A PRELIMINARY REPORT

EFFECTS OF TIMBER HARVEST ON SMALL MAMMALS AND AMPHIBIANS IN OLD-GROWTH CONIFEROUS FORESTS ON THE PRIEST LAKE RANGER DISTRICT, IDAHO PANHANDLE NATIONAL FORESTS

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ABSTRACT

Small mammals and amphibian abundance and species richness were estimated on pitfall trapping grids with drift fences at 15 sites representing five replicates of three treatments. The three treatments were old-growth cedar-hemlock stands, second-growth stands, and recent clearcuts. Vegetation was also sampled at each site on Forest Service ECODATA plots. Most sampling sites were classified as western hemlock-queencup beadlily habitat types. Old-growth sites had the largest trees and the greatest canopy cover by trees; shrub cover was greatest in second-growth sites and forb cover was greatest on clearcuts. A total of 12 small mammal species (five shrew sp., one pocket gopher sp., six sp. of mice and vole) and three amphibian species was captured on the 15 sampling sites over a 3-yr period. Masked and vagrant shrews were the most commonly captured small mammals. Species richness but not species composition was similar across the three treatments. The greatest total number of small mammals was captured on clearcut sites, followed by second-growth and old-growth sites. Two species of rare, threatened, or endangered small mammals were captured: the pygmy shrew and the northern bog lemming. Pygmy shrews were captured on second-growth and old-growth sites; the northern bog lemming was found primarily on second-growth sites. Old-growth sites captured the greatest number of amphibians but species richness and abundance of amphibians was relatively low on all sites. Results presented in this paper are <u>preliminary</u> in that they provide a summary but not analysis of the field data that were collected. A later report will contain statistical analyses, a more thorough discussion of the relevant literature on habitat relations of small mammals and amphibians, and a discussion of the effects of timber harvest on small mammal and amphibian populations.

INTRODUCTION

The response of small mammals and amphibians to habitat fragmentation in old-growth forests of the Pacific Northwest has received considerable attention in recent years (Ruggiero et al. 1991). Yet, scant attention has been paid to the interior cedar-hemlock (Thuja plicata - Tsuga heterophylla) and mixed coniferous forests of eastern Washington, northern Idaho, and western Montana. Hoffman (1960) and Rickard (1960) sampled climax plant associations, including the cedar-hemlock association, for small mammals in eastern Washington and northern Idaho. Stout et al. (1971) reported on the abundance and diversity of small mammals in burned and adjacent unburned areas of mixed coniferous forest in northern Idaho. Finally, Scrivner and Smith (1984) investigated the relative abundance of four species of small mammals in successional stages of spruce-fir forests in north-central Idaho.

Although several studies have focused on the presence of amphibians in old-growth forests of the Pacific Northwest and the impact of timber harvest on these amphibians (e.g., Corn and Bury 1989, Welsh 1990), no studies have systematically sampled amphibians in the interior cedar-hemlock and mixed coniferous forests. Nor have any studies investigated the impacts of timber harvest on amphibian species in these forests.

The purpose of this study was to examine small mammal and amphibian species richness and abundance in old-growth cedar - hemlock stands, recently harvested stands, and stands harvest 25-30 years ago on the Priest Lake Ranger District of the Idaho Panhandle National Forests in northern Idaho near the Canadian border. Concurrently, a separate study in the same area investigated the impacts of forest fragmentation on bird communities (Hejl and Paige 1994).

STUDY AREA

Small mammals, amphibians, and vegetation were sampled at 15 sites on three adjacent areas of the Priest Lake Ranger District: the Tepee Creek and Bottle Lake Research Natural Areas, the Tango Creek timber sale area, and the Distillery Bay timber sale area (Figure 1). The Bottle Lake/Tepee Creek RNAs constituted an area of contiguous older-aged coniferous forests. The Tango Creek timber sale area was a selectively harvested older forest fragmented by 10-25 year-old clearcuts, while the Distillery Bay timber sale was a more recently fragmented older forest containing areas clearcut between 1984 and 1990.

Geologically, the study area is underlain by the Kaniksu batholith granitics and associated gneisses and schists (Savage 1967). Forested vegetation is dominated by western white pine

(Pinus monticola) and western redcedar - western hemlock (Thuja plicata - Tsuga heterophylla) SAF cover types (Wellner 1980). Most of the study area is classified as *T. heterophylla* habitat types (Cooper et al. 1991). Climate of the area can be described generally as moist and cool with about half of the precipitation coming in the winter as snow (Wellner 1980).

The study area is approximately 6.5 km in length from north to south and 4.8 km in width from east to west (Figure 1). Elevation of the study area ranges from about 790 m - 1400 m (2600' - 4600'). Information on the location, size, and harvest history of sampling sites is provided in Table 1.

METHODS

Sampling sites were selected by examining a forest stand map that had been overlain on USGS topographic maps covering the Tepee Creek - Tango Creek - Distillery Bay areas. This forest stand map (Figure 1) contained information for the study area in the following categories: 1) harvested 1966-1969 (Tango Creek area), 2) harvested 1980-1982 (Tango Creek area), 3) harvested 1987-1990 (Distillery Bay area), 4) mature timber stands (throughout the study area), 5) immature or pole timber stands (throughout the study area), and 6) old-growth timber stands interspersed throughout the study area but only contiguous in the Tepee Creek area. Five replicate sampling sites were selected from each of three categories identified above: harvested 1966-69 (referred to as Second Growth (SG) 1-5), harvested 1987-1990 (referred to as Clearcuts (CC) 1-5), and old growth (referred to as Old Growth (OG) 1-5). Thus, there was a total of 15 sampling sites with five replicates in each of three treatments. Stands selected for the five replicate sampling sites were chosen so as to have the greatest possible distance between stands represented by the replicates. Two sampling sites (OG1 and OG2) were located within the boundary of the Tepee Creek RNA, and one (OG3) was within the boundary of the Bottle Lake RNA.

At each site, a sampling grid for small mammals and amphibians was established as near as possible to the center of the stand. A sampling grid consisted of two arrays of pitfall traps and associated drift fences with the centers of the two arrays being 25 m apart (Bury and Corn 1987, Corn and Bury 1990). A single array contained six pitfall traps with a single trap located at each end of three 5-m long drift fences. The drift fences were arranged like three spokes of a wheel, each 120° apart. Thus, there were 12 pitfall traps per sampling site and a total of 180 traps in the study area. Drift fences were made of 50-cm tall aluminum valley roofing metal buried approximately 20 cm in the ground. A pitfall trap consisted of two No. 10 tin cans held together with duct tape and buried so that the top end of the two-can unit was flush with the ground.

For each animal trapped, the following information was recorded in the field: date, site name, trap station, trap night, species (if possible), sex, sexual condition (for small mammals: juvenile vs. adult), weight, length (SVL for amphibians, total length for small mammals). With the exception of easily identified and common small mammals like the deer mouse (Peromyscus maniculatus), each small mammal was placed in an individually marked plastic bag, frozen as soon as possible, and transported to the Department of Biological Sciences at the University of Idaho (Moscow) or the College of Idaho (Caldwell) for specimen preparation and identification. Amphibian specimens were individually marked with leg tags and stored in 10% solutions of formalin for transport to the Museum of Natural History at Idaho State University (Pocatello).

Trapping was conducted at each sampling site for 40 consecutive nights in 1991 (August 20 - September 29), 10 consecutive nights in 1992 (June 11 - June 20), and 13 consecutive nights in 1993 (June 19 - July 1). During 1991, traps were checked daily for the first 4 days, every third day for the next two trapping periods, then once every 6-8 days for the remainder of the trapping session. In 1992, traps were checked approximately daily for the first 6 days, then every other day for the remaining two trapping sessions. For 1993, traps were checked every other day during the 13-day trapping session.

Vegetation sampling was conducted in August 1992 and generally followed Forest Service ECODATA methodology (USFS Ecosystem Inventory and Analysis Guide 1992). Forms completed during this sampling included Form GF (General Field), Form PC (Plant Composition Data), Form LI (Line Intercept Cover Data), and Form DD (Density Data). Data were collected on a 37'- radius (11.3 m) circular plot centered on one of the two pitfall trapping arrays established at each of the 15 sampling sites. The pitfall trapping array selected for vegetation sampling was chosen randomly.

On each vegetation sampling plot the following information was recorded: vegetation formation, habitat type, dominant live and dead life forms and size classes, canopy cover class, dominant species in upper-middle-lower canopy layers, topographic position of sampling plot, aspect (compass), slope (clinometer), % cover class for ground cover types, fuel loading class, depth of duff and litter, % cover of dead woody material, average height of dominant vegetation layer (clinometer), basal area (angle guage), height (clinometer) and age (increment bore) of dominanat trees, and % canopy cover of trees, shrubs, and herbs. Unless indicated otherwise in parentheses, all measurements were taken ocularly. Mean height (clinometer), % canopy cover, and size class were estimated for most plant species occurring on each plot.

The amount of dead and downed woody material was estimated with the line intercept technique on three 50′ (15.2 m) transects radiating out from the center of the pitfall trapping array. Like the pitfall trapping fences, the transects were arranged like the spokes of a wheel, each located 120° apart, in between and 60° apart from the pitfall drift fences. On each transect, the line intercept was recorded for downed wood in four different size classes: small (1-6") (2.5-15.2 cm), medium (7-21") (17.8-53.3 cm), large (22-33") (55.9-83.8 cm), and very large (>33")(83.8 cm).

The same transects were used to estimate the number of rotten and sound stumps in two size classes: small (<12" diameter) (30.5 cm) and large (>12" diameter). Stumps were counted along three 3′-wide (0.9 m) transects.

RESULTS

Vegetation

Habitat type of old-growth sampling sites was either *Tsuga heterophylla-Clintonia uniflora* (western hemlock-queencup beadlily) or *T.heterophylla-Gymnocarpium dryopteris* (western hemlock-oak fern). On all clearcut sites the habitat type was identified as *T. heterophylla-C. uniflora*. Similarly, all but one of the second growth sites was also habitat typed as *T. heterophylla-C. uniflora* with one sampling plot typed as *Thuja plicata-Athyrium filix-femina* (western redcedar-lady fern).

Clearcut sites had the greatest amount of litter cover (Table 6), whereas cover of dead woody material was similar across all three treatment types. As would be expected, the DBH of live trees was greatest in old-growth sites as was the percent canopy cover of trees. Shrub cover was greatest in second-growth sites and forb cover was greatest in clearcuts. Average percent cover of ferns was also greatest in second-growth sites. Moss cover was substantial only on old-growth sites.

Small Mammals and Amphibians

Eleven species of small mammals and three species of amphibians were captured on old-growth sites during the 3-year study (Table 2). The small mammals included four species of shrew, 6 species of mice or vole, and 1 pocket gopher species. The masked shrew (*Sorex cinereus*) was the most abundant small mammal in all three years. Several species including the dusky shrew (*S. monticolus*), northern pocket gopher (*Thomomys talpoides*), meadow vole (*Microtus pennsylvanicus*), long-tailed vole (*M. longicaudus*), heather vole (*Phenacomys intermedius*), and the northern bog lemming (*Synaptomys borealis*) were infrequenly captured on old-growth sites. The long-toed salamander (*Ambystoma macrodactylum*) was the most commonly captured amphibian in all three years. No amphibian was consistently captured on all five old-growth sampling sites.

Twelve species of small mammals and two species of amphibians were captured on second-growth sites (Table 3). Again, the masked shrew was the most abundant small mammal overall and in two out of three years. However, the vagrant shrew (*S. vagrans*) was also abundant on these sites. The dusky shrew and northern pocket gopher were uncommonly captured (n<10). No species of amphibian was abundant on second-growth sites.

Like the second-growth sites, twelve species of small mammals and two species of amphibians were captured on clearcut sites (Table 4), but the species composition was different. The vagrant shrew was the most abundant small mammal on clearcuts followed by the masked shrew and deer mouse (*Peromyscus maniculatus*). Two species, the pygmy shrew (*S. hoyi*) and the water shrew (*S. palustris*), were rare (n=1) on clearcuts. As with second-growth sites, no species of amphibian was abundantly captured on clearcuts during the study.

A total of 12 small mammal species and three amphibian species were captured on all 15 sampling sites during the 3-yr study (Table 5). A similar number of species was captured among the old-growth, second-growth, and clearcut sites (11-12 species), but the species composition was different. Only one individual water shrew was captured during the study, and this capture occurred on a clearcut site. Pygmy shrews were captured primarily on old-growth and second-growth sites, whereas the northern bog lemming was captured primarily on second-growth sites. No junmping mice were captured on old-growth sites. The greatest number of small mammals was captured on clearcut sites followed by second-growth and old-growth, a trend that was exhibited in each of the three years of the study.

Old-growth sites captured the greatest number of amphibians followed by second-growth and clearcut at similar levels. Boreal toads (*Bufo boreas*) were not captured on second-growth sites and spotted frogs (*Rana pretiosa*) were not captured on clearcut sites. No amphibian species were captured in large numbers during this study.

Two species of rare, threatened, or endangered species (Moseley and Groves 1992) were captured during this study. The pygmy shrew is a state species of special concern and the northern bog lemming is both a state species of concern and a Forest Service sensitive species. As mentioned above, the pygmy shrew was captured mostly on old-growth and second-growth sites. This study represents only the fourth documentation of the pygmy shrew in Idaho (Foresman 1986, Johnson 1993, Groves 1994), with the other three locales being in mixed coniferous sites (2) at high elevation on the Clearwater National Forest and Bog Creek on the Bonners Ferry Ranger District.

The captures of northern bog lemmings also represent the fourth documentation of bog lemmings in Idaho and the third since their "rediscovery" in 1988 (Groves and Yensen 1989). Historically, they were captured near Gold Peak on the Priest Lake Ranger District and Johnson (1993) recently captured them in a bog on the West Fork Smith Creek, Bonners Ferry Ranger District, in close proximity to the site of their rediscovery. In this study, bog lemmings were uncommonly captured on all second-growth sampling sites, but not during all years.

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Table 1. Location, size, and harvest history of 15 sampling sites on the Priest Lake Ranger District, Boundary County, Idaho, 1991-1993.

Site Name	Stand #	Township, Range and Section	Date Harvested	Stand Size (Ac) (Ha)
Old Growth 1 (OG1)	83401002	T62N R4W S16SE4NW4		27 (10.9)
Old Growth 2 (OG2)	83401041	T62N R4W S16SE4NW4		31 (12.5)
Old Growth 3 (OG3)	83401015	T62N R4W S20NE4		52 (21.0)
Old Growth 4 (OG4)	83502048	T62N R4W S31NE4		110 (44.5)
Old Growth 5 (OG5)	83502065	T62N R4W S31SE4SE4		162 (65.6)
Second Growth 1 (SG1)	83501007	T62N R4W S20NE4SW4	June 1969	74 (29.9)
Second Growth 2 (SG2)	83501003	T62N R4W S19SE4SW4	June 1969	6 (2.4)
Second Growth 3 (SG3)	83501008	T62N R4W S19SE4SE4	June 1969	23 (9.2)
Second Growth 4 (SG4)	83501003	T62N R4W S19SW4SW4	June 1969	3 (1.2)
Second Growth 5 (SG5)	83501002	T62N R4W S30NE4NW4	June 1969	31 (12.5)
Clearcut 1 (CC1)	83502009	T62N R4W S31SE4NE4	July 1988	27 (10.9)
Clearcut 2 (CC2)	83502017	T62N R4W S31NW4NE4	January 1989	8 (3.2)
Clearcut 3 (CC3)	83502014	T62N R4W S30SW4SE4	August 1988	3 (1.2)
Clearcut 4 (CC4)	83502023	T62N R4W S31SE4SE4	August 1989	7 (2.8)
Clearcut 5 (CC5)	83502002	T61N R4W S5 N2 center	September 1990	5 (2.0)

Table 2. Numbers of small mammals and amphibians captured in pitfall trapping grids in old-growth stands on the Priest Lake Ranger District, Idaho Panhandle National Forest, 1991-1993. Data are not standardized to number of trapping nights which varied among the three years: 1991=40 consecutive trapping nights/grid, 1992=10 consecutive trapping nights/grid, and 1993=13 consecutive trapping nights/grid.

Species	OG1 91 92 93	OG2 91 92 93	OG3 91 92 93	OG4 91 92 93	OG5 91 92 93	Total	3-Yr Total
MAMMALS							
Sorex cinereus	31 14 5	23 12 5	27 11 13	35 8 12	32 9 13	148 54 48	250
Sorex vagrans	5 - -	17 5 8	10 2 4	6 4 -	7 1 2	45 12 14	71
Sorex monticolus		1 - 1	1 1 -			2 1 1	4
Sorex hoyi			1 1 -	3 1 2		4 2 2	8
Sorex species	1 - -	4 - 1	3 - 1	2 - 2	2 - 2	12 - 6	18
Thomomys talpoides				1 - 1		1 - 1	2
Peromyscus maniculatus	8 - 2	4 - 2	10 - 4	12 4 5	5 1 1	39 5 14	58
Clethrionomys gapperi	7 - 1	7 - 2	2 - -	5 3 1	6 3 1	27 6 5	38
Microtus pennsylvanicus			1 - 1			1 - 1	2
Microtus longicaudus	1 - 1				1 - 1	2 - 2	4
Phenacomys intermedius				1 1 -		1 1 -	2
Synaptomys borealis		1 - -				1 - -	1
Total Number Animals	53 14 9	57 17 19	55 15 23	65 21 23	53 14 20	283 81 94	458
Total Number Species	5 1 4	6 2 5	7 5 4	7 6 5	5 4 5	10 7 9	11
AMPHIBIANS							
Ambystoma macrodactylum	3 2 -	3 1 1	27 1 -		2 2 -	35 6 1	42
Bufo boreas	2 1 -		1 - 1	2 - 2	2 2 -	7 3 3	13
Rana pretiosa	4 - -	- - 2	20 2 1			24 2 3	29
Total Number Animals	9 3 -	3 1 3	48 3 2	2 - 2	4 4 -	66 11 7	84
Total Number Species	3	2	3	1	2	3 3 3	3

Table 3. Numbers of small mammals and amphibians captured in pitfall trapping grids in second-growth sites (SG) on the Priest Lake Ranger District, Idaho Panhandle National Forest, 1991-1993. Data are not standardized to trapping nights which varied among the three years: 1991=40 consecutive trapping nights/grid, 1992=10 consecutive trapping nights/grid, and 1993=13 consecutive trapping nights/grid.

Species	SG1 91 92 93	SG2 91 92 93	SG3 91 92 93	SG4 91 92 93	SG5 91 92 93	Total	3-Yr Total
MAMMALS							
Sorex cinereus	31 6 10	32 11 8	17 6 2	37 17 5	54 7 17	171 47 42	260
Sorex vagrans	11 2 5	28 8 11	23 7 11	44 14 17	12 2 7	118 33 51	202
Sorex monticolus		1 - 1		1 1 -	1 - -	3 1 1	5
Sorex hoyi	3 1 1	5 1 3	1 1 -	3 1 1	4 2 1	16 6 6	28
Sorex species	2 2 -	2 - 2	5 - -	4 - 2	7 1 3	20 3 7	30
Thomomys talpoides			1 - -	2 - 1		3 - 1	4
Peromyscus maniculatus	9 - -	10 1 2	5 - -	20 8 1	2 - -	46 9 3	58
Clethrionomys gapperi	5 - -	11 1 1	8 1 -	6 2 1	10 1 -	40 5 2	47
Microtus pennsylvanicus	2 1 -		10 - -			12 1 -	13
Microtus longicaudus	1 1 -		5 - -	2 1 -		8 2 -	10
Phenacomys intermedius	1 - -	5 1 2	1 - -	3 1 -	10 3 -	20 5 2	27
Synaptomys borealis			5 1 1	1 - 1		6 1 2	9
Zapus princeps				7 4 2	4 3 1	11 7 3	21
Total Number Animals	65 13 16	94 23 30	81 16 14	130 49 31	104 19 29	474 120 120	714
Total Number Species	8 5 3	7 6 7	10 5 3	11 9 8	8 6 4	12 11 10	12
AMPHIBIANS							
Ambystoma macrodactylum	2 1 -			1 - -		3 1 -	4
Rana pretiosa	1 - 1		5 - 2			6 - 3	9
Total Number Animals	3 1 1	0	5 - 2	1 - -	0	9 1 3	13
Total Number Species	2	0	1	1	0	2 1 1	2

Table 4. Numbers of small mammals and amphibians captured in pitfall trapping grids in recent clearcuts on the Priest Lake Ranger District, Idaho Panhandle National Forest, 1991-1993. Data are not standardized to trapping nights which varied among the three years: 1991=40 consecutive trapping nights/grid, 1992=10 consecutive trapping nights/grid, and 1993=13 consecutive trapping nights/grid.

Species	CC1 91 92 93	CC2 91 92 93	CC3 91 92 93	CC4 91 92 93	CC5 91 92 93	Total	3-Yr Total
MAMMALS							
Sorex cinereus	24 6 11	24 8 7	26 5 6	25 5 6	26 10 7	125 34 37	196
Sorex vagrans	46 4 31	41 10 15	75 16 43	30 3 21	36 8 21	228 41 131	400
Sorex palustris					1 - -	1 - -	1
Sorex monticolus		3 2 -	2 1 1	2 - -		7 3 1	11
Sorex hoyi	1 - -					1 - -	1
Sorex species	7 - 5	3 - 1	7 - 7	2 - 1	5 - 4	24 - 18	42
Thomomys talpoides	6 1 5	- - 1	1 - -	3 1 2	2 - -	12 2 8	22
Peromyscus maniculatus	20 7 8	25 6 5	22 9 11	23 4 4	18 3 7	108 29 35	172
Clethrionomys gapperi	3 1 1	1 - -	4 - -	2 - -	3 1 -	13 2 1	16
Microtus pennsylvanicus		1 - -	2 - 1	1 - -	3 - 2	7 - 3	10
Microtus longicaudus	4 - -	2 1 -	8 - -	8 2 1	5 - 2	27 3 3	33
Phenacomys intermedius	12 1 1	4 - 3	7 4 2	6 2 -	5 1 1	34 8 7	49
Zapus princeps	1 1 -		10 3 6	1 - 1	1 - 1	13 4 8	25
Total Number Animals	124 21 62	104 27 32	164 38 77	103 17 36	105 23 45	600 126 252	978
Total Number Species	9 7 6	8 5 5	10 6 7	10 6 6	10 5 7	12 9 10	12
AMPHIBIANS							
Ambystoma macrodactylum				2 1 1		2 1 1	4
Bufo boreas	2 1 -		1 - 1	1 1 -	4 1 -	8 3 1	12
Total Number Animals	2 1 -		1 - 1	3 2 1	4 1 -	10 4 2	16
Total Number Species	1	0	1	2	1	2	2

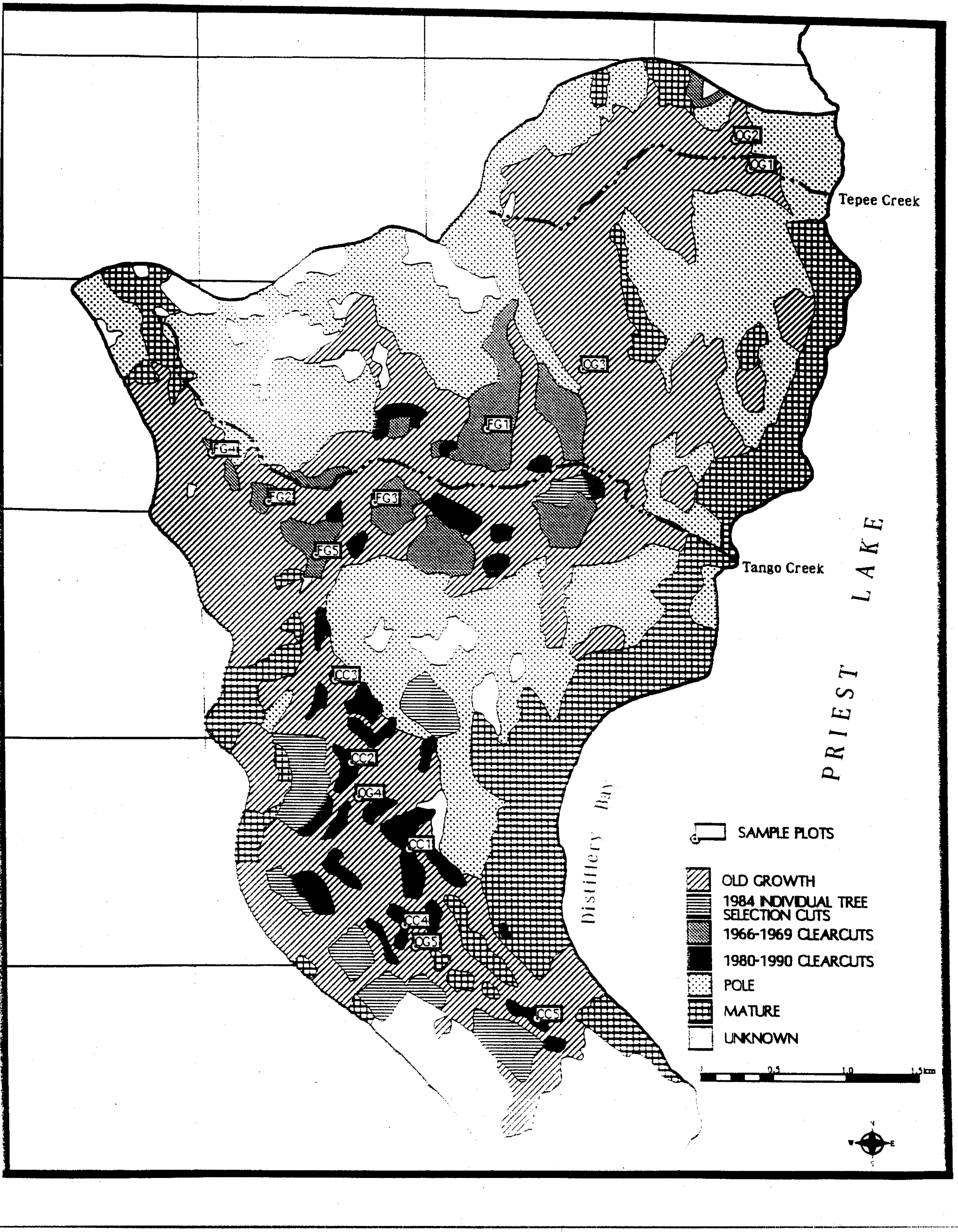
Table 5. Number of small mammals and amphibians captured on pitfall trapping grids located in old-growth stands (OG), second-growth stands (SG), and clearcuts (CC) on the Priest Lake Ranger District, Idaho Panhandle National Forest, 1991-1993. Number of trapping nights varied among years so data are only comparable within the same year across different treatments: 1991=40 consecutive trapping nights/grid, 1992=10 consecutive trapping nights/grid, and 1993=13 consecutive trapping nights/grid.

Species	OG91	OG92	OG93	Total	SG91	SG92	SG93	Total	CC91	CC92	CC93	Total
Sorex cinereus	148	54	48	250	171	47	42	260	125	34	37	196
Sorex vagrans	45	12	14	71	118	33	51	202	228	41	131	400
Sorex palustris									1			1
Sorex monticolus	2	1	1	4	3	1	1	5	7	3	1	11
Sorex hoyi	4	2	2	8	16	6	6	28	1			1
Sorex species	12		6	18	20	3	7	30	24		18	42
Thomomys talpoides	1		1	2	3		1	4	12	2	8	22
Peromyscus maniculatus	39	5	14	58	46	9	3	58	108	29	35	172
Clethrionomys gapperi	27	6	5	38	40	5	2	47	13	2	1	16
Microtus pennsylvanicus	1		1	2	12	1		13	7		3	10
Microtus longicaudus	2		2	4	8	2		10	27	3	3	33
Phenacomys intermedius	1	1		2	20	5	2	27	34	8	7	49
Synaptomys borealis	1			1	6	1	2	9				
Zapus princeps					11	7	3	21	13	4	8	25
Total No. Animals	283	81	94	458	474	120	120	714	600	126	252	978
Total No. Species	10	7	9	11	12	11	10	12	12	9	10	12
Ambystoma macrodact.	35	6	1	42	3	1		4	2	1	1	4
Bufo boreas	7	3	3	13					8	3	1	12
Rana pretiosa	24	2	3	29	6		3	9				
Total No. Animals	66	11	7	84	9	1	3	13	10	4	2	16
Total No. Species	3	3	3	3	2	1	1	2	2	2	2	3

Table 6. Summary of vegetation measurements for old-growth stands (OG), second-growth stands (SG), and clearcut stands (CC) on the Priest Lake Ranger District, Idaho Panhandle National Forest, 1992. Aspect and slope are measured in degrees, DBH in inches, and all other cover measurements reflect percent cover on sampling plots. Dwoodcov and DDBH refers to the percent cover of dead wood and the DBH of dead trees, respectively.

Site	Aspect	Slope	Littercov	Dwoodcov	DBH	DDBH	Treecov	Shrubcov	Forbcov	Ferncov	Mosscov
OG1	39	10	30	20	23	15	70	1	3	0	40
OG2	54	2	20	10	25	12	70	3	3	3	60
OG3	140	15	30	3	21	16	70	3	10	1	60
OG4	194	22	70	20	21	5	70	1	1	0	3
OG5	42	21	50	10	24	11	80	10	3	0	30
OGAVG		14	40	12.6	22.8	11.8	72	3.6	4	.8	38.6
SG1	123	7	60	10	4	0	40	40	30	1	3
SG2	90	17	70	10	3	0	40	40	3	10	1
SG3	0	0	40	30	2	0	20	10	20	40	1
SG4	94	17	0	10	27	22	3	10	3	60	1
SG5	108	19	70	10	3	14	50	10	3	10	1
SGAVG		12	48	14	7.8	7.2	30.6	22	11.8	24.2	1.4
CC1	97	11	70	20	0	0	1	3	20	1	0
CC2	126	15	70	20	0	45	1	1	20	1	1
CC3	78	21	70	10	0	30	3	10	10	1	1
CC4	59	18	80	10	36	15	1	3	30	1	1
CC5	26	16	70	20	3	12	1	1	20	0	0
CCAVG		16.2	72	16	7.8	20.4	1.4	3.6	20	0.8	0.6

Figure 1. Map of the study area on the Priest Lake Ranger District, Kaniksu National Forest, Idaho Panhandle National Forests, 1991-1993.



Tepee Creek
Tango Creek
PRIEST LAKE
Distillery Bay
OG2
OG1
OG3
FG1
FG4
FG2
FG3
FG5
CC3
CC2
OG4
CC1
CC4
OG5
CC5
SAMPLE PLOTS
OLD GROWTH
1984 INDIVIDUAL TREE SELECTION CUTS
1966-1969 CLEARCUTS
1980-1990 CLEARCUTS
POLE
MATURE
UNKNOWN
0
0.5
1.0
1.5km