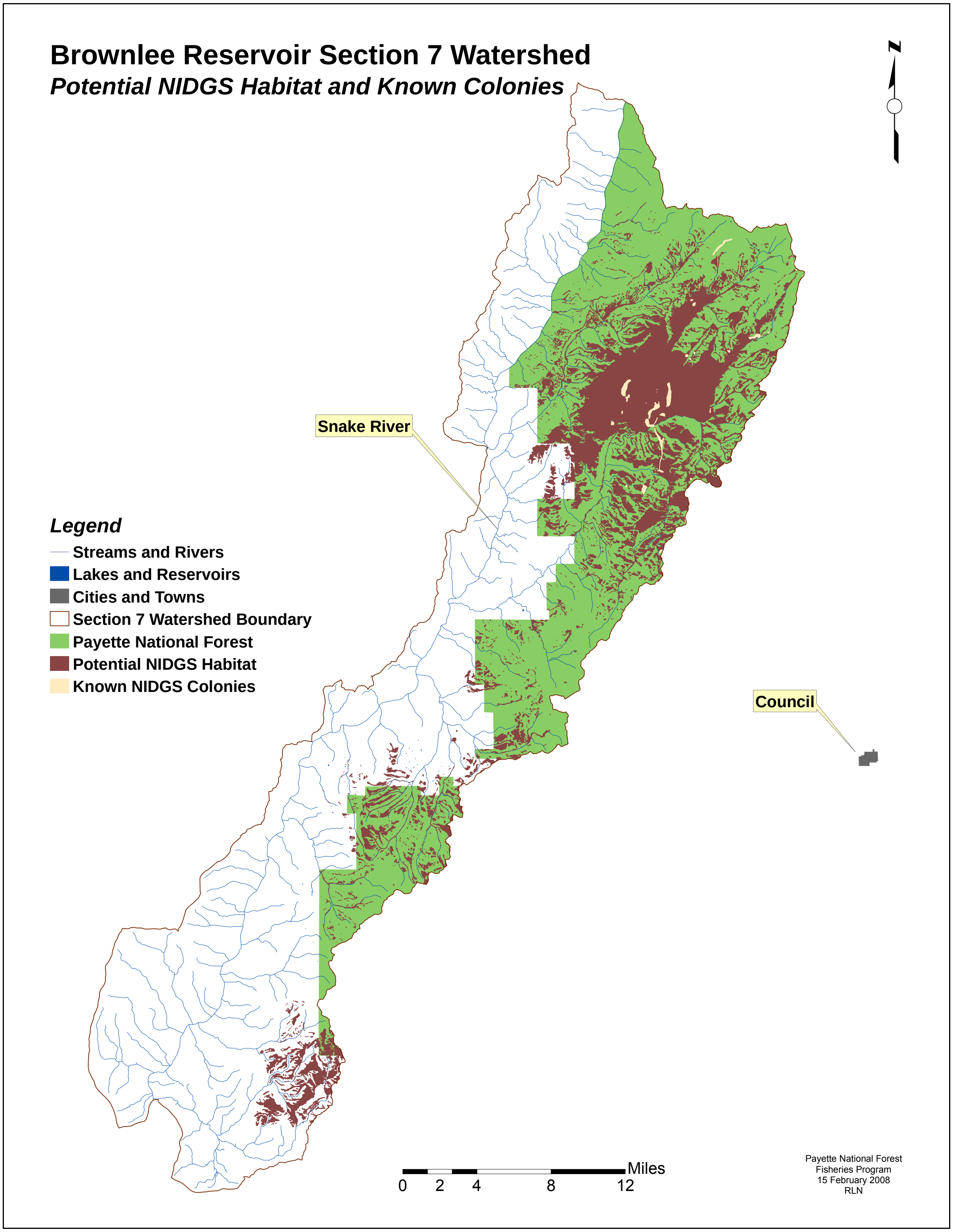

Figure 2.—Modeled potential habitat for NIDGS and known colonies in the Brownlee Reservoir Section 7 watershed.

Given the extremely low population levels and disjunct and isolated habitat that presently occurs, population viability is a concern for this species (USDI FWS 1996, USDI FWS 2002, Wisdom et al. 2000). In 1996, while still a candidate species, a Conservation Agreement between the Payette Forest and the USFWS was developed to address this viability concern and encourage habitat improvement opportunities. Prior to and since this agreement, the Payette Forest has been implementing habitat improvement projects to decrease tree encroachment on current occupied sites, and to try to connect adjacent populations (USDI FWS 1996). These projects appear to be beneficial to the squirrel, but are still being evaluated to determine their effectiveness.

b. Life History

Northern Idaho ground squirrels emerge in late March or early April and cease above ground activity in late July or early August (Yensen 1991). Adult (2 years old) males emerge first, followed by adult females, then yearlings. Entrance into seasonal torpor is in about the same order, with pups active approximately 1 month later than adult males. Ground squirrels are diurnally active (Sherman 1989). Newly emerged females remain near their hibernacula, where they are located and courted by adult males. Females are sexually attractive to males for only a few hours on the first or second afternoon following their emergence. Diet consists of forbs, grasses, seeds and other green vegetation (Yensen 1991).

c. Habitat

The habitat of the northern Idaho ground squirrel is drier meadows surrounded by ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) forests. The species originally appeared to be restricted to elevations between 1160 to 1830 meters (3,800 to 6,000 feet), but recent locations have expanded the known suitable elevation to 7,500 feet. In suitable habitat, the squirrels are usually associated with deeper, well-drained soils generally on south-facing slopes with less then 30 percent slope. The xeric meadows typically have a shallow (<1 m [<3.281 ft] to bedrock), reddish-brown to yellowish-red skeletal-loam or clay-loam soil (Yensen 1991). These drier portions of meadows are occupied by Idaho ground squirrels only in the absence of Columbia ground squirrels (*Spermophilus columbianus*). Vegetation in these drier meadows often is dominated by *Artemisia rigida* (stiff sage) or *A. tridentata vaseyana* (mountain big sage), with *Lomatium sp*., *Sedum stenopetalum*, *Allium sp*., *Gilia aggregata*, *Brodiaea douglasii*, various bunchgrasses and other forbs.

d. Threats

A number of factors have been attributed the decline of the species. They include meadow invasion by conifers, changes in land use such as golf course development and agricultural land conversion, public access particularly off-road vehicle use and shooting, road construction, overgrazing by sheep and cattle, and dispersed and developed campground expansion. The main predators of these ground squirrels include badgers, coyotes, and prairie falcons. Mortality from predation by badgers can occur during hibernation (Yensen 1993). The squirrel is also threatened by competition from the larger Columbian ground squirrel, as well as other naturally occurring events such as winter mortality, predation and disease. Information also suggests that past and present livestock grazing has modified the herbaceous communities that are important to ground squirrels (Sherman and Runge 2002). Table 2 summarizes threats to the species as identified in the Recovery Plan.

The subspecies is considered to be primarily threatened by habitat loss due to seral forest encroachment into former meadow habitats that may fragment suitable habitats and isolate squirrel colonies. Fire suppression activities and the dense regrowth of conifers after logging activities likely have reduced available habitat, including dispersal corridors. The lack of dispersal corridors may have caused isolated populations to become extinct as habitat continued to be reduced.

The range of the Columbian ground squirrels overlaps the distribution of the northern Idaho ground squirrel. Sherman and Yensen (1994) reported that the segregation of the two species is due to competitive exclusion as opposed to differing habitat requirements. Past management activities such as fire exclusion may have modified these habitats (increased density of vegetation) and unknowingly given the Columbian ground squirrel a competitive advantage in areas where the two species are in close appropriation. These habitat changes have reduced the sizes of the meadows and eliminated dispersal corridors along the valley bottoms (Yensen and Sherman 1997).

Table 2.—Summary of threats to the northern Idaho ground squirrel as identified in the Recovery Plan.

Threat	Description
Present or threatened destruction, modification, or curtailment of the species or habitat or range	Loss of meadow habitat due to long-term fire suppression, conifer encroachment, and/or development modifies and replaces squirrel habitat. The primary threat to the northern Idaho ground squirrel is meadow invasion by conifers (Sherman and Yensen 1994).
Over-utilization for commercial, recreational, scientific, or educational purposes	Human-caused mortality through shooting (recreational plinking) is a major threat to the species
Disease or Predation	Predation by badgers, hawks, and prairie falcons may be a threat due to the low population numbers in most colonies
Inadequacy of existing regulatory mechanisms	Effective regulatory mechanisms to control shooting do not currently exist. Also, there are no regulatory mechanisms to enhance or maintain habitat on public lands
Other natural or man-caused factors affecting the species' continued existence	Encroachment into meadow by invading conifer trees, due to fire suppression and natural succession, reduce available habitat
	Squirrels inhabit shallow soil areas and may be prone to fluctuating water tables and freezing during harsh, but dry winters
	Poisoning through use of rodenticide may reduce the population
	North Idaho ground squirrels are competitively inferior to Columbian ground squirrels under present habitat and environmental conditions

Researchers suggest the northern Idaho ground squirrel may have been forced into shallower soils by the Columbian ground squirrel (Yensen 1993). Columbian ground squirrels are larger and may be competing for the deeper soils that provide better over-winter protection and better forage vegetation. In areas where both species occur, the northern Idaho ground squirrel tends to occupy the shallower soil areas. Columbian ground squirrels need the deeper soils due to larger body size.

The NIDGS is primarily granivorous and ingest large amounts of grass seeds, stems and herbs to store body energy for the long period it spends in torpor from August through late March of each year. Hibernation in shallow soils makes the squirrel susceptible to freezing during periods of lower snow depths and colder temperatures, particularly if individuals do not have an adequate fat reserve. Over-winter mortality appears to be a contributing variable in the decline of the northern Idaho ground squirrel, particularly when snow levels are low. The soils tend to freeze to lower depths when snow levels are inadequate. When snow levels are high, the squirrels are insulated from freezing or running out of stored energy during torpor. Researchers have found that population crashes do occur at some sites when snow levels are below normal (USDA 1994). Due to the small sizes of individual populations and the small total number of individuals, the northern Idaho ground squirrel may have little resilience to stochastic events.

e. Summary of Recovery Plan Objectives

The Recovery Plan for the northern Idaho ground squirrel was completed in 2003 (USFWS 2003). The plan summarizes objectives, criteria, and strategies for recovery of the species. The plan summarizes objectives, criteria, and strategies for recovery of the species. The goal of the recovery plan is to increase population size and establish a sufficient number of viable metapopulations so that the species can be delisted. This number has been identified as 10 metapopulations consisting of more than 500 individuals for 5 consecutive years.

3. Canada Lynx

a. Status and Management

The Final Rule to list the lynx as threatened under ESA by the USFWS occurred in March 2000 (65 FR 16052).

In 2000, the Canada Lynx Conservation Assessment and Strategy (LCAS; Ruediger et al. 2000) was developed to provide a consistent and effective approach to conserve Canada lynx on federal lands. During 2002, an effort was started that would amend existing Forest Plans that are several years from revision or have just completed revision, so that they would be consistent with the Canada Lynx Conservation Assessment and Strategy (LCAS). The intent of this amendment (called the Northern Rockies Lynx Amendment) is to make existing plans that have little, if any, direction for lynx management, consistent with the Lynx Conservation Agreement and Strategy, 2nd Edition (Ruediger et al. 2000). The final EIS for this amendment was signed March 23, 2007.

The Payette National Forest is within the area for the Northern Rockies Lynx Amendment, but is not included in the amendment process because the Forest revised the Forest Plan in 2003 and included appropriate LCAS direction. An attempt was also made to make the Forest Plan direction consistent with the Northern Rockies Lynx Amendment, but because the later document took 4 more years to complete, some sections differ from the PNF Forest Plan direction and from the LCAS.

b. Distribution

The lynx has a circumboreal distribution. In North America, the Canada lynx ranges across nearly all of Canada and Alaska, and extends south into the northern, forested United States. In the western U.S., lynx are known to occur in Washington, Idaho, Montana, Utah, and Wyoming along the spine of the Rocky Mountains.

Lynx may be present in the vicinity of the Payette National Forest, there was one verified lynx sighting in 1957, but there have been no verified sightings since then (Lewis and Wenger 1998, PNF files 2006). The Idaho Conservation Data Center maintains statewide records of rare animal observations (ICDC 2002). There are 38 records through 2002 for lynx in the Southwest Idaho Ecogroup (Boise, Payette, and Sawtooth National Forests) and 5 records through 2002 for lynx on the Payette National Forest (Table 3).

Table 3.—Idaho CDC - 2002 Lynx Occurrence Records

Lynx Analysis Unit Name	Number of Records
PNF-Disappointment-Little Squaw	1
PNF- Chamberlain	2
PNF- Cabin Canyon	1
PNF-Upper North Fork Payette	1
PNF Total	**5**

During 1999, a national effort was undertaken to collect lynx hair samples for DNA analysis. This survey was not intended to be a population monitoring or presence/detection approach, but rather an attempt to determine DNA variability for any lynx for which any hair sample that was collected. Areas to be surveyed were selected by local biologist because they believed had the highest likelihood of survey to encountering a lynx and collect a sample (Weaver 1999). No hair samples were found on the PNF, but 2 lynx hair samples were found on the Boise National Forest in 1999.

c. Life History

Lynx are usually more active at night than during the day. The eyes of lynx are well adapted for night hunting. Preferred winter food consists primarily of snowshoe hares, along with rodents such as red squirrels, and birds. Habitat for snowshoe hares generally consists of young conifer stands with relatively dense and interconnected canopies that provide both understory cover and food. Snowshoe hares densities in terms of patch size and spatial arrangement in north central Idaho range from 0.1 to 9.7 hectares/25 acres. Predation rates of snowshoe hares are high (>80%). Snowshoe hare populations tend to be cyclical in nature; however there is limited evidence that population cycles occur in the southern portion of their range because of high predation rates (Wirsing et al. 2002). Snowshoe hare are nocturnal during the winter (Foresman and Pearson 1999).

Many decades of aggressive fire suppression have likely reduced the quality and quantity of lynx and snowshoe hare habitat by altering the amount and pattern of vegetation types and structural stages

(USDI FWS 2000). Fire had been a dominant influence historically in the northern Rocky Mountains (Agee 1999, Gruell 1983).

Forest management practices such as commercial harvest, road construction, and post harvest thinning can influence lynx habitat and its prey. Snowshoe hares may reach highest densities in young, dense coniferous or coniferous-deciduous forest and forest with a dense understory of shrubs, aspen, and /or conifers. Red squirrels appear in the later stages of forest development when mature cone-bearing trees are common.

Timber harvest is not a substitute for natural disturbance processes. Timber harvest may result in removal of biomass, especially larger trees; selective removal of particular tree species; removal, thinning, and planting that may give a competitive advantage to certain tree species; and the construction of roads that may be used as travel routes after the project has been completed. As a result, forest composition and structure have changed in these areas, with stands generally becoming more homogeneous, composed of more shade-tolerant species with more canopy layers, and being more susceptible to severe fire, insects, and diseases (Quigley et al. 1997).

Denning habitat for lynx occurs in mature and late structural boreal forests with locally abundant large woody debris present. Fire suppression and logging have altered the mosaic of habitats needed for prey species and denning sites (Ruediger et al. 2000, Wisdom et al. 2000).

d. Threats

Major risk factors include direct human threat (shooting, trapping, vehicle collisions), as well as forage and denning cover habitat modifications (Ruediger et al. 2000). Lynx may have evolved a competitive advantage in deep snow environments due to their large paws that allow them to hunt prey where other predators cannot because of snow conditions. Snow trails compacted by human activity may allow other predators to access prey in deep snow conditions where historically they were excluded. Advances in snowmobile capabilities have raised concerns about intrusion into previously isolated areas. The legal harvest of lynx was closed in Idaho in 1996 (Lewis and Wenger 1998, McKelvey et al. 1999, Wisdom et al. 2000).

Current conditions of lynx habitat have resulted from many factors, primarily related to fire. Timber harvest has had relatively minor effects, given the small amount of activity that has occurred in high-elevation lodgepole pine and subalpine fir forests. Fire suppression, on the other hand, has occurred for many decades over the entire Forest, resulting in changes to forest structure and composition, and an increase in fuels. Fire regimes for the PNF are as follows:

- Non-lethal, – 0-35 year frequency, low severity;
- Mixed1 – 35-100 year frequency, mixed severity;
- Mixed2 – 35-100+ year frequency;
- Lethal – 200+ year frequency, stand-replacing severity.

Most lynx habitat is within the Mixed 2 and Lethal fire regimes. From 1971 to 2000, an estimated 38 percent (879,049 acres) of the PNF was burned by wildfire. Forty percent (344,014 acres) of the 840,455 acres of potential lynx habitat burned during that same period (Table 4). Since 2000, an additional 546,000 (non-overlapping) total acres have burned on the Forest. In 2008, the PNF will assess the effects of these recent burns on Forest vegetation and potential lynx habitat.

Table 4.—Total Acres and Acres of lynx habitat Burned on the Payette National Forest, from 1970-2000 [PNF Forest Plan BA].

Decade	Total Acres Burned	Decade	Acres Lynx Habitat Burned
1971-1980	3,407	1971-1980	735
1981-1990	201,999	1981-1990	53,842
1991-2000	673,643	1991-2000	289,437
Total Burned	**879,049**	**Totals**	**344,014**
Percent Burned 1971-2000	38	Percent of Potential Habitat Burned, 1971-2000	40

[a] Some of the areas burned in the 1991-2000 period, re-burned areas that burned during other time periods, but none of the burned acres were double counted in the totals. Fires less then 100 acres in size are not represented in these tables.

e. Habitat

Effects to Canada lynx are analyzed based on Lynx Analysis Units (LAUs) that have been delineated across the Forest. These LAUs were delineated across the Forest using fifth level hydrologic unit (HU) boundaries whenever possible. When fifth level HU were not appropriate, a combination of sixth level HUs were used. Thirty-eight LAUs have been delineated on the Forest.

The Brownlee Section 7 Watershed contains one LAU: the Granite LAU (Figure 3). Due to changes over time in the mapping of watershed boundaries, the entire LAU extends beyond the boundary of the Brownlee Section 7 Watershed (see mapped section delineated in light blue in Figure 3), but the entire Granite LAU was placed into this watershed for analysis purposes.

The amount of suitable and potential habitat in each LAU was calculated for the Southwest Idaho Ecogroup (Boise, Payette, and Sawtooth National Forests) during revision of the Forest Plans. At that time, LANDSAT data was used to predict and map lynx habitat, because it was the only data set that could be consistently applied across the entire Ecogroup. These data (PVGs/structural mapping) are highly dependent on canopy closure and likely a poor predictor of snowshoe hare habitat that is dependent on understory conditions (Hodges 1999, Wirsing et al. 2002). Also, fine-scale habitat features such as snags, patch size, and understory vegetation cannot be identified with LANDSAT data. LANDSAT is best, when used to identify broad patterns because of the limitations of the 30-meter resolution data (Redmond et al. 1997).

The analysis of the effects of the ongoing actions in this Biological Assessment followed direction in the Payette National Forest (PNF) Protocol for Lynx Analysis to use the best available information, a combination of PNF working groups and strata, landsat imagery and ground verification. This habitat analysis was conducted using PNF working group and strata information, when available. For those areas where working group and strata data were not available (wilderness areas) a combination of PVG and LANDSAT were used. For more details on how these data sources were used see Payette National Forest Lynx Analysis Protocol.

The Granite LAU in the Brownlee Section 7 Watershed has very low amounts of potential lynx habitat, and the amount of suitable habitat is approximately 67 percent of potential (Table 5).

Table 5.—Potential and suitable lynx habitat by LAU in the Weiser Section 7 Watershed.

LAU	Total Acres	Potential Habitat Acres	Suitable Habitat Acres	% of Suitable Habitat
Granite	84,940	3,512	2,406	67%

B. Scope of the Actions.

This assessment is limited to ongoing actions of the Payette National Forest within the range of the NIDGS and Canada lynx. These actions include miscellaneous forest product use, mistletoe control and pre-commercial thinning, trails and recreation and administrative site operation and maintenance, travel management, fire management activities, noxious weed management, road management, watershed and fish habitat improvement activities, livestock management, and power and telephone line easement administration.

C. Location.

The location of the Brownlee Section 7 Watershed is displayed in Figure 1.

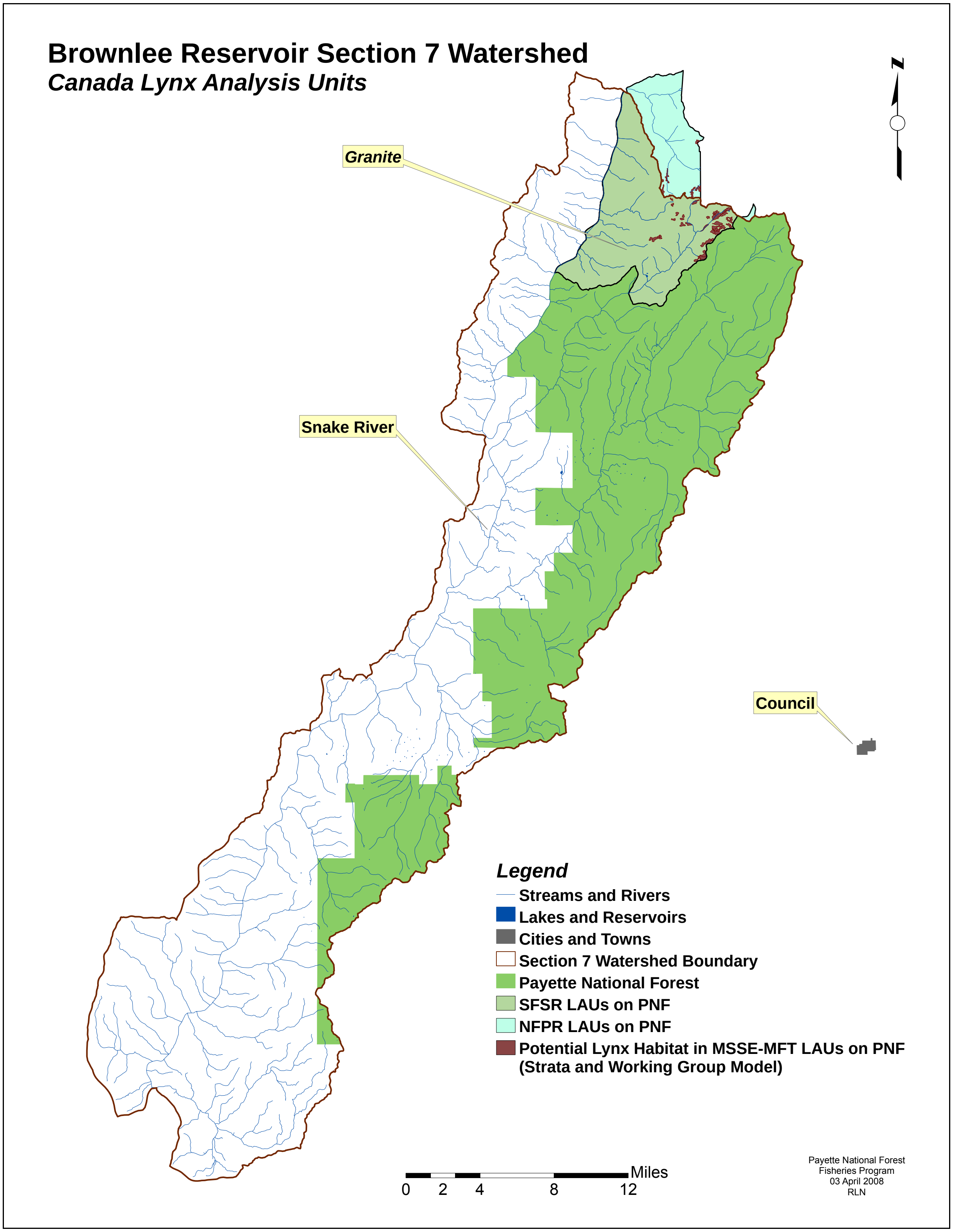

Figure 3.—Canada lynx analysis units and modeled potential habitat on the Payette National Forest in the Brownlee Reservoir Section 7 watershed.

III. SPECIFIC DESCRIPTION OF THE SUBWATERSHEDS (ENVIRONMENTAL BASELINE)

The Brownlee Section 7 Watershed is described in detail by subwatershed in the companion fish BA (BR Volume 7). Additional information pertinent to listed wildlife species is provided below for all subwatersheds combined.

A. NORTHERN IDAHO GROUND SQUIRREL

1. NATURAL PHYSICAL CHARACTERISTICS

Within the Brownlee Section 7 Watershed, approximately 52,394 acres of private state, and federal lands are considered potential habitat (this derived from Nutt and Crist 2006 from ArcGIS grid). Within the USFS portion of the watershed approximately 46,789 acres are considered potential habitat. Figure 3 shows the distribution of potential habitat within Section 7 watersheds on the Forest.

2. HUMAN-CAUSED PHYSICAL CHARACTERISTICS

NIDGS sites are characterized as relatively flat, open meadows with shallow, dry, well-drained soils surrounded by ponderosa pine and Douglas-fir forests. Most, if not all of these meadow habitats in the watershed are being encroached by dense stands of young ponderosa pine and Douglas-fir trees or sagebrush. This accelerated forest succession, which is assumed to be brought about primarily by fire suppression, livestock grazing and past vegetative management practices, continues to reduce available habitats and preferred forage required by the northern Idaho ground squirrel. Connectivity of meadow habitats have also been reduced thereby restricting movement or dispersal of individuals between colonies or their ability to recolonize meadow habitats that have already been extirpated.

Historically, fire regimes in these ecosystems were more frequent, less intense, of lower severity and of different spacial arrangements. Alteration of these fire regimes have contributed to the loss of meadow habitats and have significantly changed general forest structure. Fire suppression and vegetation management have also contributed to changes in forest structure resulting in much denser, more even-aged stands of trees with thinner and less heterogeneous understory plant communities (Burns and Zborowski, 1996). Fire suppression has allowed conifers to invade areas that were once meadows; thus shrinking the size of the grass/forbs openings and closing the grassy corridors that once connected them.

Since 2000, the PNF has actively worked to improve NIDGS habitat. Table 6 lists all recorded NIDGS habitat improvement projects in the Brownlee Section 7 Watershed from 1996-2006 on the Council and Weiser ranger districts.

Table 6.—Council and Weiser Ranger Districts 1996-present NIDGS Habitat Improvement Projects

Year	Area	Thin Acres	Burn Acres	Other
1996	Lick Creek Restoration Area (East)	20	-----	-----
	Lick Creek Restoration Area (West)	30	-----	-----
	Summit Gulch	20	-----	-----
	Cottonwood Corral Restoration Area	33	88	-----
	Huckleberry Restoration Area	-----	-----	Fence construction south end of meadow (no acres reported)
1997	Lick Creek Restoration Area (East)	-----	30	-----
	Lick Creek Restoration Area (West)	-----	20	-----
	Summit Gulch	-----	20	-----
	Cottonwood Corral Restoration Area	150	340	100 acres seeded; 1.25 miles of fence
1998	Cottonwood Corral Restoration Area	121	204	-----
1999	Fawn Creek	11	-----	-----
	Tree Farm	80	80	-----
	Summit Gulch	-----	-----	Livestock exclosure fences constructed
	Cottonwood Corral Restoration Area	-----	25	-----
	Mill Creek	15	52	-----
	Rocky Comfort Restoration Area	3	10	-----
	Huckleberry Restoration Area	71	32	-----
2000	Cold Springs (East)	10	-----	-----

Year	Area	Thin Acres	Burn Acres	Other
	Cold Springs (West)	9	-----	-----
	Hoo Hoo Gulch	40	-----	-----
	Hoo Hoo Gulch	40 (corridor)	-----	-----
	Summit Gulch	25	-----	-----
2001	Lick Creek Restoration Area (East)	-----	20	-----
	Hoo Hoo Gulch	-----	100	-----
	Summit Gulch	-----	20	-----
2002	None	-----	-----	-----
2003	None	-----	-----	-----
2004	None	-----	-----	-----
2005	None	-----	-----	-----
2006	None	-----	-----	-----
2007	None	-----	-----	-----

3. *Cumulative Effects*

Activities on and by state, county and private entities are cumulative to those actions being considered by the PNF. Activities authorized under this BA are designed to minimize effects of Forest management on NIDGS, thereby minimizing potential cumulative effects.

Roads throughout occupied northern Idaho ground squirrel habitat in the Watershed allow access and the potential for target shooting. Roads often are adjacent to, and in some cases cross through northern Idaho ground squirrel sites or suitable habitat. In relation to the Travel Plan action, about 3 miles of road in the Brownlee watershed under jurisdiction by the state, county, or private entities adjoin or bisect NIDGS colonies (Table 7). While state, private, and county roads may negatively affect NIDGS, measures to reduce the effects of National Forest System roads are included in this BA.

Effects of livestock use may include a change in plant species composition as a result of the past 100 or more years of grazing in this area. Due to the scarcity of historical records regarding plant species composition, it is difficult to determine what plants could have been a part of the ground squirrel diet in the past. In general, management of livestock allotments on private lands that include known NIDGS colonies appears to be sensitive to the needs of the squirrel. In 2008, a cooperative study between the PNF, IDF&G, and FWS will be instigated on NIDGS nutrition and forage use. In subsequent years, the study will investigate the role of livestock in NIDGS nutrition and forage use. Opportunities to expand these studies onto private land are also being considered.

Private land development is more likely to have negative effects on NIDGS than other activities. The FWS is actively working on Habitat Conservation Plans and other measures to minimize these effects.

Table 7.—Miles of road under jurisdiction by the state, county, or private entities adjoin or bisect NIDGS colonies

Section 7 Watershed	Colony Name	Jurisdiction	Miles
Brownlee	Halfway	County	0.09
	Lick Creek	County	0
	Rocky Comfort Flat	County	2.56
	Squirrel Manor	County	0.21

4. *Description and Distribution of the Listed Species*

On the Payette National Forest in the Brownlee Section 7 watershed, NIDGS currently occupy 15 known sites on approximately 465 acres (see Table 9 below). No other sites occur on state or private lands but there is approximately 5,605 acres of potential habitat. Known locations are also displayed in Figure 3.

5. *Habitat Condition, Trend and Limiting Factors*

Since 1996, more than 500 acres of existing and potential NIDGS habitat has been improved in the Brownlee Watershed. This subspecies currently occupies 15 sites on NFS on about 500 acres in the watershed. Table 8 shows the current status and Table 9 demonstrates the change over time in numbers of ground squirrels recorded at each site. Note that sampling methods and observers have changed over time, which likely contributed to the changes seen in numbers of NIDGS.

Table 8.—Current status of NIDGS colonies and metapopulations in the Brownlee Section 7 Watershed.

Colony Name(s)	Name of Metapopulation	Acres Occupied	Minimum Population Estimate
Squirrel Valley	Bear Meadow	111	65
Bear Cemetery		4	10
Squirrel Manor		74	145
Lick Creek		6	15
Rocky Comfort Flat		108	50
Upper Lick Creek		4	5
Tree Farm	Summit	10	37
Summit Gulch		4	31
Calf Pen Gulch, North		120	15
Riley Ranch	Paradise	53	Unknown
Cold Springs	Lick Creek Canyon	52	61
Hoo Hoo Gulch		7	3
Upper Hoo Hoo Gulch		1	Unknown
Butterfield		1	Unknown
Fawn Creek		5	6
Huckleberry	Huckleberry	9	24
OX- Bear Creek	None	5 (est)	1
North Steves Creek	None	5	7
Smith Mountain Lookout	None	5 (est)	20
Bear Lick Ridgeline	None	5 (est)	20
YCC	None	5	1
Huckleberry	Huckleberry	9	24
Private and/or State Lands			
Barber Flat	None	Unknown	Unknown

Table 9.—Change in numbers of NIDGS recorded at sites in the Brownlee Section 7 Watershed from 1982 through 2006. (Note sampling methods and observers changed over time).

NIDGS Site	Year																								
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
N Hornet Cr	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2+	15	-----	-----	-----	-----	-----	-----	0	0	0	0
Greenwood	-----	8	11	-----								-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0	0	0
Halfway (both)	-----	376	80	-----	-----	-----	-----	-----	-----	-----	40	-----	-----	-----	-----	3	-----	-----	-----	3	7	17	20	50	35
Riley Ranch	-----	1K	958	-----	-----	-----	-----	-----	-----	15	75-100	-----	-----	4	0	-----	3	0	0	-----	-----	-----	-----	0	0
Paradise Flt	-----	-----	26	-----	-----	-----	-----	-----	0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0
Barber Flat	-----	-----		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0		0
Rocky Comfort Flat	-----	-----	164 8	-----	-----	-----	-----	-----	-----	-----	-----	-----	14	35-50	-----	-----	16	9	3	3	-----	12	22	33	50
Lick Creek	130	187	119	-----	-----	-----	-----	-----	-----	-----	-----	76	71	90-107	20-30	-----	9	-----	-----	-----	-----	2	6		15
Squirrel Manor	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	150	131	155	310-325	234	47	15	30	-----	-----	-----	108	125	145	145
Squirrel Valley	-----	-----	-----	-----	37	134	190	86	77	80	130-175	72	101	100-150	52	29	31	10	-----	-----	-----	40+	45	7	65
Steve's Crk	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	100	-----	-----	
Steve's N	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	7
Bear Cemetery	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	35	21	-----	10-15	13-15	1	2	-----	-----	-----	-----	0?	3	2	10
Upper Lick Creek	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0	0	-----	5
Cold Springs	255	79	49	-----	-----	-----	-----	-----	-----	-----	20		28	44-50	54	-----	64	26	21	30	26	27	37	32	61
Hoo Hoo Gu	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	9	0		-----		5	3	9	3
Fawn Creek	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2	3	0	-----	0	0.1	5		6
Roadside (Butterfield)	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1	0	0	-----	-----	-----	0	0	0
Calf Pen Gu	8	-----	-----	30	-----	-----	-----	-----	-----	-----	30	-----	-----	0		0	-----	-----	-----	-----	-----	-----	-----	-----	-----
Calf Pen N	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	7+	-----	-----	15
Tree Farm	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	30-40	21	-----	14	54	63	56	83	45	37
Summit Gulch	46	55	177	-----	-----	-----	-----	-----	-----	-----	27	9	2	1	1	15	28	12	26	41	32	51	45	44	31
Summit N	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3+	-----	-----	0
Huckleberry	100	38	198	-----	-----	-----	-----	-----	-----	27	30	-----	38	52-55	69-72	-----	-----	12	11	5	4	3+	20	9	24
YCC	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2+	1	4	1
OX-Bear Creek West	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1
Smith Mtn	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	20
Bear Lick Ridgeline	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	20

B. Canada Lynx

1. *Natural Physical Characteristics*

The Brownlee Watershed contains one lynx analysis unit (LAU) approximately 85,000 acres in size with very limited lynx habitat (Table 5). Lynx habitat is defined in the Payette National Forest Lynx Analysis Protocol. The lynx is associated with boreal subalpine fir and lodgepole forested environments. Lynx are not common in Idaho and are primarily restricted to northern Idaho. Primary criteria for lynx habitat are forested elevations above 5,000 feet composed of stands of spruce, subalpine fir and lodgepole pine. Primary foraging habitat is young pole stage lodgepole pine where they prey on snowshoe hare. Denning habitat is mature spruce and subalpine fir forest with extensive downfalls.

2. *Human-caused Physical Characteristics*

Current conditions of lynx habitat in the watershed have been somewhat affected by human-caused activities. About 67 percent of the potential lynx habitat in the Granite LAU is currently classified as suitable. Timber harvest has had relatively minor effects, given the small amount of activity that has occurred in high-elevation lodgepole pine and subalpine fir forests. Fire suppression has occurred for many decades over the entire Forest and resulted in changes to forest structure and composition, and an increase in fuels.

3. *Cumulative Effects*

Activities on and by state, county and private entities are cumulative to those actions being considered by the PNF. Activities authorized under this BA are designed to minimize effects of Forest management on lynx, thereby minimizing potential cumulative effects. Two actions that may contribute to the most cumulative effects on lynx habitat in the past are fire suppression and timber harvest. Fire suppression activities over the last 75-90 years have modified forest vegetation conditions towards "climax" conditions, although recent wildfires may be offsetting many of these effects.

Timber harvest over the same period of time has had a different set of effects. Harvest has generally converted older structural stages to younger ones and reintroduced seral species through reforestation. Harvest has also increased roads and access into wildlife habitat.

Hunting, trapping, livestock grazing, pesticide use, animal damage control, and firewood gathering have also adversely affected populations of some species. Overall, the combination of these and other effects mentioned previously have changed wildlife distribution and population from what they were before Euro-American settlement.

4. *Description and Distribution of the Listed Species*

The Idaho Conservation Data Center maintains statewide records of rare animal observations (ICDC 2002). There are 5 records through 2002 for lynx on the PNF (Table 3).

5. *Habitat Condition, Trend and Limiting factors*

Much of the estimated lynx's habitat on the PNF has not been actively managed in the past, other than to suppress wildfires that would have otherwise altered age class, stand structure, and species composition. Large-scale management activities are not anticipated in lynx habitat; succession and fire will cause most of the vegetation changes over the long term as they have in recent years. Many areas that historically had patches of trees in mixed ages, sizes, and species have been replaced by larger stands of even-aged but older trees, in or approaching climax conditions. Long-term fire suppression has generally reduced lynx foraging habitat, but has likely benefited denning habitat. Although a large amount of lynx habitat has burned within the last 35 years, it is estimated that 15-30 years may be needed for succession to advance before some of these recently burned areas turn into lynx foraging habitat (USDI FWS 2000). Recently burned areas are not considered suitable lynx habitat until they become re-established with sufficient vegetation to support lynx prey (i.e. snowshoe hare), and cover for lynx.

IV. Descriptions of Proposed Actions

The proposed action descriptions occur in the companion fish BA (BR Volume 7). Additional descriptions and mitigation pertinent to wildlife occur here.

A. Federal Action: Miscellaneous Forest Products

Dates of Previous Concurrence:

- NIDGS: May 17, 2001
- Lynx: Sept. 12, 2000

Description:

See companion fish BA (BR Volume 7) for definition of action and general mitigations.

NIDGS

- Standing and down wood will not be removed at known occupied NIDGS sites.
- Occupied NIDGS sites are closed to miscellaneous forest product harvest.
- NIDGS sites closed to public harvest are identified on public firewood maps.
- Signs along roads adjacent to NIDGS sites identify those sites as closed to firewood harvest.
- Monitoring is used to help identify problems.
- Log haul through occupied NIDGS habitat would be restricted to after August 15 and prior to reemergence of squirrels in spring.

Lynx

- If more than 30 percent of lynx habitat within a LAU is currently in unsuitable condition no additional habitat may be changed to unsuitable habitat as a result of vegetative management projects (LRMP TEST15). This standard does not apply in the following: (LRMP TEST14)
  - □ Within 200 feet of Forest Service administrative sites, dwellings, and /or associated outbuildings as needed to reduce risk of loss from wildfire.
  - □ Research studies and genetics tests (i.e., performance test, long-term field test and realized gains trials) necessary to evaluate genetically improved reforestation stock.
  - □ Within the wildland urban interface in order to develop or maintain fuel profiles that are necessary to reduce the risk of wildfire.
  - □ Where outweighed by demonstrable short- or long- term benefits to lynx and its prey habitat conditions

B. Federal Action: Mistletoe Control and Pre-Commercial Thinning

Dates of Previous Concurrence:

- NIDGS: May 17, 2001
- Lynx: Sept. 12, 2000

Description:

See companion Fisheries BA (BR Volume 7) for description of action and general mitigations.

Additional Mitigations for Wildlife:

NIDGS

- At occupied NIDGS sites, when squirrels are not hibernating, crew work occurs between 10 am and 3 pm when squirrels are less active.
- Slash piles and debris are distributed throughout the project area to provide cover for squirrels and provide barriers to fuel wood gatherers and off-road vehicle use.

- Heavy fuel concentrations are scattered prior to burning to reduce heat generated when slash piles are burned.
- Burning in occupied NIDGS habitat would be restricted to after August 15 and prior to reemergence of squirrels in spring.
- All thinning prescriptions near NIDGS sites are coordinated with a journey level wildlife biologist prior to implementation.
- An annual list of pre-commercial thinning projects within NIDGS habitat will be provided to the Level 1 Team for informal review by May 1 each year.

Lynx

- Within lynx habitat, pre-commercial thinning will be allowed only when stands no longer provide snowshoe hare habitat (e.g., self-pruning processes have eliminated snowshoe hare cover and forage availability during wine condition with average snow pack) (LCAS p. 7-6).

C. Federal Action: Fire Management Activities

Dates of Previous Concurrence:

- NIDGS: May 17, 2001
- Lynx: Sept. 12, 2000

Description:

See companion fish BA (BR Volume 7) for description of action and general mitigations.

Additional Mitigations for Wildlife:

NIDGS

Prescribed Fire

- Appropriate fire prescriptions commensurate with the natural fire regime of the area will be used.
- All prescribed fire proposals in or near NIDGS sites are coordinated with a journey level wildlife biologist.
- Fire will not be prescribed during the time squirrels are foraging above ground unless the prescription serves to maintain sufficient forage as determined by a wildlife biologist. In this situation, crew work will occur between 10 am and 3 pm when squirrels are less active.
- Mechanical line construction will not occur at any NIDGS site.
- Fire line construction by use of natural barriers adjacent to NIDGS sites will be encouraged.
- Heavy fuel concentrations are scattered prior to burning to reduce potential of creating water repellent soils.
- No new roads will be constructed to access prescribed burns at NIDGS sites.

Wildland Fire Suppression

- A wildlife biologist will be assigned as a Resource Advisor or Deputy Resource Advisor when fire occurs in or near to occupied NIDGS sites.
- A wildlife biologist will be involved in the development of the Wildland Fire Situation Analysis (WFSA) when fires occur in, or have the potential to enter, NIDGS sites or habitat.
- Maps of occupied NIDGS sites will be updated annually and provided to each district FMO.
- Ground disturbing activities will not be allowed within NIDGS sites, except for hand lines.

- Camps, staging areas, and base heliport locations will be identified during the WFSA process to avoid impacts to NIDGS.
- Dozer lines, camps, and parking areas will not be allowed within NIDGS sites.
- Retardant drops will not occur near NIDGS sites.
- A journey level wildlife biologist will be assigned to the rehab team when fires occur within or near NIDGS sites.

Lynx

Prescribed Fire

- All prescribed fire proposals in or near potential lynx habitat are to be coordinated with a journey level wildlife biologist.

Wildland Fire Use

- A wildlife biologist will be involved in the development of the Wildland Fire Implementation Plan (WFIP) when fire occurs in, or has potential to enter lynx habitat.

Wildland Fire Suppression

- A wildlife biologist will be involved in the development of the Wildland Fire Situation Analysis (WFSA) when fires occur in or have potential to enter lynx habitat.
- The use of backfires that may result in an LAU exceeding 30% unsuitable lynx habitat will be discussed with the USFWS.

D. FEDERAL ACTION: WATERSHED AND FISH HABITAT IMPROVEMENTS AND MAINTENANCE

DATES OF PREVIOUS CONCURRENCE:

- NIDGS: None
- Lynx: None

DESCRIPTION:

See companion fish BA (BR Volume 7) for definition of action and general mitigations.

ADDITIONAL MITIGATIONS FOR WILDLIFE:

NIDGS

- Propose ground disturbing activities will be reviewed by a wildlife biologist. Ground disturbing activities will not be allowed within NIDGS sites unless approved by the biologist.

Lynx:

No Effect

E. FEDERAL ACTION: NOXIOUS WEED MANAGEMENT

DATES OF PREVIOUS CONCURRENCE:

- NIDGS: None
- Lynx: None

DESCRIPTION:

See companion fish BA (BR Volume 7) for definition of action and general mitigations.

Additional Mitigations for Wildlife:

NIDGS

- Noxious weed removal by hand or mechanical treatment is preferred to chemical treatment in and adjacent to occupied NIDGS sites.
- Chemical treatments in and near NIDGS sites are limited to the following chemicals: Metsulfuron Methyl, Glyphosphate, Clopyralid, or Picloram. The chemical 2-4 D will not be used in NIDGS sites.
- A buffer for excluding the use of 2-4 D in occupied habitat will be implemented on a site-by-site basis and will be determined based on current and projected habitat use, including projected immigration/emigration patterns.
- All noxious weed treatments in or near NIDGS sites are coordinated with a journey level wildlife biologist.
- Treatments will be preformed in a manner that maintains or improves meadows and NIDGS dispersal corridors.
- Only spot spraying will occur in occupied habitat: no boom spraying
- Efforts will be made to only use herbicide when NIDGS are underground in the early spring, inactive during the day, or in hibernacula.

Lynx

- No additional mitigation

F. Federal Action: Road Management

Dates of Previous Concurrence:

- NIDGS: May 17, 2001
- Lynx: Sept. 12, 2000

Description:

See companion fish BA (BR Volume 7) for definition of action and general mitigations.

Additional Mitigations for Wildlife:

NIDGS

- Disturbance associated with road management at NIDGS sites is concentrated along the existing road prism.
- New ground disturbing activities (defined also as use of unauthorized roads that are not on the Forest Travel Plan, but show as roadbeds on the ground), realignment, and upgrades of existing roads near NIDGS sites are coordinated with a journey level wildlife biologist. Projects that occur within 2 miles of occupied NIDGS will be presented to the Level 1 Team at the yearly coordination meeting. Surveys for NIDGS will be conducted when projects occur in potential habitat.
- Side casting of excess material onto the fill slope will not occur when blading and shaping roads in NIDGS sites.
- When treating weeds or brush along roads near NIDGS sites, measures would be implemented to ensure consistency with the Noxious Weeds action.
- No fuel will be stored near NIDGS sites.
- Chemical leaks from heavy equipment will be controlled and monitored at NIDGS sites.
- Heavy equipment will not be authorized to park within NIDGS sites.
- Road maintenance will not result in surface runoff into NIDGS habitat that renders existing habitat unsuitable.
- Road surfaces may be upgraded to reduce erosion and sedimentation so long as cut and fill-slopes are not enlarged or disturbed; for example, a native surface road may be upgraded to pit-run gravel, crushed aggregate or asphalt, if the road to be upgraded is

reviewed by a wildlife biologist and the determination made that no occupied NIDGS sites would be impacted.

- Road realignment could occur if the wildlife biologist has determined that NIDGS would benefit by road realignment and mitigation measures (e.g., timing restrictions and other actions defined above) are implemented to ensure no adverse affects to NIDGS.

Lynx

- Within lynx habitat, minimize roadside brushing in order to provide snowshoe hare habitat (LCAS, p. 7-10).

G. Federal Action: Trails, Recreation, and Administrative Site Operation and Maintenance

Dates of Previous Concurrence:

- NIDGS: May 17, 2001
- Lynx: Sept. 12, 2000

Description:

See companion fish BA (BR Volume 7) for definition of action and general mitigations.

Additional Mitigations for Wildlife:

NIDGS

- Maintenance and new ground disturbing activities near NIDGS sites are coordinated with a journey level wildlife biologist. If ongoing maintenance of sites may impact NIDGS, the site will be analyzed to be moved or closed. New disturbance will not occur if disturbance to NIDGS is anticipated.

Lynx

- No additional mitigation

H. Federal Action: Travel Plan

Dates of Previous Concurrence:

- NIDGS: May 17, 2001
- Lynx: Sept. 12, 2000

Description:

See companion fish BA (BR Volume 7) for definition of action and general mitigations.

Additional description of travel pertinent to wildlife:

In addition to revision of the Travel Plan for designated roads and trails, as described in the Travel Plan FEIS (USFS 2007), the action as described in this BA includes the ongoing activity of dispersed recreation during snow-free seasons. Hiking, bird watching, fishing, berry picking, hunting, and camping are just a few of the many types of dispersed recreation activities that occur on the Payette National Forest. The vast majority of these activities occur within a short distance of existing roads and trails and during snow-free times of year. Winter camping, snowmobiling, backcountry skiing, and snowshoeing are types of activities that occur when snow is present, but only the winter travel activity of over-snow motor vehicle use (i.e., snowmobiling) is specifically addressed in the Travel Plan FEIS. The winter travel activity of over-snow motor vehicle use will be analyzed using a separate consultation process and document. No Record of Decision (ROD) for winter travel will be issued until this separate consultation process is completed.

ADDITIONAL MITIGATION FOR WILDLIFE:

NIDGS

- No off-road travel or travel to dispersed campsites will be allowed in occupied NIDGS habitat.
- NIDGS sites will be monitored for illegal off-road travel and, if necessary, these sites will be closed by barricades, fences, or by other means to reduce potential negative impacts to NIDGS habitat.
- The Level 1 Team and NIDGS technical team will work together to identify opportunities to close and/or relocate NFS roads that occur in or adjacent to occupied NIDGS sites.
- Information signs will be posted along roads that occur in or adjacent to occupied NIDGS sites to caution the public to drive slowly and avoid impacting NIDGS.

Lynx

- Manage recreational activities to maintain lynx habitat and connectivity (LRMP TEOB30)
- Minimize building of roads directly on ridgelines (LCAS, p. 7-10)
- Over the next few years, Forest wildlife biologists will analyze the projected main wildlife travel corridors and propose actions, if necessary, to promote their viability for use for lynx, wolverine, and other forest carnivores.

I. FEDERAL ACTION: LIVESTOCK GRAZING ALLOTMENTS.

DATES OF PREVIOUS CONCURRENCE:

- NIDGS: May 25, 2001
- Lynx: Sept 12, 2000

DESCRIPTION:

See companion fish BA (BR Volume 7) for definition of action and general mitigations.

ADDITIONAL DESCRIPTION PERTINENT TO WILDLIFE:

Lick Creek Allotment — The cattle allotment is 38,342 acres subdivided into eight pastures. Located on the Council District its boundaries are from the Snake River in Hells Canyon south of Windy Ridge through Rocky Comfort Flat to Gladheart along the watershed boundary ridge east of Lick Creek to just north of Hoo Hoo Gulch and back down to Summit Gulch. Ten NIDGS sites are currently associated with this allotment: Summit Gulch, Tree Farm, Calf Pen Gulch, Roadside (Butterfield Gulch), Cold Springs, Hoo Hoo Gulch, Fawn Creek, Upper Lick Creek, YCC, and Rocky Comfort.

The Summit Gulch NIDGS site was first discovered in 1982 with 46 individuals. Current population surveys indicate that 31 individuals are present. Livestock monitoring in the general Summit Gulch area indicate that utilization rates were light from 2001-2006 at 10 to 30%. Seed head counts and nested plot frequencies have been conducted since 2001 and results vary depending on sample times (see Appendix).

The Tree Farm site was first discovered in 1997 and was estimated to be 30-50 individuals. Current estimates indicate that approximately 37 individuals are present. Livestock utilization at the site is considered light at 15-32%. Seed head counts and nested plot frequencies indicate that grass and forb distribution remained relatively constant since 2001.

The Calf Pen Gulch site was first discovered in 1982 with approximately eight individuals. By 1985 the site appeared to be extirpated. Seven individuals were discovered north of this site in 2003 and the site name became Calf Pen Gulch North. 2006 population surveys estimates the population to be 15 individuals. No current vegetative monitoring data exists for this site.

The Roadside/Butterfield Gulch site was first discovered in 1998 with one individual. In 2006 the site was no longer occupied. No current vegetative monitoring data is available for this site.

The Cold Springs site was first documented in 1982 with 255 individuals. According to population surveys, the population precipitously declined throughout the late 1980's and mid 1990's. Current population surveys indicate that there are approximately 61 individuals present. Vegetation monitoring includes seed head counts, utilizations, and two nested plot frequencies. Utilization data suggest that livestock grazing was light at 5-25% from 2001 to 2006. Grass and forb availability appear to be well distributed, but have fluctuated probably due to the sample timing.

Hoo Hoo Gulch was first documented in 1998 with nine individuals. 2006 surveys found three individuals. Utilization monitoring indicates light utilization from 5-40% depending on year from 2001-2006. Grass and forb distribution remains relatively constant, with slight increases in forbs.

Fawn Creek was first documented in 1998 with two individuals. 2006 surveys indicate that there are six NIDGS present. Utilization studies indicate light use at 5-30% from 2001-2006. Grass and forb distribution remains high.

Upper Lick Creek is a relatively new site and currently has five individuals.

The YCC site was first documented in 2003 with two individuals. 2006 surveys indicate one individual is present. No other data is available.

Rocky Comfort Flat was first documented in 1984 with and estimated population of 1,648 individuals. 2006 estimates indicate that approximately 50 individuals are present. No monitoring data is available for this site.

Bear Creek Allotment — The cattle allotment is 14,772 acres subdivided into two pastures. Located on the Council District its boundaries are from Summit Gulch to the Smith Mountain lookout within the Bear Creek subwatershed. There is one NIDGS site associated with this grazing allotment.

The Huckleberry site is 7 acres and lies in an opening surrounded by closed canopy ponderosa pine and Douglas fir with grand fir and some lodgepole pine. An adjacent 1.5 acres on private land is also a part of the site. The meadow occurs on a gentle (10%) south facing slope with low, rocky ridges and intervening grassy swales. In a study of northern Idaho ground squirrel burrows Yensen et al. (1991) describes understory species at the Huckleberry site as being dominated by *Eriogonum* species, onions, *Lomatium* species, *Gilia aggregata*, *Sedum stenopetalum* and *Penstemon deustis* with 40% bare ground. Vegetation monitoring results indicate *Bromus japonicus*, *Poa bulbosa*, *Ventenata dubious*, *Madia glomerata*, *Allium tolmei*, *Polygonum majus*, *Sanguisorba occidentalis*, *Dodecatheion conjugens* and *Navarretia divaricarpa* as being the primary understory species. These results also indicate that ground cover at the site is approximately 65% rock, litter and moss. Utilization monitoring indicates light grazing use at 23% in 2001 and 8% in 2006. Grass and forb occurrence for the same time period has remained relatively constant with some variation depending on sampling times and weather conditions.

Wildhorse/Crooked River Allotment —The cattle allotment is 36,244 acres divided into two pastures. Located on the Council District it encompasses a majority of the Wildhorse/Crooked River drainages and most of the Cuddy Mountain area. The Riley Ranch site associated with this allotment is currently unoccupied.

Smith Mountain Allotment — This sheep allotment is 82,167 acres and consists of six pastures. Located on the Council District, it is the most northern allotment on the District. There are five sites located with this allotment: Smith Mountain Lookout, Lick Creek, Lick Creek Lookout, Hoo Hoo Gulch, and Lick Creek-Lower.

The Smith Mountain Lookout site includes 20 individuals and was discovered in 2006. No other information exists for this high elevation (8,000 ft.) site.

The Lick Creek site was first discovered in 1982 with 130 individuals. Population numbers have fluctuated since that time and are currently estimated at 15 individuals. No monitoring data is available for this site.

The Lick Creek Lookout site is a new site discovered in 2005 and surveyed in 2006. There are currently 35 individuals present at this site. No vegetation data is available.

Hoo Hoo Gulch was first discovered in 1998 with nine individuals and has remained relatively static. In 2006, three individuals were documented. Site conditions include dry, rocky openings interspersed with larger diameter ponderosa pine. The openings range from 5-20% slope and contours down to Hoo Hoo Gulch Creek, a perennial, fish-bearing stream. Primary overstory species in addition to ponderosa pine are Douglas-fir, tamarack and lodgepole pine. Vegetation monitoring results from 2006 indicate the primary understory species at the Hoo Hoo Gulch site as being *Poa bulbosa*, *Poa secunda*, *Bromus comuitatus*, *Madia glomerata*, *Achillea milletolium*, *Orthocarpus hispidus*, *Erigeron pumilis* and *Geranium viscosissimum*. Since 2001, livestock utilization rates have been light to moderate (5-40%) depending on the month in which the measurement was taken.

Lick Creek Lower was identified in 2005 and surveyed in 2006. The five individuals in this population are located approximately ½ mile downhill from the Lick Creek Lookout at approximately 6,500 ft. in elevation. No vegetative monitoring data exists for this site.
Due to the relatively good condition of vegetation at the Cold Springs sites as a result of habitat improvement projects, nutrition at these sites is probably adequate and therefore is not likely to affect reproduction. Average utilization over an 11 year period has been approximately 12% with no periods of over utilization. Population numbers have remained relatively constant since the early 1980's, but are at a current high of 64 individuals.

Steves Creek Allotment — The 2,844 acre cattle allotment is located on the Council District and consists of one pasture. One NIDGS site (North Steves Creek) exists on this allotment and includes 7 individuals. No other data is available for this site.

PROJECT DESCRIPTION AS RELATES TO WILDLIFE:

Allotments are managed by either the West or East Zone Range Conservationist. The current annual operating plan (AOP) describes the season of use, maximum utilization, livestock numbers, and permittee(s) for each allotment. Utilization standards exist for both riparian and upland use. Standards vary depending on whether the allotment is used by cattle or sheep and if the allotment contains listed fish species or habitat.

Outside of areas with listed fish species and/or habitat, in cattle allotments, the riparian standard is a minimum herb stubble height of 4 to 6 inches for sedges (*Carex* spp.) and rushes (*Juncus* spp.) at the end of the grazing season and 50% maximum use for grass species on the bank and floodplain. The maximum utilization for uplands is 50% for key species unless the area is identified as big-game winter range where utilization maximum is 35%.

Where listed fish species and/or habitat occur, in cattle allotments, the maximum use for grass species on the riparian bank and floodplain is 30% and the maximum utilization for uplands is 40% (see project description in fisheries BAs). In sheep allotments, once-over grazing is required, which equates to 30% use in both riparian and upland areas (see fisheries BAs). This requirement pertains to all allotments in listed fish or wildlife habitat.

The Brownlee Watershed has five grazing allotments that have the potential to affect occupied NIDGS sites (see Table 10). Note some NIDGS sites occur in more than one grazing allotment and may be included and discussed in other section 7 watersheds.

Table 10.—Livestock Grazing at NIDGS (Northern Idaho Ground Squirrel) Sites in the Brownlee Section 7 Watershed. Allotments are divided into smaller pastures. Number refers to the permitted numbers authorized for the allotment.

NIDGS Site	2006 Pop. Status[1]	Allotment	Pasture	Timing of Grazing at NIDGS Site	Monitoring Type & Year[2]	Type & Number of Livestock	Section 7 Watershed
Summit Gulch	31	Lick Creek C&H	Lower West Lick Creek	6/20-8/15	SHC-2001-2005, Utilization, NPF	518 cow/calf pairs	Brownlee
Summit Gulch North	0	Lick Creek	Upper West Lick Creek	11/10-12/10	No Data	425 c/c	Brownlee
Tree Farm	37	Lick Creek	Lower WLC & Upper WLC	6/20-8/15 LWLC & 11/10-12/10 UWLC	SHC Utilization NPF 2007	518 c/c LWLC 425 c/c UWLC	Brownlee
Calf Pen Gulch North	15	Lick Creek	Upper WLC	11/10-12/10	Utilization NPF SHC	425 c/c	Brownlee
Roadside (Butterfield Gulch)	0	Lick Creek	East Lick Creek	8/5-10/30	Utilization & stubble ht	450 c/c & 20 bulls	Brownlee
N. Steves Creek	7+	Steves Creek C&H	Steves Creek	6/8-7/11 & 8/16-10/31	Use in vicinity	100 c/c	Brownlee
Cold Springs	61+	Lick Creek C&H & Smith Mtn S&G	ELC & Smith Mtn	8/5-10/30 ELC & 8/26-10/7 Smith Mtn	SHC Utilization NPF (2) east and west	450 c/c & 20 bulls ELC & 1200 dry ewes Smith Mtn	Brownlee
Hoo Hoo Gulch	3+	Lick Creek	ELC	8/5-10/30	SHC Utilization NPF 2007	450 c/c & 20 bulls	Brownlee
Upper Hoo Hoo	0	Smith Mtn	Smith Mtn	8/26-10/7	No Data	1200 dry ewes	Brownlee
Fawn Creek	6+	Lick Creek	ELC	8/5-10/30	SHC Utilization NPF	450 c/c & 20 bulls	Brownlee
Huckleberry	24	Bear Creek C&H	Upper Bear Creek	7/12-8/15	SHC Utilization NPF	100 c/c	Brownlee
Upper Lick Creek	5	Lick Creek	ELC	8/5-10/30	No Data	450 c/c & 20 bulls	Brownlee
YCC *	1	Lick Creek			No Data		Brownlee
Smith Mountain Lookout	20	Smith Mtn	Smith Mtn	8/26-10/7	NPF 2007	1200 dry ewes	Brownlee
Lick Creek	15+	Smith Mtn	Bear-Lick Ridgeline	8/26-10/7	No Data	1200 dry ewes	Brownlee
Rocky Comfort	50+	Lick Creek	Gladhart FS	6/9-7/31	No Data	456 yrlg steers	Brownlee
Ox-Bear Creek West (Private)	1+				Not Applicable		Brownlee
Riley Ranch	0	Wildlhorse/ Crooked River C&H	Ditch Creek	5/16-6/9	No Data	100 c/c	Brownlee
Lick Creek Lookout & Lower	50	Smith Mtn.	Smith Mtn	none	Utilization 2007	none	Brownlee
Bear-Lick Ridgeline	20+	Smith Mtn & Bear Creek	Smith Mtn & Upper Bear Creek	8/26-10/7 Smith Mtn & 7/12-8/15 Upper Bear Creek	No Data	1200 dry ewes Smith Mtn & 100 c/c Bear Creek	Brownlee

[1] Minimum estimates from IDFG 2006
[2] Abbreviations: SHC = Seed Head Count NPF = Nested Plot Frequency (conducted every 5 years)

In response to concerns about the effects of livestock use on NIDGS, changes in numbers of NIDGS at many sites have been tracked annually for many years. Change in numbers is not necessarily due to actual population changes, but may also be due in part to variation in observer skills, and sampling effort and technique.

Monitoring data collected at NIDGS sites in the watershed the past 6 years shows high variability and lack of any clear correlation with changes in squirrel numbers (see Appendix). Currently seedhead counts and utilization measures are not occurring at standard times. Generally, but not always, seedhead counts are occurring early in the season. Utilization levels are usually monitored in October. Monitoring times must be standardized and be consistent with NIDGS ecological requirements (e.g., utilization measurements need to coincide with NIDGS hibernation times to show that forage supply is adequate prior to hibernation). Monitoring may need to be adjusted for NIDGS sites at higher elevations (e.g., 7,500 ft.).

Based on the analysis presented in this BA, the PNF proposes the following changes to monitoring in the Brownlee Watershed:

- Seedhead counts will be added for the two new NIDGS discovered at higher elevations in (Smith Mountain and Lick Creek lookouts). Seedhead counts will take place early in the growing season and will be replicated in early August to monitor the amount of seedheads remaining prior to NIDGS hibernation.
- Utilization levels will be monitored by wildlife biologists and/or range technicians at NIDGS sites during the first two weeks of August to ensure utilization levels are at or below 40%.
- Existing nested frequency studies will be reevaluated with USFWS and the NIDGS technical team to determine their utility and if they should be continued or expanded. In particular, use of studies such as these to track changes in forbs in sheep allotments with NIDGS sites will be investigated.
- The PNF will work with USFWS and the NIDGS technical team to design an intensive monitoring study to rigorously test potential competition between livestock and NIDGS.

ADDITIONAL MITIGATIONS FOR WILDLIFE:

NIDGS

- Concentrated livestock use will not be allowed on occupied NIDGS sites. Concentrated use is defined as the physical presence of livestock on the NIDGS colony to the extent that trailing and other ground disturbance is seen and/or that vegetation use in the area of the colony exceeds utilization standards**. Utilization standards will require use to be at or below 40%, which is defined as light use.** Wildlife biologists and/or range specialists will monitor sites in early August to determine the level of use and work with the permittee to reduce use through herding, temporary fencing or other methods (including fencing, if necessary). Results of monitoring will be presented at the yearly Level 1 coordination meeting.
- Prior to maintenance of existing fences and water developments in NIDGS habitat, the activity will be coordinated with a wildlife biologist.
- Action for new construction of fences or watering facilities is not considered ongoing. These actions are associated with a specific project and will be assessed for effects to NIDGS at that time.
- Livestock will be excluded for at least two years after prescribed burning for habitat enhancement discussion when the Level 1 team determines exclusion is unnecessary. Potential reasons why this could be considered unnecessary include: the entire allotment was burned, so concentrated livestock use is not anticipated or cattle would enter the unit after plants have dried out and squirrels have gone into hibernation.
- An adaptive management approach will be developed when and if livestock use is allowed within existing fenced exclosures. A plan will be developed for each occupied and or/enhanced site.

- The Huckleberry site, which is adjacent to private land, will be monitored for livestock access from private land. If unauthorized access and impacts are occurring, problems will be addressed immediately (i.e., removal of unauthorized livestock).
- The vegetation monitoring plan will be revised with the aid of the NIDGS technical team. The revised plan will be designed to provide better, more rigorous information on the potential effects of livestock grazing on NIDGS.
- Off-road vehicle use by permittees will not be allowed in occupied NIDGS sites.
- In all cattle and sheep allotments that contain NIDGS sites, language will be incorporated in AOPs that will identify the NIDGS as a threatened species under the ESA. The language will indicate that there are known sites and populations of the NIDGS located on the grazing allotment.
- The permittee will be required to avoid concentration livestock on NIDGS sites. No sheep bedding will be allowed on these sites. Sheep grazing will be avoided and once-over grazing only will occur in the vicinity of NIDGS sites.
- Placement of salt must be a minimum of ¼ mile from NIDGS sites.

Lynx

- Delay livestock use in post fire and post harvest created openings in lynx habitat until successful regeneration of the shrub and tree components occurs. (LCAS p. 7-11)
- Within lynx habitat, manage livestock grazing in riparian areas to maintain and achieve mid seral or higher condition. (LCAS p. 7-11)

J. FEDERAL ACTION: POWER AND TELEPHONE LINE EASEMENTS ON FEDERAL LANDS.

DATES OF PREVIOUS CONCURRENCE:

- NIDGS: None
- Lynx: Sept 12, 2000

DESCRIPTION:

See companion fish BA (BR Volume 7) for description of action and general mitigations.

ADDITIONAL MITIGATIONS FOR WILDLIFE:

NIDGS

- Any work, especially ground disturbing activities, performed near NIDGS sites would be coordinated with a journey-level PNF wildlife biologist to avoid adverse effects.
- Because the power line maintenance roads and underground cable routes were likely not surveyed for NIDGS at the time of construction, field surveys should be conducted to determine the presence of NIDGS in the activity area.
- If NIDGS are identified at a new site, Level 1 Team discussions will be initiated to ensure that the planned activity does not adversely affect NIDGS.
- To avoid potential impacts from fire suppression activities at these sites, the location of known NIDGS sites will be shared with the PNF Fire program, including current maps of known sites, potential habitat, and habitat requirements. Fire crews and equipment operators will be briefed on NIDGS information prior to initiation of fire suppression activities at these sites.
- To avoid potential impacts from noxious weed control at these sites, mitigation measures for noxious weed control will be followed (see Section E above).

Lynx

- No additional mitigation

V. Analysis of Potential Effects

A. Effects of Management Disturbances

1. Direct and Indirect Effects of Miscellaneous Forest Products

Harvest of miscellaneous forest products includes firewood, post and poles, Christmas trees, small volumes of timber (less than 70 acres of green harvest or 250 acres of salvage in any analysis area annually, and mushrooms and other plants and seeds by permitted Forest users.

NIDGS

Small Volume Timber Harvest

Effects Discussion. **—**Vegetation management would open dense, even-aged stands which will allow for an increase in the quality and quantity of understory vegetation. Preferred forage will increase in the short-term. Skidding by tractors may increase soil compaction, but this activity will not be allowed in occupied habitat. In addition, standing and down timber would not be removed at NIDGS sites nor would log hauling thru occupied habitat when NIDGS are above ground. Log haul through occupied NIDGS habitat would be restricted to after August 15 and prior to reemergence of squirrels in spring. Because of these mitigation measures no adverse impacts to NIDGS are expected to occur.

Personal Use Firewood

Effects Discussion. **—**Firewood cutting will not be allowed in occupied habitat from May 1 – November 30. As a result, no impacts to NIDGS are expected.

Personal Use Christmas Tree Sales

Effects Discussion. **—**Personal use Christmas tree harvest does not result in the conversion of NIDGS habitat to an unsuitable condition. This is because Christmas tree harvest would generally occur in December when NIDGS would be in hibernation and not directly affected. Tree cutters are required to use system roads and designated snowmobile routes. Frozen ground conditions would protect NIDGS burrows while in hibernacula.

Post and Poles

Effects Discussion. **—**No post and poles harvest will occur in occupied habitat; therefore no impacts to NIDGS are expected.

Lynx

Small Volume Timber Harvest

Additional Project Description Information Pertinent to Lynx Analysis.**—**The majority harvest of small volumes of timber (less than 70 acres) and salvage harvest (less than 250 acres) on the PNF occur in ponderosa pine and mixed conifer stand and are outside potential lynx habitat. For projects inside of potential lynx habitat, harvest will be not be allowed if more than 30% of lynx habitat within the LAU is currently in an unsuitable condition and management actions will not change more that 15 % of lynx habitat within a LAU to an unsuitable condition within a 10-year period (LCAS, p. 3-5).

Effects Discussion.**—**LCAS Consistency: Harvesting in lynx habitat could temporarily disturb lynx that are using the area, although such use is highly unlikely. Harvesting occurs mainly during daylight hours. Temporal segregation likely minimizes any impact that disturbance would have on lynx.

Personal Use Firewood

Additional Project Description Information Pertinent to Lynx Analysis.—Approximately 4,500 cords of personal use firewood are sold each year on the 2.3 -million acre Payette National Forest. Firewood regulations require that only dead trees may be taken. Firewood permits designate areas that are unavailable for firewood collection. The permits include maps that specify practices and locations for removing forest products. Areas approved for personal use firewood collection are reviewed on an annual basis based on availability of wood, resource protection needs, and access.

Effects Discussion.—Firewood collection in lynx habitat could temporarily disturb lynx that are using the area, although it is highly unlikely that lynx occur in areas where most firewood collection occurs on the PNF. Firewood collection occurs mainly during daylight hours. Temporal segregation likely minimizes any impact that disturbance would have on lynx as discussed in the Lynx Conservation Assessment and Strategy (LCAS p. 7-8). Additionally, western larch and Douglas-fir are preferred species for firewood and are not typically a major component of suitable lynx habitat. The low volume of firewood collected over the amount of area on the PNF does not result in conversion of suitable habitat to unsuitable habitat.

Personal Use Christmas Tree Sales

Additional Project Description Information Pertinent to Lynx Analysis.—Approximately 1,000 personal use Christmas tree permits are sold annually on the 2.3 -million acre Payette National Forest. The permits include maps and guidelines that specify authorized practices and locations for removing forest products. There is a limit of two trees per household. Permit holders are typically restricted by snow and road access as to where they can find a suitable tree.

Effects Discussion.—Personal use Christmas tree harvest does not result in the conversion of lynx habitat to an unsuitable condition or impact connectivity of habitat across the landscape. This is because the small number of trees harvested (estimated to be less than 2,000 trees) is generally removed from areas that are within 100-200 feet of an open road or groomed snowmobile route across the 2.3 million acre Forest. Removal of such small amounts does not result in conversion of suitable lynx habitat to unsuitable habitat and meets the direction in the LCAS and PNF Land and Resource Management Plan (LCAS 7-3 and LRMP TEST 16).

Post and Poles

Additional Project Description Information Pertinent to Lynx Analysis.—Approximately 15 acres of green post and pole sales are sold each year on the 2.3 -million acre Payette National Forest. Trees are cut only in designated areas.

Effects Discussion.—Cutting of post and poles in lynx habitat could temporarily disturb lynx that are using the area, although such use is highly unlikely because lynx are considered rare on the PNF. Post and pole collection occurs mainly during daylight hours. Temporal segregation likely minimizes any impact that disturbance would have on lynx. Areas within lynx habitat will only be designated for cutting when removal of these trees does not increase unsuitable habitat above 30% of potential. Therefore, effects to lynx habitat are expected to be insignificant. This meets the LCAS and LRMP direction for protection of lynx habitat (LCAS, p. 7-3 and LRMP TEST16).

2. DIRECT AND INDIRECT EFFECTS OF MISTLETOE CONTROL AND PRE-COMMERCIAL THINNING

Mistletoe control and pre-commercial thinning occur as follow up activities to previous timber harvest or in other tree stands were stand density is too great to meet management objectives. Mistletoe control can involve the removal of any size tree infested with mistletoe. Pre-commercial thinning generally occurs 15 to 25 years after a timber sale to reduce stand density. Most stands to be thinned are plantations. These activities include mitigation measures (pg. 17-18) to protect listed species, including the requirement that an annual list of pre-commercial thinning projects within NIDGS habitat will be provided to the Level 1 Team for informal review by May 1 each year."

NIDGS

Timber stand improvement

Effects Discussion. —Timber stand improvement would only occur in occupied habitat when NIDGS are dormant. Thinning of overstory may improve the herbaceous component that NIDGS prefer and provide for corridors to facilitate immigration and emigration. The species becomes extirpated from areas that develop high densities of small tress (Sherman and Yensen 1993). Some TSI may include leaving downed trees for hiding and burrowing cover which may be a beneficial effect. Additionally, reduced densities of conifers, including canopy closure, may protect existing NIDGS habitat from high intensity stand replacing fires and may also be beneficial to NIDGS. If hauling of timber is necessary, designated haul routes including timing restrictions (which restrict hauling through occupied sites until approximately August 15 after squirrels are below ground) would be implemented to eliminate conflict. Timber stand improvement will be coordinated with a PNF wildlife biologist and will be based on NIDGS ecological requirements in suitable habitat.

Lynx

Additional Project Description Information Pertinent to Lynx Analysis.—The majority of mistletoe control and pre-commercial thinning projects on the PNF occur in ponderosa pine and mixed conifer stands outside potential lynx habitat. For projects inside of potential lynx habitat, pre-commercial thinning will be allowed only when stands no longer provide snowshoe hare habitat (e.g., self-pruning processes have eliminated snowshoe hare cover and forage availability during winter condition with average snow pack) (LCAS, p. 7-6).

Effects Discussion.—LCAS Consistency: Thinning in lynx habitat could temporarily disturb lynx that are using the area, although temporal segregation likely minimizes any impact that disturbance would have on lynx. Project design features (see above) will avoid changes in habitat for lynx prey that could reduce the prey base.

3. DIRECT AND INDIRECT EFFECTS OF FIRE MANAGEMENT ACTIVITIES

NIDGS

Prescribed Fire

Effects Discussion. — Prescribed fire can be used to restore or maintain natural ecosystems by reducing fuel accumulations and risk of future severe wildland fires, recycling nutrients, enhancing fire-dependent vegetation communities, and promoting growth of early seral vegetation. A lack of wildfire in NIDGS habitat has resulted in loss of meadow habitat through encroachment of conifers. Historically forests within the range of the NIDGS were open stands of conifers with a herbaceous understory, interspersed with open meadows. As a result of logging and fire suppression in post settlement times, these have largely been replaced by dense stands of relatively young trees without a herbaceous understory (Steele et al 1986, Truska and Yensen 1990). The EIS for the Forest Plan states that prescribed fire (or its equivalent) needs to be reintroduced into the ecosystem to increase habitat availability and to reverse the current trend in loss of habitat for NIDGS. While prescribed fire is expected to improve habitat for the species in the long term, minimal short-term effects may not be entirely avoided. Such effects could include localized short term (generally 1-3 years) loss of forage or cover species. For this reason, prescribed fires will be timed and designed to maintain and promote preferred forage species and minimize loss.

The use of fire as a natural component of ecosystem management will provide for more open stands of conifers. Understory vegetation will increase in quantity and quality with increased sunlight. Forage will be rejuvenated and palatability will increase. Heavy fuel concentrations, that can cause water-repellent (hydrophobic) soils and delay regeneration of forage species, will be removed.

Wildland Fire

Effects Discussion. —Wildland fire suppression activities may have effects on ground squirrels directly or indirectly through changes in vegetation communities. Further, direct effects could occur during suppression if activities are carried out in squirrel habitat that disturb or compact soil or alter forage or cover plants. Among those actions are construction of fire lines and establishing operation or base camps–including helicopter bases and other staging areas. Squirrels could also be harmed by inadvertent contact with chemical fire retardants or fuels associated with suppression activities. Indirect effects on habitat from fire suppression could result in death or injury to northern Idaho ground squirrels. Suppression of fire accelerates forest succession toward denser stands of later seral species allowing canopies to close. This closed canopy results in less understory herbaceous vegetation and therefore less food for NIDGS. Historically, fire suppression has reduced the amount and quality of squirrel habitat and has the potential to further limit habitat availability and quality. These adverse effects are avoided and minimized by Fire Management Standards that limit ground disturbance and the use and storage of toxic substances in occupied habitat.

Lynx

Prescribed Fire

Additional Project Description Information Pertinent to Lynx Analysis.—The prescribed fire program on the Payette National Forest is designed to achieve and maintain desired vegetative condition and appropriate fuel levels. Fire operates within historical fire regimes appropriate to the vegetation type and management objectives.

Effects Discussion.—The LCAS calls for fire to be restored as an ecological process: “Use fires to move toward landscape patterns consistent with historical succession and disturbance regimes” (LCAS, p. 7-8). The LRMP states “Use fire alone or with other management activities to maintain desirable plant community attributes including fuel levels, as well as ecological process”

These objectives drive all prescribed fire projects. For this reason, prescribed fire projects on the PNF are likely to benefit lynx habitat in the long term. In addition, LRMP standard TEST15 states “if more than 30 percent of lynx habitat within an LAU is currently unsuitable condition, no additional habitat may be changed to unsuitable habitat as a result of vegetative management projects.” Application of this standard ensures that lynx habitat is maintained in the short and long term. The one exception is the wildland urban interface (WUI) projects are not bound by this standard. WUI projects are intended to maintain or reduce fuel profiles needed to reduce the risk of wildfire threats to wildland urban interface areas. WUI projects occur within the wildland urban interface generally within ¼ to ½ mile of the urban areas. These projects are expected to have negligible effects to potential lynx habitat use. The projects are limited to relatively small areas around small communities and lynx would probably avoid these urban interface areas due to human disturbance.

Wildland Fire Use

Additional Project Description Information Pertinent to Lynx Analysis.—The wildland fire Use Program on the Payette NF focuses on restoring fire as an ecological process to Forest Service lands. Fires that are determined to be within the criteria outlined in the LMRP and the Forest Fire Management Plan are allowed to burn, as they would have historically.

Effects Discussion.—The LCAS calls for fire to be restored as an ecological process: “Use fires to move toward landscape patterns consistent with historical succession and disturbance regimes" (LCAS, p. 7-7). In some cases large fires may increase unsuitable lynx habitat above 30 percent in the short term. The LCAS states "periodic vegetation disturbances maintain the snowshoe hare prey base for lynx. In the period immediately following large stand replacing fires, snowshoe hare and lynx densities are low. Populations increase as the vegetation grows back and provide dense horizontal cover, until vegetation grows out of the reach of hares (LCAS, pp. 7-7, 7-8). Therefore, in the long term, even large stand replacing fires, are expected to benefit lynx habitat.

Wildland Fire Suppression

Additional Project Description Information Pertinent to Lynx Analysis.—Fire, both prescribed and wildland is used as a tool to achieve and maintain vegetative condition and desired fuel levels. Fire plays a natural role where appropriate and desirable, but is actively suppressed where necessary to protect life, investments, and valuable resources. Fire operates within historical fire regimes appropriate e the vegetation type and management objectives (LRMP, p. III-38)

Effects Discussion.—The LCAS states that in the event of a large wildfire, conduct a post-disturbance assessment prior to salvage harvest, particularly in stands that were formerly in late successional stages to evaluate potential for lynx denning and foraging habitat (LCAS, p. 7-7). No major salvage harvest has been proposed in suitable lynx habitat in the past 10 years, but post-disturbance assessments are in preparation for the entire PNF following the large wildfires of 2007. In addition, a wildlife biologist will be involved in the development of the Wildland Fire Situation Analysis (WFSA) when fires occur in or have potential to enter lynx habitat. Backfires that create more than 30% unsuitable lynx habitat will be discussed with the FWS.

4. DIRECT AND INDIRECT EFFECTS OF WATERSHED AND FISH HABITAT IMPROVEMENTS

NIDGS

Effects Discussion. —This action generally occurs in riparian areas outside of known NIDGS habitat, but may occasionally occur in upland areas of less than 10 acres in size or on roadbeds identified for obliteration. Such ground disturbing activities near NIDGS sites must be coordinated with a journey level wildlife biologist. If the activities may impact NIDGS, measures will be incorporated to avoid impacts (such as treatments after NIDGS are in hibernacula) or the project may not occur. Due to the required mitigation measures, this action is expected to have negligible impacts to NIDGS.

Lynx

No Effect

5. DIRECT AND INDIRECT EFFECTS OF NOXIOUS WEED MANAGEMENT

NIDGS

Effects Discussion.—This section is a summary of toxicity information presented in Forest Service Risk Assessments (SERA 1998, 2001, 2003) and some public literature for small mammals. It is broken down into two parts, Part 1 - Analysis of Effects for Inactive Ingredients, and Part 2 - Analysis of Effects for Active Ingredients. Part 1describes the potential effects of inerts, adjuvants, impurities, etc, and then Part 2 analyzes the effects of the active ingredients from the 6 herbicides on a surrogate small mammal. Terms and acronyms used in the analysis are listed in Table 11.

Information was found in the human health and ecological risk assessment sections of the risk assessments, and obtained literature published in peer-reviewed journals, from authors, and on the internet. Syracuse Environmental Research Associates (SERA) conducted very comprehensive searches of the literature when preparing the risk assessments, and also evaluated the research papers for quality of methods and analysis used (USDA, Forest Service 2005).

Table 11.—Terms and acronyms used in this Effects Analysis.

Term or Symbol	Definition
Allometric	Pertaining to allometry, the study and measure of growth. In toxicology, the study of the relationship of body size to various processes that may impact how chemicals affect the organism or how the chemicals are transported within the organism.
Bioaccumulation	The net accumulation of a substance by an organism as a result of uptake directly from all environmental sources and from all routes of exposure (primarily from food or water that is ingested).
Dose	The actual quantity of a chemical administered to, or absorbed by, an organism.
Gavage	A method of dose administration; the substance is placed directly in the stomach.
Exposure	The amount of chemical in contact with an animal.
LD_{50} (lethal dose50)	The dose of a chemical calculated to cause death in 50% of a defined experimental animal population over a specified observation period. The observation period is typically 14 days.
LOAEL	Lowest-observed-adverse-effect level; lowest exposure associated with an adverse effect.
NOEL	No-observed-effect level; no effects attributable to treatment.
NOAEL	*No-observed-adverse-effect level*: An exposure level at which there are no statistically or biologically significant increases in the frequency or severity of adverse effects between the exposed population and its appropriate control; some effects may be produced at this level, but they are not considered as adverse, or as precursors to adverse effects. In an experiment with several NOAELs, the regulatory focus is primarily on the highest one, leading to the common usage of the term NOAEL as the highest exposure without adverse effects.
NOEC	No-observed-effect concentration; synonymous with NOEL.
Surfactant	Surface acting agent; any substance that when dissolved in water or an aqueous solution reduces its surface tension or the interfacial tension between it and another liquid.
Surrogate	A substitute; lab animals are substituted for humans or other wildlife in toxicity testing.
Toxicity index	in this document, it is the dose of herbicide used to determine the potential for an adverse effect to wildlife. It is the lowest dose reported to cause the most sensitive effect in the most sensitive species tested, and is usually a reported NOAEL for a sub-lethal effect, but may be an LD_{50} (or a portion thereof) when data is lacking.
a.e.	Acid equivalent.
a.i.	Active ingredient.
kg	Kilogram, equivalent to 1000 grams or 2.2 pounds
mg	Milligram; 0.001 gram.
mg/L	Milligrams per liter; equivalent to ppm.
mg/kg	Milligrams per kilogram; equivalent to ppm.
ppm	Part(s) per million; equivalent to mg/L and mg/kg.
ppb	Part(s) per billion

[a] Preventing and Managing Invasive Plants Final Environmental Impact Statement April 2005 DRAFT

Herbicides have the potential to adversely affect the environment. The U.S. Environmental Protection Agency (EPA) must register all herbicides prior to their sale, distribution, or use in the United States. In order to register herbicides for outdoor use, the EPA requires the manufacturers to conduct a safety evaluation on wildlife including toxicity testing on representative species of birds, mammals, freshwater fish, aquatic invertebrates, and terrestrial and aquatic plants. An ecological risk assessment uses the data collected to evaluate the likelihood that adverse ecological effects may occur as a result of herbicide use.

The Forest Service conducts its own risk assessments, focusing specifically on the type of herbicide uses in forestry applications. The Forest Service contracts with SERA to conduct human health and ecological risk assessments for herbicides that may be proposed for use on National Forest System lands. The information contained in this BA relies on these risk assessments. All toxicity data, exposure scenarios, and assessments of risk are based upon information in the SERA risk assessments unless otherwise noted. Typical application rates of herbicides and nonylphenol polyethoxylate (NPE) surfactant used in this analysis can be found in Table 12.

Table 12.—Herbicide application rates used to treat invasive plants. Included are the incidental rates of application of the impurity hexachlorobenzene.

Herbicide	Typical Application Rate lb ai/ac[a]	Lowest Application Rate lb ai/ac	Highest Application Rate lb ai/ac
Clopyralid	0.35 - 0.5	0.1	0.5
Glyphosate	1.35 - 2	0.5	7
Metsulfuron Methyl	0.03 - 0.06	0.013	0.15
Picloram	0.35 - 0.5	0.13	1.0
Aminopyralid	ND	0.06	0.1
2,4-D	1.0	0.5	2.0
Hexachlorobenzene[b]	0.000004	0.0000024	0.000012

[a] Pounds of active ingredient per acre.
[b] These application rates reflect the incidental rates of application of the impurity hexachlorobenzene that makes up part of the surfactant when applying the herbicide.
ND = No Data
Source: USDA Forest Service 2003, SERA 1998, 2001, 2003

Analysis of Effects - Part 1

Inerts, Adjuvants, Impurities, Endocrine Disruption and Synergistic Effects.—Inert compounds are those that are intentionally added to a formulation, but have no herbicidal activity and do not affect the herbicidal activity. Inerts are added to the formulation to facilitate its handling, stability, or mixing. Impurities are inadvertent contaminants in the herbicide, usually present as a result of the manufacturing process. Adjuvants are compounds added to the formulation to improve its performance. They can either enhance the activity of an herbicide's active ingredient (activator adjuvant) or offset any problems associated with its application (special purpose or utility modifiers). Surfactants are one type of adjuvant that makes the herbicide more effective by increasing absorption into the plant, for example.

Inerts and adjuvants, including surfactants, are not under the same registration guidelines as are pesticides. The EPA classifies these compounds into four lists based on the available toxicity information. List 1 contains "inerts of toxicological concern"; List 2 contains "potentially toxic inerts, high priority for testing"; List 3 contains "inerts of unknown toxicity"; and List 4 contains "minimal risk inerts" or "inerts for which EPA has sufficient information to conclude that their current use patterns will not adversely affect public health or the environment." If the compounds are not classified as toxic, then all information on them is considered proprietary and the manufacturer need not disclose their identity. Therefore, inerts and adjuvants generally do not have the same amount of research conducted on their effects, compared to active ingredients.

Inert Ingredient Effects

There is very little data regarding the effects to most wildlife species from inert ingredients contained in the 6 herbicides considered in this BA. None of the inert ingredients included on EPA's List 2, 3, or 4 need to be disclosed on the herbicide label, despite evidence that some compounds on these lists may cause adverse effects to laboratory animals and humans (Anonymous 1999; Cox 1999; Knight 1997; Knight and Cox 1998; Marquardt et al. 1998). EPA's own website (http://www.epa.gov/opprd001/inerts/) states, "Since neither federal law nor the regulations define the term "inert" on the basis of toxicity, hazard or risk to humans, non-target species, or the environment, it should not be assumed that all inert ingredients are non-toxic." Northwest Coalition for Alternatives to Pesticides (NCAP) obtained the identity of many inert ingredients through a Freedom of Information Act request; the list of inerts they obtained can be found at http://www.epa.gov/opprd001/inerts/lists.html. Many of the inert ingredients are proprietary in nature and have not been tested on laboratory or wildlife species. SERA obtained clearance to access confidential business information (i.e. the identity of proprietary ingredients) and used this information in the preparation of the risk assessment. However, toxicity data to support any assessment of hazard or risk are usually very poor, even when the identity of the inert is known.

- **Clopyralid –** Identified inerts include monoethanolamine and isopropyl alcohol, both approved food additives. These inert ingredients do not impact the assessment of risk.
- **Glyphosate** – There are at least 35 glyphosate formulations that are registered for forestry applications (SERA, 2003-Glyphosate) with a variety of inert ingredients. SERA obtained clearance to access confidential business information (i.e. the identity of proprietary ingredients) and used this information in the preparation of the risk assessment. Surfactants (discussed below) were the only additives identified that impact risk (SERA, 2003-Glyphosate).
- **Metsulfuron methyl** - The identity of inerts used in metsulfuron methyl formulations are confidential, but SERA reviewed them for preparation of the risk assessment (SERA, 2003-Metsulfuron methyl). EPA has not classified any of the inerts as toxic.
- **Picloram** – The formulations Tordon K and Tordon 22K contain the following inerts: potassium hydroxide, ethoxylated cetyl ether, alkyl phenol glycol ether, and emulsified silicone oil (NCAP website; www.pesticide.org/FOIA/picloram.html). Potassium hydroxide is an approved food additive. The other compounds are all on EPA's List 4B, inerts of minimal concern. They may also contain the surfactant polyglycol 26-2, which is on EPA's List 3: Inerts of Unknown Toxicity, discussed in the following section. The toxicity data on the formulations encompasses toxic risk from the inerts. Inerts in picloram formulations do not appear to pose a unique toxic risk to wildlife (SERA, 2003-Picloram).
- **2,4-D** – There is no discussion of inert ingredients in the SERA risk assessment for 2,4-D. Identities of inerts contained in many formulations are available at the NCAP website (www.pesticide.org/FOIA/24d.html). Most inert ingredients identified are on EPA's List 3 or List 4 for inert ingredients and not identified as toxic. However, several formulations contain inerts that are on EPA's List 2; Potentially Toxic Inerts, High Priority for Testing. List 2 inerts in some 2,4-D formulations include:

    - Antifoam 1400 (CAS # 1330-20-7)
    - Xylene (CAS # 1330-20-7)
    - Diethanolamine (CAS # 111-42-2)
    - Petroleum solvent (CAS # 64742-94-5)
    - Hydrogenated aliphatic solvent (CAS # 64742-47-8)
    - Butoxyethanol (CAS # 11-76-2)

- **Aminopyralid –** No Data (SERA data is in preparation, but currently not available)

The amount of inert ingredients in the above formulations is generally not known, so exposure and dose estimates cannot be calculated.

Surfactant Effects

Surfactants, or surface-acting agents, facilitate and enhance the absorbing, emulsifying, dispersing, spreading, sticking, wetting, or penetrating properties of herbicides. There is a fair amount of research on the effects of surfactants to terrestrial and aquatic organisms because they are widely used in detergents, cosmetics, shampoos and other products designed for human exposure.

The following information is taken from “Analysis of Issues Surrounding the Use of Spray Adjuvants With Herbicides” (USDA FS, 2002) and “Human and Ecological Risk Assessment of Nonylphenol Polyethoxylate-based (NPE) Surfactants in Forest Service Herbicide Applications” (USDA FS, 2003). Refer to these documents for more complete discussions.

Some glyphosate formulations contain polyethoxylated tallow amine (POEA) surfactant, which is substantially more toxic to aquatic species than glyphosate or other surfactants that may be used with glyphosate (SERA, 2003-Glyphosate, p. 4-14). In the SERA risk assessment, the toxicity of glyphosate is characterized based on the use of a surfactant, either in the formulation or added as an adjuvant in a tank mixture (SERA, 2003-Glyphosate, p. 4-14).

Polyglycol 26-2, used in picloram, will impact mitochondrial function in vitro, but information is insufficient to evaluate risks to wildlife in vivo from field applications at plausible levels of exposure (SERA, 2003-Picloram).

The primary active ingredient in many of the non-ionic surfactants used by the Forest Service is a component known as nonylphenol polyethoxylate (NPE). NPE is found in these commercial surfactants at rates varying from 20 to 80 percent. NPE is formed through the combination of ethylene oxide with nonylphenol (NP), and may contain small amounts of un-reacted NP. The properties of the particular NPE depend upon the number of ethoxylate groups that are attached to the NP. The most common NPE used in surfactants with pesticides is a mixture that has, as a majority, 8-10 ethoxylate groups attached, and can be abbreviated NP9E. NP is a material recognized as hazardous by the U.S. EPA (currently on U.S. EPA’s inerts List 1). Both NP and NPE exhibit estrogen-like properties, although they are much weaker than the natural estrogen, estradiol.

Potential effects of NPE were analyzed using exposure scenarios to quantitatively estimate the dose of NPE that mammals may receive if they consumed contaminated vegetation or prey, or if a small mammal was directly sprayed. Each estimated dose was compared to toxicity levels reported from laboratory data and summarized in USDA FS 2003.

The use of NPE-based surfactants in any of the 6 (Milestone presumed to be equivalent to the other five products) herbicides considered in this BA could result in toxic effects to some mammals and at typical and high application rates (USDA FS 2003). The exposure scenarios and calculated doses used in the analysis represent worst-case scenarios and are not entirely plausible. At the typical application rate, adverse effects could occur to small mammals that may be directly sprayed.

Effects of Impurities

All herbicides likely contain impurities as a result of the synthesis or production process. The toxic effects of impurities are addressed in toxicity tests using the technical grade product, which would contain the impurities.

Hexachlorobenzene is an impurity in the technical grade products of clopyralid and picloram. Hexachlorobenzene is a ubiquitous and persistent chemical in the environment, as it is used or present in a wide variety of manufacturing processes. It has been shown to cause tumors in mice, rats and hamsters, and EPA has classified it as a probable human carcinogen (SERA, 2003-Picloram). The amount of hexachlorobenzene released into the environment from Forest Service use of picloram and clopyralid is inconsequential in comparison to existing background levels and the annual release from manufacturing processes (SERA, 2003-Picloram, pp. 3-25). The use of picloram and clopyralid in remote forest locations could constitute the primary source of localized contamination, however. The projected amount of hexachlorobenzene released during invasive plant treatments is calculated to be well below the level that poses a risk to cancer in mammals.

Surfactant used in Roundup and Roundup Pro contain 1,4-dioxane as an impurity, which has been classified by EPA as a probable human carcinogen. Based on current toxicity data and an analysis by Borrecco and Neisess (1991), the potential effects of 1,4-dioxane are encompassed by the available toxicity data on the Roundup formulation (SERA, 2003-Glyphosate). Borrecco and Neisess (1991) also demonstrated that the upper limit of risk of cancer from this impurity was less than one in a million.

Endocrine Disruption

Recent information has highlighted the potential for certain synthetic and natural chemicals to affect endocrine glands, hormones, and hormone receptors (endocrine system). The endocrine system helps control metabolism, body composition, growth and development, reproduction, and many other physiological regulators. An endocrine disrupter is a substance that may exert effects to the body by affecting the availability of a hormone to its target tissue(s) and/or affecting the response of target tissues to the hormone (SERA, 2002). Estrogen is a prominent hormone in animal systems and substances that mimic estrogen or stimulate similar responses in target tissues are referred to as “estrogenic”.

Scientists have expressed concern regarding estrogenic effects of synthetic chemicals since before the 1970’s. The U.S. EPA (1997) reports effects of endocrine disruption in animals that “include abnormal thyroid function and development in fish and birds; decreased fertility in shellfish, fish, birds, and mammals; decreased hatching success in fish, birds, and reptiles; demasculinization and feminization of fish, birds, reptiles, and mammals; defeminization and masculinization of gastropods, fish, and birds; decreased offspring survival; and alteration of immune and behavioral function in birds and mammals.” Many of the known endocrine disrupting contaminants have been banned or are regulated (e.g., DDT/DDE, PCB, TCDD).

Glyphosate has been evaluated for endocrine disrupting effects, and the weight of evidence indicates that this herbicide has no specific toxic effects on endocrine function (SERA, 2002).

Synergistic Effects

Certain chemicals may cause synergistic effects in the presence of other chemicals: that is, the total effect of two chemicals may be greater than that suggested by the sum of the effects from the individual components (USEPA, 2000). However, information regarding the existence or potential for synergistic effects from the herbicides discussed in this document is very limited.

Some of the herbicides analyzed in this document (e.g., 2,4-D and picloram) have been investigated for possible synergistic effects but the study designs were insufficient for the assessment of toxicological interactions (SERA, 2003-Picloram; p. 3-35) However, data on this potential effect is incomplete and not likely to be obtained in the foreseeable future: the sheer number of potential combinations of contaminants, environmental stressors, and wildlife species make it unfeasible to investigate thoroughly.

USEPA (2000) did state that for exposures at low doses, with low risk for each component in the chemical mixture, that the likelihood of significant interaction (e.g., synergistic effects) is usually considered to be low. Likewise, a report by the Agency for Toxic Substances and Disease Registry (ATSDR) 2004 cited several studies using rats that found no synergistic effects for mixtures of four, eight and nine chemicals at low (sub-toxic) doses. But statistically significant interactions (both synergistic and antagonistic) have been noted in some studies. Unfortunately, even with excellent data, the uncertainties and complexities of chemical interactions create substantial uncertainty in the risk characterization for chemical mixtures (ATSDR, 2004; USEPA, 2000).

Analysis of Effects – Part 2

***Effects of Active Ingredients on Surrogate Species*.—**Generally, active ingredients have been tested on only a limited number of species and mostly under laboratory conditions. While laboratory experiments can be used to determine acute toxicity and effects to reproduction, cancer rates, birth defect rates, and other effects that must be considered, laboratory experiments do not account for wildlife in their natural environments. This leads to uncertainty in the risk assessment analysis. Environmental stressors can increase the adverse effects of contaminants, but the degree to which these effects may occur for various herbicides is largely unknown. Adverse affects to wildlife health such as lethargy, weight loss, nausea, and fluid loss due to diarrhea or vomiting, can affect their ability to compete for food, locate and/or capture food, avoid or fight off predators, or reproduce. The following analysis relies on these types of effects, when sufficient data exists, rather than lethal doses, to determine the potential for doses to cause an "adverse effect" to wildlife.

FS/SERA risk assessments and published literature is the primary sources of information used to evaluate effects of herbicides to small mammals. First, is a discussion of field studies found in the published literature regarding potential effects of herbicide use to small mammals. Then, qualitative and quantitative information from the FS/SERA risk assessments and published literature regarding effects of active ingredients are discussed.

Toxicity Data and Exposure Analysis

The FS/SERA risk assessments present the toxicity data from studies conducted to meet EPA registration requirements and from published literature. In addition, exposure of various small mammals to herbicide is quantitatively estimated to characterize risk from the use of each herbicide.

The Use of Surrogate Species

Most toxicity testing utilizes surrogate species. Surrogate species serve as a substitute for the species of interest, because all species of interest can not be tested. Surrogate species are typically organisms that are easily tested using standardized methods, are readily available, and inexpensive. Rare species are not tested and the physiological requirements for some organisms prohibit their use in toxicity testing because these requirements cannot be met within the test system. However, caution should to be taken when addressing ecological risk and the use of surrogates when analyzing those ecological risks. Some herbicides demonstrate more variation than others in effects among different species, and very limited numbers of species have been tested.

Because of the variation of responses among species, and the uncertainty with regard to how accurately a surrogate species may represent other wildlife, the FS/SERA risk assessments use the most sensitive endpoint from the most sensitive species tested as the toxicity index for terrestrial wildlife. This does not alleviate concerns over interspecies variations in response, however.

Doses and Responses

The likelihood that an animal will experience adverse effects from an herbicide depends on: (1) the inherent toxicity of the chemical, (2) the amount of chemical to which an animal is exposed, (3) the amount of chemical actually received by the animal (dose), and (4) the inherent sensitivity of the animal to the chemical.

The toxicity of the chemical is measured by laboratory tests required by EPA. The amount of chemical to which an animal may be exposed is influenced by several factors, discussed below. When an animal is exposed to a chemical, only a portion of the chemical applied or ingested is actually absorbed or taken in by the animal (the dose). Various absorption rates for wildlife are not available, so some scenarios use the same value for exposure and dose. Also, different species have different susceptibilities to various chemicals. This is discussed below.

Factors that Influence Exposure and Dose

The exposure of an animal to an herbicide is greatly influenced by relationships between body size and several physiological, metabolic, and pharmacological processes (allometry). For example, allometric relationship dictates that animals of smaller size have a larger amount of surface area for their mass than larger animals. This relationship greatly influences basic physiological properties, such as food consumption and thermoregulation. Some of the allometric factors that influence exposure to herbicides are detailed below.

Body Weight.—Several parameters used to estimate herbicide contact are reported on a "per body weight" basis, expressed in grams (g) or kilograms (kg). For example, both food and water ingestion rates are reported on a per body weight basis (such as gram of fresh food or water per gram of fresh body weight per day). Body weights, in units of mass, are reported as fresh weight that might be obtained by weighing a live animal in the field. Also, body weight data are used in empirical models to calculate some parameters, such as surface area, when there are no specific measurements available. Calculations of "potential dose to animal" use body weight of animals.

Metabolic Rate.—Metabolic rate is not directly calculated in this document, or in the FS/SERA risk assessments, but reported values for various species are used to calculate food consumption requirements. It is reported on the basis of kilocalories per day for units of body weight (kcal/kg/day). Metabolic rate is closely related to body size, with smaller animals generally having higher metabolic rates than larger animals.

Contact Rate.—Exposure involves direct contact with the herbicide, and wildlife may be exposed to herbicides by ingesting the chemical (oral) or by external contact (dermal). Oral exposures may occur from eating contaminated vegetation, drinking contaminated water, or by grooming activities. Dermal exposures may occur from direct spray, or contact with contaminated vegetation or water. These contact routes are influenced by allometric relationships, as well as habitat preferences and feeding behaviors.

Oral Routes.—These include:

Food ingestion
Small animals generally have higher caloric requirements than large animals, so a small animal ingests a greater amount of food per unit body weight compared to large animals. A 20g mouse, for example, will generally consume an amount of food equal to about 15 percent of its body weight every day, depending on calorie content of the diet. A value of 3.6 g of food consumed per day for a 20g mouse is used in the FS/SERA risk assessments for calculating exposure from contaminated food. This is equivalent to 18 percent of the body weight and is generated from general allometric relationships for food consumption in rodents (US EPA/ORD, 1993, p. 3-6, as cited in SERA, 2003-Glyphosate). This value may underestimate exposure to small mammals that consume primarily vegetation, rather than seeds (SERA, 2003). Food consumption is calculated from caloric requirements for different sized animals for the various exposure scenarios in the FS/SERA risk assessments.

Dietary composition
Dietary composition is an important consideration in exposure assessments because different foods have varying herbicide residues. Grasses may have substantially higher residues than fruits or other vegetation (Fletcher et al. 1994; Pfleeger et al., 1996). The FS/SERA risk assessments use data from Siltanen et al. (1981) for concentrations on fruit.

Water ingestion
There are well-established relationships between body weight and water consumption across a wide range of mammalian species. Mice, weighing about 20 g (0.02 kg) consume about 0.005 L of water/day (i.e. 0.25 L/kg/day). These values are used in the exposure scenarios for small mammals. Water ingestion is obviously influenced by environmental factors, such as heat and availability. But estimates for the variability in water consumption are not available for wildlife.

Grooming
Mammals may spend a great deal of time grooming fur. If the animal has been exposed to herbicide, some chemical may be absorbed through the grooming process. However, a study by Gaines (1969, as cited in SERA, 2001) suggests that grooming is not significant in the toxic

response of small mammals. At any rate, the doses received from grooming would be less than those received through contaminated food or direct spray, given the assumptions in the exposure scenarios. See dermal exposure route information below.

Dermal Route.—Dermal contact can occur from direct spray or contact with contaminated vegetation or water. Since only a small portion of an applied herbicide would be available as dislodgeable residue on vegetation, or in a water body where it was diluted, dermal exposure is modeled only for direct spray scenarios in FS/SERA risk assessments. The extent of dermal contact for an animal depends on the application rate of the herbicide, the surface area of the animal, and the rate of absorption. Since a larger proportion of a small animal's body would be involved, relative to larger animals, direct spray scenarios are only conducted for a small mammal and a honeybee in FS/SERA risk assessment (SERA, 2001). Skin and fur provide some protection from chemicals, and not all of the chemical on an animal will be absorbed. In this document, it is assumed that the skin affords no protection at all (e.g., 100 percent absorption). Scenarios with a different assumption regarding absorption may be found in the various FS/SERA risk assessments. The approach taken here (100 percent absorption) may account for multiple absorption pathways, such as dermal absorption plus that from grooming, etc. However, there is no quantitative data available regarding this assumption. The actual dose received after dermal exposure is also influenced by the specific herbicide considered since different herbicides have different dermal absorption rates and properties (SERA, 2001, section 3.9).

Summary of Exposure Scenarios.—An exposure scenario was developed, and a quantitative estimate of dose received by the animal type in the scenario was calculated when enough data was available (SERA, 2001). While it is possible to model exposure in a very large number of non-target animals, highly species-specific exposure assessments are of little use in the absence of species specific dose-response data (SERA, 2001). The exposure assessment should not be more complicated than the dose-response assessment.

The exposure scenarios that are used in the Ecological Risk Assessments (SERA, 2001) and/or for this BA for small mammals in general are as follows:

Acute Exposures

20 g mammal.—A mouse-sized mammal is directly sprayed over 50 percent of body surface area and 100 percent absorption occurs over one day. A "mouse" consumes contaminated vegetation, daily food consumption equal to 18 percent of body weight (a value between seed diet and vegetation diet needs), and one day's diet is 100 percent contaminated. A "mouse" consumes contaminated insects, daily food consumption equals 50 percent of body weight, and one day's diet is 100 percent contaminated. A "mouse" consumes contaminated water (volume water consumed is based on allometric relationship) after spill of 200 gallons into a small pond (with no dissipation or degradation of the herbicide).

5 kg mammal.—A fox-sized animal consumes small mammal prey that has been contaminated by direct spray. Daily food consumption equals 8 percent of body weight.

Chronic Exposures

20 g mammal.—A mouse-sized mammal consumes contaminated vegetation for 90 days (upper estimate assumes 20 percent of diet is contaminated), and the herbicide dissipates over time. A "mouse" consumes contaminated ambient water for an extended period.

In this document, only the highest ranges of exposure assumptions are included, although a more complete range of possible values is included in the SERA risk assessments. For example, for a given herbicide, residues of the herbicide on vegetation that are reported in the literature will vary between studies and by vegetation type. A range of residue rates is used in the SERA risk assessment worksheets, but only the highest reported rates are used in the data reported here.

Only the highest values are used here to reduce length and complexity of this document and also to present a reasonable "worst-case" exposure analysis.

Estimated doses from the above exposure scenarios are compared to toxicity levels from laboratory research. The lowest reported dose that caused the most sensitive effect in the most sensitive species is used in this analysis to indicate the potential for an adverse effect when that dose is exceeded. These doses are referred to as "toxicity indices" in this document, and NOAEL's are used whenever possible. If available data have not identified a NOAEL, then an LD_{50} or other level may be used. Table 13 lists the toxicity indices for mammals.

Following the table is a summary of herbicide effects to mammals based on the results of the analysis and information in the literature. The likelihood that potential adverse effects would occur is then discussed followed by a brief summary of some of the available field studies. The document concludes with detailed descriptions of the exposure scenario results for each scenario and herbicide.

Table 13.—Toxicity indices ***for mammals*** used in the effects analysis. Indices represent the most sensitive endpoint from the most sensitive species for which adequate data are available.

Herbicide	Duration	Endpoint	Dose	Species	Effect Noted at LOAEL
Clopyralid	Acute	NOAEL	75 mg/kg	Rat	Decreased weight gain at 250 mg/kg
- chronic	NOAEL		15 mg/kg/day	Rat	Thickening of gastric epithelium at 150 mg/kg/day
2,4-D	Acute	"non-lethal"	10 mg/kg	Rat & Dog	Effects on kidney, blood, and liver
- chronic	NOAEL		1 mg/kg/day	Rat & Dog	Effects on kidney, blood, and liver at 5 mg/kg/day
Glyphosate	Acute	NOAEL	175 mg/kg	Rabbit	Diarrhea at 350 mg/kg
- chronic	NOAEL		175 mg/kg/day	Rabbit	Diarrhea at 350 mg/kg
Metsulfuron methyl	Acute	NOAEL[a]	25 mg/kg	Rat	Decreased weight gain at 500 mg/kg
- chronic	NOAEL		25 mg/kg/day	Rat	Decreased weight gain at 125 mg/kg
Picloram	Acute	NOAEL	34 mg/kg	Rabbit	Decreased weight gain at 172 mg/kg
- chronic	NOAEL		7 mg/kg	Dog	Increased liver weight at 35 mg/kg[b]
Aminopyralid	ND	ND	ND	ND	ND
NPE Surfactants	Acute	NOAEL	10 mg/kg	Rat	Slight reduction of polysaccharides in liver at 50 mg/kg/day
- chronic	NOAEL		10 mg/kg/day	Rat	Increased weights of liver, kidneys, ovaries, and decreased live pups at 50 mg/kg/day

[a] The acute NOAEL of 24 mg/kg is very close to the chronic NOAEL, so chronic value is used for acute exposures as well.
[b] USEPA/OPP 1993
ND = No Data

Summary of Herbicide Effects to Mammals.**—**The data available for mammals are derived from numerous studies conducted to meet registration requirements, and primarily on laboratory animals that serve as surrogates.

Availability of information on the direct toxicological effects of the 6 herbicides on wild mammals varies by herbicide. Glyphosate and 2,4-D have been widely studied, including field applications. Little or no data on wildlife may exist for other herbicides. Herbicides have been tested on only a limited number of species under conditions that may not well-represent populations of free-ranging animals (SERA 1998, 2001, 2003).

Tables 13, 14, and 15 summarize the results of exposure scenarios for the 6 herbicides and NPE surfactants considered in this analysis. Metsulfuron methyl does not appear to pose any plausible risk to terrestrial wildlife at either the typical or highest application rates. When an herbicide does pose plausible risk, it is consistently insectivorous and grass-eating animals that are most likely to receive doses above the toxicity index. Direct spray of mammals is a concern only for 2,4-D, and NPE surfactants at the typical application rate. Consumption of contaminated water, even as the result of an accidental spill, results in doses well below the toxicity index for all herbicides. 2,4-D has the highest potential to adversely affect small mammals.

2,4-D also has a relatively low acute toxicity to mammals in terms of direct lethal doses, but signs of adverse effects to the nervous system or internal organs may occur at very low doses. The toxicity indices for 2,4-D in the risk assessment (SERA,1998) are inconsistent with the most sensitive effects reported for mammals (SERA 1998, p. 3-52). Relying on the most sensitive effects reported, 2,4-D may produce exposures that can have adverse effects to terrestrial wildlife in 15 scenarios at the typical application rate, and 16 scenarios at the highest application rate.

Glyphosate, applied at the typical application rate has little potential to adversely affect mammals. At the highest application rate, glyphosate has the potential to adversely affect large grass-eating mammals and mammals in acute and chronic exposures.

Clopyralid, applied at the typical application rate has little potential to adversely affect mammals, except for insectivorous mammals. There are no data available on the persistence or degradation of clopyralid residue on insects, so the acute dose is compared to the chronic toxicity index. This is an extremely protective approach and may greatly overestimate risk. However, it is worth noting so that appropriate protective measures may be taken when using clopyralid in the habitat of insectivorous mammals. At the highest application rate, clopyralid may adversely affect insectivorous mammals. In total, clopyralid exposures exceed the toxicity indices for one exposure at the typical application rate, and four at the highest application rate.

The actual likelihood of exposing specific mammal species depends on the application method, size of treatment area, habitat treated, and season of application, and must be analyzed at the site-specific level.

Table 14.—Exposure scenario results from FS/SERA risk assessments for mammals using the ***typical application rate*** and upper residue rates.

Animal/ Scenario	Clopyralid	Glyphosate	Metsulfuron methyl	Picloram	Aminopyralid	2,4-D	NPE Surfactant
ACUTE EXPOSURES							
Direct spray, sm. mammal	--	--	--	--	ND	⬟	⬟
Consume contaminated vegetation							
small mammal	--	--	--	--	ND	⬟	--
Consume contaminated water							
Spill, small mammal	--	--	--	--	ND	⬟	--
Consume contaminated insects							
small mammal	--	--	--	--	ND	⬟	⬟
CHRONIC EXPOSURES							
Consume contaminated vegetation							
small mammal, on site	--	--	--	--	ND	⬟	--
Consume contaminated water							
small mammal	--	--	--	--	ND	--	--

Symbol meanings are as follows:

-- Exposure scenario results in a dose below the toxicity index.

⬟ ◊ Exposure scenario results in a dose that exceeds the toxicity index.

ND = No data

Table 15.—Exposure scenario results from FS/SERA risk assessments for mammals using the ***typical application rate*** and upper residue rates.

Animal/ Scenario	Clopyralid	Glyphosate	Metsulfuron methyl	Picloram	Aminopyralid	2,4-D	NPE Surfactant
ACUTE EXPOSURES							
Large mammal on site	--	--	--	--	ND	♦	--
Consume contaminated water							
Small mammal	--	--	--	--	ND	--	--

Symbol meanings are as follows:

-- Exposure scenario results in a dose below the toxicity index.

♦ Exposure scenario results in a dose that exceeds the toxicity index

ND = No data

Likelihood these exposures and effects will actually occur.**—**While the above exposure scenarios consider animal sizes, feeding habits, herbicide application rates, and toxicity data, they cannot account for all the variables found in the field during actual applications. Such factors as foliar interception, animal behavior (e.g. nocturnal versus diurnal activity), season of use, and selective application methods can significantly reduce or eliminate actual exposure to herbicides in field conditions.

Direct spray of small mammals (ground squirrels) is very unlikely to occur, since they typically spend most of their time in burrows. Squirrels may be active in treatment areas, but would likely seek shelter or move away from the treatment activity.

Consumption of contaminated grass by mammals would depend on the habitat-type in the treatment area and whether these animals are likely to forage there. The application method would be very important in determining the amount of exposure. Selective foliar applications to target invasive plants are not likely to lead to exposure. But broadcast foliar applications of large areas, could contaminate forage. Consumption of contaminated vegetation is a substantial concern for some herbicides, but the specific application methods and timing may easily avoid exposure.

Field studies.**—**Field studies can help evaluate the likelihood of population effects to wildlife from herbicides as applied. Some herbicides have been tested in many field studies on several groups of species with results published in open literature, while other herbicides have few or no field studies reported.

Most field studies could only detect changes in population numbers and are not sensitive enough to detect sub-lethal effects to wildlife. Some studies have investigated sub-lethal effects (e.g. Sullivan et al., 1998). However, sub-lethal effects that resulted in indirect mortality or other population changes would produce effects that could be detected by most longer-term field studies.

Clopyralid

Rice et al. (1997) published results from an 8-year field study that found no significant effects on plant species diversity from the use of clopyralid, clopyralid plus 2,4-D, or picloram. Hassan et al. (1994) reported summary of effects to terrestrial invertebrates in field trials.

Glyphosate

Sullivan et al. (1998) looked at long-term influence of glyphosate treatment in a spruce forest on reproduction, survival, and growth attributes of deer mouse (*Peromyscus maniculatus*) and southern red-backed vole (*Clethrionomys gapperi*) populations. For all statistically significant differences in their study (e.g. successful pregnancies, survival), the differences between treated and untreated populations were within the range of natural fluctuations for these small mammal populations over a 5-year period.

Sullivan et al. (1997) investigated the influence of aerial herbicide treatments on small mammal populations 9 and 11 years post-treatment. They found that glyphosate did not adversely affect reproduction, survival, or growth of deer mice or Oregon voles (*Microtus oregoni*) in coastal forest a decade after application. Species richness and diversity changed little over the decade after treatment and concluded that post-harvest successional change had more impact than that induced by herbicide treatment.

Cole et al. (1998) found that small mammal capture rates in Oregon forests that were logged, burned and then sprayed with glyphosate did not differ from those that were just logged and burned. Other studies have found that numbers of some species appear to increase or remain the same after treatment with herbicides, while other species decrease (Anthony and Morrison 1985; Lautenschlager, 1993; Ritchie et al., 1987; Sullivan, 1990a). The same species might show all three responses in different studies with the same herbicide (see Sullivan, 1990a). In these studies, effects to small mammals occurred from habitat changes created by herbicide treatment, rather than from direct effects of herbicides (Santillo et al., 1989; Sullivan 1990a; Sullivan 1990b; Sullivan and Sullivan, 1981).

Metsulfuron methyl

Metsulfuron methyl was in one of the mixtures used to treat electric transmission right-of-ways in the Bramble et al. (1997) study mentioned above (see glyphosate), which found no apparent adverse effects to butterfly diversity and abundance.

Picloram

Rice et al. (1997) published results from an 8-year field study that found no significant effects on plant species diversity from the use of clopyralid, clopyralid plus 2,4-D, or picloram. Brooks et al. 1995 studied effects of picloram, imazapyr, and triclopyr mixtures on small mammals and found reduced numbers on sites after herbicide treatments. However, no control site (i.e. non-treated) was used so it is not possible to discern herbicide effects from normal population fluctuations that are common with small mammals. Nolte and Fulbright (1997) studied effects of an aerial application of picloram/triclopyr mixture on small mammals, birds, and rare plants. Effects to animal diversity or plant species richness or evenness were not found.

Picloram was in some of the mixtures used to treat electric transmission right-of-ways in studies by Bramble et al. (1997, 1999). The 1997 study found no significant differences to butterfly diversity and abundance, while the 1999 study found significantly higher diversity and abundance of butterflies on herbicide-treated units than on hand-cutting units.

2,4-D

Rice et al. (1997) published results from an 8-year field study that found no significant effects on plant species diversity from the use of clopyralid, clopyralid plus 2,4-D, or picloram. Response of earthworms is variable with no measurable effect in the field or in a microcosm for some studies (Potter et al., 1990; and Gile, 1983; cited in SERA, 1998).

2,4-D was one of the herbicides used in a study by Bramble et al. (1999), which found significantly higher diversity and abundance of butterflies on herbicide-treated units than on hand cutting units in electric transmission right-of-ways.

Johnson and Hansen (1969) found no significant difference in density or litter size of deer mouse populations between areas treated with 2,4-D and untreated areas. They also found that treatment with 2,4-D reduced density of northern pocket gophers (*Thomomys talpoides*) and least chipmunks (*Eutamias minimus*) and increased abundance of Montane vole (*Microtus montanus*). Changes in density and abundance were attributed to changes in food and cover produced by the herbicide treatment.

Aminopyralid

No field studies were found for this product.

Results of Exposure for each Proposed Herbicide.—Summarized below:

Clopyralid

Small Mammal Directly Sprayed.—The acute NOAEL for mammals in laboratory toxicity tests is 75 mg/kg. For, exposure scenarios that use the typical application rate of 0.35 lb/acre, if a small mammal is directly sprayed, and 100 percent absorption is assumed, the animal would receive an acute dose of 8.49 mg/kg (SERA, 2003-Clopyralid, Worksheet F02a). This estimated dose is 0.10 of the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to mammals are plausible (SERA, 2003-Clopyralid, p. 4-23).

At the highest application rate of 0.5 lb/acre, the animal would receive an acute dose of 12.1 mg/kg (project file). This dose is 0.2 of the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to mammals are plausible at any application rate.

Small Mammal Drinking Contaminated Water.—The estimated doses to a small mammal from drinking water contaminated by an accidental spill, assuming the highest levels of contamination, are 2.33 mg/kg for acute exposure (SERA, 2003-Clopryalid, Worksheet F05). If a small mammal consumes contaminated water over time, accounting for dissipation, degradation, and other processes, the animal would receive a chronic dose of 0.00067 mg/kg/day (SERA, 2003-Clopyralid, Worksheet F07). Doses to a large mammal would be even lower on a per kg body weight basis. These doses are 0.03 of the acute NOAEL, and 0.00004 of the chronic NOAEL, respectively, so there is no basis for asserting or predicting that adverse effects to mammals are plausible (SERA, 2003-Clopyralid, p. 4-23).

At the highest application rate of 0.5 lb/acre, the acute dose from drinking water contaminated by a spill is 3.32 mg/kg. This dose is 0.04 of the acute NOAEL. The chronic dose is also below the chronic NOAEL, so there is no basis for asserting or predicting that adverse effects to mammals are plausible, even in a worst-case scenario.

Small Herbivorous Mammal.—The acute NOAEL for mammals in laboratory toxicity tests is 75 mg/kg. If a small mammal consumes contaminated vegetation shortly after application, assuming the highest residue rates, the acute dose received is 0.938 mg/kg (SERA 2003 Clopyralid, Worksheet F03). This estimated dose is 0.01 of the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to small herbivorous mammals are plausible (SERA 2003 Clopyralid, p. 4-23).

The chronic NOAEL for mammals in laboratory toxicity tests is 15 mg/kg/day. If a small mammal consumes contaminated vegetation at the treatment site for 90-days, assuming highest residue rates, the animal would receive a chronic dose of 0.0987 mg/kg/day (SERA 2003 Clopyralid, Worksheet F04a). This estimated dose is 0.007 of the chronic NOAEL, so there is no basis for asserting or predicting that adverse effects to small herbivorous mammals are plausible (SERA 2003 Clopyralid, p. 4-23).

Estimated doses using the highest application rate (0.50 lb/acre) are less than the acute and chronic NOAELs for mammals, so there is no basis for asserting or predicting that adverse effects are plausible using typical or worst-case exposure assumptions (SERA 2003 Clopyralid, p. 4-23).

Glyphosate

Small Mammal Directly Sprayed.—The acute NOAEL for mammals in laboratory toxicity tests is 175 mg/kg. For, exposure scenarios that use the typical application rate of 2 lb/acre, if a small mammal is directly sprayed, and 100 percent absorption is assumed, the animal would receive an acute dose of 48.5 mg/kg (SERA 2003-Glyphosate, Worksheet F02a). This estimated dose is 0.3 of the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to mammals are plausible (SERA 2003-Glyphosate, p. 4-43).

At the highest application rate of 7 lb/acre, the animal would receive an acute dose of 170 mg/kg. This dose is 0.97 of the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to mammals are plausible at any application rate.

Small Mammal Drinking Contaminated Water.—The acute NOAEL for mammals in laboratory toxicity tests is 175 mg/kg. The estimated doses to a small mammal from drinking water contaminated by an accidental spill, assuming the highest levels of contamination, are 5.32 mg/kg for acute exposure (SERA 2003-Glyphosate, Worksheet F05). If a small mammal consumes contaminated water over time, accounting for dissipation, degradation, and other processes, the animal would receive a chronic dose of 0.00234 mg/kg/day (SERA 2003 Glyphosate, Worksheet F07). Doses to a large mammal would be even lower on a per kg body weight basis. These doses are 0.03 of the acute NOAEL, and 0.00001 of the chronic NOAEL, respectively, so there is no basis for asserting or predicting that adverse effects to mammals are plausible (SERA 2003-Glyphosate, p. 4-43).

At the highest application rate of 7 lb/acre, the acute dose from drinking water contaminated by a spill is 18.6 mg/kg. This dose is 0.1 of the acute NOAEL. The chronic dose is also below the chronic NOAEL, so there is no basis for asserting or predicting that adverse effects to mammals are plausible, even in a worst-case scenario.

Small Herbivorous Mammal.—The acute NOAEL for mammals in laboratory toxicity tests is 175 mg/kg. If a small mammal consumes contaminated vegetation shortly after application, assuming the highest residue rates, the acute dose received is 2.11 mg/kg (SERA 2003-Glyphosate, Worksheet F03). This estimated dose is 0.01 of the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to small herbivorous mammals are plausible (SERA 2003-Glyphosate, p. 4-43).

The chronic NOAEL for mammals in laboratory toxicity tests is 175 mg/kg/day. If a small mammal consumes contaminated vegetation at the treatment site for 90-days, assuming highest residue rates, the animal would receive a chronic dose of 0.231 mg/kg/day (SERA 2003-Glyphosate, Worksheet F04a). This estimated dose is 0.001 of the chronic NOAEL, so there is no basis for asserting or predicting that adverse effects to small herbivorous mammals are plausible (SERA

2003-Glyphosate, p. 4-43). Estimated doses using the highest application rate (7 lb/acre) are less than the acute and chronic NOAEL for mammals, so there is no basis for asserting or predicting that adverse effects are plausible using typical or worst-case exposure assumptions.

Metsulfuron methyl
Small Mammal Directly Sprayed.—The acute NOAEL for mammals in laboratory toxicity tests is 25 mg/kg. For, exposure scenarios that use the typical application rate of 0.03 lb/acre, if a small mammal is directly sprayed, and 100 percent absorption is assumed, the animal would receive an acute dose of 0.727 mg/kg (SERA 2003-Metsulfuron methyl, Worksheet F02a). This estimated dose is 0.03 of the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to herbivorous mammals are plausible (SERA 2003-Metsulfuron methyl, p. 4-26).

At the highest application rate of 0.15 lb/acre, the animal would receive an acute dose of 3.64 mg/kg. This dose is 0.1 of the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to mammals are plausible at any application rate.

Small Mammal Drinking Contaminated Water.—The estimated doses to a small mammal from drinking water contaminated by an accidental spill, assuming the highest levels of contamination, are 0.0443 mg/kg for acute exposure (SERA 2003-Metsulfuron methyl, Worksheet F05). If a small mammal consumes contaminated water over time, accounting for dissipation, degradation, and other processes, the animal would receive a chronic dose of 0.00000176 mg/kg/day (SERA 2003 Metsulfuron methyl, Worksheet F07). Doses to a larger mammal would be even lower on a per kg body weight basis. These doses are 0.002 of the acute NOAEL, and 0.00000007 of the chronic NOAEL, respectively, so there is no basis for asserting or predicting that adverse effects to mammals are plausible (SERA 2003-Metsulfuron methyl, p. 4-26, 4-27).

At the highest application rate of 0.15 lb/acre, the acute dose from drinking water contaminated by a spill is 0.222 mg/kg (project file). This dose is 0.009 of the acute NOAEL. The chronic dose is also below the chronic NOAEL, so there is no basis for asserting or predicting that adverse effects to mammals are plausible, even in a worst-case scenario.

Small Herbivorous Mammal.—The acute NOAEL for mammals in laboratory toxicity tests is 25 mg/kg. If a small mammal consumes contaminated vegetation shortly after application, assuming the highest residue rates, the acute dose received is 0.0804 mg/kg (SERA 2003 Metsulfuron methyl, Worksheet F03). This estimated dose is 0.003 of the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to herbivorous mammals are plausible (SERA 2003-Metsulfuron methyl, p. 4-26).

The chronic NOAEL for mammals in laboratory toxicity tests is 25 mg/kg/day. If a small mammal consumes contaminated vegetation at the treatment site for 90-days, assuming highest residue rates, the animal would receive a chronic dose of 0.00676 mg/kg/day (SERA, 2003-Metsulfuron methyl, Worksheet F04a). This estimated dose is 0.0003 of the chronic NOAEL, so there is no basis for asserting or predicting that adverse effects to small herbivorous mammals are plausible (SERA 2003-Metsulfuron methyl, p. 4-27).

Estimated doses using the highest application rate (0.15 lb/acre) are less than the acute and chronic NOAEL for mammals, so there is no basis for asserting or predicting that adverse effects are plausible using typical or worst-case exposure assumptions (SERA 2003 Metsulfuron methyl, p. 4-27).

Picloram
Small Mammal Directly Sprayed.—The acute NOAEL for mammals in laboratory toxicity tests is 34 mg/kg. For, exposure scenarios that use the typical application rate of 0.35 lb/acre, if a small mammal is directly sprayed, and 100 percent absorption is assumed, the animal would receive an acute dose of 8.49 mg/kg (SERA 2003-Picloram, Worksheet F02a). This estimated dose is 0.2 of

the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to herbivorous mammals are plausible (SERA 2003-Picloram, p. 4-29).

At the highest application rate of 1 lb/acre, the animal would receive an acute dose of 24.2 mg/kg (project file). This dose is 0.7 of the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to mammals are plausible at any application rate.

Small Mammal Drinking Contaminated Water.—The estimated doses to a small mammal from drinking water contaminated by an accidental spill, assuming the highest levels of contamination, are 0.887 mg/kg for acute exposure (SERA, 2003-Picloram, Worksheet F05). If a small mammal consumes contaminated water over time, accounting for dissipation, degradation, and other processes, the animal would receive a chronic dose of 0.000205 mg/kg/day (SERA 2003-Picloram, Worksheet F07).

Doses to a large mammal would be even lower on a per kg body weight basis. These doses are 0.03 of the acute NOAEL, and 0.00003 of the chronic NOAEL, respectively, so there is no basis for asserting or predicting that adverse effects to mammals are plausible (SERA 2003-Picloram, p. 4-29).

At the highest application rate of 1 lb/acre, the acute dose from drinking water contaminated by a spill is 2.53 mg/kg (project file). This dose is 0.07 of the acute NOAEL. The chronic dose is also below the chronic NOAEL, so there is no basis for asserting or predicting that adverse effects to mammals are plausible, even in a worst-case scenario.

Small Herbivorous Mammal.—The acute NOAEL for mammals in laboratory toxicity tests is 34 mg/kg. If a small mammal consumes contaminated vegetation shortly after application, assuming the highest residue rates, the acute dose received is 0.938 mg/kg (SERA 2003-Picloram, Worksheet F03). This estimated dose is 0.03 of the acute NOAEL, so there is no basis for asserting or predicting that adverse effects to herbivorous mammals are plausible (SERA 2003-Picloram, p. 4-29).

The chronic NOAEL for mammals in laboratory toxicity tests is 7 mg/kg/day. If a small mammal consumes contaminated vegetation at the treatment site for 90-days, assuming highest residue rates, the animal would receive a chronic dose of 0.024 mg/kg/day (SERA, 2003-Picloram, Worksheet F04a). This estimated dose is 0.003 of the chronic NOAEL, so there is no basis for asserting or predicting that adverse effects to small herbivorous mammals are plausible (SERA 2003-Picloram, p. 4-29).

Estimated doses using the highest application rate (1 lb/acre) are less than the acute and chronic NOAELs for mammals, so there is no basis for asserting or predicting that adverse effects are plausible using typical or worst-case exposure assumptions.

2, 4, -D

Note: whether the chronic dose of 1 mg/kg is an actual NOAEL is ambiguous and it could be argued that it is a LOAEL. There is conflicting interpretation between EPA (USEPA 1997) and the authors of the study (Serota et al. 1983) upon which the value is based.

Small Mammal Directly Sprayed.—The acute “non-lethal” dose for mammals in laboratory toxicity tests is 10 mg/kg. For, exposure scenarios that use the typical application rate of 1 lb/acre, if a small mammal is directly sprayed, and 100 percent absorption is assumed, the animal would receive an acute dose of 24.2 mg/kg (Project file, 2,4-D Worksheet F02a). This dose is within the range of doses in which mild signs of systemic toxicity are *plausible*, and sub-clinical signs of neurologic toxicity, increased thyroid weight, decreased testicular weight, decreased body weight gain, damage to several organs are *expected* (SERA 1998, p. 3-52).

Small Mammal Drinking Contaminated Water.—The estimated dose to a small mammal from drinking water contaminated by an accidental spill, assuming the highest levels of contamination, is 0.664 mg/kg for acute exposure (Project file, 2,4-D Worksheet F05). If a small mammal consumes contaminated water over time, accounting for dissipation, degradation, and other processes, the animal would receive a chronic dose of 0.000586 mg/kg/day (Project file, 2,4-D Worksheet F07). Doses to a larger mammal would be even lower on a per kg body weight basis. These doses are 0.07 of the acute "non-lethal" dose, and 0.0006 of the chronic NOAEL, respectively. The acute dose is within the range of doses in which increased thyroid weight, decreased testicular weight, and decreased body weight gain are plausible (SERA 1998, p. 3-52).

At the highest application rate of 2 lb/acre, the acute dose from drinking water contaminated by a spill is 1.33 mg/kg (project file). This dose is 0.10 of the acute NOAEL. The acute dose is within the range of doses in which increased thyroid weight, decreased testicular weight, decreased body weight gain, sub-clinical pathology to kidney and liver, and sub-clinical signs of neurotoxicity are plausible (SERA 1998, p. 3-52).

The chronic dose (0.0017 mg/kg) is below any dose level in which effects have been noted.

Small Herbivorous Mammal.—The acute "non-lethal" dose for mammals in laboratory toxicity tests is 10 mg/kg. If a small mammal consumes contaminated vegetation shortly after application, assuming the highest residue rates, the acute dose received is 2.68 mg/kg (Project file, 2,4-D Worksheet F03). This dose is 0.3 of the acute "non-lethal" dose. This dose is within the range of doses in which sub-clinical signs of neurologic toxicity are *plausible*, and increased thyroid weight, decreased testicular weight, decreased body weight gain, and subclinical pathology to kidney and liver are *expected* (SERA 1998, p. 3-52).

The chronic NOAEL for mammals in laboratory toxicity tests is 1 mg/kg/day. If a small mammal consumes contaminated vegetation at the treatment site for 90-days, assuming highest residue rates, the animal would receive a chronic dose of 0.119 mg/kg/day (Project file, 2,4-D Worksheet F04a). This estimated dose is 0.1 of the chronic NOAEL. This dose is within the range of doses in which increased thyroid weight, decreased testicular weight, and decreased body weight gain are plausible (SERA 1998, p. 3-52).

Estimated doses using the highest application rate (2 lbs/acre) are less than the acute "non-lethal" dose and chronic NOAEL for mammals (Project file, 2,4-D High Rate Worksheet WL Ex1). The acute dose (5.36 mg/kg) is within the range of doses in which sub-clinical signs of neurologic toxicity are *plausible*, and increased thyroid weight, decreased testicular weight, decreased body weight gain, and subclinical pathology to kidney and liver are *expected* (SERA 1998, p. 3-52).

Aminopyralid
No results from exposure are available for this product.

Summary of Analysis:

Based of the above discussion, each product except for 2, 4-D poses minimal risk when applied under manufacturer directions. Because 2, 4-D may have some potential for adverse affects such as neurologic toxicity, the PNF has chose not to use this product in occupied habitat. A buffer for excluding the use of 2-4 D in occupied habitat will be implemented on a site-by-site basis. When SERA has completed its analysis for aminopyralid products for the U.S. Forest Service the PNF will determine if this more environmentally friendly product may be advantageous to use near NIDGS sites.

Lynx

Effects Discussion.—As directed in the LCAS: "Management activities should seek to minimize the loss or modification of lynx habitat as a result of the spread of non native invasive plant species (LCAS p. 7-17). Control and eradication of noxious weeds will help maintain or improve lynx habitat. Therefore, the Noxious Weed Control program may benefit lynx. Such benefits are expected to be minor due to the low likelihood that lynx occur on the Forest and the small amount of acres treated each year cross the PNF, (generally less that a few hundred acres). Based on the analysis of effects of the noxious week program on NIDGS, it is extremely unlikely that small mammals would concentrate herbicides to any extent to cause 1) harm to the small mammal and 2) result in secondary poisoning of lynx that may prey upon the small mammals.

6. Direct and Indirect Effects of Road Management

NIDGS

Effects Discussion. —Roads have impacted the NIDGS through direct loss of habitat and disruption of connectivity between colonies. Roads through occupied sites may allow for direct mortality when individual squirrels are run over by vehicles. This associated action is addressed under the Travel Plan action (below). The Travel Plan action considers the effect of public use of a system of road and motorized trails and includes measures to minimize effects (i.e., harm or direct mortality of NIDGS). In addition, road management as described here allows for road closures in the future if resource impacts are identified, that were not addressed in the Travel Plan analysis.

Road management of the existing road system (as described fully in the companion fish BA [BR Volume 7]) includes maintenance, administration of easements or rights of- way and permits, and physical closures of various types related to reducing resource impacts. Disturbance associated with road management at NIDGS sites is concentrated along the existing road prism.

New ground disturbing activities (defined also as use of unauthorized roads that are not on the Forest Travel Plan, but show as roadbeds on the ground), realignment, and upgrades of existing roads near NIDGS sites are coordinated with a journey level wildlife biologist to minimize effects. Projects that occur within 2 miles of occupied NIDGS will be presented to the Level 1 Team at the yearly coordination meeting. Surveys for NIDGS will be conducted when projects occur in potential habitat.

Any potential impacts to squirrels will be minimized through mitigation measures. Sediment will not bury NIDGS or burrows because side casting of excess material onto the fill slope will not be allowed. Weed and brush treatments along roads near NIDGS sites will be consistent with the Noxious Weeds action. Potential impacts from other chemicals will not occur because fuel storage and parking of heavy equipment will not be allowed near NIDGS sites. If leaks occur from heavy equipment traveling through the area, they will be controlled and monitored.

Road surfaces may be upgraded to reduce erosion and sedimentation so long as cut and fill-slopes are not enlarged or disturbed; for example, a native surface road may be upgraded to pit-run gravel, crushed aggregate or asphalt, if approved by a wildlife biologist with a determination that no occupied NIDGS sites would be impacted. In addition, road realignment may occur if the wildlife biologist has determined that the NIDGS habitat and/or populations will benefit and that any effects to NIDGS will be minimized through timing restrictions and monitoring. Due to project mitigation measures, road management is expected to have negligible effects on the species.

Lynx

Effects Discussion.—Preliminary information in the LCAS (p. 7-10) suggests that lynx may not avoid roads, except at high traffic volumes. Because of the lack of research on the effects of road density on lynx, the LCAS goes on to state: 'therefore, at this time, there is no compelling evidence to recommend management of road density to conserve lynx'. The LCAS further states: Determine where high total road densities (2 miles per square mile) coincide with lynx habitat, and prioritize roads for season restriction or reclamation in those areas, and: Minimize roadside brushing in order to provide snowshoe hare habitat. The analysis for the Travel Plan addresses the direction above. The description of the Road Management Action requires that roadside brushing be minimized. In addition, Road Management Objectives are established for every road in the Forest road system. Consideration of the LCAS recommendations will occur as appropriate when establishing or reviewing Road Management Objectives and in consideration with other resource needs and user safety. For the reasons discussed above, effects of road management on lynx and lynx habitat are expected to be negligible.

7. *Direct and Indirect Effects of Trails, Recreation and Administrative Site Operation and Maintenance*

NIDGS

Effects Discussion. —This action involves operation and maintenance of existing facilities (i.e, trails, Price Valley Guard Station) and replacement or moving of trail segments (to improve trail function, for resource protection or other management needs). Maintenance and new ground disturbing activities near NIDGS sites must be coordinated with a journey level wildlife biologist. If ongoing maintenance of sites may impact NIDGS, the site will be analyzed to be moved or closed. New disturbance will not occur if disturbance to NIDGS is anticipated. (Additional analysis of the trail system is discussed under the Travel Plan action below). Due to the required mitigation measures, this action is expected to have negligible impacts to NIDGS.

Lynx

Trail Management

Additional Project Description Information Pertinent to Lynx Effects Analysis.—All 38 LAUS on the PNF have established trails. Trail maintenance activities generally include removing fallen trees from across the trail, pruning vegetation, tread and drainage maintenance of the trail itself, installing signs, and maintenance of bridges on the trail. Trails are generally less than 6 feet wide. All trails do not receive annual maintenance. The miles of trail maintained fluctuate yearly with annual budgets. This action includes “Replacement of moving of trail segments (to improve trail function, for resource protection or other management needs), if potential effects to stream channels are reduced or eliminated,” but does not include new trail construction.

Effects Discussion.—The LCAS does not identify specific threats to lynx from trails although it mentions it is possible that summer use of roads and trails through denning habitat, may have negative effects if lynx are forced to move kittens because of associated human disturbance (Ruggiero, et al, 2000). Most, if not all, trail maintenance activities occur during the day. Disturbances associated with trail maintenance represent a very short term and localized disturbance. The abundance of diurnal security habitat in trailed areas, and temporal segregation of use, likely minimizes disturbance to lynx along trails. Trail width (6 feet) is not great enough to deter lynx movement throughout suitable habitat. It is unlikely that trails would affect lynx denning habitat. Lynx are believed to be extremely rare on the Payette NF and there are no known den sites, hence there is a low likelihood that a trail would be near any den sits.

Campgrounds and Administration Sites

Additional Project Description Information Pertinent to Lynx Effects Analysis.—There are developed campgrounds and administration sites within suitable lynx habitat on the Forest. Most developed campgrounds have forested vegetation between and around each campsite. Trailhead sites exist adjacent to existing roads and some are located in suitable lynx habitat. Lookouts for fires suppression occur outside, but often adjacent to, lynx habitat. Some Forest Service winter rental facilities are located in suitable lynx habitat and are accessed by winter visitors by skiing, snowshoeing or snowmobiling, in accordance with the travel management plan. In addition to use of these areas, other activities that may occur in campgrounds and administrative sites include maintenance activities such as: painting, individual tree removal, grading and/or graveling roads in the site, replacement of camping structures (fire rings, picnic tables), and repair to comfort stations.

***Effects Discussion.*—**Campgrounds and administrative sites on the PNF do not provide suitable lynx habitat although some are located within suitable lynx habitat. Developed campgrounds and administration sites generally do not provide suitable foraging or denning habitat because tree structure and down woody debris is not sufficient to either support a prey base or provide for denning. Habitat characteristics utilized by lynx and their primary prey species would typically not be found in campgrounds and administrative sites since these areas are not managed for dense, multi-layered vegetation that maximizes cover and browse and ground cover but usually as more open areas with larger, well-spaced trees with high crowns or in some cases (i.e. fire look outs) the areas are managed as completely open areas. It is anticipated that lynx will not utilize these sites to any degree because of the lack of foraging or denning habitat.

The maintenance and use of developed campgrounds and administrative sites is consistent with the LCAS because it "concentrates recreational activities within existing developed areas rather than developing new recreational areas in lynx habitat (LCAS, p.7-8).

For the reasons discussed above, the effects of trails, recreation, and administrative site operations and maintenance on lynx and lynx habitat are expected to be negligible.

8. Direct and Indirect Effects of the Travel Plan

NIDGS

Travel Plan

***Effects Discussion.* —**The Travel Plan will not increase roads or motorized trails in occupied NIDGS habitat and will restrict off-road travel. Off-road travel will only be allowed to access dispersed campsites for 300 feet of either side of a road and 100 feet on either side of a trail, but no off-road travel will be allowed for any reason in occupied NIDGS habitat.

Cross-country motor vehicle use can detrimentally impact northern Idaho ground squirrel habitat through soil compaction and removal of vegetation and can physically harm or take northern Idaho ground squirrel individuals via collisions and illegal shooting. Sites known to be occupied by NIDGS are currently closed to off-road travel, but by restricting all cross-country travel, the Travel Plan also protects suitable habitat that has not yet been found to be occupied.

Mitigation measures will require yearly monitoring of occupied NIDGS to ensure compliance with the off-road travel restrictions. If illegal off-road travel occurs in occupied habitat, measures will be taken to physically barricade the area to such travel. Monitoring will also be used to identify newly occupied NIDGS habitat – these areas will be added to the Forest's Motor Vehicle Use Map and closed to travel for dispersed camping.

The Travel Plan continues to allow travel on approximately 3 miles of NFS roads adjacent to occupied NIDGS habitat on the Council Ranger District portion of the Brownlee Watershed (Table 16). A map of these roads in relation to known colonies is included in the supporting documentation (CD1: ..\Support Documents\Maps\nidgs_colonies.pdf). Roads that occur in the vicinity of NIDGS colonies can result in accidental vehicle collisions with squirrels. Access into NIDGS colonies also allows more opportunities for illegal shooting.

Table 16.—Inventoried roads or motorized trails adjacent to NIDGS colonies.

Section 7 Watershed	Colony Name	Jurisdiction	Miles
Brownlee	Cold Springs	FS	0.43
	Lick Creek	FS	0.19
	North Steves Creek	FS	0.21
	Paradise Flat	FS	0.09
	Riley Ranch	FS	0.18
	Rocky Comfort Flat	FS	0.22
	Smith Mountain Lookout	FS	1.16
	Squirrel Manor	FS	0.06
	Squirrel Valley	FS	0.13

Section 7 Watershed	Colony Name	Jurisdiction	Miles
	Summit Gulch	FS	0.2
	Bear-Lick Ridgeline	FS	0.19
	Smith Mountain Lookout	FS	0.01

In the Brownlee Section 7 Watershed, most effects from travel on NFS roads are anticipated to be minimal because in most cases only very small segments of NFS road bisect NIDGS colonies (see Table 16). The size and design of these roads limits travel speed and minimizes potential harm to NIDGS. Monitoring will be used to verify that only negligible effects are occurring in these areas.

In a few cases, travel on NFS roads may lead to greater effects. To reduce the harm to NIDGS, the PNF will post road signs along roads near the following NIDGS colonies: Lick Creek and Squirrel Manor. Although lands on both sides of the roads are private, the roads are under easement to the Payette National Forest. The signs will provide information on NIDGS and advise the public to travel slowly through the area to avoid impacts. Closure of these roads was not considered a viable option because they provide major access routes onto the Forest. Realignment of the roads is not feasible because the adjacent land is private and because it would likely provide only temporary benefits since the area where the road could be moved is potential NIDGS habitat. Based on the analysis and mitigation measures identified above, effects to NIDGS will be minimized, but would not be reduced to negligible.

Non-motorized Dispersed Recreation

***Effects Discussion.* —**Dispersed recreation is not expected to have more than negligible impacts on NIDGS. Dispersed recreation tends to occur near water and forested areas and not in the scabland habitats preferred by NIDGS. On the rare occasion that a person, horse, or mountain bike might travel through occupied habitat, it is reasonable to expect that the squirrels will be protected from any impacts simply by moving below ground. Such use is infrequent enough that no trailing or compaction is expected.

Lynx

Roads, Trails, and Motorized Access during Snow-free Periods

***Effects Discussion.* —**There is little information on the effects of roads and trails on lynx or their prey (Apps 2000, McKelvey et al. 2000). Construction of roads may remove lynx habitat; conversely, lynx may use less-traveled roads for travel and foraging if vegetation conditions provide good snowshoe hare habitat. Preliminary information indicates that lynx do not avoid roads except those with high traffic volume (Aubry et al. 2000, Ruggerio et al. 2000a) or when road use coincides with sensitive habitat such as denning habitat (Ruggerio et al. 2000b).

The likelihood of lynx encountering people has dramatically increased over the last few decades because of elevated levels of human access into lynx habitat. Roads, trails and off-road vehicles enable human access into historically remote forests, thereby increasing the likelihood of lynx being displaced from otherwise suitable habitats and increasing the vulnerability of lynx to human-induced mortality (Brittell et al. 1989, Koehler and Brittell 1990). Roads may also increase the vulnerability of lynx to hunters and trappers (Koehler and Aubry 1994).

Lynx avoid open areas and use mature forest or forest with dense cover, tall shrubs, and well-vegetated riparian areas as travel corridors. Lynx will use some types of roads for hunting and travel down old roads less than 50 feet wide with good cover along both edges (Koehler and Brittell 1990) and cross openings less than approximately 300 feet in width (Koehler and Aubry 1994). However, roads may disrupt lynx travel and hunting patterns. Koehler and Aubry (1994) concluded road construction and maintenance are important components of lynx habitat management because they both destroy and create prey habitat, but also make lynx more vulnerable to human-caused mortality.

The PNF Forest Plan (USDA Forest Service 2003) does not include a guideline or standard for road densities in relation to lynx habitat. The Lynx Conservation and Assessment Strategy (LCAS) recommends prioritizing roads for closure or seasonal restrictions in lynx habitat where road densities exceed two miles per square mile, but the Fish and Wildlife Service has concluded that roads, even with high traffic volume, constitute a low threat to lynx populations (USDI 2003). In the Granite LAU, the existing (baseline) density of open motorized routes in lynx habitat is less than 2.0 miles/square mile.

Refugia

Effects Discussion. —Research suggests that local refugia are critical for successful lynx reproduction and fitness (Ruediger et al. 2000). "Refugia" are large areas of high quality habitat relatively secure from human exploitation, habitat degradation, and disturbance. The minimum size of refugia for lynx is unknown, but a study in north-central Washington found that a 448,000-acre area is sustaining lynx populations (Koehler 1990), but this area is also connected to lynx habitat and populations in Canada.

The PNF has large blocks of relatively undisturbed areas or potential "refugia" in the Inventoried Roadless Areas (IRAs). All 22 IRAs on the PNF contain potential lynx habitat. About 69 percent (638,924 of 926,600 acres) of potential lynx habitat on the PNF outside of Wilderness occurs in IRAs. Cumulatively, additional refugia are provided outside the Travel Plan project area in the FC-RONR Wilderness. The wilderness contains 770,700 acres of LAUs with 488,700 acres of potential lynx habitat.

Based upon the current and historic status of lynx in Idaho, there is a low probability of lynx occurrence on the Forest. In the Brownlee Watershed, the Travel Plan will have a limited effect on lynx habitat during snow-free months. The Travel Plan action was designed to ensure consistency with Forest Plan direction for protection of lynx and lynx habitat. Specifically, the standard *TEST12* states: "*minimize or avoid management actions within known nest or denning sites of TEPC species if those actions would disrupt reproductive success during the nesting or denning period. During project planning, determine sites, periods, and appropriate mitigation measures to avoid or minimize effects*." Although lynx denning habitat exists throughout the Forest, no actual lynx dens are known to be present on the Forest. Denning habitat occurs in dense timber stands with an abundance of fallen logs. The Travel Plan does not allow for off-road travel and continues to protect IRAs from motorized use, thereby minimizing potential impacts to lynx denning habitat.

Non-motorized Dispersed Recreation

Effects Discussion. —The frequency of use of non-motorized dispersed trail sites and the numbers of individuals using dispersed sites and participating in dispersed activities is unknown. Dispersed recreation during snow-free times of the year is not expected to greatly influence lynx behavior and/or use of suitable lynx habitat. The LCAS does not identify specific threats to lynx from trails or trail use although it mentions it is possible that summer use of roads and trails through denning habitat, may have negative effects if lynx are forced to move kittens because of associated human disturbance (Ruggiero et al. 2000). Since most trail use occurs during the day, disturbances associated with trail use represent a temporary and localized disturbance and any effects are expected to be insignificant. The abundance of diurnal security habitat in trailed areas, and temporal segregation of use, is expected to minimize disturbance to lynx along trails. It is recognized not all studies have shown lynx activity to be correlated only with nocturnal or crepuscular activity and that Apps (2000) hypothesized that weather may be the factor that determines when lynx are most active. Given the large home range of the species and the opportunity to avoid temporary disturbances from recreationists, disturbance to lynx in the vicinity of dispersed recreation sites is expected to be minimal and will have very little effect on diurnal security. Other dispersed recreation activities (berry picking, fishing, bird-watching, camping, etc.) during snow-free periods are expected to have similar effects as described for trail use.

Winter dispersed recreation (motorized and non-motorized) will be addressed in the separate consultation for winter travel.

Habitat Connectivity

Effects Discussion. —Habitat connectivity is also an important component of habitat conservation for lynx. Providing for habitat connectivity in order to promote wildlife movement and genetic interaction benefits lynx populations by maintaining secure habitat in dispersal routes used by juvenile animals and for breeding activities. Areas with high road densities and/or human use patterns can interrupt habitat connectivity and fragment lynx habitat (Ruediger et al. 2000). The LCAS discourages the building of motorized routes on ridge tops as this might interfere with lynx habitat connectivity. Forest Plan direction on this topic is broader (TEOB30) and states: "Manage recreational activities to maintain lynx habitat and connectivity." Based upon the current and historic status of lynx in Idaho, there is a low probability of lynx occurrence on the Forest. The Travel Plan in snow-free periods will have a limited effect on lynx habitat connectivity. Existing roads in the watershed generally occur near waterways, although a few routes exist on ridge tops, and no cross-country OHV travel is allowed. Areas and corridors that could provide habitat connectivity for lynx were identified during the Travel Plan analysis. No effects to these areas are anticipated in relation to travel during snow-free months in the Brownlee Watershed.

9. Direct and Indirect Effects of Livestock Grazing

NIDGS

Effects Discussion. —The potential effects of livestock grazing on northern Idaho ground squirrel habitat are not well understood. Livestock may alter the vegetative components of NIDGS habitat. Heavy or concentrated use may reduce vegetation that the squirrels require or prefer. It may also allow less palatable or nutritious species to become established on a site, or allow for the introduction of exotic weed species. Heavy or concentrated use may also reduce fine fuels required for successful habitat enhancements.

Conversely, moderate to light use by cattle and sheep may transform tall, decadent vegetation into lower more palatable vegetation. Researchers have suggested that livestock grazing that manages for grass heights of a minimum of four inches with maximum seed head production would benefit ground squirrel nutrition and predator avoidance (Sherman and Yensen, 1994).

NIDGS studies have identified both positive and negative effects from livestock grazing, but these effects are generally based on observations and not rigorous studies. Sherman and Yensen (1994) found in 1993, the unusually tall spring and summer vegetation may have been unfavorable for ground squirrel species. Results suggest the importance of keeping the grass height down by using large herbivores as "tools" to manage for ground squirrels. However, disturbance associated with grazing has also favored exotic annual grasses over native bunch grasses and forbs (Yensen 1992). NIDGS population declines in areas dominated by nonnative grasses may result from an inability to obtain sufficient fat and nutrient laden seeds by mid-July to survive the next eight months in hibernation (Sherman and Gavin 1997).

Recent data summaries at current NIDGS monitoring sites indicate six-year average utilization levels (2001-2006) of 7-25% (CD1: ..\Support Documents\Wildlife\range_rporting.pdf). This level of utilization is considered very light. Light utilization is defined at 20-40%. The low value (less desirable) herbaceous plants are not grazed and 60 to 80% of the current seeds talks or key herbaceous species remain intact. Most young plants are not grazed. Moderate is defined by 40- 60% utilization with 15 to 25% of key herbaceous species remaining intact. No more than 10% of the low value herbaceous forage plants are utilized.

Given that livestock grazing can alter the vegetative component of ground squirrel habitat, insight into intensity and timing of grazing and the associate effect on the vegetation is needed. A study of small mammal populations in grazed and ungrazed riparian habitat in northeast Nevada found the most evident structural difference between grazed and ungrazed was in the herbaceous layer where graminoid biomass and graminoid and forb height values were reduced on the grazed site (Medin and Clary 1989). Graminoid biomass on the grazed plot was only half that inside the exclosure. Five of the 11 species of mammals trapped were found only in the ungrazed habitat. Townsend's ground squirrel (*Spermophilus townsendii*) was one of them. Golden-mantled ground squirrels *(Spermophilus lateralis*) were more abundant in the ungrazed site.

Another study by Oldemeyer and Allen-Johnson (1988) measured the effects of cattle grazing on small mammal microhabitat and abundance in northwest Nevada. The 17,183 acre allotment was grazed between mid-June through early August one year and early August through late October the next year, over a five year period. Total relative abundance of small mammals did not differ between year or area. Townsend's ground squirrels and golden-mantled ground squirrels were found on both grazed and ungrazed sites on alternate years. There was a general trend for cover of both grasses and forbs to be lower in the allotment than in the exclosure. However, the means did not differ significantly.

Comparing these two studies suggests that differing intensities and timing of livestock grazing can have a varied response on small mammals. There is some level of grazing that benefits habitat requirements. However, beyond a certain threshold level affects become detrimental to small mammals.

In California, Fehmi et. al 2005, found that California ground squirrels (*Spermophilus beecheyii* Richardson) when subjected to low to moderate levels of cattle grazing did not appear to have a strong effect on the population dynamics of California ground squirrels, and grazing may be compatible with maintenance of ground squirrel populations. Based on multivariate analysis of variance of 1994 data, live plant cover, native plant cover, and standing biomass were lower where the number of burrows was higher on grazed colonies but were little affected on ungrazed colonies.

Based on these studies, and the fact that livestock use on the PNF has been light with use levels showing no correlation with changes in NIDGS, it appears that light amounts of lifestock grazing is having only negligible effects on NIDGS populations at this time. Until studies provide better data, light grazing and no concentrated livestock use are required at occupied NIDGS sites to ensure negligble effects from livestock management.

On the PNF, site-specific utilization standards will be written into the AOPs for cattle and sheep allotments in an effort to maximize available forage for ground squirrels. For cattle allotments at NIDGS sites in early August, use will be no greater than 40%. On sheep allotments, use of 40% or less will be maintained by requiring once over grazing.

To avoid concentrated use on NIDGS sites, sheep herders will be advised of the location of NIDGS sites and will be instructed to not bed sheep on those sites. On all allotments, placement of salt must be a minimum of ¼ mile from NIDGS sites. These measures will be monitored and enforced. Results of monitoring will be presented the yearly Level 1 coordination meeting.

Currently, monitoring for seedhead counts and utilization does not occur at a standardized time. Seedhead counts will be added for the two new NIDGS discovered at higher elevations in (Smith Mountain and Lick Creek lookouts). Seedhead counts will take place early in the growing season and will be replicated in early August to monitor the amount of seed heads remaining prior to NIDGS hibernation. Utilization levels will be monitored by wildlife biologists and/or range technicians at NIDGS sites during the first two weeks of August to ensure utilization levels are at or below 40%.

Management of livestock grazing also includes fence reconstruction and use of spring or pond developments. Maintenance of existing fences can cause ground disturbance when setting posts or braces. To avoid any impacts, prior to maintenance of existing fences and water developments in NIDGS habitat, the activity will be coordinated with a wildlife biologist (see Mitigation Measures). Action for new construction of fences or watering facilities is not considered ongoing. These actions are associated with a specific project and will be assessed for effects to NIDGS at that time.

Additional measures will be used in management of livestock allotments to minimize potential effects to NIDGS. Off-road vehicle use by permittees will not be allowed. In addition, for all cattle and sheep allotments that contain NIDGS sites, language will be incorporated into the AOPs that identify the NIDGS as a threatened species under the ESA. The language will indicate that known sites and populations of NIDGS are located on the grazing allotment. The permittee will be required to avoid concentration livestock on these sites.

Lynx

Effects Discussion. —Six livestock allotments occur within the Brownlee Section 7 Watershed. Livestock grazing was determined consistent with the LCAS if grazing does not impede vegetation moving towards or meeting the desired vegetative status of the LCAS. The LCAS specifically requires that livestock use not be allowed in openings created by fire or areas where timber harvest has occurred such that grazing would delay successful regeneration of the shrub and tree components (LCAS p. 7-11). The concern is for the development and maintenance of habitat for lynx prey (snowshoe hare). The LCAS also directs livestock grazing within riparian areas in lynx habitat to provide conditions for lynx and lynx prey (LCAS p. 7-11) and to ensure that ungulate grazing does not impede the development of snowshoe hare habitat in natural or created openings within lynx habitat (LCAS, p. 7-11).

On the PNF, management of allotments within LAUs is consistent with LCAS direction to maintain habitat for lynx prey. Specifically, grazing is excluded in timber harvest or fire areas when it would delay successful vegetation regeneration and grazing is managed to protect riparian areas (P. Grinde pers. commun.). In addition, as part of permit administration, permittees are given instructions about the protected status of lynx.

Effects to lynx on the PNF from livestock grazing are expected be negligible. This is because evaluations show allotments are being managed to be consistent with the LCAS and because allotment management meets other conservation measures (described above).

10. Direct and Indirect Effects of Power and Telephone Line Easements on Federal Lands

NIDGS

Effects Discussion —Maintenance of existing power and telephone lines may include ground disturbing activities. Any work, especially ground disturbing activities, performed near NIDGS sites will be coordinated with a journey-level PNF wildlife biologist to avoid adverse effects. Because the power line maintenance roads and underground cable routes were likely not surveyed for NIDGS at the time of construction, field surveys may be required to determine the presence of NIDGS in the activity area. If NIDGS are identified at a new site, Level 1 Team discussions will be initiated to ensure that the planned activity does not adversely affect NIDGS. The biologist will also coordinate with weed control and fire suppression activities in this area to ensure the proper mitigation measures to minimize the effects of these activities are used (see sections C and F and above). These mitigation measures are expected to minimize potential effects to NIDGS from this activity to negligible levels.

Lynx

Effects Discussion —This action has very little potential to affect lynx. Negligible effects are expected because falling trees and brushing powerline corridors will yield little ground disturbance and such activities will occur in areas that have been previously disturbed (when the lines were initially constructed).

VI. Mitigation Measures

No additional mitigation measures are needed other than those specified in the descriptions of the proposed actions.

VII. Monitoring and Evaluation

No additional monitoring is proposed beyond what is described in the descriptions of the specific actions.

VIII. DETERMINATIONS

Table 17.— Determinations for ongoing actions.

Federal Action	NIDGS Effects Determination	Lynx Effects Determination	Expiration Date
Miscellaneous Forest Products	NLAA	NLAA	Dec. 31, 2017
Mistletoe Control and Precommercial Thinning	NLAA	NLAA	
Fire Management Activities	NLAA	NLAA	
Watershed and Fish Habitat Improvement and Maintenance	NLAA	NE	
Road Management	NLAA	NLAA	
Trails, Recreation and Administrative Site Operation and Maintenance	NLAA	NLAA	
Noxious Weed Management	NLAA	NLAA	
Travel Plan	LAA	NLAA	
Livestock Grazing	NLAA	NLAA	
Power & Telephone Line Easements	NLAA	NLAA	

[1] NLAA means the Federal action is not likely to adversely affect the listed fish species.
[2] May… and Will not… means the federal action may or will not (respectively) make irreversible or irretrievable commitments of resources or foreclose on the development of any reasonable and prudent alternatives should the action be carried out before the completion of consultation.

A. RATIONALE

1. MISCELLANEOUS FOREST PRODUCTS:

The considered action is **not likely to adversely affect** listed wildlife species or critical habitat. These activities are expected to yield negligible effects to listed wildlife species or their habitat because required mitigation measures preclude actions in occupied NIDGS habitat and meet direction in the LCAS for protection of lynx. For a complete discussion of effects see above.

2. MISTLETOE CONTROL AND PRE-COMMERCIAL THINNING:

The considered action is **not likely to adversely affect** NIDGS because required mitigation measures minimize impacts in occupied NIDGS habitat. The action is **not likely to adversely affect** lynx because it meets direction in the LCAS for protection of lynx and maintains suitable amounts of habitat for lynx prey. For a complete discussion of effects see above.

3. FIRE MANAGEMENT ACTIVITIES:

The considered action is **not likely to adversely affect** listed wildlife species or critical habitat. The federal action discussion provides direction that address potential effects. In addition, direction to see that fire personnel are briefed and familiar with fire management guidelines in this BA, and oversight and continued education/briefing of fire personnel on fires by resource advisors will be implemented. This action is expected to have negligible effects due to implementation of mitigation measures and guidelines, continued education of fire personnel, and use of wildlife biologists as resource advisors. For a complete discussion of effects see above.

4. WATERSHED AND FISH HABITAT IMPROVEMENTS AND MAINTENANCE:

The considered action is not likely to adversely affect the NIDGS and will have **no effect** on lynx. Mitigations described in the Federal action will insure that any temporary degrading effects are negligible to NIDGS. For a complete discussion of effects see above.

5. ROAD MANAGEMENT:

The considered action is **not likely to adversely affect** listed wildlife species or critical habitat. Mitigations described in the Federal action (e.g., minimize roadside brushing in order to provide snowshoe hare habitat) will insure that any temporary degrading effects are negligible. For a complete discussion of effects see above.

6. *TRAILS, RECREATION, AND ADMINISTRATIVE SITE OPERATION AND MAINTENANCE:*

The considered action is **not likely to adversely affect** listed wildlife species or critical habitat. Mitigations described in the Federal action will insure that any temporary degrading effects are negligible. For a complete discussion of effects see above.

7. *NOXIOUS WEED MANAGEMENT:*

The considered action is **not likely to adversely affect** listed wildlife species or critical habitat. Mitigation measures are expected to minimize effects, including potential sub-lethal effects, to negligible levels. For a complete discussion of effects see above.

8. *TRAVEL PLAN:*

The considered action is **likely to adversely affect** the northern Idaho ground squirrel because of the potential impacts to the NIDGS population along two roads under easement to the Payette National Forest. Effects will be reduced through the use of information signs that describe the potential impacts to NIDGS and advise slower speeds, but effects are not expected to be reduced to negligible. On most NFS roads only very small segments of NFS road bisect NIDGS colonies in the Brownlee Watershed. The size and design of these roads limits travel speed and minimizes potential harm to NIDGS. The considered action is **not likely to adversely affect** lynx because only very limited amounts of lynx habitat occur in the watershed with very few roads. The Travel Plan in snow-free periods will have a limited effect on lynx habitat connectivity and lynx refugia. For a complete discussion of effects see above.

9. *LIVESTOCK GRAZING ALLOTMENTS:*

The considered action is **not likely to adversely affect** NIDGS due to mitigation measures that require utilization standards, salting and bedding areas away from occupied NIDGS sites, once over sheep grazing away from NIDGS sites, and monitoring to ensure compliance. The considered action is **not likely to adversely affect** lynx because of measures to protect vegetation regeneration areas and lynx prey foraging habitat from livestock grazing. For a complete discussion of effects see above.

10. *POWER AND TELEPHONE LINE EASEMENTS ON FEDERAL LAND:*

The considered action is **not likely to adversely affect** listed wildlife species or critical habitat. Negligible effects are expected because falling trees and brushing powerline corridors will yield little ground disturbance and such activities will not be allowed to occur in occupied NIDGS when squirrels are above ground. A journey level wildlife biologist will be involved in mitigating ground disturbing activities. The considered action is **not likely to adversely affect** lynx because only very limited amounts of lynx habitat occur in these easement areas and the areas are currently disturbed. For a complete discussion of effects see above.

IX. REFERENCES

Agge, J.K. 2000. Disturbance ecology of North American boreal forests and associated northern nixed/sublpine forests. Pages 39-82 In Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. (Tech. Rds.) Ecology and conservation of lynx in the United States. Univ. Press of Colorado. Boulder, CO. 480 pp.

Anonymous. 1999. Are "inert" ingredients in pesticides really benign? J. Pesticide Reform 19 (2): 8

Anthony, R.G., and Morrison, M.L. 1985. Influence of glyphosate herbicide on small-mammal populations in western Oregon. Northwest Science 59(3):159-68.

Apps, C.D. 1999. *Space-use, diet, demographics, and topographic associations of lynx in the southern Canadian Rocky Mountains: a study.* Pp. 351-371. In: *Ecology and Conservation of Lynx in the United States*. Ruggiero et al. Rocky Mountain Research Station. Technical Report RMRS-GTR-30WWW. http://www.fs.fed.us/rm/pubs/rmrs-gtr030.pdf 485 pp.

ATSDR (Agency for Toxic Substances and Disease Registry). 2004. Guidance manual for the assessment of joint toxic action of chemical mixtures. Available from U.S. Department of Health and Human Services, Public Health Service, ATSDR, Division of Toxicology.

Aubry, K.B., G.M. Koehler and J.R. Squires. 1999. *Ecology of Canada Lynx in Southern Boreal Forests.* In: *Ecology and Conservation of Lynx in the United States*. Ruggiero et al. Rocky Mountain Research Station. Technical Report RMRS-GTR-30WWW. http://www.fs.fed.us/rm/pubs/rmrs-gtr030.pdf 485 pp.

Bailey, T.N., E.E. Bangs, M.F. Portner, J.C. Malioy, and R.J. McAvinchey. 1986. *An apparent over-exploited lynx population on the Kenai Peninsula, Alaska.* Journal of Wildlife Management. 50. Pp. 279-290.

Banci, V.A. 1994a. *Fisher* (Pp. 44 and 47). In: L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, eds. *The scientific basis for conserving forest carnivores, American marten, fisher, lynx and wolverine in the western United States.* USDA For. Serv. Rocky Mt. For. and Range Exp. Stn., Gen. Tech. Rep. RM-254. Fort Collins: CO.

Borrecco, J.E., and J. Neisess. 1991. Risk Assessment for the Impurities 2-Butoxyethanol and 1,4-Dioxane found in Garlon 4 and Roundup Herbicide Formulations. Forest Pest Management, Report No. R91-2. Pacific Southwest Region. 33 pp.

Bramble, W.C., R.H. Yahner; and W.R. Byrnes. 1997. Effect of herbicides on butterfly populations of an electric transmission right-of-way. J. Arboriculture 23(5): 196-206.

Brittell, J. D., R. J. Poelker, S. J. Sweeney, and G. M. Koehler. 1989. *Native cats of Washington.* Washington Department of Wildlife, Olympia. 3pp. www.predatorconservation.org

Bunnell, K. D., J. T. Flinders, M. L. Wolfe, and J. A. Bissonette. 2006. *Potential impacts of coyotes and snowmobiles on lynx conservation in the intermountain west.* Wildlife Society Bulletin 34(3):2006. 11 pp.

Buskirk, S.W., L.F. Ruggerio, and C.J. Krebs. 1999. *Habitat Fragmentation and Interspecific Competition: Implications for Lynx Conservation.* Rocky Mountain Research Station. Technical Report RMRS-GTR-30. 9 pp. http://www.fs.fed.us/ rm/pubs/rmrs-gtr030.pdf

Cox, C. 1999. Inert ingredients in pesticides: who's keeping secrets? J. Pesticide Reform 19 (3): 2-7

Federal Register, April 5, 2000. Vol. 65, pp. 17779-17786. Endangered and threatened wildlife and plants; determination of threatened status for the northern Idaho ground squirrel.

Federal Register, July 3, 2003. Vol. 68. No. 128, pp. 40075-40101. *Final Rule: Notice of Remanded Determination of Status for the Contiguous United States Distinct Population Segment of the Canada Lynx; Clarification of Findings.*

Fletcher, J.S., J.E. Nellessen, and T.G. Pfleeger. 1994. Literature review and evaluation of the EPA food-chain (Kenaga) nomogram, an instrument for estimating pesticide residue on plants. Environ. Toxicol. and Chemistry 13(9): 1383-1391.

Gaines, T.B. 1969. Acute toxicity of pesticides. Tox. Appl. Pharamacol. 14: 515-534 (cited in SERA 2001)

Gavin, T.A., P.W. Sherman, E. Yensen, and B. May. 1999. Population genetic structure of the northern Idaho ground squirrel (Spermophilus brunneus brunneus). Journal of Mammalogy 80:156-168.

Gill, A.E., and E. Yensen. 1992. Biochemical differentiation in the Idaho ground squirrel, *Spermophilus brunneus* (Rodentia: Sciuridae). Great Basin Naturalist 52(2): 155-159.

Gruell, G. 1983. Fire and vegetation trends in he Northern Rockies: interpretations from 1871-1982 photographs. USDA Forest Service, Intermountain Forest and Range Experiment Station. INT-158. 117 pp.

Hodges, K. E. 2000. The ecology of snowshoe hares in southern boreal and montane forests. Chapter 7 In Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. (Tech. Eds.) Ecology and conservation of lynx in the United States. Univ. Press of Colorado. Boulder, CO. 480 pp.

Johnson, D.R., and Hansen, R.M. 1969. Effects of range treatment with 2,4-D on rodent populations. Journal of Wildlife Management 33: 1125-132.

Knight, H. 1997. Hidden toxic "inerts": a tragicomedy of errors. J. Pesticide Reform 17 (2): 10-11

Knight, H. and C. Cox. 1998. Worst kept secrets: toxic inert ingredients in pesticides. unpub. report downloaded from: http://www.pesticide.org/ActiveInertsRpt.pdf on January 14, 2004. Northwest Coalition for Alternatives to Pesticides. Eugene, Oregon. 19 pp.

Koehler, G. M. 1990. *Population and habitat characteristics of lynx and snowshoe hares in north-central Washington.* Canadian Journal of Zoology 68. Pp. 845-851.

Koehler, G.M. and J.D. Brittell. 1990. *Managing spruce-fir habitat for lynx and snowshoe hares.* Journal of Forestry. 10. Pp. 10-14.

Koehler, G.M. and K. B. Aubry. 1994. *Lynx*. Pp. 74-98 In: L.F. Ruggeiro, K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski. 1994. *The scientific basis for conserving forest carnivores, American marten, fisher, lynx and wolverine in the western United States*. USDA For. Serv. Rocky Mt. For. and Range Exp. Stn., Gen. Tech. Rep. RM-254, Fort Collins, CO. 184 pp.

Kolbe, J. A., J. R. Squires, D. Pletscher, and L. F. Ruggiero. 2007. The effect of snowmobile trails on coyote movements within lynx home ranges. Journal of Wildlife Management. 71

(5):1409-1418.

Lautenschlager, R.A. 1993. Response of wildlife to forest herbicide applications in northern coniferous ecosystems. Canadian Journal of Forest Resources 23:2286-99.

Lewis, L. and C.R. Wenger. 1998. Idaho's Canada lynx: pieces of the puzzle. Idaho Bureau of Land Mangement, Technical Bulletin No. 98-11. 21 pp.

Marquardt, S., C. Cox, and H. Knight. 1998. Toxic Secretes: "inert" ingredients in pesticides 1987-1997. Northwest Coalition for Alternatives to Pesticides. Unpub. report downloaded from http://www.pesticide.org/inertsreport.pdf on January 14, 2004.

McKelvey, K.S., K.B. Aubry, J.K. Agee, S.W. Buskirk, L.F. Ruggiero, and G.M. Koehler. 2000. Lynx conservation in an ecosystem management context. In: Ecology and Conservation of Lynx in the United States. Ruggiero et al. Rocky Mountain Research Station. Technical Report RMRS-GTR-30WWW. http://www.fs.fed.us/rm/pubs/rmrs-gtr030.pdf 485 pp.

Mowat, G., K. G. Poole, and M. O'Donoghue. 1999. Ecology of Lynx in Northern Canada and Alaska. Pp. 265-306. In: L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvery, and J. R. Squires. In: Ecology and conservation of lynx in the United States. Ruggiero et al. 1999. USDA Forest Service. Rocky Mountain Research Station. Technical Report RMRS-GTR-30WWW. http://www.fs.fed.us/rm/pubs/rmrs-gtr030.pdf 485 pp.

Nolte, K.R., and T.E. Fulbright. 1997. Plant, small mammal, and avian diversity following control of honey mesquite. J. Range Manage. 50(2): 205-212.

Nordstom, L., A. Hecht, M. McCollough, B. Naney, J. Trick, N. Warren, and M. Zwartjes. 2007. Recovery Outline: Contiguous United States Distinct Population Segment of the Canada Lynx. US Fish and Wildlife Service, Denver, Colorado. 25 pp.

Pfleeger, T.G., A. Fong, R. Hayes, H. Ratsch, and C. Wickliff. 1996. Field evaluation of the EPA (Kenaga) nomogram, a method for estimating wildlife exposure to pesticide residue on plants. Environmental Toxicology and Chemistry 15(4):535-543.

Quigley, T.M., R.W. Haynes, and R.T. Graham. Tech. Eds. 1996. Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-382. Portland, OR. USDA, Forest Service, Pacific Northwest Research Station. 303 pp. See abstract.

Quigley, T.M., and S.J. Arbelbide. Tech Eds., 1997. An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-405. Portland, OR. USDA, Forest Service, Pacific Northwest Research Station. 4 volumes. See abstract.

Rice, P.M., J.C. Toney, D.J. Bedunah, and C.E. Carlson. 1997. Plant community diversity and growth form responses to herbicide applications for control of *Centaurea maculosa*. J. Applied Ecol. 34(6): 1397-1412.

Ritchie, D.C., A.S. Harestad, and R. Archibald. 1987. Glyphosate treatment and deer mice in clearcut and forest. Northwest Science 61(3):199-202.

Ruediger, R., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, R. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wegner, and A. Williamson. 2000. Canada lynx conservation assessment and strategy. Amended 2003 and 3004. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula MT. 142 p.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski. 1994. The scientific basis for conserving forest carnivores, American marten, fisher, lynx and wolverine in the western United States. USDA Forest Service. Rocky Mtn. Forest and Range Exp. Stn: Gen. Tech. Rep. RM-254: Fort Collins CO.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. The scientific basis for lynx conservation: qualified insights. Pp 443-454. In: Ecology and conservation of lynx in the United States. Ruggiero et al. 1999 USDA Forest Service. Rocky Mountain Research Station. Technical Report RMRS-GTR-30WWW. http://www.fs.fed.us/rm/pubs/rmrs-gtr030.pdf 485 pp.

Santillo, D.J., D.M. Leslie, Jr., and P.W. Brown. 1989. Responses of small mammals and habitat to glyphosate application on clearcuts. J. Wildlife Manage. 53(1): 164-172.

Serota, D., C. Burns, G. Burdock, et. al. 1983. Subchronic toxicity study in rats – 2,4-Dichlorophenoxyacetic acid (2,4-D). Project No. 2184-102 Final report. Unpublished study received October 14, 1983 under unknown admin. No. Prepared by Hazleton Laboratories America, by 2,4-D Task Force, Washington, DC. MRID No. 00131304. [Contains confidential business information and is cited in SERA 1998, but not available to the USDA Forest Service).

SERA (Syracuse Environmental Research Associates, Inc.). 1998. 2,4-Dichlorophenoxyacetic acid Formulations – Human Health and Ecological Risk Assessment - Final Report. SERA TR 95-21-09-01d. September 20, 1998.

SERA (Syracuse Environmental Research Associates, Inc.). 2001. Preparation of Environmental Documentation and Risk Assessments. SERA MD 2001-01a. July 18, 2001. Syracuse Environmental Research Assoc., Inc. Fayetteville, New York.

SERA (Syracuse Environmental Research Associates, Inc.). 2007. Aminopyralid - Human Health and Ecological Risk Assessment – Final Report. SERA TR 052-04-04a. June 28, 2007. Syracuse Environmental Research Assoc., Inc. Fayetteville, New York.

SERA (Syracuse Environmental Research Associates, Inc.). 2003. Chlorsulfuron - Human Health and Ecological Risk Assessment – Peer Review Draft. SERA TR 02-43-18-01b. September 5, 2003. Syracuse Environmental Research Assoc., Inc. Fayetteville, New York.

SERA (Syracuse Environmental Research Associates, Inc.). 2003. Clopyralid – Human Health and Ecological Risk Assessment – Peer Review Draft. SERA TR 02-43-17-03a. August 27, 2003. Syracuse Environmental Research Assoc., Inc. Fayetteville, New York.

SERA (Syracuse Environmental Research Associates, Inc.). 2003. Dicamba – Human Health and Ecological Risk Assessment – Peer Review Draft. SERA TR 03-43-17-06a. October 31, 2003. Syracuse Environmental Research Assoc., Inc. Fayetteville, New York.

SERA (Syracuse Environmental Research Associates, Inc.). 2003. Glyphosate - Human Health and Ecological Risk Assessment - Final Report. SERA TR 02-43-09-04a. March 1, 2003. Syracuse Environmental Research Assoc., Inc. Fayetteville, New York.

SERA (Syracuse Environmental Research Associates, Inc.). 2003. Metsulfuron Methyl - Human Health and Ecological Risk Assessment – Peer Review Draft. SERA TR 03-43-17-01a. September 23, 2003. Syracuse Environmental Research Assoc., Inc. Fayetteville, New York.

SERA (Syracuse Environmental Research Associates, Inc.). 2003. Picloram - Human Health and Ecological Risk Assessment – Final Report. SERA TR 03-43-16-01b. June 30, 2003. Syracuse Environmental Research Assoc., Inc. Fayetteville, New York.

Sherman, P.W. and M.C. Runge. 2002. Demography of a population collapse: the northern Idaho ground squirrel (*Spermophilus brunneus brunneus*). Ecology 83:2816-2831.

Sherman, P.W. and T.A. Gavin. 1997. Transplanting northern Idaho ground squirrels (*Spermophilus brunneus brunneus*). Cornell University, Ithaca, New York. 8 pp.

Sherman, P.W. and E. Yensen. 1994. Behavior and ecology of Idaho ground squirrel. Annual report detailing results of the 1993 field season. Cornell University, Ithaca, New York. 12 pp.

Siltanen, H., C. Rosenberg, M. Raatikainen, and T. Raatikainen. 1981. Triclopyr, glyphosate and phenoxyherbicide residues in cowberries, bilberries and lichen. Bull. Environ. Contam. Toxicol. 27(5): 731-737.

Sullivan, T.P., and D.S. Sullivan. 1981. Responses of a deer mouse population to a forest herbicide application: reproduction, growth, and survival. Can. J. Zool. 59:1148-1154.

Sullivan, T.P., C. Nowotny, and R.A. Lautenschlager. 1998. Silvicultural use of herbicide in sub-boreal spruce forest: implications for small mammal population dynamics. Journal of Wildlife Management 62(4): 1196-206.

Sullivan, T.P. 1990a. Demographic responses of small mammal populations to a herbicide application in coastal coniferous forest: population density and resiliency. Can. J. Zool. 68: 874-883.

Sullivan, T.P. 1990b. Influence of forest herbicide on deer mouse and Oregon vole population dynamics. J. Wildlife Manage. 54(4): 566-576.

Todd, A. 1985. The Canada lynx: ecology and management. Canadian Trapper 3. Pp. 15-20. Abstract In: T. W. Butts, editor. Lynx (Felis lynx) biology and management: a literature review and annotated bibliography. 1992. USDA Forest Service: Missoula MT.

Truska, A. and E. Yensen. 1990. Photographic evidence of vegetation changes in Adams County, Idaho. Journal of the Idaho Academy of Science 26:18-40.

US EPA/ORD (Environmental Protection Agency/Office of Research and Development). 1993. Wildlife Exposure Factors Handbook. Volumes 1 and 2. EPA/600/R-93/187a,b. Available NTIS: PB94-174778 and PB94-174779.

USEPA (Environmental Protection Agency). 1997. Status of data for 2,4-D. Accessed at: http://www.epa.gov/ngispgm3/.

USEPA (Environmental Protection Agency). 2000. Supplementary guidance for conducting Health Risk Assessment of chemical mixtures. EPA/630/r-00/002. Washington, D.C. 143 pp. + appendices.

USDA Forest Service. 2002. Analysis of Issues Surrounding the Use of Spray Adjuvants with Herbicides. David Bakke. Pacific Southwest Region. Vallejo, California

USDA Forest Service. 2003. Human and Ecological Risk Assessment of NPE Surfactants in Forest Service Herbicide Applications, 2003. David Bakke. Pacific Southwest Region. Vellego, California.

USDA Forest Service. 2003a. Payette National Forest Land and Resource Management Plan (Forest Plan). USDA Forest Service: Payette National Forest: McCall ID

USDA Forest Service. 2005. Summary of Herbicide Effects to Wildlife. Preventing and managing invasive plants EIS: Region 6 Regional office. USDA Forest Service, Portland, OR. 138p.

USDA Forest Service and USDI Fish and Wildlife Service. 1999. Habitat restoration plan for the northern Idaho ground squirrel (*Spermophilus brunneus brunneus*) 2000-2005. 23pp. Unpublished document.

USDA Forest Service and USDI Fish and Wildlife Service. 2005. Canada Lynx Conservation Agreement. Second Edition. R1-00-53. Missoula MT. 142 pp.

USDI Fish and Wildlife Service. 1985. Final report for the Idaho ground squirrel, Memorandum from Field Supervisor, Idaho State Office, to Chief, Endangered Species Program, Portland, Oregon. 2 pp.

USDI Fish and Wildlife Service. 1996. Conservation *agreement Spermophilus brunneus brunneus* - northern Idaho ground squirrel. Prepared jointly by U.S. Fish and Wildlife Service and U.S. Forest Service. 14 pp.

USDI Fish and Wildlife Service. 2003. Recovery Plan for the Northern Idaho Ground Squirrel (Spermophilus brunneus brunneus). Portland, Oregon. 68 pp.

USDI Fish and Wildlife Service. 2006. Occupied Mapped Lynx Habitat Amendment to the Canada Lynx Conservation Assessment and Strategy. Missoula Mt. 5 pp. Attached to USDI Fish and Wildlife Service Canada Lynx Conservation Agreement with the USDA Forest Service, 2006 correspondence. Fish and Wildlife Service, Portland, Oregon. 2 pp.

Weaver, J.L. 1999. Results of 1998 lynx hair snagging survey and DNA analysis for northern Idaho. Unpubl. Report. 1p..

Wirsing, A.J., T.D. Steury, and D.L Murray. 2002. A demographic analysis of a southern snowshoe hare population in a fragmented habitat: evaluating the refugium model. Can. J. Zool. 80:169-177.

Wisdom, M.J., R.S. Holthausen, B.C. Wales, C.D. Hargis, V.A. Saab, D.C. Lee, W.J. Hann, T.D. Rich, M.M. Rowland, W.J. Murphy and M.R. Earnes. 2000. Source habitats for terrestrial vertebrates of focus in the Interior Columbia Basin: Broad-scale trends and management implications, Volume 2 – Group level results. Gen. Tech. Rep. Threatened and Endangered Species, Sensitive Species and Management Indicator Species and the level of analysis required. PNW-GTR-485. Pp. 181-190; 199-208; 219-223; 237-241; 242-248; 258-265; 293-297. www.fs.fed.us/pnw/pubs/gtr485/485v1 and 485v2a and 885v2b.pdf

Yensen, E. 1991. Taxonomy and distribution of the Idaho ground squirrel, Spermophilus brunneus. Journal of Mammalogy 72:583-600.

Yensen, E. 1999. Population survey of the southern Idaho ground squirrel, Spermophilus brunneus endemicus. Unpublished report for U.S. Fish and Wildlife Service.

Yensen, E. 2001. Population survey of the southern Idaho ground squirrel (Spermophilus brunneus endemicus). Unpublished report for U.S. Fish and Wildlife Service.

Yensen, E. and P.W. Sherman. 2003. Ground squirrels (*Spermophilus* species and *Ammospermophilus* species). Pp. 211-231 *in* Wild Mammals of North America, 2nd edition. (G. Feldhammer, B. Thompson, and J. Chapman, eds). Johns Hopkins University Press, Baltimore, MD.