Idaho Panhandle National Forests

Forest Plan Monitoring and Evaluation Report

1998

United States Department of Agriculture

USDA Forest Service Northern Region

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1998 FOREST PLAN
MONITORING AND EVALUATION REPORT
Idaho Panhandle National Forests

I. Introduction

This 1998 report presents the following information:

1) A summary of the major findings from our Forest Plan monitoring from 1988-1998.

2) The monitoring results for individual Forest Plan Monitoring Items for 1998, and trend information for some items for 1988-1998.

3) Other Monitoring reported for 1998.

II. Summary of findings from Forest Plan Monitoring for 1988 Through 1998

*The volume of timber offered and sold has been lower than projected in the plan. High timber values during most of that time kept the payments to counties relatively high. For some years, reduced timber values and other factors caused the amount of payments to drop significantly. Payments to counties increased by $858,000 in 1998 compared to 1997.

*The amount of land allocated to old growth has continued to meet the Forest Plan goal of 10 percent.

*There has been less than a 5 percent reduction in acreage in Inventoried Roadless Areas.

*The forest is building very few new roads. For several years we have been obliterating roads that are causing environmental problems in sensitive areas. We have been reconstructing roads in some areas.

*The forest has several thousand miles of roads and the amount of money available to maintain them has continued to go down.

*Many highly roaded watersheds continue to produce sediment which affects water quality and fish habitat.

*Fish habitat and populations are substandard in many watersheds.

*Only a very small amount of clearcutting is being used on the forest.

*With the move away from clearcutting, the impacts on the visual resource have been reduced.

*Land exchanges from 1981 through 1998 included 67,770 acres of federal land disposed and 90,638 acres of non-federal land acquired.

*Bull trout and westslope cutthroat trout have become concerns.

*While the amount of security area for grizzly bears is relatively stable, the number of animals lost by illegal shootings continues to be a problem. Loss of caribou by mountain lions is also a problem.

*Our knowledge of rare plants has increased substantially. Some plants previously thought to be rare have been found to be common and have been removed from rare plant lists. Other plants have been found to be very rare and our knowledge of their characteristics and distribution has increased.

*Through monitoring we have learned about some of the ways our management practices can impact soil productivity. We have implemented practices that will insure that we maintain long-term soil productivity.

*The demand for recreation facilities and opportunities on the forest continues to increase.

*The number of people employed by the forest has gone down significantly, especially during the last six years. Several districts have been combined and the forest now operates on a zone basis.

*Some species of trees that are important parts of our ecosystems occur in smaller amounts than desired, especially white pine, whitebark pine, ponderosa pine, and larch. Because of the loss of white pine and whitebark pine from blister rust, these populations are greatly reduced.

*Wildfire suppression has also altered the vegetative composition and patterns across the forest, reducing the amount of some species and increasing the amounts of others. This has lead to increased risk of large fires in some areas.

*The Forest has adopted a management philosophy based upon ecosystems with major emphasis on the restoration of those ecosystems.

III. Forest Plan Monitoring and Evaluation Results For 1998, and Trends for Some Items for 1988-1998

In September 1987 the current Forest Plan for the IPNF was adopted. Part of that plan identified 22 forest plan monitoring and evaluation items. Background information for each of these is given in the table in Appendix A.

Forest Plan Monitoring Item A-1: Quantitative Estimate of Performance Outputs and Services For 1998 – Table 1

budget	$36,881,379 (excludes emergency funding)
Total number of employees	514 (permanent and temporary)
Volume of timber offered	76.3 million board feet
Volume of timber sold	90.3 million board feet*
Volume of timber harvested	84.6 million board feet
Total receipts	$18,821,202
Payments to counties	$4,758,048
Total reforestation completed	5,324 acres
Timber stand improvement completed	8,964 acres
Soil and water improvement completed	1,036 acres
Roads maintained	8,316 miles
Roads obliterated	74 miles
Roads constructed	12 miles
Roads reconstructed	276 miles
Trails constructed/reconstructed	2 miles
Trails available	3,279 miles
Number of wildfires	198 fires
Acres burned by wildfire	62 acres
Prescribed burning completed	6,465 acres
Recreation use	3,390,000 visits
Wildlife habitat restored	1,342 acres
Wildlife structures constructed	484 structures
TES terrestrial habitat restored	340 acres
TES structures constructed	25 structures
Inland fish streams restored	20 miles
TES stream habitat restoration	9 miles
Noxious weeds treated	1,848 acres
Grazing use	4,189 head months
Abandoned mines reclaimed	17 sites
Heritage inventory	1,375 acres
Heritage sites evaluated	33
Heritage sites preserved and protected	4

*Some timber sold in 1998 was offered in 1997

Forest Plan Monitoring Item A-2: Effects of Other Government Agency Activities on the National Forests and the Effects of National Forest Management on Adjacent Land and Communities

Payments to Counties

By law, 25-percent of the Forests' gross receipts are paid to the State for distribution to counties that contain National Forest lands. The amount a county receives depends upon the amount of national forest land within it. The base for the 25 percent payment to states by the IPNF for 1998 was collection of $18,821,202. Timber volume harvested in 1998 was 84.6 million board feet, up about 28 million board feet from 1997. Table 2 on the following page depicts how receipts were distributed by county for the past 11 years. Receipts to counties in 1998 totaled $4,758,048 up $858,244 from 1997.

Table 2. Distribution of payments to counties for the past 11 years.

County	FY88	FY89	FY90	FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Benewah	39,898	49,995	79,053	65,777	71,747	78,926	60,217	60,294	56,152	45,610	31,051
Bonner	829,648	685,852	894,346	830,257	1,229,474	823,120	929,071	966,681	880,735	491,055	761,712
Boundary	897,648	725,789	969,688	895,881	1,330,307	885,433	1,003,376	1,060,285	954,333	529,089	823,583
Clearwater	3,976	5,206	8,232	6,869	7,492	8,242	7,130	6,929	6,452	5,257	3,579
Kootenai	551,999	742,944	613,531	645,371	905,926	689,921	826,323	619,058	800,937	492,483	696,058
Latah	18,392	24,093	38,097	31,787	34,672	38,141	32,853	31,908	29,716	24,212	16,483
Lincoln, MT	41,875	33,776	45,127	41,692	61,909	41,192	46,624	49,267	44,186	24,498	38,160
Pend Oreille, WA	224,307	180,923	241,726	223,327	333,409	221,838	251,092	265,328	237,964	131,936	205,511
Sanders, MT	11,932	9,624	12,858	11,879	17,640	11,737	13,285	14,038	12,590	6,980	10,873
Shoshone	1,947,324	2,601,931	3,024,285	2,783,740	3,423,283	3,180,350	3,213,263	2,758,792	3,011,686	2,148,684	2,171,037
Totals	4,566,999	5,060,133	5,926,943	5,536,580	7,415,859	5,978,900	6,383,234	5,832,580	6,034,751	3,899,804	4,758,048

Table 3 Comparison of Payments to Counties with Harvested Timber Volume for 1988-1998

Year	Payments (MM$)	Volume harvested (MMBF)
1988	4.6	253
1989	5.0	263
1990	5.9	280
1991	5.4	232
1992	7.4	235
1993	6.0	134
1994	6.4	116
1995	5.8	87
1996	6.0	81
1997	3.9	57
1998	4.8	85

Employment

Table 4. Total employees per fiscal year

Year	Total Number of Employees
1987	648
1988	653
1989	655
1990	695
1991	714
1992	762
1993	743
1994	669
1995	575
1996	552
1997	525
1998	514

The table shows the way our workforce has changed from 1987 to 1998. We went from a total of 648 people (includes permanent and temporary employees) in 1987, to a high (for this period) of 762 in 1992, to 514 at the end of fiscal year 1998.

Forest Plan Monitoring Item B-1: Harvested Lands Restocked Within Five Years

The National Forest Management Act specifies that lands where timber harvest occurs should be adequately restocked with trees within five years after final harvest. The IPNF has a forest plan standard of 90 percent of harvested lands adequately stocked within 5 years following final regeneration harvest.

The Timber Stand Data Base is used to give the percentage of stands in each regeneration status category. There are three possible regeneration status catagories in the data base: failed, progressing, and certified. Failed means that the stand is not expected to meet stocking standards for certification within 5 years without major future treatment. Progressing means that the stand is on a trajectory that meets stocking standards, but that the crop trees are not yet old enough, large enough, or growing rapidly enough that the stand can be removed from regeneration status. Progressing stands are not expected to need any further major treatment to become certified within 5 years. Certified stands fully meet the stocking standards, and the trees are large enough, old enough, and growing rapidly enough that the stand can be considered fully established and removed from regeneration status. To be considered either progressing or certified, a stand must be adequately stocked according to the stocking objectives for that site.

Over the past eleven years of monitoring (Table 5), our reforestation success rate has averaged 88 percent. Of the stands that had a final regeneration harvest in 1993, our success rate as measured in 1998 averaged 81 percent adequately restocked. This is a lower percentage than normal and is due to a multi-year contracting problem on one district.

Table 5. Forest average for stands satisfactorily stocked within 5 years.

Year	Average Stocked Within 5 Years
1983	86%
1984	90%
1985	94%
1986	95%
1987	96%
1988	96%
1989	92%
1990	86%
1991	78%
1992	78%
1993	81%

In 1998, over 1,950,000 seedlings were planted on 4693 acres.

Forest Plan Monitoring Item B-2: Timberland Suitability

The plan called for the forest to gather data on timberland suitability by monitoring project-level development (EAs). Changes in timberland suitability (suitable land that was actually unsuitable, or unsuitable land that was actually suitable) were to be noted and recorded on an overlay map and a separate data file. The threshold was a 10 percent change in the 1,584,163 acres of timberland currently classed as physically suitable for timber production (a 158,416 acre change).

Suitable Forest Land was defined as land for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions; for which there is reasonable assurance that such lands can be adequately restocked and for which there is management direction that indicates that timber production is an appropriate use of that area.

Unsuitable timber land was not selected for timber production in step II and III of the suitability analysis during the development of the Forest Plan due to (1) the multiple-use objectives for the alternative preclude timber production, (2) other management objectives for the alternative limit timber production activities to the point where management requirements set forth in 36 CFR 219.27 cannot be met and (3) the lands are not cost-efficient over the planning horizon in meeting forest objectives that include timber production. Land not appropriate for timber production shall be designated as unsuitable in the Forest Plan.

The only data received for the 1998 report was from Sandpoint RD.

Table 6. Management Area Recommended Changes by Project Summary
Sandpoint Ranger District, 1994-1999

	to MA3	**to MA4**	**to MA6**	**to MA18**
from MA4				300 acres (Nafweed)
from MA9	178 (Kirbys)	243 acres (Upper Cedar); 2,088 (Packsaddle)	1,372 (Packsaddle)	

Words underlined are the names of projects where the suitability changes were determined.

MA3 Land designated for timber production within identified grizzly bear habitat and big game winter range. Timber harvest scheduling will be used to maintain grizzly bear security within each bear unit and to provide big game winter range requirements.

MA4 Lands designated for timber production within big game winter range.

MA6 Lands designated for timber production and within important elk summer range habitats (mostly in the southern 2/3 of the IPNF.)

MA9 Consists of non-forest lands, lands not capable of producing industrial products, lands physically unsuited for timber production, and lands capable of timber production but isolated by the above type lands or nonpublic ownership.

MA18 Administrative sites: ranger stations, work centers, lookouts and the Coeur d'Alene Nursery.

The 3881 acre changes from MA9 to MA3, MA4 and MA6 indicates a change from unsuitable to suitable. The 300 acre change from MA4 to MA18 is a decrease in suitable acres.

Forest Plan Monitoring Item B-3: Validate Maximum Size Limits for Harvest Areas

The Forest Plan stated that openings created by even-aged silviculture were to be generally limited to 40 acres. Projects that would create larger openings were to conform with Regional guidelines regarding public notification, environmental analysis and approval.

The monitoring plan set a threshold when 10 percent of openings exceeded the 40 acre standard over a five year reporting period. The measurement was to be by regeneration acre sold or harvested. A regeneration acre is the removal of timber by clearcut, shelterwood, or seed tree harvest and renewal of a tree crop.

Table 7. Acres and Number of Units Over 40 Acres Using Regeneration Harvest

Year	Regeneration Acres Harvested	Acres in openings greater than 40	Percent of Total	Number of Units Harvested	Number of Units greater than 40 acres	Percent of Total
1994	5183	1136	21.9%	218	18	8.3%
1995	3447	1057	30.7%	164	17	10.3%
1996	2622	725	27.6%	126	8	6.3%
1997	2699	1317	48.8%	114	19	16.6%
1998	2906	977	33.6%	147	14	9.5%

Table 8. Acres and Number Of Units Over 40 Acres Harvested By Clearcuts (Including Clearcuts With Reserves)

Year	Acres Harvested By Clearcut	Acres in Openings Greater than 40	Percent of Total	Number of Clearcut Units Harvested	Number of Units Greater Than 40	Percent of Total
1994	2216	126	5.6%	96	3	3.1%
1995	1275	240	18.8%	57	4	7.0%
1996	685	0	0.0%	50	0	0.0%
1997	359	44	12.2%	25	1	4.0%
1998	326	0	0.0%	22	0	0.0%

Of the regeneration acres harvested from 1994-1998, 32.5 percent were greater than 40 acres in size. Of the number of units harvested, 10.2 percent were greater than 40 acres.

Of the acres harvested using clearcuts 2.5 percent were greater than 40 acres in size. Only 2.8 percent of the clearcut units were greater than 40 acres in size.

Forest Plan Monitoring Item B-4: Insect and Disease Hazard

Aerial surveys, ground surveys, timber stand inventories, and actual insect trapping are all utilized to determine the extent of current pest problems and to predict future insect and disease impacts. There is also a large number of activities which while they principally involve collecting information on vegetation also provide observations on insect and disease occurrance.

The purpose of this monitoring item is to determine insect and disease impact as modeled in the Forest Plan. The threshold is when insect and disease conditions are predicted to reach epidemic or serious levels on 5 percent of the Forest.

The following discussion includes a short summary of information for 1998. This is followed by a discussion of trends since 1988.

1998

Root diseases and blister rust are the dominant diseases affecting the IPNF. The acreages associated with these diseases does not change dramatically from year to year. That is not the case with insect activity which can change rapidly.

Most of the acres infested with insects in 1998 were picked up by aerial survey in 1999. The acre figures for this will not be available until January 2000. The estimate for number of acres infested with Douglas-fir beetle in 1998 on state, private, and FS land in the IPNF boundary is 108,000 acres as mapped by aerial survey. The total number of acres for all insects and diseases will be higher.

1988-1998

What associated with insects and disease has changed since the Forest Plan was adopted in 1987?

·Forest Health has become a major issue in Northern Idaho: the national risk map and DFB outbreaks have received national attention.

·The IPNF is experiencing a major Douglas-fir beetle outbreak and mountain pine beetle continues to threaten lodgepole pine

·The introduced balsam wooly adelgid continues to expand its range and itensify
.
·Treatments needed to reduce I&D hazards have been greatly reduced (specifically regeneration of tree species less-susceptible to I&D).

What do we know now that we didn't know in 1987?

·The major change in forest composition and structure that has occurred in the past century has been documented and better quantified.

·The amount of IPNF forest area that is susceptible to insects and pathogens increased significantly during recent decades, and much of the area is now at risk of root disease or bark beetle attack.

·CRB modeling and Forest Health Assessments have shown that I&D drive succession in the absence of fire or management, and the result is further departure from historic forest conditions.

·Rust-resistant western white pine has been performing better than expected over the first 10-25 years after outplanting on most sites that have been monitored.

Recommendations

·Treat Forest Health as an issure in the up-coming Forest Plan revision, and make improvement in forest structure and composition a purpose and need action.

·In the revision, calibrate and use successional models to predict future vegetative conditions under different management scenarios to determine how much management and what activities are needed to reverse the decline of forest conditions and achieve a specified level of improvement.

·Use GAA information to identify locations where treatment is needed to reduce I&D susceptibility and improve forest conditions while also improving watershed conditions and wildlife habitat.

·Develop new thresholds for I&D that involve monitoring treated and non-treated lands for change in hazard and risk.

·Use multi-resource inventory, supplemented as needed, to monitor changes in root disease and bark beetle hazard and risk and evaluate the performance of blister rust resistant western white pine.

Forest Plan Monitoring Item B-5: Road Construction

The Forest Plan projected that 176 miles of new roads would be constructed each year and 97 miles would be reconstructed. The following table summarizes the number of miles of road construction and reconstruction that actually occurred from 1987 through 1998.

Table 9. Miles of road construction and reconstruction, 1988-1998

Fiscal Year	Miles of Construction	Miles of Reconstruction
1988	103	233
1989	134	130
1990	83	140
1991	46	107
1992	65	109
1993	57	233
1994	2	43
1995	12	54
1996	1	41
1997	16	202
1998	12	276
Totals	531	1568

This table shows that the projected amount of annual new road construction (176 miles) was much greater than the amount that actually occurred for every year from 1988-1998. For road reconstruction the amount projected (97 miles) was exceeded for 8 of the 11 years. Road reconstruction generally occurs on older roads and is necessary to bring them up to standards so they are driveable.

Forest Plan Monitoring Item B-6: Actual Sell Area and Volume

Timber Volume

The allowable sale quantity (ASQ) in the forest plan was to sell up to 280 million board feet (MMBF) of timber annually on an estimated 18,688 acres. The monitoring plan shows the threshold of concern for this ASQ is reached when accomplishments fall below 75-percent of the desired volume and acres. Table 3 depicts timber volumes offered and sold, and sale acreages for the past 11 years.

In 1998, the Idaho Panhandle National Forests offered 76.3 million board feet of timber for sale. We sold 90.3 million board feet.

Table 10. Timber volumes offered and sold on the IPNF (million board feet)

Fiscal Year	Volume Offered	Volume Sold	Total Acres Sold
1988	247.7	246.4	15,798
1889	251.4	240.4	13,790
1990	244.9	214.8	16,307
1991	201.6	163.2	13,989
1992	121.8	108.0	10,508
1993	129.4	124.3	13,939
1994	46.5	16.4	4,283
1995	64.1	37.5	8,437
1996	75.4	42.9	8,631
1997	79.3	108.3	10,914
1998	76.3	90.3	6,974

In 1997 and 1998 the volume sold was greater than the volume offered because some of what was sold had been offered in the previous year.

Compared to the forest plan projected outputs, the cumulative 11 year average for timber sold and acres are 45 percent and 60 percent, respectively.

Harvesting Methods

As shown in Table 11 below, in recent years very little clearcutting has been used on the IPNF. Only 4 percent of the acres harvested during the last 7 years were clearcuts.

Table 11. Number of acres by type of harvesting method, 1992-1998 (total 63,406 acres)

Year	Clearcut	Shelterwood	Overstory Removal	Salvage	Commercial Thinning	Selection
1992	1,023	2,383	479	1,988	1,013	3,622
1993	1,125	3,547	602	6,273	1,189	1,203
1994	28	514	171	2,441	642	471
1995	45	1,096	674	2,531	1,687	2,110
1996	68	663	329	5,790	1,161	650
1997	289	2,532	0	6,326	1,225	542
1998	0	1,386	0	2,832	2,347	409
Total	2,578	12,121	2,255	28,181	9,264	9,007
% of 7 year	4%	19%	4%	44%	15%	14%

Clearcut: a regeneration method under an even-aged silvicultural system in which the existing stand of trees is removed.

Shelterwood Harvest: a regeneration system in which a new stand is established under the protection of a partial canopy of trees. A minimum of two harvests is required, the last or final removal cuts the remaining stand after the new stand is established. This results in continuous coverage of large or small trees.

Overstory removal: a harvest method that removes the overstory of a two story stand and leaves the smaller understory for further treatment.

Salvage harvest: the cutting of trees that are dead, dying, or deteriorating before they lose commercial value as sawtimber. The removed trees are generally overmature, damaged by fire, wind, insects, fungi or other injurious agencies.

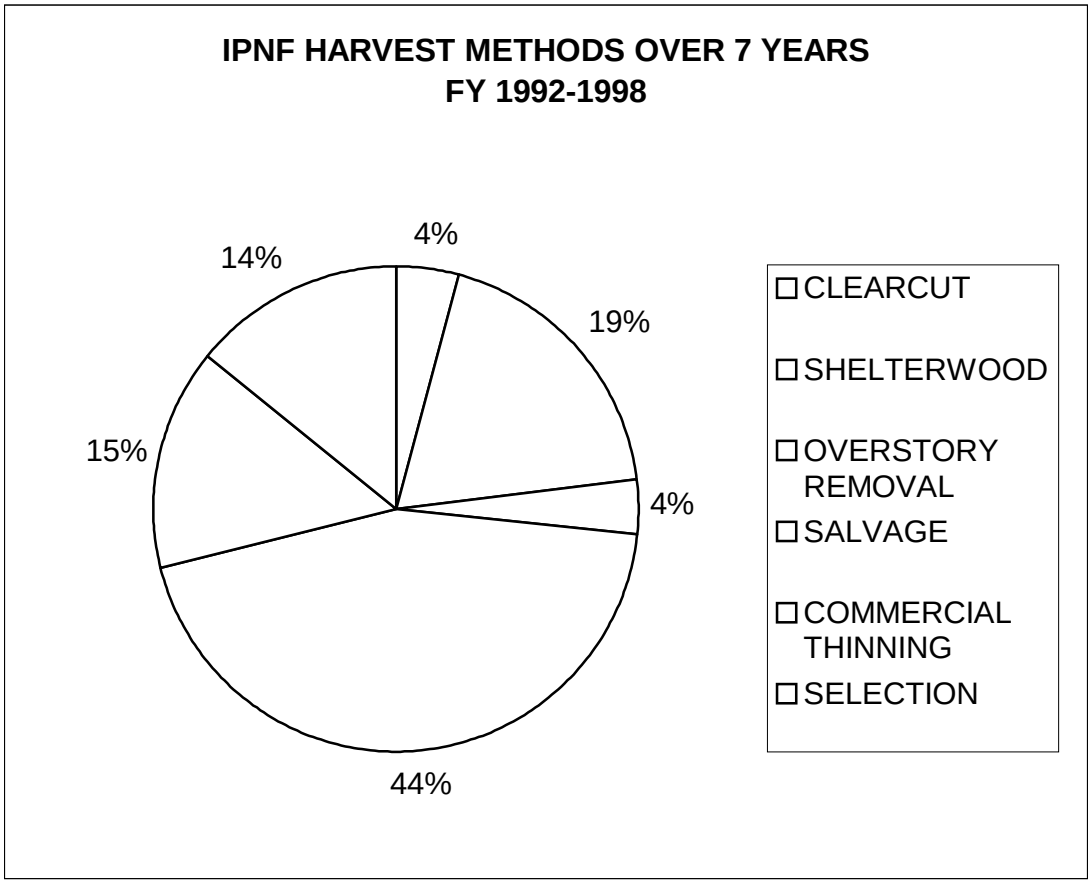
Commercial thinning: tree thinning that produces merchantable material at least equal in value to the direct costs of harvesting.

Selection harvest: the periodic removal of trees, usually at 10 - 20 year intervals, individually or in small groups, from an uneven-aged forest in order to realize yield and establish regeneration.

Forest Plan Monitoring Item C-1: Meeting Visual Quality Objectives

On the Idaho Panhandle National Forests there has been a marked change in harvest methods. Figure 1 below summarizes harvest methods used for 1992 through 1998..

Figure 1. Distribution of harvest methods on the IPNF from 1992 through 1998.



Between 1992 and 1998, of the approximately 63,000 acres harvested on the IPNF, only 4% were Clearcut. Clearcuts typically sustain high negative visual and environmental impact. They result in even-aged stands that lack any variety of texture or form, color, or size.

Less visually and environmentally impactive methods of harvest used on the IPNF include Shelterwood Harvest, Overstory Removal, Salvage Harvest and Selection Harvest. From 1992 through 1998, these prescriptions were used on 96% of project acres. On the 44% of acres where Salvage Harvest methods were employed and only the dead, dying or deteriorating trees in a stand were removed, natural appearing landscapes have resulted. The variety of color, form, texture and size produced, results in a high level of visual quality. In addition, the harvested trees typically have commercial value as sawtimber.

Selection Harvest methods were used on 14% of acres in this seven year period. High visual quality can result from use of this site and species specific approach to harvest. Through the periodic removal of trees in 10-20 year intervals, individually or in small groups, natural appearances and high visual quality typically result, despite this method's focus on high yield and regeneration.

19% of acres were harvested using the Shelterwood approach. Shelterwood Harvests promote regeneration and establishment of new stands under the protection of a partial tree canopy. Following a minimum of two harvests, the resulting product is an even-aged stand with continuous coverage. A natural appearance is rarely achieved when this harvest method is used.

Commercial Thinning and Selection methods were the methods used on 15% and 14% of the land, respectively. Commercial thinning is used where cost of harvest needs to equate to value of merchantable material. The result is typically neither aesthetically nor environmentally of high value.

Recommendations

The progress that has been made in scenery management in the last 7-10 years will only be enhanced as we move into use of the new Scenery Management System (SMS) which is replacing the Visual Management System (as defined in Agricultural Handbook #462) as the system for inventory and analysis of aesthetic values of the National Forest lands. While the essence of the Visual Resource Management system remains essentially intact, approach and terminology has been changed and expanded to incorporate updated research, methodologies and findings. With the establishment of this more environmentally sensitive system that includes active constituent participation, the planning process will be increasingly responsive to the importance of the integration of aesthetics with other biological, physical and social/cultural resources in sustaining beautiful, healthy, and productive forests for future generations.

Forest Plan Monitoring Item D-1: Off-Road Vehicles -- Effects on Resources, Uses, Public Safety

The purpose of this monitoring item is to determine the impacts of off-road vehicles on resources or other resource users. It is also to determine if Forest Travel Plan direction is being followed?

Several sources of information are used for this monitoring item. One source is the number of violations associated with off-road vehicle use. Listed below is summary of the number of citations issued for 1987-1998.

Table 12. Total number of citations issued by year

Year	Number of Citations
1987	22
1988	13
1989	54
1990	182
1991	144
1992	167
1993	204
1994	185
1995	88
1996	133
1997	240
1998	246

Eight different types of off-road vehicle violations are commonly noted. Examples of these include damaging, roads, trails, or gates; operating vehicles in a manner than endangers any person or property, or which damages or unreasonably disturbs the land, wildlife or vegetative resources; or the use is in violation of State law or published Orders.

Some violations by off-road vehicle users occur when no Forest Service personnel are around to witness their actions. For this reason some damage occurs which may go undetected for a considerable amount of time. For these reasons the table of violations presented above only presents a limited view of the violations which occur on the IPNF.

Forest Plan Monitoring Item E-1: Potential Impacts of Land Disturbing Projects on Known Cultural resources

Threshold: Any unmitigated adverse impact.

1. Introduction.

The Idaho Panhandle National Forests was a party to a Programmatic Agreement (P.A.) involving cultural resources on National Forests in Northern Idaho. This agreement, signed in 1993, included the three northern Idaho Forests (Idaho Panhandle, Clearwater and Nez Perce), the Idaho State Historic Preservation Officer and the Advisory Council on Historic Preservation. A stipulation of this agreement (#4) is that each Forest will prepare a report for their heritage program and submit it to the Idaho State Historic Preservation Office.

This report covers the Fiscal Year 1998 heritage program on the Idaho Panhandle National Forests. The Forest used the terms of the agreement on a small number of undertakings. Section 2 gives a summary of these undertakings and if they came under the agreement. The other sections summarize other parts of the program for the information of the Idaho State Preservation Office.

2. Description of Undertakings Subject to Section 106 Review.

a. Land Exchanges - The Forest inventoried (and the State Historic Preservation Office reviewed) three of the current proposed land exchanges in 1998. We found one heritage resource and this was determined to be an historically insignificant property. These land exchange projects needed no further involvement by an archaeologist.

b. Timber Sales - The Forest inventoried and the State Historic Preservation Office reviewed two new timber sales on the Idaho Panhandle National Forests proposed for 1998. The other proposed timber sales were either deferred, withdrawn or fell under the P.A. as previously inventoried project areas with no historic properties in the area of potential effect.

The Moodoo Timber Sale reviewed in 1998 contained three heritage sites within the area of potential effect. One property will have a single pre-approved log road crossing. It was determined that this would be "no adverse effect" and the Advisory Council on Historic Preservation did not to object to this finding.

The Priest Lake Winter Damage Salvage Sales umbrella project contained three heritage resources. None of these resources would be affected by the timber sale proposals and both the Idaho and Washington SHPOs concurred.

c. Mining - The Forest Archaeologist and the State Historic Preservation Office reviewed three mining projects. A proposal to mine landscape stone from the top of Marble Mountain was inventoried in 1998. The project involved two heritage sites. The project

was limited to avoid the heritage sites and SHPO agreed that the project would have no effect on significant historic properties. St. Joe Mine closures project proposed closure of the shaft of the Copper Kopje with a "bat friendly plug". This was found to be of "no effect" on historic values.

The Bethlehem Mine Closure was also a project involving a bat friendly structure at the entrance of a mine. It was concluded and the SHPO agreed that the project would have no effect on the historic property.

d. Roads - The Boundary Creek Road Reconstruction/Obliteration project was inventoried and received full review by both the SHPO and the ACHP. The project will have no adverse effect on two historic properties provided that the stipulations for protection measures are carried out by the Forest. The Skin Creek Road Relocation/Kirk Road Project was inventoried and also found to be no adverse effect, as it would avoid any surviving features of the historic property involved.

e. Trails - The Forest began construction of the "Route of the Hiawatha" rail trail in 1997. The 1997 work included all construction proposed between Roland (the west portal of the St. Paul Pass Tunnel) west to Pearson (the mouth of Loop Creek) (See attached maps). The work included installation of guard rails on trestles, repairing the lining of one tunnel, repairing the water tunnel under one earth fill, removing a decayed tunnel snow shed, building a bypass around a collapsing tunnel, building a bypass around an major washout, grading the route and building a trailhead facilities at Roland and Pearson. The 1998 work included the replacement of portions of the concrete liner in the St. Paul Pass Tunnel, work that is still in progress (See 1995 Report Documenting No Adverse Effect for the Route of the Hiawatha Trail Bridge Modifications).

The Hemlock Trail #488 Trailhead and Road Closure project was inventoried by the Forest and reviewed by the SHPO. One heritage site was found but the project had no effect on this or any other historic property.

f. Special Use Permits - Two Special Use Permit project was inventoried by the Forest and reviewed by the SHPO. This project, Carter Road Access, had no effect on heritage resources. The Stimson Access Proposal was inventoried in 1998 and no significant heritage resources were encountered.

g. Recreation - The Forest proposed altering the drainage channel on the south boundary of the Sam Owen Campground. This project was near a previously recorded prehistoric site. A test excavation indicated that the project would have no effect on the prehistoric site.

h. Facilities - A Region One Preservation Team member spent one week at Shoshone Park Cabin, near Mullan, Idaho, replacing rotten logs at the beginning of Fiscal Year 1998. A review of the Snipe Cabin Removal project concluded that the cabin was not an eligible property and no further heritage work will be needed before removal. A project to replace part of the floor of the Red Ives Ranger's House was completed after

consulting the SHPO. Work at the Magee Ranger's House review by the SHPO include stripping carpet from wood floors, repair of walls in kitchen and porch repairs.

3. Volunteer Projects

a. The Bartoo Island Archaeological Project - The Bartoo Island Archaeological Project completed four years of field work in 1996. In 1997 work on a draft report on this work continued. A final report is expected to be completed in 1999.

d. Surveyors Peak - During the summer of 1998, volunteers repaired Surveyors Peak Fire Lookout. The repairs included replacements of broken or weak planks and railings. The work also brought the structures into line with the current safety standards (e.g. raising the height of the railings and putting fencing on the railings).

d. Seneacquoteen Road - Mark E. Weadick volunteered to locate the remnants of the Seneacquoteen Road. Mark made some progress on this project in 1988.

c. Grand Forks - As part of the Passport in Time program, the Forest conducted a test excavation at the site of the railroad construction town of Grand Forks, Idaho in June 1998. The project established the location and some detailed history of this town (associated with the construction of the Chicago Milwaukee and St. Paul Railroad over the Bitterroot Mountains in 1907-1911). A report is in preparation and plans are being developed to return to the site in June 1999.

4. Cooperative Agreements

a. The Corps of Engineers - A cooperative agreement between the Corps of Engineers and the Sandpoint Ranger District regarding the monitoring of archaeological sites around Lake Pend Oreille and the Pend Oreille River continued in 1998.

b. Coeur d'Alene Tribe - The Tribe requested assistance from the Forest Service in completing a heritage resource inventory for their Bingo Hall expansion. This was completed in 1997-98 by the Forest Service and reviewed by the SHPO.

c. Priest Lake Museum - Developed under a cooperative agreement, the Priest Lake Museum is housed in the Luby Bay Guard Station. In 1998 it had 3641 visitors and the Forest Service continues its involvement which will be formalized in a special use permit in 1949.

d. Vinther and Nelson Inc. - The Vinther/Nelson Cabin has been under special use permit to the Vinther and Nelson descendents to manage as an historic site. In 1998 there were 949 visitors to the site.

Forest Plan Monitoring Item F-1: Population Trends of Indicator Species

This monitoring item has a five year reporting period. Since it was last reported in 1993 the 1998 report presents the five year update. For this reason and because of the many species covered under this item, the following discussion will be longer than some of the others in this report that are reported more frequently.

This monitoring report discusses information collected from 1987 to 1998 to help determine population trends of threatened, endangered, and sensitive management indicator species. In 1987, the Idaho Panhandle National Forests (IPNF) Forest Plan identified indicator species to help assess the impact of land management decisions on the wildlife resource. The ten indicator species are: bald eagle, grizzly bear, woodland caribou, gray wolf, elk, moose, white-tailed deer, goshawk, pine marten and pileated woodpecker. The peregrine falcon was listed after the Forest Plan was adopted.

Population Estimates: Estimating population numbers and trends can be extremely difficult. Most estimates involve cooperative surveys and information sharing with other agencies, such as the Idaho Department of Fish and Game, Washington Department of Fish and Wildlife, Forest Service and University researchers. Examples of the sources of information for population trends include ground surveys, aerial surveys, radio-collared animals, mortality and harvest reports, transplant activities, incidental sightings and law enforcement activities. Habitat information may be used where population data are lacking.

Population and Habitat Surveys: Since the Forest Plan, surveys have been conducted on the IPNF for woodland caribou, grizzly bears, peregrine falcons, gray wolves, bald eagles, Townsend's big-eared bats, wolverines, lynx, northern bog lemmings, harlequin ducks, northern goshawks, flammulated and boreal owls, black-backed woodpeckers and Coeur d'Alene salamanders. Direct population surveys have been completed by Idaho Depaartment of Fish and Game and Washington Department of Fish and Wildlife for some species.

Necessary monitoring continues to be limited by available funding. The recommendations that follow will likely not occur without increased funding levels. Species will be monitored based on funding and priority.

Funding from timber sales (K-V funds) and the following partners were also used for wildlife monitoring:

~ U.S. Fish and Wildlife Service
~ U.S. Bureau of Land Management
~ Idaho Department of Fish and Game
~ Washington Department of Fish and Wildlife
~ British Columbia Ministry of Environment

~ Dr. Barry Keller and Dr. Chuck Peterson from Idaho State University
~ Idaho State University Research Committee
~ Dr. Dennis Murray of University of Idaho
~ Wildlife Conservation Society
~ Peregrine Fund
~ Rocky Mountain Elk Foundation
~ Pacific Gas Transmission Company
~ Audubon Society
~ National Fish and Wildlife Foundation
~ Clark Fork Pend Oreille Wetlands Trust
~ National Fish and Wildlife Foundation

ENDANGERED SPECIES

Species listed under the Endangered Species Act are in danger of extinction throughout all or a significant portion of their range. The endangered species that occur on the IPNF are the woodland caribou, gray wolf and peregrine falcon.

Gray Wolf

Background and factors limiting population: The northern Rocky Mountain wolf (a subspecies of the gray wolf) was listed as endangered in 1973. However, based on enforcement problems and a trend to recognize fewer subspecies of wolves, the entire species was listed as Endangered throughout the entire lower 48 states, except Minnesota, in 1978 (USDI 1987). In the past, substantial declines in numbers of wolves resulted from control efforts to reduce livestock and big game depredations. By the 1940's, as a result of shooting and poisoning, the Rocky Mountain wolf was essentially eradicated from its range. Historically, many wolves were hunted, shot and poisoned. Mortality from illegal killing is still the primary limiting factor for wolves. The risk of human-caused wolf mortality is related to the density and distribution of roads and trails open to motorized use.

When the wolf recovery plan was revised in 1987, it defined a recovered wolf population as at least 10 breeding pairs of wolves, for 3 consecutive years, in each of 3 recovery areas (northwestern Montana, central Idaho and the Yellowstone area). (Federal Register 8/16/94, p. 42109) In 1994, final rules in the Federal Register made a distinction between wolves that occur north of Interstate Highway 90 and wolves that occur south of Interstate 90 in Idaho. Gray wolves north of I-90 are listed as Endangered species and receive full protection in accordance with provisions of the Endangered Species Act. Gray wolves occurring south of I-90 are listed as part of an experimental population, with special regulations defining their protection and management. For recovery purposes, wolves north of I-90 are counted with the northwest Montana population and wolves south of I-90 are counted considered part of the Idaho population.

Evaluation - Population: Wolf populations historically were much higher than in recent years in the Idaho Panhandle. Forty wolves were killed in 1899 near the Pend Oreille River. A 1939 report estimated there were 48 wolves on Idaho's national forests, with only 2 wolves on the Coeur d'Alene Forest. There are records of wolf packs in the Idaho Panhandle in 1952 and 1953. Hansen collected 156 reports of wolves in northern Idaho, including 145 since 1974 (Hansen).

Wolves are social and highly mobile animals requiring large home ranges to feed and raise their young. In Idaho, home ranges of twelve packs averaged 359 square miles (229,760 acres). Conservation requirements for wolf populations are not fully understood, but the availability of prey, secure den and rendezvous sites and limiting the risk of human-caused mortality are considered key components or limiting factors (USDI 1987, Tucker et al 1990).

Wolves primarily feed on ungulates. The IPNF supports moose, elk, white-tailed deer and mule deer as potential prey items. Ungulates are common and provide an ample prey base to support several packs of wolves on the IPNF. Currently, prey populations are not believed to be limiting wolf recovery. Prescribed burning on winter ranges to maintain elk populations and maintenance of cover on white-tailed deer winter ranges helps ensure an adequate food supply for wolves.

A few formal surveys for wolves have been conducted, but no wolves were found. Surveys targeted for other species such as lynx and noxious weeds may also detect wolves or evidence of wolf activity when conducted afoot. Between 1980 and 1989, 60 wolf sightings were reported in the Idaho Panhandle, and from 1990 to 1993, 32 sightings (Montana Cooperative Wildlife Research Unit). Approximately 30 reports of wolves have been documented within the Priest Lake Basin since 1988. The majority of the reports indicate only lone animals, whereas at least four reports indicate two or more wolves traveling together. No evidence of successful reproduction has been reported or observed. Follow-up surveys consisting of a visit to the observation location and/or interview with the observer were conducted on approximately 20 reported observations. Reports with merit were classified as degree of probability. The largest reporting year was 1994 with eight-valid reports being documented.

Extensive road closures for grizzly bears have helped prevent roadkills and illegal mortality of wolves north of the Clark Fork/Pend Oreille River in north Idaho. One reported wolf mortality was documented on private land in January 1995 as a result of animal damage control efforts in the Priest Lake Basin. Another was documented adjacent to the Basin in 1994; the cause of death is unknown but was closely associated with an open road system.

The recovery goals for wolves have not been met. In 1998, northwest Montana had 6 reproducing wolf packs with a population of 65 wolves. Central Idaho had 10 reproducing packs totaling 122 wolves. The only pack on the IPNF is the Snow Peak Pack, which formed in 1998 with the pairing of two wolves transplanted to central Idaho

in 1996. This pack lives in the upper St. Joe River drainage and is the northernmost wolf pack in Idaho. In 1998 the pack size was estimated to be 7 wolves. (Nez Perce Tribe)

One objective of the wolf recovery plan is to "develop and initiate information and education programs." This includes informing the public about the legal protection of the wolf under the Endangered Species Act (ESA). The IPNF has included a statement in our environmental impact statements and environmental assessments that explains the wolf's status under ESA. We acquired a live mount of a wolf, which is on display in our supervisor's office.

Habitat: Wolf habitat was monitored on 2,920 acres in 1996; 5,500 acres in 1997 and 32,000 acres in 1998.

Recommended Action: Continue to encourage forest visitors and residents to report wolf activity. Conduct follow-up investigations when possible to determine the validity of the sighting. Report incidental sightings of gray wolves to the Nez Perce Tribe, which is the statewide clearinghouse for wolf populations in Idaho. If wolf packs occupy the IPNF, cooperate with the Tribe in monitoring those packs. Update the status of wolves and post it on the IPNF Web Site. Continue to reduce open road densities below two miles per square mile, especially north of Interstate 90.

Peregrine Falcon

Background and factors affecting population: The American peregrine falcon was listed as an endangered species in 1970 under the Endangered Species Conservation Act. In 1973, the peregrine falcon was transferred to the authority and protection of the Endangered Species Act. Pesticide poisoning was the primary factor contributing to the decline of peregrine falcons. DDT, the primary pesticide attributed to the decline of peregrine falcons, was banned from use in the U.S. in 1972. DDT interferes with birds' ability to deposit calcium in their eggs; the result is thin eggshells that are susceptible to breaking during incubation.

Two recovery goals were established for this species in its Recovery Plan in 1984: a minimum of 183 breeding pairs in the Rocky Mountain / Southwest population; and a long term average production rate of 1.25 young per pair per year. These goals have been met. In August 1999 the species was determined to be recovered and the Secretary of the Interior removed the peregrine falcon from the Threatened and Endangered Species List. In 1988, 2 peregrine falcon nesting territories were known in Idaho; these were not on the Idaho Panhandle National Forest. The limiting factor for this species on the IPNF is availability of nesting cliffs.

Evaluation - Population: The number of known peregrine falcon nesting territories in Idaho has grown from 2 in 1988 to 17 in 1998. Peregrine falcon management has focused on surveying and protecting historic and potential nest sites, and identifying possible reintroduction sites. Prior to the Forest Plan, there was only one known sighting of a peregrine falcon in the Idaho Panhandle. In 1982, The Peregrine Fund, in

cooperation with U.S. Fish & Wildlife Service and the Idaho Department of Fish and Game, began peregrine recovery in Idaho by releasing captive-reared, young peregrine falcons into the wild (hacking). At that time there were no known nesting peregrines remaining in Idaho. When the release program was concluded in 1995, 288 young peregrines had been released in Idaho.

In 1987, a peregrine falcon habitat and potential reintroduction site survey was completed on the Sandpoint Ranger District. In 1990, a pair was released in the lower Clark Fork River basin, near the only confirmed historical peregrine falcon nesting site on the Idaho Panhandle National Forests. From 1990-1995, 34 peregrine falcons were released from this site with the expectation of establishing a nesting territory in the vicinity of the historic site. Cooperators with the reintroduction effort included The Peregrine Fund, Idaho Department of Fish and Game, the U.S. Fish and Wildlife Service and Avista Utilities (formerly Washington Water Power).

In 1997, monitoring efforts confirmed an occupied territory located on a cliff face overlooking the lower Clark Fork River basin. This territory initiated the first successful breeding pair of peregrine falcons in north Idaho in several decades. Within this same time frame, the origin of another successful pair in the Spokane area was traced to one of the 1990-1995 releases on the Sandpoint Ranger District. The same summer a pair of peregrine falcons was sighted in the Stevens Peak area on the Coeur d'Alene River District.

Idaho Department of Fish and Game's "Idaho Peregrine Falcon Survey and Nest Monitoring 1998 Annual Summary" states, "Idaho's peregrine falcon population is probably continuing to increase based upon productivity figures and increased sightings of peregrines outside of known nesting areas during the nesting season. However, continued funding restrictions and logistical difficulties have limited our ability to locate new nesting territories and accurately assess Idaho peregrine falcon population trends."

Habitat: Peregrine falcon habitat was monitored on 125 acres in 1996 and 5,500 acres in 1997.

Recommended Action: The Forest Service will manage the Peregrine Falcon as a sensitive species. It will continue to record incidental sightings of peregrine falcons and will forward them to the Idaho Conservation Data Center for their statewide wildlife database. The Forest will continue to monitor the existing nest site on the Sandpoint Ranger District to determine site occupancy and nesting success, and will evaluate potential nest sites to document population expansion.

Bald Eagle

Background and factors affecting population: Bald eagles and their nests and eggs are protected by the Bald and Golden Eagle Protection Act of 1940. The bald eagle was listed as endangered in Idaho and threatened in Washington on February 14, 1978. It was later downlisted to threatened in Idaho In July 1999 the bald eagle was proposed for

delisting or removal from threatened status, because all of the criteria for delisting had been achieved. These include: number of nesting pairs; fledging success rate; and winter population trends. A final decision by the U.S. Fish and Wildlife Service on the bald eagle's status is expected in July 2000.

The Pacific Bald Eagle Recovery Plan (page 20) states, "habitat loss continues to be and will probably continue as the most significant long-term threat to all bald eagle populations in the recovery area. Urban and recreational development, logging, mineral exploration and extraction, and all other forms of human activities are adversely affecting the suitability of breeding, wintering and foraging areas.....Shooting continues to be the most frequently recorded single cause of bald eagle mortality....." Pesticide contamination, lead poisoning associated with waterfowl hunting, poisoning from predator control and electrocution by powerlines were other contributing factors leading to listing. DDT, the primary pesticide attributed to the decline of bald eagles, was banned from use in the U.S. in 1972. However, DDT is still used in Mexico, and birds which winter there are still ingesting DDT-contaminated prey. DDT interferes with birds' ability to deposit calcium in their eggs; the result is thin eggshells that are susceptible to breaking during incubation.

Not all of the factors listed above have affected North Idaho bald eagles. The current problems for eagles on the IPNF include: 1) heavy metal toxicity from historic mining; and, 2) disturbance from recreationists and residents whose homes are in eagle habitat. Fish and waterfowl in the Coeur d'Alene River drainage still carry lead and other toxic wastes from historic mining. The sources of contamination are mostly on private land and out of the control of the Forest Service. Lead is also prevalent in portions of the Columbia River. Every dead eagle which has been collected in North Idaho and eastern Washington by the U.S. Fish and Wildlife Service during the last 5 years (about 12 total) has had elevated levels of lead or other toxic metals. One had almost 4 times the lethal dose of lead. (Parker)

Evaluation - Population: The Idaho Conservation Data Center has two records of bald eagles in the Idaho Panhandle prior to 1987. Idaho Department of Fish and Game also has records of seven bald eagle nests in the Idaho Panhandle prior to 1987. Monitoring bald eagle populations is a cooperative effort by the Forest Service, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, Bureau of Land Management, U.S. Army Corps of Engineers and Idaho Department of Lands. Aerial surveys are conducted during the breeding season to check known nests and look for new nests in appropriate habitat. Each January a midwinter bald eagle count is made along major lakes and rivers, including Pend Oreille and Coeur d'Alene Lakes, and the Pend Oreille and Kootenai Rivers.

The IPNF is in Zone 7 as designated in the 1986 Pacific States Bald Eagle Recovery Plan (USFWS 1986). At the time of federal listing, bald eagles were uncommon in this zone. Key recovery areas in northern Idaho have contributed enough new territories to exceed the goals listed in the Recovery Plan. The bald eagle was proposed for de-listing (removed from the threatened species list) in July 1999. The U. S. Fish and Wildlife

Service is reviewing the status of this species to determine whether to take it off the threatened species list. The following table shows how bald eagle populations have increased steadily in Zone 7 since the Forest Plan was written. New bald eagle nesting territories have been found every year for the past several years. Only three of the nests in the following chart are on national forest lands.

Table 13. Bald Eagle Nest Monitoring

Year	No. of Nests Monitored	No. of Nests Occupied	No. Of Chick Fledged	Midwinter Count
1988	10	10	10	240
1989	11	11	11	155
1990	11	11	14	90
1991	10	10	7	149
1992	17	8	10	231
1993	20	18	20	84
1994	23	21	24	198
1995	25	22	26	174
1996	29	25	28	164
1997	31	24	28	153
1998	34	26	32	129

The local bald eagle population increases in the winter, when Canadian eagles are attracted to the area's large lakes and rivers that don't freeze. These open water areas provide foraging opportunities throughout the winter for eagles to feed on fish and waterfowl.

Midwinter bald eagle counts vary considerably from year to year, largely due to the extent of ice on large lakes and rivers in Idaho and Canada in early January. Midwinter counts from 1988 to 1992 averaged 158. Midwinter counts from 1993 to 1998 averaged 164.

Habitat: Bald eagles select isolated shoreline areas with large trees for nesting, feeding and roosting. Nesting habitat is usually close to a sufficient food supply, where there are tall, dominant trees within line-of-sight of a large body of water (often within 0.25 mile of water). Nest trees typically are large ponderosa pine, Douglas-fir, western larch or cottonwood trees with open crowns in areas that are relatively free from human disturbance. Because eagles continue to establish new nesting territories each year in the Idaho Panhandle, nesting habitat is not considered to be limiting.

Residual toxic metals from historic mining are still present in sediment in some areas of the Coeur d'Alene Basin. The Forest Service is careful when conducting ground disturbing activities in those areas to not release those metals into streams or lakes. Hundreds of old mines that are potential sources of toxic metals have been identified and prioritized for cleanup. Four sites have been rehabilitated, including one with 120,000

cubic yards of mine tailings. Bald eagle habitat was monitored on 1,650 acres in 1996 and 22,285 acres in 1997.

Recommendations: The Forest Service will continue to monitor bald eagle nests and conduct midwinter bald eagle counts in cooperation with other agencies for at least five years, even if the eagle is delisted (USFWS 1999). We will continue to provide educational materials about bald eagles in Forest Service offices, on our web site and at the winter bald eagle viewing site on Lake Coeur d'Alene. We will continue to remove potential sources of lead and other contaminants from national forest lands by rehabilitating surface mine tailings under CERCLA (Comprehensive Environmental Response, Compensation and Liability Act of 1980).

Grizzly Bear see discussion for monitoring item F2

Woodland caribou see discussion for monitoring item F3

MANAGEMENT INDICATOR SPECIES (MIS)

Three threatened and endangered species listed as Management Indicator Species are discussed in other sections: bald eagle (in the previous section), grizzly bear (see discussion for item F2) and woodland caribou (see discussion for F3). Other MIS are discussed in this section. They include species commonly hunted and trapped which have special habitat needs that are affected by forest management (elk, white-tailed deer, moose and marten) and other species whose population changes are believed to indicate effects of management activities on a major biological group (pileated woodpecker and northern goshawk).

Northern Goshawk

Background and factors limiting population: The goshawk is a species of special concern for the Idaho Dept. of Fish and Game. Northern goshawks are large forest hawks that occur in northern Idaho year-round, although they are less common in winter. The Goshawk was chosen as a MIS as an indicator of mature and old growth habitat characterized by a dense overstory of large trees and an open understory. They feed primarily on small mammals and birds (Warren 1990 p. 20). Northern goshawks avoid large open areas due to competition from red-tailed hawks and great horned owls (Reynolds 1983). There are two limiting factors for goshawks: the amount of mature and old growth stands in large enough patches to provide nesting habitat; and open understory structure in otherwise suitable habitats.

Evaluation - Population: No data are available on goshawks in the Idaho Panhandle prior to 1987. Historic numbers of goshawks were likely higher than they are today, because mature and old growth forests were more abundant historically. The Idaho Conservation Data Center had no records for goshawks in the Idaho Panhandle although Forest Service biologists knew of eight goshawk territories on the IPNF when the Forest Plan was written. Since then we have found and monitored activity at 51 goshawk nest sites on the forest. Because of budget limitations, most could not be monitored annually. In some cases, biologists made conscious decisions that monitoring known goshawk nests was not a critical need; this decision arose from the belief that goshawks are relatively common in the IPNF and that other species have greater priorities at this time.

Annual monitoring efforts and surveys of habitats that had not previously been searched have increased the number of known nests to 51 in 1997. In 1988, six of the known nests were checked, and all were active. The number of active nests has varied between 4 and 13 over the last twelve years. Because the monitoring effort was not consistent each year, it is impossible to determine a population trend from these data.

T**able 14.** Goshawk Monitoring

Year	No. of Known Territories	No. of Territories Monitored	No. of Active Nests of Those Monitored
1988	8	6	6
1989	16	6	4
1990	22	7	4
1991	29	11	10
1992	32	19	13
1993	39	20	9
1994	44	9	7
1995	48	25	4
1996	42	19	4
1997	51	30	11
1998	51	D7=5 SZ=0	D7=2

Habitat: The draft geographic area assessment for the North Zone of the IPNF (Priest Lake, Sandpoint and Bonners Ferry Ranger Districts) indicates there is less mature and old growth than occurred historically on the IPNF. Old growth is important for northern goshawks because it provides prey species habitat and large trees for their substantial nests. Because northern goshawks require a combination of adequate understory to provide prey species, and adequate clearance for flight maneuverability, some stands that historically were suitable for foraging are no longer suitable because they now have a dense understory of small trees. Fire suppression has been the major cause of increased understory growth.

A model was developed to evaluate timber stand data and determine which stands are goshawk habitat. The North Zone has 86,940 acres of capable goshawk habitat and 40,830 acres of currently suitable habitat. In many parts of the forest, capable habitat is not currently suitable because of small tree size, low density of large trees, low canopy closure, or a high density of understory vegetation. Habitat with few large trees may grow into suitable habitat over time.

Goshawk habitat was monitored on 23,900 acres in 1996; 7,065 acres in 1997; and 5,825 acres in 1998. Five structures were constructed to benefit goshawks in 1997. The extensive goshawk nest monitoring on the Bonners Ferry Ranger District in the last few years was funded primarily by a grant from Pacific Gas Transmission Company; it would not have been possible without their support. When the forest plan was written, goshawks were thought to be an old growth-dependent species. Goshawks usually nest in stands dominated by large and old trees. Our monitoring also found goshawk nests in stands which would not have previously been considered goshawk habitat, where the trees were small diameter (not old growth), and the forest canopy was fairly open. One goshawk nest successfully fledged young the three years after the forest around it had

been thinned by timber harvest. Another nest was first found in 1998, mitigation measures were taken to protect the nest during logging, and it produced young in 1999.

A nesting pair of goshawks typically has one or more alternate nests in its territory; only one nest will be used each year. As we have found more alternate nests, the percent of nests that are active in a given year is less than the total number of nests. Inactive nests may indicate a decline in population, however, it is also likely that a pair has used an alternate nest. Since alternate nests can be up to 1.5 miles from the previously used nest, it is often very difficult to locate them. Surveyors often report goshawks near a previously used nest, but are unable to find a new nest. Annual weather conditions and time of surveys have a large effect on determining whether territories are active or not.

Recommendations: Based on current funding levels and other higher priority species, goshawks would no longer be monitored. Develop mature and old growth strategies thru the Geographic Assessments and monitor habitats thru project analysis and at larger scales as appropriate.

Elk

Background and factors limiting population - Elk are now present in greater numbers than they were historically, partially due to reintroductions in the early 1900's. The key habitat limiting factor for maintaining elk population numbers may be the loss/maturing of low elevation brushfields (Idaho Department of Fish and Game).

Elk are the Management Indicator Species for big game on the central and southern portion of the IPNF (the watersheds of the Coeur d'Alene, St. Joe and St. Maries Rivers). Managing for elk includes: 1) Maintaining cover and productive winter range habitat to support overall elk population; 2) Providing security areas at least 250 acres in size well distributed across the forest to maintain bull elk populations; and 3) coordinating with Idaho Dept. of Fish and Game to meet bull elk and total elk population goals.

Evaluation - Population: Many factors affect elk populations, including habitat conditions, winter weather, and hunter success. Idaho Department of Fish and Game conducts surveys when elk are concentrated on winter ranges, but not most years due to limited funding. Two 1998 surveys of elk in the Panhandle Zone (Units 1, 2, 3, 4, 4A, 6, 7 and 9) found 6,668 and 5,561 elk respectively. Elk populations have declined 30% since the late '80's (personal communication, Jim Hayden, regional wildlife biologist, Idaho Department of Fish and Game 9/22/99). This is due mostly to a major winterkill of big game in the winter of 1996-1997 and partly due to reduced forage capacity over this period.

The following data summarize elk harvest in the Panhandle Zone.

Table 15. Number of elk harvested, 1988-1998

Year	Number of Elk Harvested
1988	2,311
1989	2,561
1990	2,055
1991	2,150
1992	2,047
1993	2,946
1994	3,418
1995	3,003
1996	3,004
1997	1,515
1998	1,520

Habitat: The status and type of roads in Elk Habitat Units (EHUs) are supposed to be monitored and updated annually to reflect changes due to timber sales (includes both opening and closing roads), watershed improvement projects and other management activities. Elk Habitat Potential (EHP) is an estimate of the existing habitat condition compared to what it would potentially be if all habitat factors were optimal (Leege). EHP measures elk habitat security and is mainly driven by open road densities; it does not measure winter range quality. Elk habitat was monitored on 3,335 acres in 1996. EHP was monitored on the Central Zone (Wallace and Fernan) and South Zone (Avery and St. Maries). The following table shows the weighted average EHP for the elk habitat units each year. ND = no data available.

Table 16. Elk habitat potential

Year	Wallace	Fernan	Avery	St. Maries
GOAL	52% or more	48% or more	65% or more	53% or more
1988	53%	48%	70%	ND
1989	55%	48%	67%	ND
1990	54%	46%	65%	ND
1991	54%	47%	67%	ND
1992	54%	48%	68%	61%
1993	53%	49%	67%	61%
1994	46%	51%	ND	ND
1995	46%	51%	ND	ND
1996	46%	51%	ND	ND
1997	46%	51%	ND	ND
1998	54%	52%	58%	66%

In 1997, winter range shrub plantings monitored on 5 timber sales on the South Zone found survival rates of 8% to 89%; competition from other plants and damage from big game and gophers contributed to poor survival. Two other elk habitat improvements were monitored on the SZ in 1997: browse slashing project produced abundant regrowth; an aspen regeneration project indicated felling may be more effective than girdling.

Historically, low elevation brushfields were maintained by frequent wildfires. Our current policy of fire suppression controls fires that could, if left to burn, improve elk winter ranges. Between 1988 and 1993, elk habitat was improved on 8,442 acres on the IPNF by timber harvest and prescribed burning. Additional elk winter ranges were improved on 290 acres in 1996 and 1,971 acres in 1998. Each year numerous road closure structures are repaired or maintained for elk security. In 1997, the South Zone installed 15 structures to reduce open road density and improve elk habitat security.

Recommendations: Continue to improve elk habitat winter range conditions with prescribed fire and noxious weed control as funding is available. Develop prescribed natural fire plans that would allow wildfires to burn when they would improve big game summer or winter ranges. Transportation-related issues, such as highway mortality, will increasingly be addressed through cooperation with state and federal agencies and railroad interests. Work with Idaho Department of Fish and Game to assess effects of all terrain vehicle use on elk habitat potential. Re-evaluate the current elk model to determine whether we should be monitoring bull vulnerability to hunting and habitat conditions separately.

Moose

Background and factors limiting population: Moose occur in a variety of habitats but favor early successional stages especially during winter. Early seral stages are necessary for winter foraging, and cover is necessary for escape, thermal protection, and hiding.

The IPNF includes the nucleus and winter range of Washington's only viable resident moose population. Moose are found in low numbers scattered throughout the forest. Moose on the St. Joe are dependent in winter on mature timber stands. Pacific yew is their preferred browse and it is a late successional species. The Forest Plan does not emphasize moose on the central and southern portion of the Forest.

Evaluation - Population: Idaho Department of Fish and Game and Washington Department of Fish and Wildlife haven't conducted a moose census since the forest plan was written. Monitoring of moose consists of collecting harvest information from the Idaho Department of Fish and Game, the Washington Department of Wildlife, and tracking the modification of Pacific yew stands on the Avery District. According to Idaho Department of Fish and game, the moose population is increasing; highest densities are north of the Pend Oreille River. Although data are not available on how many moose are killed by motor vehicles and trains, transportation corridors have been recognized as important sources of mortality for moose in the Idaho Panhandle. Along with poaching,

roadkills account for 25 to 45 moose deaths annually (Hayden 1999). This represents about 1/3 of all known moose mortalities.

One measure of population trends is hunter harvest. The following table shows moose harvest in the Panhandle Zone.

Table 17. Number of moose harvested, 1988-1998. ND = no data available

Year	Number of Moose Harvested
1988	39
1989	41
1990	41
1991	43
1992	ND
1993	ND
1994	ND
1995	84
1996	ND
1997	88
1998	87

Recommendation: Transportation-related issues, such as highway mortality, will increasingly be addressed through cooperation with state and federal agencies and railroad interests.

White-tailed Deer

Background and factors limiting population: White-tailed deer are the chief big game species of the northern portion of the forest, which includes the Kootenai, Priest, and Pend Oreille River watersheds. White-tailed deer replace elk as indicator species in these areas.

This species flourished in the 1800s, but by the early 1900s their populations were reduced to low numbers due to over exploitation by trappers, miners and settlers. White-tailed deer populations have rebounded to a point where they are the most abundant big-game species in northern Idaho. Idaho Fish and Game's 1986-1990 Statewide goals for white-tailed deer were changed from emphasizing increases in populations to maintaining populations, harvest, and recreational opportunities. White-tailed deer are very adaptable and prolific, and thrive in a variety of habitat types and seral stages. They are also tolerant to disturbances, such as agriculture and forestry practices, and prefer areas where an adequate arrangement of cover and forage is available. Some of the largest white-tailed deer populations in Idaho occur in the Idaho Panhandle. In 1985, the Idaho Department of Fish and Game estimated that 99 percent of the State's population was found in their two northern regions.

Evaluation - Population: Many factors affect deer populations. These include habitat conditions, winter weather, and hunting regulations, but the limiting factor in north Idaho is severe winter weather. Idaho Department of Fish and Game doesn't track deer populations in this part of the state, and it has no plans to census deer in the next five years. The following data (Idaho Department of Fish and Game 10/98) show white-tailed deer for Game Management Units on the IPNF (harvest units 1, 2, 3, 4a, 5, 6, 7 and 9).

Snowfall during the winter of 1996-1997 was one of the heaviest on record. The sharp decline in deer harvest in 1997 was a result of 20% to 60% winterkill in various watersheds during that winter. White-tailed deer populations are again rebounding after a mild winter in 1998-99.

Table 18. Number of white-tailed deer harvested, 1988-1998. ND = no data

Year	White-tailed Deer Harvested
1988	ND
1989	ND
1990	ND
1991	6,511
1992	3,962
1993	7,566
1994	12,897
1995	12,946
1996	8,729
1997	4,877
1998	4,405

High populations of white-tailed deer can affect other wildlife populations. Deer are prey for many predators, including mountain lions, grizzly bears and wolves. As deer populations increase, predator populations often follow. Mountain lion populations have doubled or tripled in the last ten years (Hayden 1999). A few years ago, Washington stopped allowing hunters to use hounds to hunt mountain lions; as a result, mountain lion populations are increasing in northeast Washington. Mountain lion predation on caribou is a concern. Increasing mountain lion populations are threatening the survival of the woodland caribou in the Selkirk Mountains.

Habitat: White-tailed deer habitat was monitored on 1,318 acres in 1998. The following table shows acres of winter range improved for deer and other big game by timber harvest, prescribed fire and browse planting on the IPNF.

Table 19. Acres of big game winter range improved, 1988-1998

Year	Acres of big game winter range improved
1988	0
1989	0
1990	0
1991	0
1992	0
1993	0
1994	1,520
1995	1,045
1996	520
1997	624
1998	0

Recommended Action: Encourage Idaho Dept. of Fish and Game and Washington Dept. of Fish and Wildlife to monitor white-tailed deer populations and evaluate this keystone species' effect on predator populations, woodland caribou and other wildlife including mule deer.

American Marten

Background and factors limiting population: The marten was selected as a management indicator species because they are closely associated with mature and old-growth timber stands where there is an abundance of down woody material, preferring moist habitat types where small mammals are more abundant. American martens avoid stands with less than 30 percent canopy closure (Warren 1990, Spencer 1981 in Warren 1990 p. 30). Large downed logs and snags provide secure resting locations and denning habitat. Leaning trees and logs are used as travelways during the winter; martens hunt along them for small mammals living beneath the snow (Patton and Escano in Warren, 1990, pp. 29-30). American martens are easily trapped and are highly vulnerable to overharvest in areas accessible by fur trappers. The limiting factor for this species is availability of mature forests with abundant large down woody material.

Evaluation - Population: Because the marten is a furbearer species, populations can vary greatly from year to year, depending on where this species is trapped. Therefore low marten populations do not necessarily predict poor habitat conditions. Fur trapping activity today is only a fraction of what it once was.

Approximately 12 miles of winter track surveys on two districts during 1992 found five sets of marten tracks. 1993 surveys covered approximately 10 miles and found eighty-six sets of marten tracks on undisturbed roads and trails. On the Priest Lake Ranger District in 1995, four baited camera stations were maintained in the Kalispell Creek drainage for the winter period; marten were photographed at all stations. In 1997, three

baited camera stations maintained for a thirty-day monitoring period in the Solo Creek drainage documented martens at each station throughout the monitoring period. In 1998, approximately 70 miles of winter track surveys were conducted with three repetitions on the Priest Lake Ranger District, and marten tracks were documented.

The Forest Service supported a master's student who conducted marten research on the forest. His thesis has not been completed, and the data from his research are not available. Population trends for this species are currently unknown.

Habitat: When the Forest Plan was written, we did not have the technology to assess mature and old growth forest habitats at the landscape scale. Consequently, the pine marten was chosen as a surrogate for estimating habitat condition. It is better to measure the habitat directly than to use a wildlife species as a surrogate to estimate habitat suitability. We now use Geographic Information Systems (GIS) extensively to evaluate habitat abundance and distribution. Habitat modeling based on the timber stand database has its limitations: the data are, on average, 15 years old; canopy closure estimates are inaccurate; and data do not exist for the abundance or distribution of snags or down woody material, which are both important marten habitat components.

Recommended Action: Re-evaluate whether the marten is appropriate as a management indicator species. Apply snag and down woody material guidelines from the Upper Columbia River Basin Assessment to improve marten habitat. Implement mature and old growth forest structures, thru the geographic area assessments that include amounts, patch sizes, connectivity, and distribution to meet species needs. Monitor habitats thru project analysis and by sub-basin.

Pileated Woodpecker

Background and factors limiting population: Pileated woodpeckers are indicators of old growth or late successional ponderosa pine and Douglas-fir forests. They are year-round residents that nest in forests with tall, large diameter (at least 20 inch dbh) dead or defective trees. Nest cavities are usually located more than 30 feet above the ground. This is a keystone species in the ecosystem because vacated pileated woodpecker nest cavities are used by dozens of other wildlife species. Pileated woodpeckers feed primarily on carpenter ants and other insects, excavated from deep within dead and decaying wood.

Because foraging habitats include a wider ecological range of forest ages and structures, nesting habitat [trees at least 20 inch diameter breast height (dbh)] is considered the most critical and limiting factor for pileated woodpeckers. A pileated nesting area should be at least 100 contiguous acres with an overall canopy cover of at least 50 percent (Warren 1990, p. 16).

Evaluation - Population: We have done very little monitoring of pileated woodpeckers directly because it is very difficult and expensive to monitor the species compared to monitoring its habitat. The Forest Service found one pileated woodpecker on a 2.5 mile

transect in 1992. Biologists often note where they observe pileated woodpeckers or their sign in the field, but these incidental data are not sufficient to estimate current or past populations of this species. In 1995, ornithologist Dr. Dick Hutto stated, "Pileated woodpeckers are widespread throughout the western third of the region." (This includes the IPNF) "They need large trees in relatively uncut stands for nesting purposes, which is reflected in the fact that they occur significantly more often on points with an abundance of snags and dead/down than on points without those characteristics." (Hutto) This species can be detected during the Region 1 Landbird Monitoring Program. However, because woodpeckers tend to call earlier in the season than most migrants, the survey protocol underrepresents woodpeckers. This program is designed to monitor long-term trends in landbird populations, so the numbers found thus far do not adequately indicate trends yet.

Habitat: When the Forest Plan was written, we did not have the technology to assess mature and old growth forest habitats at the landscape scale. Consequently, the pileated woodpecker was chosen as a surrogate for estimating habitat condition. We now use Geographic Information Systems (GIS) extensively to evaluate habitat abundance and distribution. Habitat modeling based on the timber stand database has its limitations: the data are, on average, 15 years old; canopy closure estimates are inaccurate; and data do not exist for the abundance or distribution of snags or down woody material, which are both important pileated woodpecker habitat components.

Recommended Action: Re-evaluate whether the pileated woodpecker is appropriate as a management indicator species. Continue to monitor numbers on a long-term trend basis with the Landbird Monitoring Program. Continue to develop procedures to monitor snags and down wood across the landscape. Snag data can be used along with long-term monitoring results, and habitat modeling, to estimate population trends. Document locations where pileated woodpeckers are observed and submit these data to the Conservation Data Center.

Forest Plan Monitoring Item F-2 Grizzly Bear Recovery Objective

The purpose of this monitoring item is to monitor the population changes and habitat effectiveness of grizzly bears to determine if recovery objectives outlined in the Grizzly Bear Recovery Plan are being met.

Background and factors limiting population: The grizzly bear was listed as threatened in 1975. The bear originally occupied a variety of habitats throughout western North America. Today, it is confined to less than 2 percent of its original range, represented in five or six population centers south of Canada, including the Selkirk and Cabinet-Yaak Ecosystems. Three main criteria listed in the grizzly bear Recovery Plan evaluate the status of grizzly bear recovery: 1) the number of female grizzly bears with cubs; 2) the number of bear management units (BMUs) where grizzly bears are known to occur; and 3) the number of grizzly bear mortalities.

Populations of grizzly bears persist in those areas where large expanses of relatively secure habitat exist and where human-caused mortality is low. The U.S. portion of the Selkirk Ecosystem of northwestern Idaho, northeastern Washington and southeastern British Columbia includes 1,081 square miles of grizzly bear habitat. Of the 2,600 square miles of grizzly bear habitat in the Cabinet-Yaak Ecosystem of northwestern Montana and northeastern Idaho, 749 square miles are in Bear Management Units (BMUs) managed by the IPNF. Forty to fifty percent of Selkirk/Cabinet/Yaak grizzly bears use habitat in both the U.S. and Canada. Grizzly bears are considered habitat generalists and opportunistic feeders. They commonly choose low elevation riparian areas and wet meadows during the spring and generally are found at higher elevations the rest of the year.

Historic information confirms that grizzly bears were undoubtedly more plentiful in the past than they are today. From the arrival of the first white settlers through the late 1970's, human access has steadily increased into areas occupied by grizzly bears, precipitating an increase in the frequency of human/bear encounters. These encounters have resulted in the death of some grizzly bears. The limiting factor for recovery of grizzly bear populations is direct mortality from people shooting bears, especially during hunting season. Sanitation is also an important threat, since most garbage sites are still open to bears. The main goal for recovery in both ecosystems is reduction of human-caused mortality (SCY report). Ever-increasing human use of the national forest and development on private lands will cause more future impacts to grizzly bears, especially on their spring ranges. higher elevation meadows, ridges, and open brush fields during the summer.

Evaluation – Population: In 1988, the Selkirk grizzly bear population density in the U.S. was estimated at one bear per 16 square miles. The recovery plan gave no population or density estimate for the Cabinet-Yaak ecosystem (USFWS 1993, p. 3). Grizzly bear populations are hard to assess because dense forest vegetation make it difficult to see bears. Population estimates are based on surveys, bear sightings and mortality data from the Idaho Department of Fish and Game and U.S. Fish and Wildlife Service. The Selkirk

ecosystem population estimate is 45 to 50 grizzly bears; the Cabinet-Yaak estimate is 30 to 40 bears. The populations are at or below half of the carrying capacity of the habitat (SCY report), and increasing by about 2% to 2.5% per year (Wakkinen).

Since 1983, thirty-six grizzly bears have been fitted with radio collars and monitored (18 in the Selkirks and 18 in the Cabinet-Yaak). Grizzly bear family groups have been seen in all BMUs on the IPNF except LeClerc; none have been sighted in the Lakeshore BMU in the last 5 years. Most known mortality since 1987 (26 grizzly bears) has been human-caused, associated with motorized access and either legal hunting in British Columbia or hunter mis-identification. Grizzly bear hunting in the Canadian Selkirks has been closed since 1985 (SCY report). Grizzly bear mortalities were documented between 1987 and 1993 in the Blue-Grass, Long-Smith, Sullivan-Hughes, LeClerc, Kalispel-Granite and State of Idaho BMUs. In the last 5 years, only the Blue-Grass and Kalispell-Granite BMUs have had known grizzly bear mortalities.

The Forest Service has contributed to several goals in the grizzly bear recovery plan. (USFWS 1993) We have helped fund the monitoring of radio-collared grizzly bears. We have also published brochures and posted signs to help educate the public about bears and prevent accidental shooting of grizzly bears by hunters. Our law enforcement personnel have cooperated with state and U.S. Fish and Wildlife Service law enforcement agencies in preventing, investigating and prosecuting illegal bear mortalities.

Habitat Monitoring / Grizzly Bear Security: Monitoring radio collared grizzly bears in the Selkirks between 1989 and 1994 showed that grizzly bears prefer habitat with low road densities, and avoid areas with over 2 miles of total road per square mile of habitat.

Increased public awareness, law enforcement and motorized access management are the primary tools for reducing grizzly bear mortality caused by humans. The number of gates in grizzly bear habitat is 10 times the number that existed in 1987.

The goals of access management in recovery areas are to reduce the potential for humans to encounter grizzly bears; and to provide secure habitat areas for females to raise their young (SCY report). Most road systems regulated to protect grizzly bears are only closed seasonally; they are open to motorized access when bears are in their dens. Winter logging is used extensively in grizzly bear habitat, when denning bears will not be disturbed.

Fifty-seven road closures designed to provide security habitat have been routinely monitored on the Priest Lake Range District since 1995. Sixteen of these closures are guardrail barriers and the remainders are standard gates. Monitoring is conducted on the average of once each two weeks and a shorter time period when conditions permit. During state hunting seasons, closures are monitored once each week. Monitoring determines gate effectiveness and also provides routine maintenance such as replacement of signs and repair of any structural damage if needed. With regular monitoring and maintenance, gates and guardrail closures are very effective in providing security habitat for grizzly bear and other wildlife species. Guardrails are generally more effective than

gates. Gates are more easily vandalized than guardrails as a result of their generally lighter construction. Guardrails present a more formidable closure structure than gates and thus are less likely to be breached by vandalism. Guardrail barriers are more acceptable by the public than gates.

Grizzly bear habitat security is measured annually in fifteen grizzly bear management units (BMUs) in the Selkirk and Cabinet-Yaak Ecosystems. Each BMU (except Lakeshore) is approximately 100 square miles, the average home range of a female with cubs. The primary habitat management goal in 1987 was to maintain at least 70 square miles of secure habitat in each BMU, with essentially no restrictions on administrative use. In 1998 it is 70% of each BMU in secure habitat, with limited administrative use.

Lakeshore BMU on the west shore of Priest Lake is 30 square miles. The high level of summer homes, resorts, campgrounds, etc. makes grizzly bear habitat maintenance and improvement unattainable in this area. Since it is not feasible to achieve similar security and core objectives as the other BMUs because of land ownership patterns, the goal for Lakeshore BMU is to have no net lost of existing security and core habitat. Related goals are to reduce grizzly bear attractants, sanitation problems, and the risk of grizzly bear mortality.

Six BMUs have maintained 70 or more square miles of secure grizzly bear habitat since 1987: Northwest Peaks, Blue Grass, Long Smith, Ball Creek, Sullivan-Hughes and Salmo-priest. The 70 square mile goal has been reached eight out of nine years in Keno, Boulder and Scotchman BMUs; and seven years in North Lightning, Myrtle and LeClerc BMUs. Security in Kalispell-Granite has increased from 63 to 96. 1993 was the only year all BMUs met the 70 square mile goal.

Table 20. Square miles of secure habitat in each bear management unit by fiscal year.

GRIZZLY BEAR MANAGEMENT UNIT AND ECOSYSTEM	Total Square miles	FY90	FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98
Cabinet-Yaak Ecosystem										
North lightning	107	81	61	67	73	75	71	72	74	71
Scotchman	95	79	72	74	70	71	71	70	71	66
Grouse	99	46	46	68	72	72	68	68	68	56
Boulder	98	70	66	70	72	72	70	71	70	70
Keno**	96	70	70	70	70	70	70	70	69	73
Northwest Peaks**	109	74	74	81	79	79	79	79	86	72
Selkirk Ecosystem										
Blue-Grass	90	71	72	70	71	71	73	71	71	71
Long-Smith	104	82	79	83	73	73	84	84	84	72
Ball Creek	91	75	72	70	70	70	72	73	87	77
Myrtle	99	69	71	70	72	72	72	69	69	73
Sullivan-Hughes*	120	86	82	79	76	76	74	74	74	74
Le Clerc*	130	63	63	72	72	72	72	72	72	ND
Salmo-Priest	136	96	96	104	108	108	108	108	108	108
Kalispell-Granite	132					63	63	55	94	96
Lakeshore	30					ND	ND	ND	ND	8

ND = No Data
* shared with Colville NF
** shared with Kootenai NF

The Kalispell/Granite and Lakeshore bear units were established in 1993 as a result of the revised Grizzly Bear Recovery Plan.

1998 data for North Lightning, Scotchman Peak, and Grouse based on GIS analysis. Previous analysis was based on hand digitizing.

Myrtle was below security in 1990, 1996 and 1997 because of private landowner's activities. There were no security losses due to Forest Service activities.

Figure 2

Grizzly Bear Security

Percent of Bear Management Units
that meet Forest Plan standards

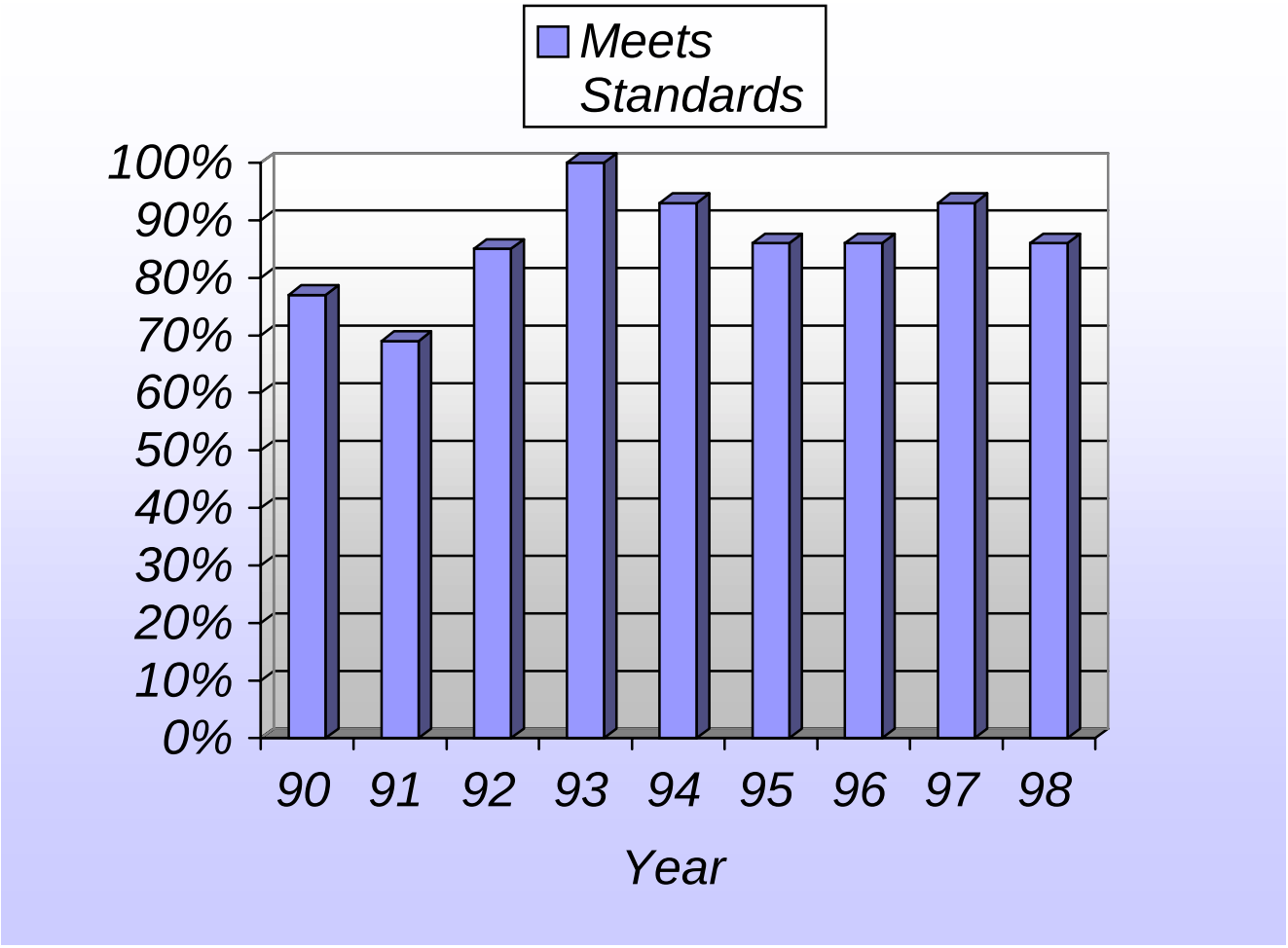


Table 21. Grizzly Bear Management Units (BMUs) - 1998

BMU	Open Roads > 1 mi./sq.mi.	Total Roads > 2 mi./sq.mi.	% Core	% Habitat Security
Blue-Grass	20	33	44.2	79
Long-Smith	25	14	70.7	70
Kalispel-Granite	34	38	43.1	70
Salmo-Priest	30	24	64.1	ND
Sullivan-Hughes	20	23	54.8	ND
Myrtle	20	18	60.5	73
Ball-Trout	ND	ND	ND	85
Le Clerc	38	48	33.2	ND
Lakeshore	ND	ND	ND	ND

ND = No Data Available

Beyond the Forest Plan: Habitat security has increased dramatically over the monitoring period in several important ways which cumulatively provide important benefits to recovering the grizzly bear:

1) less administrative use (Forest Service approved traffic on roads closed to the public);
2) reduced noise level of administrative uses behind gates (i.e. weed control or timber sale planning vs. heavy equipment use);
3) more monitoring of road closures, resulting in quicker repairs and more effective road closures;
4) planning gate locations to allow management flexibility while protecting habitats which are known to be used by grizzly bears;
5) designing and building gates which work better to restrict motorized vehicles;
6) changing gate locks to prevent illegal access into closed areas;
7) helping the public to understand and support road closures for bears by standardizing the closure dates; and making travel plans and closure signs easier to read, and educating Forest Service personnel about the importance of road closures for bears;
8) funding gate monitoring and maintenance; and
9) better accountability of road status using GIS (Geographic Information Systems).

The Forest Plan allowed for the incorporation of the best available science for the management of grizzly bears by incorporating the Interagency Grizzly Bear Committee (IGBC) as direction. This allowed the Forest Plan to be a dynamic document and take advantage of new research.

Much of the current direction for recovery of this species comes from the IGBC. The Committee recently decided that the standard for measuring grizzly bear security in the Selkirk and Cabinet-Yaak Ecosystems would be the percent (not square miles) of secure habitat. At the request of the IGBC, the Selkirk/Cabinet-Yaak subcommittee (1998) developed an interim access management strategy to address impacts related to motorized access, until Forest Plans are revised. This strategy specifies desired levels of security and core habitat in each BMU. These will be in place until the subcommittee can formally adopt guidelines for approval by the Interagency Grizzly Bear Committee. Public meetings were held in Bonners Ferry, Priest Lake and Sandpoint to determine the level of public support for the interim guidelines. Comments received at these public meetings are being used in the current review of the habitat guidelines.

The interim guidelines established a new criterion for a minimum level of security habitat which is different from the Forest Plan direction. It requires 70 percent (vs.70 square miles) of each BMU be secure habitat. It also states there will be no net loss of existing core habitat. Compared to the forest plan 70 square mile standard, the 70 percent standard is easier to achieve in BMUs that are less than 100 square miles in size. However, the new standard requires a larger area of secure habitat in BMUs that are over 100 miles in size.

This change will make it somewhat more difficult to compare the present monitoring period's ongoing BMU security status with the next decade's status.

Recommended Action: If we are to successfully recover grizzly bear populations, the Forest Service must continue to work with the Idaho Department of Fish and Game in dealing with direct mortality of the bear by humans, especially during hunting seasons. We should emphasize public information and education efforts, especially with hunters. A multi-action strategy is needed for the recovery to be successful.

Continue to monitor and maintain effective closures designed to provide security habitat for grizzly bears. Seek opportunities to convert gates to guardrail barriers whenever possible to reduce maintenance and replacement costs. Continue to monitor the status of each BMU annually, complying with guidelines established by the Interagency Grizzly Bear Committee. As funding allows, support Idaho Dept. of Fish and Game's monitoring of radio collared grizzly bears and research on road densities and bear habitat use. Investigate using seasonal road closures in areas that are not used yearlong by bears. Continue to support state law enforcement efforts.

Forest Plan Monitoring Item F-3 Caribou Recovery Objectives

The purpose of this monitoring item is to monitor the population changes and habitat effectiveness of caribou to determine if recovery objectives outlined in the Mountain Caribou Recovery Plan are being met.

Background and factors limiting population: The Selkirk caribou population was emergency listed as endangered in 1983, and a final ruling on its status appeared in the Federal Register in 1984. The recovery area for the population is the Selkirk Mountains of northern Idaho, northeastern Washington and southern British Columbia. Management for the recovery of caribou in the Selkirk Mountains includes monitoring populations and habitat conditions.

This caribou population is generally found above 4000 feet elevation in the Selkirk Mountains in Engelmann spruce/subalpine fir and western red cedar/western hemlock forest types. In the Priest Lake Basin, caribou occasionally are found as low as the valley bottom. Caribou are adapted to boreal forests and do not occur in drier, low elevation habitats except as rare transients. Seasonal movements are complex in this population, which frequently crosses the U.S. / Canada international border. Earlier this century, caribou occurred as far south as Lewiston, Idaho; now they are restricted to the northern portion of the IPNF.

The caribou population is threatened by illegal killing; predation; habitat alteration from timber harvest and fires; roadkill and possibly displacement by snowmobiles (USFWS 1994). It has been speculated that past timber harvesting in and adjacent to caribou habitat have increased habitat fragmentation beyond historic levels and have resulted in an increase in white-tailed deer in caribou habitat. As deer populations increased, so have mountain lions, resulting in more predation on caribou by mountain lions. Predation and limited amounts of early winter habitat are believed to be the most significant limiting factors for caribou at this time.

Evaluation - Population: Caribou numbers vary annually, and have been monitored with annual winter censuses and radio-collared animals by Idaho Dept. of Fish and Game, Washington Dept. of Fish and Wildlife and the U.S. Fish and Wildlife Service. From 1987 to 1990, sixty caribou were transplanted to the IPNF from British Columbia. The current population of the Selkirk caribou herd is 48. The population trend is down, although the last two years mortalities have been fewer than in previous years. Before 1996, Idaho Dept. of Fish and Game monitored the caribou on the IPNF, largely with U.S. Fish and Wildlife Service and Forest Service funding. In 1996 and 1997 Washington Dept. of Fish and Wildlife transplanted caribou from British Columbia to northeastern Washington. Since then, Washington has taken the lead in monitoring caribou survival, mortality and habitat use.

Monitoring has shown that the overall survival of the relocated caribou has been lower than expected, with high caribou mortality. The known causes of mortality have been predation, poaching, highway kills and accidental deaths. Mountain lions, grizzly and

black bears all prey on this caribou herd. In many cases, the species of predator that killed a caribou could not be determined because of extensive scavenging by bears. Forty-two caribou deaths were documented in the Selkirk population between 1987 and 1998. The radios on eighteen other caribou failed or were lost; it is not known whether these animals have died.

Table 22. Woodland caribou winter census results, Selkirk Mountains, 1991-1997 (Data from Selkirk Ecosystem Project, Dec 1996-Dec 1997, Study II: Selkirk Mountains Caribou Transplant, Idaho Department of Fish and Game, Dec. 1997)

Year	Area	No. of Adults	No. of Calves	U.S. and Canada Totals	Ecosystem Total
1991	Two-Mouth area (US)	23	3	26	
	Stagleap (Canada)	17	4	21	47
1992	Two-Mouth area (US)	23	1	24	
	Stagleap (Canada)	21	2	23	47
1993	Two-Mouth area (US)	20	3	23	
	Stagleap (Canada)	24	4	28	51
1994	Two-Mouth area (US)	12	1	13	
	Stagleap (Canada)	28	4	32	45
1995	Two-Mouth area (US)	10	3	10*	
	Stagleap (Canada)	34	5	39	49
1996	Two-Mouth area (US)	10	2	12	
	Stagleap (Canada)	23	4	27	39
1997	Two-Mouth area (US)	7	2	9	
	Stagleap (Canada)	25	5	30	39
1998	Two-Mouth area (US)	no data	no data	no data	45
	Stagleap (Canada)	no data	no data	no data	

- known incomplete count

Early surveys indicated a majority of animals in the Two Mouth area, but all surveys after 1993 detected more animals in the Stagleap area. The 1996 survey showed a decline in both areas. The Washington Department of Fish and Wildlife released 19 caribou in the spring of 1996 and 13 in the spring of 1997. Therefore the 1997 winter census includes the 19 caribou that were released in 1996 but not the 1997 release. The apparently stable population in 1997 was only possible by transplanting 19 caribou from Canada. This indicates a serious decline in the population that existed prior to the augmentation.

As part of the plan for recovery, caribou were transplanted into the ecosystem from source populations in British Columbia. Transplanting caribou from Canada into the population to compensate for the high mortality made it possible to stabilize the population at about 50 animals for several years before it declined again. 60 caribou were translocated from central British Columbia to the Selkirk Mountains of northern Idaho between 1987 and 1990. By 1990, the Selkirk caribou population had increased to approximately 55 to 70 animals. The population remained somewhat stable through the early 1990's but a decline in 1996 and was believed to be the result of increased predation and other factors. The Washington Department of Fish and Wildlife released 19 caribou in the spring of 1996 and 13 in the spring of 1997. These individuals have been found in Washington, Idaho and British Columbia since their release.

Selkirk Mountains Woodland Caribou Recovery Project: The interagency caribou technical committee has identified predation by mountain lions as a major factor limiting the recovery of this species. This project is a cooperative effort among state, federal, and provincial (British Columbia) agencies and private researchers. It is designed to monitor and identify individual mountain lions that are preying on caribou, and remove the problem animals.

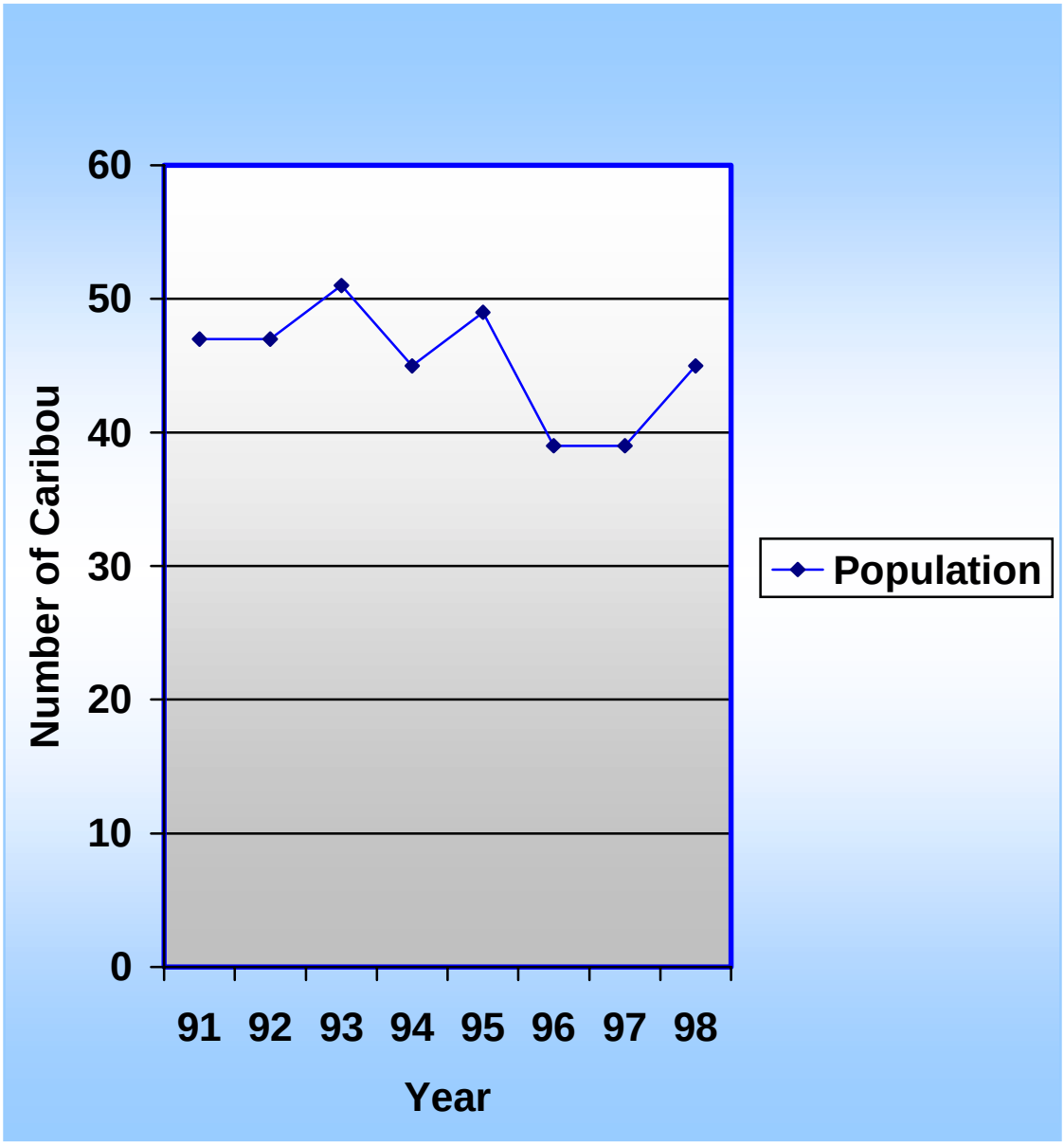
Habitat Monitoring: The Idaho Panhandle National Forest encompasses 174,760 acres of woodland caribou habitat. This is 39% of caribou habitat in the Selkirk Ecosystem and 53% of the caribou habitat in the U.S. portion of the ecosystem. (USFWS 1994) In 1998 23,300 acres of caribou habitat was monitored. Appendix N of the Forest Plan listed specific habitat management guidelines for caribou. New scientific data on how caribou use their habitat has resulted in a revised habitat analysis procedure. This effort along with continued research on caribou habitat preferences has indicated that the Forest Plan's five seasonal habitats are not distinct, but rather overlap in several seasons. Analysis thus far continues to support the assumption that early winter habitat in 'target' condition is an important and possibly limiting factor for caribou recovery.

The forest plan defined target conditions for each of five seasonal caribou habitats. Achieving these target conditions is a long-term process that can be accomplished through manipulation of vegetation or natural succession.

Recommended Action: Continue to implement recommendations of the caribou steering committee and recovery teams. Support Idaho Dept. of Fish and Game in winter caribou censuses; monitoring radio collared caribou; and research on predation and other factors that are preventing the recovery of this species. Revise the habitat management guidelines using new research information and monitor changes over time. Use silvicultural practices to improve the condition of caribou habitat and trend it toward target conditions. Develop and implement a winter security strategy thru recommendations from the North Zone Geographic Area Assessments. Monitor snowmobile and other winter uses to better understand the role of disturbance to this species during winter.

Figure 3

Selkirk Woodland Caribou Population



SENSITIVE SPECIES

Our management goal for sensitive species is to maintain viable populations so they do not become listed as threatened or endangered. The 1987 IPNF Forest Plan did not contain a list of sensitive species. Since then, the Regional Forester has designated the following species that occur on the IPNF as Sensitive.

amphibians: Coeur d'Alene salamander, northern leopard frog, boreal toad

birds: common loon, harlequin duck, flammulated owl, boreal owl, black-backed woodpecker, white-headed woodpecker and northern goshawk

mammals: Townsend's big-eared bat, northern bog lemming, lynx, fisher, wolverine

The boreal owl was removed from the sensitive species list in spring, 1999. The northern leopard frog, boreal toad and goshawk were added to the list in spring, 1999. The goshawk is discussed in the Management Indicator Species section of this report. The lynx was proposed for listing as a threatened species in July 1998.

Several sensitive species are listed by the Idaho Dept. of Fish and Game as "species of special concern." These are native species which are either low in numbers, limited in distribution, or have suffered significant habitat losses."

Coeur d'Alene salamander

Background and factors limiting population - Coeur d'Alene salamanders are a species of special concern. This narrow endemic occurs only in northern Idaho and northwestern Montana. It is limited to deep cracks in rocks in moist habitats such as springs and waterfalls.

Evaluation - Population: The Idaho Conservation Data Center (CDC) had ten records of Coeur d'Alene salamanders in the Idaho Panhandle in 1987. Through cooperative efforts between the Forest Service and CDC, surveys were conducted and incidental sightings recorded. Now the CDC database contains 141 Coeur d'Alene salamander records. In 1997, two Coeur d'Alene salamander sites were monitored; the species was found at both locations. Most of the Coeur d'Alene salamander sightings have been on the South Zone (St. Joe River watershed) of the forest.

Habitat: A habitat model was developed to predict where suitable habitat for this species occurs on the IPNF, based on the geology of the area. Habitat for this species occurs across the forest except in the Selkirk Mountains. The geology of the Selkirk Mountains is different from surrounding ranges and doesn't have the deep cracks where Coeur d'Alene salamanders live. INFISH buffers and avoidance of seeps and springs during management activities provide protection for most of this species habitat.

Recommendation: Report all sightings of this species to the Idaho Conservation Data Center. Continue to protect habitat.

Northern leopard frog

B*ackground and factors limiting population:* This species has declined across the U.S. Reasons for the declines are not certain, but probably include loss of habitat and collecting for scientific study. Environmental stress-induced diseases have killed whole populations of this species in other areas (Corkran and Thoms). Like most other frogs, fluctuations in water level can prevent eggs from hatching. Stocking of native and non-native fish in frog breeding areas increases predation, resulting in frog population declines.

Evaluation - Population: Prior to 1999, the Conservation Data Center did not track this species in its database. The Idaho Museum of Natural History has 6 museum records of leopard frogs from Idaho's northern five counties between 1892 and 1964; none of these are on national forest lands. Dr. Chuck Peterson, curator of amphibians at the Idaho Museum of Natural History, suspects the northern leopard frog may be extinct in North Idaho. Fish stocking has been extensive, and may have contributed to the decline of this species in the Idaho Panhandle.

Habitat: This species' habitat includes marshes, wet meadows, riparian areas and moist, open woods. Their breeding habitat is characterized by shallow water at least 0.5 meter deep (Corkran and Thoms) and fairly dense aquatic and emergent vegetation during mid-spring, when eggs are laid. Most potential breeding sites for this species in our region are off the national forest, and are not managed by the Forest Service. This includes several large lakes and rivers where the water level is controlled by dams.

Recommendation: Continue to search suitable habitat for this species. Report all sightings of this species to the Idaho Conservation Data Center.

Boreal toad

Background and factors limiting population: This species is declining throughout the western U.S. The causes of the population declines are not known. Habitat condition is not considered a major factor since populations have declined in wilderness areas and national parks where there hasn't been any habitat degradation.

Evaluation - Population: Surveys in 1994 and incidental sightings have found boreal toads at 19 sites, including six breeding ponds, on the IPNF.

Habitat: Habitat data have been collected at almost 50 sites on the forest which are potential breeding habitat for this species.

Recommendation: Continue monitoring amphibian populations at least two more years in cooperation with Idaho State University. Follow direction of the draft boreal toad

conservation strategy in managing amphibians and their habitats (Loeffler). Report all sightings of this species to the Idaho Conservation Data Center.

Common loon

Background and factors limiting population: The common loon was documented at Priest Lake in the fall of 1897 and spring of 1915. Historically, loons nested on Priest Lake, Lake Coeur d'Alene, Round Lake, Spirit Lake and Twin Lake (Fitch and Trost). Most of the islands in Lake Pend Oreille, Coeur d'Alene Lake and Priest Lake have been developed for recreation or residences and are no longer suitable for loon nesting. The limiting factors for this species are water fluctuations associated with dams that cause nests to be flooded or left high and dry; and disturbance from lakeshore development and recreational activity, especially motor boats, in loon habitat during the May-early July nesting season.

Evaluation - Population: The Idaho Conservation Data Center has records of loons in the Idaho Panhandle in 1992, 1995 and 1997. Loons are seen every year on the larger lakes in the area, and are most common during spring and fall migration. Approximately 75 observations of loons have been reported since 1988 on Upper Priest Lake and Priest Lake. Formal surveys for loons on both lakes were initiated with the cooperation of the Selkirk Priest Basin Association in 1996 and have been routinely conducted since then during July. The only places loons are known to have successfully nested in recent years in northern Idaho are Lake Pend Oreille and Upper Priest Lake. Loon chicks were reported on Lake Pend Oreille in 1994. Documentation of successful nesting was made on the Upper Priest lake in 1998 and indications are that successful nesting has occurred in previous years. Insufficient data are available to estimate loon populations.

Habitat: Lakes at least 20 acres in size, and sometimes smaller lakes, may be suitable for loon nesting if there is an adequate food supply of fish, and a shoreline protected from human activity such as boats and jet skis during the nesting season. Islands are a preferred habitat for nesting because they tend to be more protected from predators and human disturbance than other shorelines. In 1998, 8,100 acres of loon habitat were monitored.

Recommendation: Conduct two surveys annually in areas suitable for loon nesting. A May survey will show where loons are establishing nesting territories. A mid-July survey, on the date chosen by the North American Loon Fund for loon surveys nationwide, would document which territories successfully fledged chicks. Develop partnerships with local environmental groups to track loon sightings on the IPNF and educate recreationists about proper boating behavior in loon habitat. Investigate land exchange opportunities which would protect potential loon nesting habitat. Work with Bonner County to protect areas which appear to be important habitat areas for loons. Install information signing at major boat launch areas to help forest visitors identify loons and encourage them to report loon sightings. Develop strategy to protect key nesting areas from disturbance from May through early July thru the North Zone Geographic Area Assessments and include in the monitoring plan.

Harlequin duck

Background and factors limiting population: Prior to 1897, harlequin ducks were considered rare and had been observed on the St. Joe and Coeur d'Alene Rivers. Between 1910 and 1914 they were still considered rare in Kootenai County, and uncommon from 1921-1941 on the upper St. Joe River, where a nest was reported upriver from Avery (Burleigh). The limiting factor for this species is human disturbance on the streams where it nests. The physical nature of their habitat, high gradient streams, is not greatly at risk because of the numerous protective features present for watershed or fisheries purposes. However, recreational uses, which do not change the physical nature of the streams, are likely to be a much greater impact than other resource management. Because recreation has greatly increased over the monitoring period, and is likely to continue to increase, it is important to identify key harlequin duck staging and breeding areas and determine compatible recreational uses.

Evaluation - Population: Harlequin ducks are one of the rarest species on the IPNF. This species' distribution in Idaho includes several Idaho Panhandle streams, and the Lochsa, Clearwater, Selway, Pahsimeroi and South Fork Snake River drainages. Forest Service personnel have assisted Idaho Dept. of Fish and Game with harlequin duck surveys. The minimum number of breeding pairs of harlequin ducks in Idaho, which includes streams south of the IPNF, is 48 pairs. For streams with breeding pairs which have been surveyed at least 3 years, populations appear to be stable (Cassirer et al., p. 8) or declining (pers. comm. 11/99). Surveys were conducted early in the season, usually May to early June, to determine the number and location of identified pairs of harlequin ducks. Additional surveys were conduced during the brood rearing season in July to determine relative nesting success and number of young in broods. Many surveys found adults without a brood. The production of young appears to be somewhat correlated to weather conditions during the breeding season and more strongly associated with winter snow pack and thus spring run off. High snow pack during the winter period can produce high amounts of spring runoff during the nesting season which appears to coincide with lower successful reproduction. This may result in fewer nesting opportunities being available. Successful reproduction was documented on Granite Creek in 1995, 1996 and 1998; on Hughes Fork in 1995, 1996, 1997 and later years; on Gold Creek in 1995 and 1997 and later years; on Jordan Creek and Smith Creek in 1987; on Upper Priest River in 1989 &/or 1990; on Marble Creek in 1988; East Fork Lighting Creek in 1989 &/or 1990 and on Long Canyon Creek in 1990. There is not enough data currently being collected to discuss population numbers or trends on the IPNF.

The draft conservation strategy for this species (Cassirer et al.) recommended a rotating monitoring schedule for streams which have harlequin duck habitat. The amount of habitat monitored each year on the IPNF has varied. The following table shows the miles of stream monitored annually. Data are from district wildlife files, Cassirer 1995 and Cassirer & Groves 1991.

Table 23. Harlequin duck habitat monitoring, 1990-1998. ND = No data available

Year	No. of Streams Monitored	Miles of Stream Monitored	Number of Individuals seen in surveys	Incidential Sightings of Harlequin Ducks
1987	0			3, including 2 ducklings
1988	4	ND	At least 2 broods	1 brood
1989	4	ND	ND	5
1990	9	over 83	10, including 3 ducklings	1 brood
1992	5	24	4, including 1 duckling	11
1993	5	over 80	3	5
1994	6	over 164	9, including 3 ducklings	0
1995	4	144	5	7
1996	4	78	18, including 4 chicks	3
1997	7	72	8	0
1998	8	138	22, including 10 chicks	7

Habitat: Harlequin ducks are known or suspected to breed on twenty-two streams on the IPNF. This species has been sighted on eight other streams on the IPNF where breeding has not been documented. Harlequin duck habitat was monitored on 8,285 acres in 1998 and habitat for this species was improved on 40 acres.

Recommendation: Harlequin duck monitoring should continue according to the protocol in the draft Conservation Strategy. According to this schedule, six IPNF streams would be checked annually, and other streams less frequently. Identify capable habitat by development of a predictive habitat model, and survey suitable habitat to prioritize streams for protective measures. Report all sightings of this species to the Idaho Conservation Data Center.

Flammulated owl

Background and factors limiting population: This species is a secondary cavity nester, which means it nests in cavities created by woodpeckers or other natural processes. Flammulated owls nest in ponderosa pine and Douglas-fir habitats in large diameter (at least 15" dbh) trees in fairly open stands. The limiting factor for this species is the availability of open stands of large diameter ponderosa pine or Douglas-fir. Historically, less than 8% of the IPNF was ponderosa pine forest. Approximately 2% of the IPNF is

now ponderosa pine. Virtually all of it has been replaced by other cover types which are not suitable for flammulated owls (Wisdom).

Evaluation - Population: Only one report of this species in the Idaho Panhandle prior to 1987 occurs in the Idaho Conservation Data Center (CDC) database. The CDC added eight flammulated owl sightings to its database between 1992 and 1998. Twenty-six flammulated owls have been found during calling surveys on the IPNF since 1987. It is not known whether the owls were nesting or unpaired males. Although three locations where owls have been repeatedly located it can be assumed that nesting has and continues to occur although specified nest trees were not surveyed for and located. During these surveys several other owls were also found: long-eared, western screech, barred and saw-whet owls. Currently information is lacking to be able to discuss population numbers or trends.

Table 24. Flammulated owl monitoring

Year	District or Zone	Area Surveyed	Number of Flammulated Owls found
1992	South Zone	21 mile transect	0
1992-98	Bonners Ferry	>20,000 acres	5
1992	Priest Lake & Bonners Ferry	14,966 acres	6
1993	Priest Lake & Bonners Ferry	15,470 acres	3
1994	Priest Lake & Bonners Ferry	1,352 acres	0
1996	Priest Lake & Bonners Ferry	4,066 acres	0
1997	Priest Lake & Bonners Ferry	4,423 acres	1
1998	Priest Lake & Bonners Ferry	9,424 acres	11

Habitat: In 1998, habitat plots were measured in 4 locations where flammulated owls had been detected on calling surveys. The habitat plots showed that flammulated owls are generally but not entirely associated with the drier habitat associations. In a few instances, owls were located within the moister habitat associations but only when located in close proximity with drier and more open habitats.

A flammulated owl habitat model was developed by the IPNF that uses timber stand data to predict areas which are suitable for flammulated owls. This model is being applied to over timber sale analysis areas, and helps determine where and how timber harvest would occur in a way that will protect and enhance habitat for this species. The model underestimates nesting habitat for flammulated owls. It appears that a significant portion of the occupied habitats occur within smaller habitat features such as drier sites located

within larger more mesic stands. These smaller stand inclusions have not been adequately identified within the timber stand database.

Recommendation: Continue surveys for flammulated owls to gain a better understanding of habitat utilization within the ecosystem. Known nesting sites should be protected until we have a better understand of distribution of nesting sites and the stochastic events that may impact flammulated populations. Report all sightings of this species to the Idaho Conservation Data Center. Maintain old growth Douglas-fir and ponderosa pine habitats. In stands that are otherwise suitable for these species, continue to maintain and improve open understory conditions using thinning and prescribed fire. Monitor and map acres treated.

Boreal owl

Background and factors limiting population: In 1915, boreal owls were considered to be rare in Kootenai County (Burleigh). The Conservation Data Center has 2 records of boreal owls in the Idaho Panhandle prior to the Forest Plan, in 1984 and 1986. This species was removed from the sensitive species list in 1999. This species' habitat is mature subalpine fir forests that have tree cavities which are used as nest sites.

Evaluation - Population: The Conservation Data Center has thirty reports of boreal owls in its database for the IPNF between 1987 and 1994. Call surveys have been conducted during the February breeding season in several locations on the IPNF. On the South Zone, these surveys found 7 owls on 48 miles of transects in 1992. Monitoring began in the late 1980's with over 300 nest boxes placed across the Bonners Ferry Ranger District. By 1990, boreal owls had nested in only three boxes. This method was extremely expensive and was abandoned as a monitoring technique in 1990. Thirty-eight of the boxes were checked for boreal owls in 1993; one owlet was located. In 1998, a demographic research project on boreal owls was initiated which also used the previously located nest boxes. Although many were still in usable condition, no boreal owls were discovered in the fifty-six boxes checked in 1998. At that time, it was hypothesized that there were adequate natural cavities for the owls to use and the nest boxes were not necessary.

Early spring surveys of boreal owls have also been conducted on 16,405 acres of the Bonners Ferry Ranger District between 1991 and 1997. These efforts were primarily presence/absence type surveys, and were not intended to yield numeric population figures. Nevertheless, several surveys resulted in owl observations.

Habitat: A boreal owl habitat model was developed which uses timber stand data to predict areas that are suitable for boreal owl nesting.

Recommendation: Refine model and document capable versus suitable acres on the IPNF. Report all sightings of this species to the Idaho Conservation Data Center.

Black-backed woodpecker

Background and factors limiting population: Black-backed woodpeckers were "fairly common, especially at higher altitudes" in Kootenai County in 1897 and "rather uncommon resident in Canadian zone forests in Benewah and Shoshone Counties" in 1921-1941 (Burleigh). The limiting factor for this species may be high density patches of snags for nesting. This species is known to nest at sites with higher densities of snags than other woodpeckers select for nesting (Bull et al.) The Forest Plan standard for snag density was too low to meet the habitat requirements of black-backed woodpeckers.

Evaluation - Population: This species is widespread but occurs in very low numbers except in areas which have been burned in the last three years. The Conservation Data Center has 7 reports of this species in our area between 1992 and 1994. Surveys on the Coeur d'Alene River Ranger District located 16 black-backed woodpeckers or their sign. Over 50 incidental sightings of this species (not a part of a bird survey) have also been documented on the IPNF since 1992. Six nests have also been found in burned and unburned forests, and stands with recent timber harvesting. The Region 1 Landbird Monitoring Program is not designed to survey woodpeckers, but has detected this species.

Habitat: This species nests in a variety of tree species. Burned and unburned trees as small as 6" dbh can be used for nesting. About 2/3 of black-backed woodpecker sightings on the IPNF have been in unburned habitat. Research in Oregon found that black-backed woodpecker nest sites had higher densities of snags than nest sites of other species of woodpeckers (Bull et. al. 1986), based on 0.1 hectare plots.

Recommendation: Develop habitat guidelines that maintain adequate snag patches to provide nesting habitat for this species well distributed across the forest. Monitor source habitats (fires and major insect and disease outbreaks) thru project analysis and Forest-wide (natural disturbance events). Report all sightings of this species to the Idaho Conservation Data Center.

White-headed woodpecker

Background and factors limiting population: Very little is known about this species in northern Idaho. Its habitat is open stands of large diameter ponderosa pine. White-headed woodpeckers generally nest in snags that have lost at least half their bark. Fire suppression, timber harvest and possibly livestock grazing have contributed to the loss of large ponderosa pines in north Idaho. The limiting factor for this species is availability of large diameter (at least 20" diameter) ponderosa pines in patches large enough to be nesting habitat.

Evaluation - Population: There was only one report of this species in the Idaho Panhandle prior to 1987, according to the Idaho Conservation Data Center (CDC) database. Two records of this species are known in the Idaho Panhandle, in 1987 and 1995. No surveys have been conducted for white-headed woodpeckers on the IPNF.

Habitat: Historically, less than 8% of the IPNF was ponderosa pine forest. Approximately 2% of the IPNF is now ponderosa pine. Virtually all of it has been replaced by other cover types that are not suitable for white-headed woodpeckers (Wisdom).

Recommendation: Implement the draft conservation strategy for this species. Report all sightings of these species to the Idaho Conservation Data Center. Identify areas where the ponderosa pine cover type can be increased and managed in late seral condition in patches of at least 250 acres. In stands that are otherwise suitable for these species, maintain open understory conditions using thinning and prescribed fire. Monitor and map acres treated.

Townsend's big-eared bat

Background and factors limiting population: Habitat for this species includes caves, mines and buildings. On the IPNF, abandoned mines are the primary habitat for Townsend's big-eared bats. This species requires suitable habitat in mines and buildings that is not disturbed by recreationists while bats are roosting.

Evaluation - Population: In 1988, no Townsend's big-eared bat populations were known on the forest. The only known historic record of this species in the Idaho Panhandle prior to the Forest Plan was colony in a building near Clark Fork, Idaho in 1948. In the early 1990's this species was found in two mines on private property near Clark Fork. The Conservation Data Center has 9 records of this species in the Idaho Panhandle from 1993 to 1997.

In 1997 and 1998, Townsend's big-eared bats were found in 4 mines on the IPNF. Three of these mines are hibernacula (winter roosts) for this species. Between 5 and 11 Townsend's big-eared bats have been found hibernating in one mine that also appears to be a maternity roost for this species. Single Townsend's big-eared bats were found at 3 other mines on the national forest in 1997 and 1998. Only two other maternity sites are known for this species in Idaho; they are over 300 miles to the south in unforested habitat. It is impossible to estimate the population of this species or determine its trend from the small amount of data available. The number and distribution of suitable roost sites and hyberanaula needed to maintain resilient populations on the IPNF is not know.

Habitat: The primary habitat for this species in the northern Rockies is abandoned mines. Over 1,000 mine openings could potentially provide habitat for this species on the IPNF. As the Forest Service began to close unsafe abandoned mines, surveys were conducted to determine which mines were roost sites for bats. Thirty-two mines were checked for bats in 1997 and 1998. External surveys watch for bats flying into and out of mines at night. Internal surveys are those where a biologist enters the mine to observe roosting bats. Most of the bat surveys were external surveys during the summer; only a few mines have been inspected to determine if they are used by hibernating bats. Mines used for hibernating or raising young (maternity roosts) must maintain a narrow range of temperatures inside the mine during the season when bats would use them. Most of the

mines where temperatures have been recorded on the IPNF have appropriate temperatures for this species. Townsend's big-eared bats sometimes also roost in buildings. Townsend's big-eared bat habitat was monitored on 200 acres in 1997 and 6 acres in 1998. In 1998 nine mines were checked for bats on the Coeur d'Alene River Ranger District. Habitat was improved for this species at 9 mines in 1997 and 8 mines in 1998.

Recommendation: Follow management direction in the draft conservation strategy for this species. Develop strategy to determine number and distribution of suitable mines needed to maintain resilient populations. Continue to conduct bat surveys at appropriate mines proposed for closure and old buildings proposed for demolition. Monitor the effectiveness of gates that have been installed to protect bat habitat. Investigate whether heavy metal toxicity is limiting bat populations in the Silver Valley. Recommend that abandoned mines with suitable habitat be closed in a way that allows bat access wherever feasible. Report all sightings of this species to the Idaho Conservation Data Center.

Northern bog lemming

Background and factors limiting population: The Conservation Data Center has two records of bog lemmings in the Idaho Panhandle prior to 1987. The limiting factor for this species is the small amount and patchiness of its habitat, which includes bogs, fens, and sedge meadows.

Evaluation - Population: The Idaho Conservation Data Center has 2 records of this species in the Idaho Panhandle - one each in 1991 and 1993. Surveys were conducted on the Bonners Ferry and Priest Lake Ranger Districts early in the 90's by the Idaho Natural Heritage Program. Two bog lemmings were trapped in sphagnum bogs on each district.

Habitat: No lemming habitat monitoring has been conducted. This species is typically associated with wetland habitats that are protected from ground disturbing activities.

Recommendation: Develop a cooperative monitoring program with the Kootenai Tribe of Idaho to survey suitable habitats for bog lemmings. Report all sightings of this species to the Idaho Conservation Data Center.

Fisher

Background and factors limiting population: The Conservation Data Center has 80 records of fishers in the Idaho Panhandle prior to 1988. Trappers interviewed by the Forest Service in 1998 noted 5 other sites on the IPNF where fishers had been seen prior to 1988. The limiting factors for this species are availability of denning habitat (mature and old growth mesic forests with an abundance of large diameter down logs and snags) and possibly open road densities greater than two miles per square mile that increase human-related mortalities (i.e. shooting, road kill, and incidental trapping).

Evaluation - Population: Winter track surveys for fishers and other forest carnivore species were conducted on the Priest Lake Ranger District in 1996 and 1997. In 1998, approximately 70 miles of winter track surveys were conducted with three repetitions, and fisher tracks were found in the Hemlock Creek drainage.

Since 1988, fourteen fisher sightings have been reported on the Priest Lake District. In 1997, a valid report of a female fisher and young were documented in the Kalispell Creek drainage. Other reports were received in the surrounding area suggesting the same individual.

Habitat: A habitat model was developed for this species; it has been used to identify and map fisher habitat on the North Zone. In most areas, fisher habitat occurs in small patches that are not well connected to other fisher habitat. In 1998 1,500 acres of fisher habitat was monitored. Fisher habitat was improved on 200 acres in 1997.

Recommendation: Implement old growth mature and security strategies through the geographic area. Continue to report incidental sightings of fishers to the Idaho Conservation Data Center. Thru project analysis validate whether modeled habitats contain suitable amounts of down logs. Monitor fisher habitat after timber harvest to determine whether sufficient fisher habitat is being maintained in managed forests. Identify opportunities to improve the connections between isolated patches of fisher habitat.

Lynx

Background and factors limiting population: The Idaho Conservation Data Center (CDC) has records of 34 lynx in the Idaho Panhandle prior to the Forest Plan. Trappers interviewed by the Forest Service in 1998 listed 13 other areas where they had observed lynx before 1968 and 1 seen in 1980.

Snowshoe hare are the main prey for lynx and highest densities occur in young forests (15 to 30 years old). The limiting factors for this species are suitable amounts and distribution of foraging habitat and possibly increased competition thru snow compaction (snowmobiles) allowing other predators increased access. Because foraging habitat consists mostly of dense, young forests, it does not last long on the landscape before growing into a structure that does not provide good foraging for lynx. The amount of lynx foraging is declining compared to what occurred before wildfires were suppressed. Denning habitat occurs where there are mature and old growth forests with abundant down logs. Much of the forest burned early in the 1900's. It is not yet old enough to have abundant down logs. Salvage logging that has removed dead and dying trees has contributed to the shortage of down logs in some areas.

Evaluation - Population: Thirty-eight new lynx sightings have been added since 1987 to the CDC database. Five additional lynx locations on the IPNF were verified by DNA analysis in 1998. Baited remote sensing cameras set to detect lynx at 3 South Zone locations in 1998 found no lynx.

Since 1988, thirty reports of lynx have been received on the Priest Lake Ranger District. Reports have not been limited to a particular season and generally have been distributed throughout the elevational ranges. The average elevation of lynx sighting is 3100 feet, indicating lynx habitat is located at much lower elevations within the Priest Lake Basin then other portions of lynx range.

Winter track surveys for lynx and other forest carnivores were conducted on the Priest Lake Ranger District in 1996 and 1997. The 1996 survey documented possible lynx tracks in Solo Creek drainage in the Upper West Branch. Although baited camera stations used in 1996 and 1997 did not photograph any lynx, incidental lynx tracks were observed during maintenance of camera stations.

Habitat: Lynx habitat was monitored on 203,000 acres in 1998. Three 16-square mile and three 100-square mile monitoring grids were sampled. Hair samples were collected and analyzed for DNA content. The DNA testing verified the presence of lynx on the Priest Lake and Bonners Ferry Ranger Districts. Two hundred acres of lynx habitat were improved in 1998. A lynx habitat model was developed which uses timber stand data to predict areas that are suitable for lynx denning and foraging. This model has been applied to over 65,000 acres in two timber sale analysis areas, and helped determine where and how timber harvest would occur. Logging standards are evolving to retain more snags and more down logs in the forest.

Recommendation: Follow guidelines in the lynx conservation strategy. Monitor lynx grids using DNA analysis of hairs approximately every three years, and report all lynx sightings to Conservation Data Center. Monitor lynx habitat before and after timber harvest to determine whether sufficient lynx foraging and denning habitat is being maintained. Identify opportunities to improve the connections between isolated patches of lynx habitat. Monitor snowmobile routes in lynx habitat to determine predator use and to determine if a problem exists.

Wolverine

Background and factors limiting population: The limiting factor for this species is disturbance from humans in the spring at denning sites where wolverines give birth and raise their young (late Feb – mid April). Currently, the major concern is snowmobile use in isolated cirque basins and snowslide areas.

Evaluation - Population: Since 1988 eleven sightings of wolverines have been reported on the Priest Lake District. Winter track surveys for wolverines and other forest carnivores were conducted on the Priest Lake Ranger District in 1996 and 1997; the 1997 survey found wolverine tracks. In 1998, approximately 70 miles of winter track surveys were conducted, with three repetitions completed. Generally wolverine observations are from more remote portions of the district and have become increasingly rare as winter recreation use increases in formerly remote areas.

In winter of 1998, wolverine denning habitat was surveyed by air on all districts but Avery. Although it is difficult to distinguish wolverine tracks from the air with certainty, three observations had a high likelihood of being wolverines.

Habitat: A model was developed to predict sites that may be potential wolverine denning habitat based on topography. Wolverines prefer isolated areas, typically cirque basins with large rocks, or frequent snowslide areas with large woody debris. Thirty-one potential wolverine denning locations were identified on the South Zone, 23 on the Central Zone and 211 on the North Zone. In 1998 159,200 acres of wolverine habitat were monitored using aerial flights during the denning season. Wolverine habitat was improved on 200 acres in 1997.

Recommendation: Report all incidental sightings of wolverines to the Idaho Conservation Data Center. Continue winter snowmobile flights and ground monitoring to determine the extent and intensity of potential impact to this species. Develop a winter wolverine security and monitoring strategy through the GAs.

Other Wildlife Monitoring

Region 1 Landbird Monitoring Program

Since the 1987 Forest Plan, a region-wide monitoring plan has been implemented to determine long-term, broad-scale impacts on wildlife. The species monitored are up to 180 species of neotropical migrants, resident songbirds, and other landbirds. This large group of species is an excellent group to monitor because they are easily monitored using the same senses that humans use best (i.e., sight and sound). They occur in large numbers in all types of habitats, so monitoring can test a wide range of habitat conditions that almost all other species of wildlife use. There are well-established statistically valid methods of surveying for birds that were readily applied to forest and grassland situations. Birds are numerous enough to provide excellent statistical power, and people can be trained in consistent methodology and identification. This monitoring effort is the only standardized monitoring technique for wildlife that is currently being used in Region 1 to determine large scale effects of Forest Service and other landowner activities on wildlife.

Snags

Five timber sales were formally surveyed for snags on the Priest Lake Ranger District in 1990 and 1991, totaling 1107 acres of harvest. The timber harvest units were surveyed for total quantity and quality of snags and live tree replacements. Information was collected on species, diameter, height, apparent use by wildlife, snag condition etc. All of the surveyed timber sales met snag and live tree guidelines. This was determined by calculating the total number of snags and live trees retained on the total sale acreage, although guidelines were not met on more than half of the surveyed units when considering harvest units independently. Results show that soft snags (veteran snags) comprise less than 10 percent of the total number of snags that are retained. This is likely

a result of post harvest activities that in many cases require the falling of snags which are in advanced decay for safety purposes.

Recommendations: Continue surveys for snag and live tree retention within harvest areas following management activities.

Forest Plan Monitoring Item G-2: Water Quality

There are three general areas included under item G-2: monitoring of Best Management Practices (BMPs), baseline monitoring, and validation of watershed models.

1) Best Management Practices

Monitoring of Best Management Practices asks the following questions:

·Are BMPs's being applied? (implementation monitoring)

·Are BMPs being implemented as designed and at the right time? (implementation monitoring)

·Are the BMPs effective in controlling nonpoint sources of pollution? (effectiveness monitoring)

·Are BMPs protecting water quality and beneficial uses? (validation monitoring)

The results from the 1998 Best Management Practices Monitoring are shown in the tables on the following pages.

2) Baseline Monitoring

Baseline monitoring characterizes existing water quality conditions and establishes a basis for identifying long-term trends. The following 11 streams are monitored for baseline data:

Boulder Creek
Smith Creek
Long Canyon
North Fork Grouse Creek
Big Elk Creek
Halsey Creek
Cat Spur Creek
Flemming Creek
Siwash Creek
Skookum Creek
Bird Creek

The following types of data are being summarized and evaluated for trends: suspended sediment, bedload sediment (where available), flow data, and temperature (where available). It will take some time to complete this analysis but when it is finished, the results will be included in the next monitoring report which is prepared.

3) Validation of WATSED model

When the Forest Plan was adopted the R1/R4 Sediment Model was the model identified. Soon there after the R1/R4 model and the WATBAL model were used to develop the WATSED model, currently in use throughout the region.

All of the IPNF has been mapped using landtype surveys. WATSED model coefficients are available for each landtype. These have been calibrated by using actual measured sediment from representative watersheds.

The WATSED model has been used extensively on the forest for a number of years. It is just one of the tools used for watershed analysis. At present it seems to work well in terms of capturing our understanding of watershed responses on the IPNF. Since no obvious problems have developed in its use, we have not had reason to refine our original calibration work. When the analysis of the Forest baseline monitoring information discussed in the previous section is complete, one of the uses for that data will be to see if WATSED needs to be refined.

Table 25. Watershed monitoring

District	Type of Monitoring	Project Location	Findings	Action
Priest Lake	Implementation	Priest Lake Marina	A review noted several opportunities to improve existing operations, the primary need to develop a stormwater management plan.	Since the review, permittee is actively working towards developing a plan for the marina.
Priest Lake	Effectiveness, Determine the effectiveness and BMP compliance of road closures.	Grassy Top.	6 roads were treated as part of KV plan. Slumping at one crossing and poorly constructed water bars on 4 road systems.	Hydrologist recommended that the waterbar problems be corrected.
Priest Lake	Effectiveness, Determine the effectiveness and BMP compliance of road closures.	Lower Quartz Cr.	Most of work was successful with the exception of some poorly installed water bars.	Hydrologist is collaborating with all responsible parties to improve BMPs
Priest Lake	Effectiveness, Determine the effectiveness and BMP compliance of road closure.	Road 311 in Grizzly Bear Management Area.	Lacked basic road maintenance because of restrictions by the grizzly mgt. Plan. Evidence of plugged culverts, surface erosion, poorly functioning water bars.	All problems were repaired. Roads closed to traffic in grizzly mgt areas are not being maintained. Problem needs to be addressed.
Priest Lake	Implementation/ Effectiveness, seeding after site disturbance.	District-wide	District is finding less erosion and noxious weeds on project areas.	This BMP is applied on all projects where soils are disturbed.
Priest Lake	Implementation/ Effectiveness, improving road surfacing.	Quartz Creek Watershed	Rocking of road appears to be reducing sediment delivery.	District will pursue the possibility of using a more angular aggregate.
Priest Lake	Implementation, ditch cleanout.	District-wide	Ongoing effort on the district	District will continue as part of their road maintenance schedule.
Priest Lake	Implementation/ Effectiveness, culvert orientation and placement.	Road 1347 in Media creek	Review of work showed potential for future culvert failure was greatly diminished.	Installed a larger culvert and realigned culvert to match original stream course.

District	Type of Monitoring	Project Location	Findings	Action
Priest Lake	Implementation	District-wide	1997 BMP report stated that need existed to improve training for crews working on road maintenance.	District hydrologist talked about all aspects of road maintenance. Training was well received and a contractor was on hand to demonstrate techniques.
Priest Lake	Implementation, grazing allotments.	Lower West Branch, Upper West Branch Priest River	Salting of cattle too close to a stream encourages heavy cattle use in riparian zone. Shift in vegetation from grazing in riparian zone causing lateral migration of banks.	Continued discussion with permittees should alleviate problem of placing salt blocks within the riparian zone.
Priest Lake	Effectiveness, willow stabilization projects.	District-wide	Planting willows on slopes needing stabilization was more effective on moist slopes, right after snowmelt, in trenches so soil was about 2 inches high, and where soil moisture was high year-round.	District will implement the criteria learned from monitoring into future planting projects.
Priest Lake	Effectiveness, instream channel improvement structures.	District-wide	In 1990, fisheries and hydrology crews installed several structures to enhance fish habitat. Survey in 1998 showed structures to be ineffective in enhancing fish habitat.	Structures were all stable so no corrective measures were taken.
Bonners Ferry	Implementation, Timber Sale BMP Audits	Hell Roaring Peak, Road 2259, 2259B	Logging and maintenance met State BMPs with one exception. Landing was located in a dry draw where a debris avalanche occurred during 1997.	Hydrologist stressed that landings should be located in areas that would have the least minimal soil disturbance.

District	Type of Monitoring	Project Location	Findings	Action
Bonners Ferry	Effectiveness, Timber Sale BMP Audits, road closure.	Gone Beaver Timber Sale	Road was described as ineffective during 1997 survey. Scouring of ditch line and stream crossings posed a major sediment threat. Road was obliterated and stream crossings recontoured in 1997. Grass seed was establishing well and is expected to reduce erosion potential.	Hydrologist and sale administrators are collaborating in an effort to improve BMPs on the district.
Bonners Ferry	Effectiveness, evaluation of stream structures.	Kriest Creek	Description of work done on project described in 1996 monitoring report. Project is still functioning as designed.	Project successful.
Bonners Ferry	Effectiveness, evaluation of road obliteration projects.	Boulder Meadows, Road # 427.	3.5 miles was recontoured and a trail was reconstructed in Sept. 1997. Some erosion problems were noted because of wet fall and spring and before vegetation established. Trail was completed in summer on 1998. Project has since stabilized and all objectives met.	Hydrologist identified measures during monitoring that would have prevented soil erosion problems during implemantation of project.
Bonners Ferry	Effectiveness, evaluation of historic road closures and gated roads.	District-wide	Sediment control measures are proving to be ineffective. District not keeping up with maintenance of abandoned system and non-system roads.	District is continuing to pursue opportunities that will improve the maintenance and upkeep of these areas.

District	Type of Monitoring	Project Location	Findings	Action
Bonners Ferry	Baseline, remeasurement on cross-sections surveyed in 1975.	Black Creek, McGinty Creek in Boulder Creek watershed.	Streams were surveyed in 1997. Results have not been analyzed.	Plan is to include results in 1999 and 2000 monitoring reports.
Bonners Ferry	Baseline, landtype/landslide risk ratings.	District-wide	A number of landslides occurred during 1998 resulting from a spring rain of 3 inches within a 24-hour period	Hydrologist is continuing to evaluate risk factors involving representative landtypes on the district.
Coeur d'Alene	Effectiveness, channel restoration.	Big Mac Restoration, Tepee Creek.	Almost all of gradient control structures functioning with the exception of some which had minor scouring and localized bank erosion. Vegetation establishment averaged 70% for project. Planted tree survival averaged over 90%.	District will continue to monitor. District will strive to improve practices that will minimize soil disturbance involving future projects.
Coeur d'Alene	Effectiveness, Channel restoration.	Yellow Stacel Restoration, Yellowbanks Creek.	Gradient control structures were functioning properly. All sites were vegetated. Natural vegetation averaged less than 50% success. 5 of 8 sites that were vegetated were successful.	District will continue to monitor.
Coeur d'Alene	Effectiveness, channel restoration.	Deersham Restoration, Hayden Creek.	Gradient control structures are functioning properly and vegetation is well established from seeding. Most of the road recontouring was successful, with the exception of an encroaching road utilized by ATVs causing rutting and stream diversion.	District will continue to monitor encroaching roadway.

District	Type of Monitoring	Project Location	Findings	Action
Coeur d'Alene	Implementation, watershed rehabilitation.	Camp Goose, headwaters of Independence Creek.	17 channel sites completed resulting in fill removal, road obliteration, culvert removal and wood placement.	District will monitor effectiveness of project work.
Coeur d'Alene	Implementation, watershed rehabilitation.	First cr., Boundary Cr., Big Elk Cr. watershed	11 channel sites were completed resulting in fill removal, road removal and wood placement.	District will monitor effectiveness of project work.
Coeur d'Alene	Implementation, watershed rehabilitation.	Prado Creek	12 channel sites were restored resulting in fill removal, road obliteration.	District will monitor effectiveness of project work.
Coeur d'Alene	Implementation, watershed rehabilitation.	Swan Rehab., Cottonwood Creek	6 channel sites were completed resulting in fill removal, and road obliteration.	District will monitor effectiveness of project work.
Coeur d'Alene	Implementation, watershed rehabilitation.	Dubrielle, McGinnis Creek	12 channel sites were completed resulting in fill removal and road obliteration.	District will monitor effectiveness of project work.
Coeur d'Alene	Implementation, watershed rehabilitation.	Alder Creek	19 channel sites were completed resulting in fill removal, road obliteration and wood placement.	District will monitor effectiveness of project work.
Coeur d'Alene	Implementation, watershed rehabilitation.	Rantenan and Service Creeks	6 channel sites were completed resulting in fill removal, road obliteration, and stabilization of a mass failure.	District will monitor effectiveness of project work.
Coeur d'Alene	Implementation, watershed rehabilitation.	Hudlow Creek	21 channel sites were completed resulting in fill removal, road obliteration and wood placement.	District will monitor effectiveness of project work.

District	Type of Monitoring	Project Location	Findings	Action
Coeur d'Alene	Implementation, watershed rehabilitation.	Lewelling Creek	One channel site was completed resulting in fill removal, road obliteration, culvert removal and wood placement.	District will monitor effectiveness of project work.
Coeur d'Alene	Implementation, watershed rehabilitation.	E.F. Big Creek	Rehabilitation of 11 channel sites following 1996 flood event resulted in wood placement, fill removal, culvert and bridge removal and gradient control structures.	District will monitor effectiveness of project work.
Coeur d'Alene	Effectiveness, watershed rehabilitation.	Stewart Creek, Road # 459	Restoration work completed in fall of 1997. Work entailed road obliteration, culvert removal, wood placement and gradient control structures and seeding. All facets of project work seem to functioning as designed.	Project was successful.
St. Joe	Implementation	Gold Center Cr.	Permit issued for construction of helicopter landing. After construction, hydrologist noted that landing was found to be slumping.	Fill material was pulled back and deposited on more stable site. Landing was seeded and mulched. Site will require future monitoring.
St. Joe	Baseline	Moss Creek, Hiawatha Trail	Cross-sections established in 1997 after fill failure from 1995 flood event. Natural recovery is evident and ongoing.	Monitoring will continue to detect channel changes and/or recovery trends.

District	Type of Monitoring	Project Location	Findings	Action
St. Joe	Implementation	Willow, Tri-County, Horses Aspen Timber Sales.	Satisfactory compliance determined. Number and location of skid trails acceptable on Willow. Streams protected by adequate buffers. Helicopter landing causing minor disturbance in Emerald Cr.	No action on Willow and Horses Aspen. Sediment fence and straw bales installed along Emerald Cr. Landing was cleaned of debris and seeded. Monitoring will continue on all sales.
St. Joe	Effectiveness	E.F. Charlie Cr., Brown Cr.	EPA grant in 1997 to rehab effects from past mining. Headcut stabilization had undercut, cattle had disturbed seeded and mulched banks.	Headcut was stabilized. Riparian fence installed to prevent cattle encroachment. Photp points and cross-sections established. District will contiue to monitor.
St. Joe	Effectiveness	Beaver Cr. land exchange.	Previous landowner was issued FPA violation. Field review showed required stream cleanout was ineffective. Upslope roads and hillslopes failing. Several culverts not functioning.	A midslope road with several stream crossings were recontoured. Landing site partially recontoured. Further road obliteration will continue. District will continue to monitor.
St. Joe	Effectiveness, riparian grazing allotments.	Emerald, Keeler, Cat Spur Creeks, W.F. St. Maries River	Adaptable grazing practices within Emerald Cr. improving range and streambank conditions. Utilization excellent. Keeler Cr. functioning properly. Riparian shrubs stressed and lacking diversity in Cat Spur Cr. and W.F St. Maries River.	Monitoring to continue in Emerald and Merry Cr. allotments. Fencing may be removed if improvements continue. Grazing allotments will be adjusted in EA analysis. Fencing planned for Cat Spur Cr. and W.F. St. Maries River.

District	Type of Monitoring	Project Location	Findings	Action
St. Joe	Effectiveness	Ramskull Creek	Channel found to be stable. Old sediment traps had deteriorated and no longer functioned but no recent sediment activity. Riparian area appears to have recovered from past induced sediment from ski area. No effects from timber sale in watershed.	No action taken. Riparian area is healthy and functioning.
St. Joe	Effectiveness	Simmons Cr., watershed improvement.	10 miles within Simmons Cr. was obliterated and stream crossings were recontoured and put back to natural grade. Interfluvial areas were outsloped. Bridge removal sites were stable. Seeded and mulched sites were reducing surface erosion and weed invasion. No mass erosional sites detected within obliterated areas.	District will continue to monitor. Stability of stream crossings will be monitored by photo points. Corrective action will be taken if problems do occur.

Forest Plan Monitoring Item G-3/G-1: Validate Fish Habitat Trends

The **goals** of the 1987 Forest Plan related to fish populations and stream habitat are listed below:

·Provide for diversity of plant and animal communities

·Manage the habitat of animal and plant species listed under the Endangered Species Act provide for recovery as outlined in the species recovery or management plan. Manage habitat to maintain populations of identified sensitive species of animals and plants.

·Manage fisheries habitat to provide a carrying capacity that will allow an increase in the Forest's trout population.

· Maintain high quality water to protect fisheries habitat, water based recreation, public water supplies, and be within state water quality standards.

·Manage resource development to protect the integrity of the stream channel system.

The **objectives** of the 1987 Forest Plan goals related to fisheries are:

Riparian Areas: Riparian Areas will be managed to feature dependent resources (fish, water quality, maintenance of natural channels, certain vegetation, and wildlife communities) while producing other resource outputs at levels compatible for the objective for dependent resources.

Fisheries: The IPNF will be managed to maintain and improve fish habitat capacities in order to achieve cooperative goals with the State Fish and Game Department and to comply with state water quality standards. Fisheries and timber riparian management activities will be coordinated in order to maximize the contribution of riparian vegetation to aquatic habitats. An annual program of direct habitat improvement work will be pursued. Several unroaded stream and river segments will be managed as low public access areas to maintain a diversity of fishing experiences on the Forest.

Water: Management activities will comply with state water quality standards. This will be accomplished through the use of the Best Management Practices. The outcome of these best management practices will be monitored to determine their effectiveness.

INFISH

Since the implementation of the Forest Plan, the U.S.F.S. has amended the Forest Plan with the 1995 Inland Native Fish Strategy (INFISH) Environmental Assessment. The INFISH EA is to be used in conjunction with the 1987 Forest Plan. The INFISH EA gives an interim direction to " maintain options for inland native fish by reducing risk of loss of populations and reducing potential negative impacts to aquatic habitat" (INFISH

1995). U.S.F.S. adopted Alternative D of the five alternatives offered by the INFISH Strategy. Alternative D establishes Riparian Management Objective which aims "to achieve a high level of habitat diversity and complexity through a combination of habitat features, to meet the life-history requirements of the fish community inhabiting a watershed" (INFISH 1995). Monitoring is considered an important component of this proposed interim direction.

Inland Native Fish Strategy offered the best scientific data on key elements for productive streams at the time it was adopted, but as knowledge of stream habitat requirements has increased concerns associated with INFISH's recommendations have arisen. Some of the issues associated with INFISH are as follows:

·Different stream types have different pool characteristics

·Stream type is not considered when estimating pools/mile.

·Provides no ranges for natural variation of pools/mile.

·Pools/mile are based on wetted width but does not state at what stage of flow the wetted width should be measured. As wetted width increases there is a potential to change the number of pools to wetted width comparison, because as flow increases pools become difficult to identify.

·Pool volume, pool area, nor pool length are not measured which have a direct relation to available pool habitat within a reach.

·The quantity of pools not the quality of pools is perceived to be good habitat

·Stream type is not taken into consideration when determining stems/mile or size class of LWD.

·Different stream size and types have different requirements of size class of LWD. This variation is not considered in INFISH.

·Aggregates and individual pieces of LWD with rootwads attached are not considered. Both play an important role in stability of LWD, stability of stream channel, and cover for fish.

Though INFISH may be lacking these items in its RMO's, INFISH allows the National Forest managers to adopt site specific RMOs as more knowledge of the relationship of LWD and stream stability is gained. We believe this should be the emphasis in the future.

Monitoring Item G-1: Greater than 80% of potential emergence success

This item was monitored during 1988 and 1989. The findings were that "80% of potential emergence success" was not a good monitoring tool to use to report on the health of streams. The decision was made to combine monitoring items G-1 and G-3. G-3 was expanded to include a portion of the existing core sampling program from G-1 and additional parameters were added to use to determine the health of streams.

Monitoring Item G-3: Validate fish habitat trends

Purpose: To evaluate the impacts of forest management activities on watershed and on fish habitat. It includes the validation testing of models, determining if Best Management Practices have been implemented and are effective in controlling pollution caused by project activities, and to determine the habitat trend in important fish streams.

Threshold: A declining trend in fish habitat quality.

Reporting period: 5 years

Habitat Requirements for westslope cutthroat trout and bull trout:

The preferred habitat of Westslope cutthroat trout is cold, clear streams that contain rocky, silt-free riffles for spawning during the spring and low velocity, deep pools for feeding, resting, and over-wintering (Reel et al. 1989). Pools are a particularly important habitat component as cutthroat trout occupy pool habitat more than 70% of the time (Mesa 1991). Other key features of cutthroat habitat include large woody debris (LWD) for persistent cover and habitat diversity as well as small headwater streams for spawning and early rearing.

Rieman and McIntyre (1993) suggest that five habitat characteristics are particularly important for bull trout. These are channel stability, substrate composition, cover, stream temperature, and migratory corridors. Requirements for good rearing habitat for bull trout include water temperatures below 15 degrees Celsius (Goetz 1989) and abundant cover (Fraley et al. 1989). Juvenile rearing habitat is generally in smaller tributaries where the fish will remain for 3-5 years before migrating downstream to seek more suitable habitat. Gravel areas near headwater streams are utilized by spawning bull trout in the fall.

Though there are general characteristics of habitat for Westslope cutthroat and bull trout, specific habitat requirements vary by age and season of the year (Baltz et al. 1991, Moore and Gregory 1988, Rieman and Apperson 1989, Campbell and Neuner 1985). Young-of-the-year fish initially seek stream margins with heterogeneous habitat structure. Where this habitat is not present or has been lost, juvenile trout populations are virtually eliminated (Moore and Gregory 1989). Dolloff and Reeves (1990) reported that young Dolly Varden (Salvelinus malma), a species closely related to bull trout, most frequently used woody debris as cover. As fish grow larger and mature they seek out deep water

habitat types such as pools and deep runs (Baltz et al. 1991, Hickman and Raleigh 1982). Cutthroat trout typically seek deeper water associated with large woody debris during winters (Moore and Gregory 1989).

The function of headwater streams and their importance to downstream supported fisheries has been reviewed by Bilby and Likens (1980) and Schlosser (1982). Their work suggests that organic debris dams are an important component of small stream ecosystems and that their loss results in considerable seasonal and annual variation in the trophic structure and total biomass of aquatic ecosystems.

Stream channel equilibrium (stability) is the balance between sediment yield, water yield, and channel morphology which exists within a stream system. Studies indicate that shifts away from channel equilibrium can result in negative changes in the structure and function of stream ecosystems (Bilby and Likens 1980, Schlosser 1982) and their dependent fish populations. Bisson and Sedell (1982) reported that where stream channels have become destabilized, riffles elongated and in many cases extended through former pool locations resulting in loss of pool volume. They suggested that declines in older fish may be the result of their dependency upon deeper water habitats. The persistence of Westslope cutthroat and bull trout over time can best be provided by maintaining lateral and in-stream habitat complexity in association with channel stability (Karr and Freemark 1983, Karr and Dudley 1981, Gorman and Karr 1978).

Aquatic Habitat Monitoring

We conduct stream surveys at both the project and forest level. These surveys evaluate pool conditions, habitat complexity, spawning substrates, etc. These surveys are conducted to provide baseline information for monitoring trends of habitat composition, quality, and complexity.

Some of these surveys are only conducted once, while others have been surveyed multiple years at the same location. Repeated monitoring through time will show whether fish habitat quality is stable, improving or declining. In addition we collect information on substrate size that can be used as a surrogate for fish habitat quality. Over 400 streams have been surveyed on the IPNF since 1988.

The following information highlights some of the habitat enhancement work done in 1998.

Aquatic Habitat Enhancement - St. Joe Ranger District

Objectives: Implement activity to facilitate improved conditions for the aquatic environment.

Summary of Results: Various projects were pursued during the 1998 fiscal year to directly enhance habitat conditions for inland native fish. Stream reaches and riparian areas were treated in the Simmons Creek drainage as part of the final phase of a 2 year

watershed restoration project. Aquatic habitat improvements were implemented for areas in the St. Joe River, Eagle Creek, Loop Creek, and Cedar Creek in conjunction with sale area improvement plans associated with various timber sales. Habitat enhancement projects were also conducted in Bird Creek, North Fork St. Joe River, Loop Creek, Slate Creek, Marble Creek, Big Creek, and Emerald Creek in order to help recover areas damaged by past flood events.

Stream enhancement activities and riparian planting were implemented during the 1998 fiscal year in Simmons Creek as part of the final phase of watershed restoration activities planned for this drainage. More than 1 mile of stream in the upper portion of Simmons Creek (above Forest Road 1278) was treated by adding 54 pieces of large woody debris and developing 4 pools. In addition, over 1 acre of riparian area along Simmons Creek was planted with willow and cottonwood. Other restoration efforts in the Simmons Creek watershed that did not directly enhance fish habitat conditions involved eliminating or otherwise reducing risks for increased sediment production related to roads. These activities included obliterating roads to a nearly natural hillslope, partially obliterating roads, and preparing roads for long-term storage as dictated by long-term transportation needs and road conditions. Numerous stream crossings were eliminated and stream channels were restored during the process of treating roads.

Aquatic habitat improvements were also conducted in conjunction with sale area improvement plans for various timber sales. Habitat improvements in the St. Joe River added 91 pieces of large woody debris to approximately 2 miles of the River. In addition, 47 pieces of large woody debris and 6 pools were added to Cedar Creek and 50 pieces of large woody debris were added to Eagle Creek. Approximately 0.5 acres of riparian area was planted along the West Fork of Eagle Creek.

Other projects related to stream resources continued to be implemented during the 1998 fiscal year in order to help recover areas damaged by recent flood events. Flood damage repairs in Bird Creek consisted of adding 35 logs within a 1 mile stream section, building 2 bank barbs with boulders, removing 1 culvert to rehabilitate the damaged stream channel, and planting willow in approximately 0.5 acres of riparian area along Bird Creek. Approximately 0.5 acres of flood damaged riparian area was planted with willow and cottonwood along the North Fork. Flood repair projects in Loop Creek consisted of fully obliterating 1.5 miles of streamside road that was damaged by flooding, adding 82 pieces of large woody debris to 1.5 miles of stream, and planting cedar, lodgepole, spruce, white pine, cottonwood, dogwood, and willow in approximately 3 acres of the riparian area along Loop Creek. A flood repair project in Slate Creek included using large woody debris to reconstruct and stabilize a damaged stream channel while re-establishing a low water ford near Summit Creek. Habitat enhancement activity in the Marble Creek drainage included planting 0.5 acres of flood damaged riparian areas with willow. Flood damage repairs in Big Creek resulted in adding 26 pieces of large woody debris, constructing 1 pool, and planting willow in about 0.5 acres of riparian area. Flood damage repairs in the East Fork Emerald Creek consisted of adding 80 pieces of large woody debris and constructing 3 pools in a 1.5 miles section of stream.

Conclusions: Numerous projects were implemented during the 1998 fiscal year to directly enhance habitat conditions for inland native fish on the St. Joe Ranger District. These efforts were made possible by various funding sources including Forest appropriations (e.g. NFIF and NFTE), Knutson-Vandenberg Funds from timber sale receipts, and emergency supplemental funds for flood damages. This mix of funding allowed the District to pursue a variety of interests in aquatic habitat enhancement by targeting a priority watershed for restoration (i.e. Simmons Creek) while addressing risks to aquatic resources in other streams that are considered lower priorities in an aquatic restoration strategy.

Aquatic Habitat Enhancement – Sandpoint RD

Objectives: To facilitate activities related to timber sales to improve conditions for the aquatic environment.

Summary of Results

1) Grouse Creek Snorkeling (KV)

In 1995, 56 structures were placed in Grouse Creek. These structures were installed to provide cover, pool formation, spawning/rearing habitat, and bank stability throughout this section of stream. Because of the lack of large woody debris recruitment and pool densities in Grouse Creek it was hoped that the placement of these structures would be beneficial by providing more and better habitat. The structures were placed as single log dams, V-structure dams, and single wing deflectors. The log dams were installed to create large, fully-spanning pools as a result of scouring. The single wing deflectors were placed to improve bank stability in areas where channel scouring or bank erosion occurred - generally, they were found in stream bends. Most pools observed during the survey were fully spanning with an average depth ranging from 0.2 - 0.95 m. Of the 56 structures that were placed in 1995, 33 were found and surveyed in 1998. Two other structures were observed to be "blown out" and resting on the stream bank. This survey consisted of two parts; snorkeling and structure monitoring. Snorkeling was performed to determine fish species present in the habitat created by the structures, and to obtain a more complete view of the structures, how well they were working, and the habitat created. Monitoring was done using the Standard Structure Survey Method developed in 1995. The survey method consisted of 21 monitored variables that included location, type, function, problems, and habitat measurements. Each structure was individually surveyed and data was recorded on sheets provided by the standard structure survey method.

Of the 33 structures that were surveyed, 2 were blow-outs, 1 was a naturally formed structure, 2 were unrepairable nonfunctional, 5 were damaged functional, 3 were partially functional. Of the original 56 structures that were installed in 1995; 20 out of the 33 found appeared to still be functioning to some degree in 1998.

In the areas of the stream that were snorkeled, 103 fish were observed. Of those fish, 83 were rainbow trout, 15 were bull trout, and 5 were westslope cutthroat trout.

2) Upper Pack River (Pearson Pine/Sundance Missed KV)

Thirteen transects were snorkeled in tributaries to upper Pack River, as well as the mainstem. In the areas of the streams that were snorkeled, 260 fish were observed. Of those fish, 254 were westslope cutthroat trout, 1 was a bull trout, and 5 were unidentified.

3) Canyon and Brush Creek (Barton Hump KV)

Electrofishing was conducted in the headwaters of Brush and Canyon Creeks. No fish were observed.

Aquatic Habitat Enhancement – Bonners Ferry RD

Objectives: To facilitate activity related to timber sales to improve conditions for the aquatic environment.

Summary of Results: KV funded activities on Bonners Ferry Ranger District were completed in the 1998 field season.

Aquatic Habitat Enhancement – Priest Lake RD

Objectives: To facilitate activity related to timber sales to improve conditions for the aquatic environment.

Summary of Results

1) South Fork Gold Creek (KV)

This project was intended to monitor the effects of the KV road closure on pool habitat in Gold Creek. Snorkeling was accomplished on September 29 and 30, 1999. Two westslope cutthroat trout and one bull trout were identified. Habitat inventory and measurements were completed on those same dates. Data from 1995 has not been compared to 1998 data for conclusions.

2) Twelvemile Structure Monitoring (KV)

Fifteen cover structures were installed in Moores Creek in 1997. Initial habitat measurements were taken when the structures were installed. These structures were monitored in 1998 for effectiveness. Eleven of the fifteen structures were located. All are fully functioning as cover structures, with the exception of one, which was classed as damaged functional. Four of these structures have resulted in quality pools. Results indicate a good population of eastern brook trout.

3) Kavanaugh Flats Structure Monitoring (KV)

In 1996, five rootwads were placed in the Lower West Branch to increase cover. Monitoring project effectiveness was determined by measuring habitat conditions in the affected reach and by snorkeling. Snorkeling was completed on September 3, 1998. All five rootwads were still firmly in place. Prior to the structure placement, there was no existing pool habitat or cover except for depth. The structures have functioned to compartmentalize the habitat and provide cover. Snorkeling discovered two westslope cutthroat trout and three unidentified salmonid species.

Aquatic Habitat Enhancement – Sandpoint RD

Objectives: To facilitate activity related to timber sales to improve conditions for the aquatic environment.

Summary of Results

Upper Pack River (Pearson Pine/Sundance Missed KV)

Three cover structures were installed in upper Pack River. Cover structures were designed to increase habitat complexity and cover in an area where woody debris was removed by the Sundance Fire. Woody debris was brought in from outside the riparian zone and incorporated into the bank and channel within the Pack River.

Fish Habitat Enhancement (Simmons Creek – St. Joe Ranger District)

Objectives: Evaluate the persistence and functionality of artificially placed large woody debris in Simmons Creek.

Summary of Results: A total of 32 sites that were treated during in-stream habitat alterations in the summer and early fall of 1997 were monitored to assess the persistence and performance of artificially placed large woody debris (LWD) following 1 spring run-off event. In all, 197 pieces of LWD were originally placed in various configurations during 1997 to help diversify channel conditions and enhance aquatic habitat. Of these, 177 pieces (90%) were found at their originally designed location during the time of this monitoring. Fourteen of these logs, or 7% of the total pieces placed, were noted as having shifted in place. Two pieces of LWD that moved from their designed location were recruited to downsteam enhancement sites. An additional 5 pieces of LWD likely moved from their original placement because they were positioned in floodplain areas with the intent for them to naturally re-distributed during out-of-bank flows. It is also possible that 3 other pieces of LWD were inadvertently over-looked during this monitoring effort because they were placed away from the primary enhancement sites and no monitoring information was recorded for these logs.

Desired alterations to in-stream conditions persisted in 31 (97%) of the 32 enhancement sites despite the movement of some pieces of LWD. Most pieces of LWD that either

moved away from the enhancement sites or shifted in place were cover logs and were not critical to maintaining the functional design of the stream alterations. Therefore, the primary function of stream alterations remained largely intact although secondary benefits of the associated cover logs were likely reduced to some extent at 8 enhanced sites where at least 1 piece of LWD was lost. Pool habitat was developed to increase the quantity of this important aquatic habitat feature. Developed pools were reported to be self-maintaining with the exception of 2 units that showed some evidence of lost pool capacity. Aggregates of LWD were designed to increase stream heterogeneity by adding cover and roughness features to stream margins to help diversify aquatic habitat while collecting and retaining naturally recruited woody debris. Developed LWD aggregates were reported to be functioning as designed. Active bank erosion continued to occur at 1 site that was treated in an attempt increase bank stability; this treatment did not appear to be immediately effective. In addition, 1 stream alteration appeared to have caused minor bank erosion at the developed unit.

Conclusions: Alterations designed to diversify channel conditions and enhance aquatic habitat in targeted reaches of Simmons Creek appear to be persistent and functional following 1 spring run-off event. An over-whelming majority of the artificially placed pieces of LWD remain at their originally designed location. It is expected that logs which have moved away from their originally designed location are not lost but have been recruited to other stream locations and will continue to contribute to stream processes as they gradually work through the system. This monitoring information has shown this to be true as 2 of the potentially 20 pieces of LWD that moved away from their original placement naturally recruited to enhancement sites downstream. Results of this monitoring suggests that artificially adding large woody debris to streams can be an effective practice for enhancing stream conditions provided alterations are designed to compliment natural stream processes.

LWD (large woody debris) surveys – Sandpoint and Priest Lake Ranger Districts

Objectives: Provide baseline information for establishing existing conditions of woody debris and fish habitat in various watersheds where data needs are needed for present and future projects.

Summary of Results

On the Sandpoint Ranger District, Halfway Creek was surveyed (1.2 miles) for LWD associated with habitat types as part of the Halfway debris recruitment project. This information will be used to determine if future woody debris structures need to be incorporated within the channel.

The Upper Priest River and tributaries were nominated as stream segments of concern by the State of Idaho in 1991. The Upper Priest River has also been nominated as a Scenic and Wild River Corridor by the federal Government in 1968, and is a predominant fisheries stream for bull and westslope cutthroat trout. As a result, the Upper Priest River on the Priest Lake Ranger District, was surveyed to determine the existing LWD (large

woody debris) formative features had how they relate to existing aquatic conditions, channel morphology and channel stability. LWD concentrations were determined by documenting and mapping observed locations and distribution of in-channel woody debris. The preliminary information gathered and the results will be used to determine what future measures for LWD recruitment are necessary to improve the quality of the Upper Priest River habitat and spawning areas for bull and westslope cutthroat trout.

Stream Habitat Typing Sites – Central Zone

Results from methods of surveying stream habitat types and collecting LWD inventories have the potential to be inconsistent due to observer bias. Observer experience and water discharge levels are a few of the factors that can affect observer variation of stream habitat surveys (Roper and Scarnecchia 1995). Misclassification of size classes and lack of experience are potential factors affecting LWD surveys. The collected information is used to characterize stream reaches and trends in stream systems. Because of this variation, only general trends in stream habitats and numbers of LWD can be concluded. To adequately monitor the Forest Plan goal more intensive surveys should be conducted.

Before the 1997 field season the method used to measure mean depths of pools was changed on Central Zone. Mean depth is used to calculate the mean Residual Pool Volume (RPV). This new method gives a consistent cross section in the pool to measure depths for mean depth. The calculated mean RPV sometimes produces negative volumes. Using only three measurements to determine a pool's mean depth and the various shapes of pools could possibly be leading to the negative mean RPVs. A new method should be developed which has a consistent location that gives a positive calculated mean RPV. The best consistent location to measure mean depth might be the pools maximum depth. The mean RPV has potential in determining potential pool habitat of cutthroat trout (Oncorhynchus clarki lewisi) and bull trout (Salvelinus confluentus). Juvenile bull trout utilize pools and interstilial spaces within the substrate during winter to avoid anchor ice (Goetz 1989). Mean RPVs are no longer used to monitor pools due to the inconsistency of calculating mean RPV, instead maximum RPVs are used to monitor aggradation and degradation of pools.

1) Jordan Creek and Steamboat Creek

The areas being monitored within Jordan Creek, from the confluence with Calamity Creek upstream to bridge crossing, and Steamboat Creek, from the confluence with Indian Creek upstream to the confluence with Barrymore Creek, are Rosgen stream type B4. Jordan Creek is a lightly managed watershed which is approximately half the size of Steamboat Creek, which is a heavily managed watershed (GA, 1998). Both of these streams had sections of enhancement work implemented, Jordan Creek in 1992 and Steamboat Creek in 1993 and 1996. The enhancement work consisted of installing of LWD for bank protection, pool scour, gradient control, and fish cover. The monitoring of these streams was to meet Goal A-13 (Manage fisheries habitat to provide a carrying capacity that will allow an increase in the Forest's trout population.) and Objective B1j-Fisheries (The IPNF will be managed to maintain and improve fish habitat capacities in

order to achieve cooperative goals with the State Fish and Game Department and to comply with state water quality standards. Fisheries and timber riparian management activities will be coordinated in order to maximize the contribution of riparian vegetation to aquatic habitats. An annual program of direct habitat improvement work will be pursued.) of the Forest Plan 1987.

There was an increase in the four pool parameters analyzed after the restoration work in 1992. As presented in previous monitoring reports initial increases in all four pool variables were found with enhancement work (Monitoring Reports 1996 and 1997). After the restoration work the four pool parameters appeared to be fluctuating at levels which might be seen in a natural stream system. The flood of 1996 increased some of the parameters. Since 1997, the mean maximum RPV of Jordan Creek has decreased by 133 ft.3, percent pools by project length of reach decreased by 1%, mean length decreased by 2 ft., and number of pools (percent) by 3% (Figure 1). Since the initial increase from stream enhancement the pool characteristics analyzed appear to be demonstrating a natural variation between years, which could be associated with stream flows.

The numbers of pools in the reach, (percent), has been fluctuating at levels higher than pre-restoration stage. So even though mean pool length, total pool length and mean maximum RPV are lower than prerestoration levels there is more available pool habitat for fish, because total maximum RPV has increased. The mean maximum RPV of Steamboat Creek decreased by 440 ft3. Percent pools by length of reach decreased by 4%, mean length decreased by 7 ft., and number of pools (percent) decreased by 2% since 1997. Pool parameters of Steamboat Creek appear to be responding in the same manner as the pool parameters of Jordan Creek.

Jordan Creek and Steamboat Creek both exhibited a dramatic increase in mean maximum RPV after the 1996 flood followed by a sharp decrease after 1997. The recent trend of decreasing mean maximum RPV is probably in response to the stream returning to conditions prior to the flood of 1996. The majority of pool parameters studied exhibited an increase the year after the flood of 1996 and fluctuations of either increasing or decreasing values as time has passed after the flood.

Without discharge data, bedload movement data, and a more precise monitoring survey we can only assume there is a natural fluctuation of pool parameters in response to various water regimes in the Jordan Creek and Steamboat Creek. The initial stream enhancement appears to have increased habitat. The increase in habitat has been maintained and experienced annual variation. In these enhanced sections of stream the objectives of improving fish habitat may be being met.

2) Little North Fork Coeur d'Alene River from Picnic Creek to Cascade Creek

Unusual weather conditions in November 1996 produced an ice storm that effected the Coeur d'Alene River Ranger District causing LWD to be recruited into streams in various areas within the forest. The Little North Fork Coeur d'Alene River watershed is approximately 70.9 mi 2, a road density of approximately 7.2 mi/mi2, and a stream

density of approximately 2.4 mi/mi2. The Ice Storm caused the recruitement of significant wood between Picnic Creek and Cascade Creek, Rosgen stream type B3, which provided a good area for analysis of the effects of LWD on stream channel morpholgy.

In 1982, the first methods for stream habitat typing were developed on the forest. At the time lengths were measured by pace for every stream habitat unit, widths for stream habitat units were measured by pace on a systematic system and depths were not measured. The method classified stream habitat types into pool, pocket water, riffle, and run. The 1985 stream habitat survey used this method and reported the percent number of pools in the reach was 2.6 %, the mean length of pools was 40.0 ft., and the total lengths of pools (percent) was 0.8%.

The results from the 1997 stream survey showed pools composed 13.0% of the habitat, the pools mean lengths were 89.3 ft., and the pools composed 9.0% of the length of the stream.

This section of stream was stream habitat typed again in 1998 to observe any possible changes in habitat condition. The 1998 stream survey showed pools composed 3.1 % of stream habitat units, the pools mean length were 55.0 ft., and pools made 0.9% of the total length of the section. The three pool parameters under observation from 1985 to 1998 experienced a major jump in 1997.

A closer analysis of the 1985, 1997, and 1998 data revealed possible observer variability. The 1985 stream survey had a total of 39 habitat units, the 1997 survey had a total of 46 habitat unit, and the 1998 survey had a total of 32 habitat units. The increase in total habitat units in 1997 and decrease in total habitat units in 1998 could possibly be attributed to observer variability. The 1997 survey had two pools whose mean RPV were negative leading us to believe the units were possibly placed into the wrong habitat type, pool tail crests were measured in the wrong location, maximum depth was not found, or mean depth was measured wrong. The other possibility of fluctuations in pool parameters is the stream habitat typing crew in 1998 placed units in the wrong habitat type. We feel 1998 is more reflective of the history of the stream system and that between 1985 and 1998 there has been no change in number of pools (percent length of reach) whithin the reach.

There are several possibilities, though not limited to them, why there has been little change in stream channel morphology since the 1985 survey. One, the angle the LWD is positioned in relation to the stream channel are not providing scour. Two, the placement of LWD in relation to the depth of the stream channel are not able to provide scour. Three, sediment loads from upstream are too high for pools to form. Four, effects are still being observed from past forest management practices. Finally, the size of the LWD is not large enough to have an effect on stream channel habitat. What might be important is the amount of cover now provided by the recruitment of LWD.

There are only 2 years of samples since the initial survey in 1985 therefore we assume there has been little change in stream habitat types since the 1985 survey. The mean width of the Little North Fork of the Coeur d' Alene was 37.0 feet in 1998. INFISH standards suggest a stream with a wetted width ranging between 25 and 50 feet has 26 to 47 pools/mile for a stream. Thus, the current conditions of 0.8 pools/mile is far below the INFISH recommendations and does not meet the Forest Plan goal to: Manage fisheries habitat to provide a carrying capacity that will allow an increase in the Forest's trout population.

3) Little North Fork Coeur d'Alene River from Laverne Creek to Deception Creek

The stream habitat types of Little North Fork Coeur d'Alene River from Laverne Creek to Deception Creek are being monitored to satisfy the Forest Plan goal to: Manage fisheries habitat to provide a carrying capacity that will allow an increase in the Forest's trout population, and Forest Plan objective to: Maintain and improve fish habitat capacities in order to achieve cooperative goals with the State Fish and Game Department and to comply with state water quality standards. The stream was first habitat typed in 1982 in conjunction with a fish population survey and again in 1998 to monitor changes in habitat and fish population.

The 1982 used one of the first methods of stream habitat typing developed. Lengths were measured by pace for every stream habitat unit, widths for stream habitat units were measured by pace on a systematic system and depths were not measured. Stream habitat types were place into categories of pool, pocket water, riffle, and run. The mean length of pools was 210.0 ft, 21% of the reach length was pools, and pools composed 23% of the habitat units of the reach. The survey also reported the presence of pocket water habitat type units. Pocket water units had a mean length 131.0 ft, composed 8% length of the reach, and 9% of number of habitat units.

In 1998 the pools had a mean length of 165.0 ft, 13% length of total reach, and composed 20% of the habitat units in 1998. One braid habitat unit with a length 500.0 ft and no pocket water was observed. Runs composed 40% of the habitat units, 42% of the reach length, and had a mean length of 272.0 ft. No pocket water habitat units were observed in the survey.

We observed a constant downward trend from 1982 to 1998 in all pool parameters measured. The downward trend in pool parameters could be from an increase in other stream habitat type parameters. Run and riffle parameters measured were higher in 1998 than measured in 1982. Since there only two years of sampling any variation of the stream habitat types parameters can not be detected. The possible impacts of the flood of 1996 and the Ice Storm of 1997 cannot be observed due to having only two years of data.

Looking at the data for the two reaches in the Little North Fork it appears that there has been no change or a slight decline in pool parameters observed. This could be natural annual variation as noted in Jordan Creek and Steamboat Creek. It appears for these stream sections the objective of improving habitat has not been achieved. The stream

habitat type parameters should be monitored in this reach of stream on an annual bases considering the Deception Creek Experimental Forest is next to the reach. Forest Plan goals and objectives clearly state we should be monitoring this stream. Funds, personnel, and time should be allocated to monitor any possible effects on stream channel integrity being caused by management.

4) Independence Creek

Independence Creek is being monitored to satisfy the Low Access Fishing standard in the Forest Plan and to use information gathered as a reference reach for possible comparison analysis of annual variation in unmanaged or lightly managed watershed. Independence Creek watershed is approximately 59.8 square miles with a road density of 1.7 miles per square mile and stream density of 2.3 miles per square mile. Stream habitat inventories went from the confluence with Tepee Creek to the confluence with Camp Creek in 1992.

In 1997 an effort to get more base line data stream habitat typing surveyed from the confluence with Goose Creek upstream for two stream reaches and from the confluence with Tepee Creek to the confluence with Goose Creek in 1998. For comparison purposes only, the 1992 and 1998 surveys were analyzed since the surveys covered the same stream sections. The 1992 survey had 10 reach breaks composed of seven B and three C Rosgen stream types. The 1998 study had 7 reach breaks composed of four C and three D Rosgen stream types. We believe some of this variation in stream types is due to changes in methodology of stream typing and possible inexperience personnel during both surveys. We there compared 1992 data to the three C stream types of the 1998 survey. The 1992 reaches were adjusted by length to match the same areas surveyed in Reach 1,3 and 5 in 1998 in order to draw some conclusions between the two years. Reach 5 in 1998 was shortened to match the length of the 1992 survey because the 1998 surveyed a longer length of stream than the 1992 survey. The three areas compared were then labeled Stretch 1, Stretch 2, and Stretch 3.

The general trend for pool parameters in Stretch 1 has been a decline from the 1992 to 1998. The mean length of pools decreased from 152 feet in 1992 to 45 feet in 1998. The number of pools, as a percentage of habitat units in the reach, decreased by 1 percent from 1992 to 1998. Total lengths of pools in the reach, as a percentage, decreased from 35 percent in 1992 to 8 percent in 1998. The mean maximum RPV decreased from 9136 cubic feet to 2486 cubic feet.

Stretch 2 had a decrease in two of the four parameters analyzed. A decline in pool mean length from 152 feet to 35 feet and decrease in total length of pools, as a percent, from 18 percent to 8 percent were observed. There was no change in the percent number of pools. The mean maximum RPV for Stretch 2 declined from 19368 cubic feet to 6921 cubic feet.

Stretch 3 exhibited a decline of mean length and number of pools and an increase in total lengths of pools and mean maximum RPV. Pool mean length increased from 71 feet to 107 feet and the number of pools, as a percent, decreased from 30 percent to 26 feet.

Total lengths of pools, as a percent of the reach, increased from 17 percent to 22 percent. Mean maximum RPV increased from 4664 cubic feet in 1992 to 9555 cubic feet in 1998. The increase in mean length, total length of pools (percent of the reach), and mean maximum RPV means an increase in available pool habitat, even though number of pools have decreased.

Data in 1992 indicated a total 755 feet of braided channel and 1998 recorded a total 5174 of braided channel in the study section. From 1992 to 1998 pools/mile has decreased in all three stretches. Both years of survey were below INFISH's suggestions of 46-26 pools per mile for a stream with a wetted width of 26-47 ft. Even though pool/mile is below INFISH recommendations and has been decreasing in Stretch 1 and 2, Stretch 3 has shown an increase in available pool habitat.

The lower pool parameters in Stretch 1 and 2 in 1998 compared to 1992 lead us to several possible trends for Independence Creek. One, there is a downward trend from 1992 to 1998 in the pool parameters observed. Two, the lower values observed in 1998 are possibly on the upswing from 1992, but with only two years of data any type of trends is difficult to estimate. Three, in 1992 the pool parameters were higher than normally observed for the stream and the 1998 pool parameters might be closer to a natural variation. Four, the 1992 reported 3 pools in Stretch 1 and 3 pools in Stretch 2 created by beavers. In 1998 Stretch 1 had 1 pool and Stretch 2 had no pools formed by beavers. Beaver pools tend to be long, wide, and shallow. It is possible the flood of 1996 washed out the beaver pools observed in 1992. Since we could not determine exact location of pools between years we can only assume the flood caused a decrease in pools created by beavers. Without better monitoring of this system, general trends of pool parameters in a lightly managed watershed will be hard to determine.

Comparing data collected in the Little North Fork Coeur d'Alene and Independence Creek with the limited samples (only two different years per stream) trend could not be evaluated. But we did note some differences within the Little North Fork Coeur d'Alene. Percent pools by length were only 2 percent for Picnic Creek to Cascade Creek, 20 to 12 percent between Laverne Creek to Deception Creek, where as in Independence Creek percent pools by length of stream varied between 5 to 20 percent. Though the percent pools by length seem to be the same in the two systems there is a difference in pools/mile. Independence Creek ranged from 10 to 15 pools/mile yet there were only 0.8 pools/mile in the Little North Fork Coeur d'Alene.

Large Woody Debris Inventory Sites – Central Zone

Large woody debris has an important role in retaining course and fine particulate organic matter and inorganic particulate matter that is important in stream stability and biological productivity (Bilby 1984). Large woody debris along with boulders and bedrock outcrops provide obstructions producing variations in stream flow direction and channel velocity. The changes in channel velocity and stream flow direction have an important role in creating pools, gravel bars, and side-channel rearing areas. Large woody debris is

important in managing forested watersheds in order to preserve fish habitat. Insects, disease, windthrow, and local channel erosion are processes that deliver LWD into stream systems (Swanston 1991).

Forested systems east of the Cascade crest in Oregon, Washington, and Idaho should have greater than 20 pieces of stems/mile of LWD according to INFISH RMO's. The pieces of LWD should be greater than 12 inches in diameter and longer than 35 feet. The IPNF LWD inventory system has two classes comparable to INFISH requirements. The IPNF Class 5 has a minimum diameter of 10 inches and a maximum diameter of 24 with a minimum length of 15feet and Class 6 has a minimum diameter of 24 inches and minimum length of 15 feet. No recommendations for smaller pieces of LWD were found in INFISH. The IPNF inventory includes smaller size LWD because are they have an important role in streams forming aggregates, providing course particulate matter, and habitat for invertebrates. The INFISH LWD classification system should be adjusted to fit site specific locations and to give managers a better understanding of what size of wood is stable in relation to size of stream.

1) Jordan Creek

One of the key aspects of the enhancement work in Jordan Creek was to increase the number of pieces of stable LWD to encourage stream channel scouring, stream bank protection, and provide instream cover. LWD levels for size class 5-6 were 10 stems/mile before restoration. Jordan Creek has a low density riparian area from mainly fires and blister rust control (Ecosystem Paper #4 1998).

After restoration LWD increased to 92 stems/mile, well above INFISH RMO's, and has fluctuated over the years above INFISH RMO's. Some of the variation in number of pieces of stable LWD in Jordan Creek is from observer variability (T. Jerome Personal Communication 1998). The flood of 1996 probably caused little recruitment of LWD due to a low density riparian area and the Ice Storm of 1997 did not effect this area. Overall there was a downward trend from 1994 to 1997 in stems/mile and then an increase in stems/mile in 1998.

2) Steamboat Creek

The Steamboat Creek restoration project in 1993 involved placement of LWD for bank protection, cover, and gradient control. Prior to the restoration in 1993 LWD levels of Size Class 5-6 LWD were below INFISH RMO's. Since restoration numbers of LWD in Size Class 5-6 have increased to levels above INFISH RMO's. Large woody debris, in stems/mile, have been exhibiting variation through the years. In 1996 more LWD was installed in point bars and as cover logs in pools.

The decline in LWD in 1996 can be attributed to the flood of 1996 carrying LWD either downstream or depositing the LWD out of bankfull width. A general walk through survey found structure and cover logs had moved out of the system. What cannot be explained is the dramatic increase in LWD in stems/mile in 1998. Total pieces of Size

classes 5-6 increased from 68 pieces in 1997 to 252 pieces in 1998. Two theories can possibly explain this dramatic increase in LWD. One, observers were surveying wood outside of bankfull width resulting in an increase in LWD compared to previous years. Two, recruitment of LWD from the 1996 Ice Storm being transported down the stream during the winter.

3) Little North Fork Coeur d'Alene from Picnic Creek to Deception Creek

The Little North Fork Coeur d'Alene from Picnic to Cascade Creek was monitored to study the possible effects of the 1996 Ice Storm on number of pieces of LWD within the stream. The purpose of monitoring LWD in this reach is to observe possible effects on stream channel habitat, size of the wood contributed to the stream channel, and retention of LWD within the stream. Though no LWD inventory data existed prior to the ice storm visual inspection of the section indicated wood loading was low.

The 1997 LWD inventory had 95 stems/mile of size class 5-6 and a total of 1313 stems of all size classes. In 1998 there were 66 stems/mile and a total of 896 stems of all size classes. Both years are well above the suggested levels of 20 stems/mile by INFISH. Some of the decrease from 1997 to 1998 can possibly be attributed to observer variance on determining if LWD is within the width of the bankfull channel.

Overall there is a decreasing trend in the amount of LWD in size classes 2-6 and an increase in LWD size class 1. The increase in size class 1 should does not mean size class 1 is considered stable in this reach. The recruitment of size class 1 LWD to the channel are probably broken branches. These broken branches probably account for the increase in size class 1 LWD.

The episodic effect of wood recruitment indicates that wood loading can and does occur in single large occurrences and volumes. Our limited data indicates that we are seeing some natural movement wood out of the study reach. The observed natural sorting and downstream movement has occurred in both enhanced (Jordan Creek and Steamboat Creek) and unenhanced (Little North Fork Coeur d'Alene). This movement suggests that INFISH standards for single level LWD should not be used. We recommend that site specific and Riparian Management Objectives be developed for each stream. A continuance of monitoring this section of stream would give us knowledge of the potential effects LWD has on stream channel habitat and the stable size class of LWD for this given stretch of stream.

4) Independence Creek

The Ice Storm of 1997 had little effect in the Independence Creek watershed. Inventories for LWD were aimed at getting baseline data of LWD of a lightly managed burned watershed with no restoration work. The 1992 survey went from Tepee Creek to Camp Creek in Independence Creek. The 1992 reaches were adjusted by length to match the same areas surveyed in Reach 1,3 and 5 in 1998 in order to draw some conclusions between the two years. Reach 5 in 1998 was shortened to match the length of the 1992

survey because the 1998 surveyed a longer length of stream than the 1992 survey. The 1992 survey had 5 stems/mile for Stretch 1, no stems/mile in Reach 2, and 30 stems/mile in Stretch 3. The 1998 survey had no stems/mile for Stretch 1 and Reach 2, and 26 stems/mile in Stretch 3. Stretch 3 in both years was the only stretch to meet INFISH suggestions for LWD. It appears that there was little variation of LWD loading between the 2 years.

The lower section of Independence Creek below Stretch 3 was logged earlier this century (Ecosystem Paper #4 1998). The past logging activity in the lower part of Independence Creek is possibly a reason why there is little LWD in Stretches 1 and 2. The lower section of Independence Creek might not be dependent on LWD to provide good stream habitat. More intense monitoring should be done on Independence Creek between Tepee Creek and Goose Creek to understand the natural variation in unmanaged burned watersheds. The base line data would allow us to use Independence Creek as a template for heavily managed watersheds and restoration projects.

Wolman Pebble Counts – Central Zone

Wolman pebble counts are measured in response to the Forest Plan goal to manage resource development to protect the integrity of the stream channel system. Wolman pebble counts give the particle size distribution of material in the bed load composition. The particle size distribution can be used to determine content of spawning gravel, suitability for other habitat needs, calculate entrainment and bedload transport rates, and as a measure for Manning's roughness coefficient. Changes in particle size distribution could detect agradation or degradation of stream channel which effects stream integrity.

1) Jordan Creek

Wolman pebble count survey units located in association with the stream restoration project have been implemented since 1992. Site 1 Reach 1 is located downstream of the restoration reach and Site 2 Reach 1 and Site 3 are located within the restored stream channel. At Site 1 there has been a trend of increasing size towards courser material of D50's over the years of study. The D50 particle size has increased from 1992 to 1993 at Site 2. D50 particle size in 1998 decreased in size from 1993 but is still larger than the size in 1992. There was a slight increase in the D50 particle from 1992 to 1993 at Site 3. The 1998 D50 particle size was at the same level as observed in 1992. The relative low variability between years in D50s at Site 2 and Site 3 can possibly be attributed to the stability of the restoration project.

2) Independence

Wolman pebble count surveys were done in two separate years at separate locations in 1992 and in 1998. The two years surveyed from the confluence with Tepee Creek to above the confluence with Goose Creek. The data from the 1998 surveys were matched as closely as possible, in relation to location, to the 1992 data so only assumptions can be made of possible trends. There were small changes in the size of the D50, but the

changes do not appear to be significant. There appears to be a trend in decreasing size of D50 at sites below the confluence with Goose Creek and above the confluence with Declaration Creek.

Water Temperature Data – Central Zone

Declaration Creek, Emerson Creek, Green Creek, and Independence Creek were all monitored for water temperature in 1998. Water temperature was measured from July 1998 to October 1998 to observe if water temperature in these streams were at levels conducive to bull trout survival. All four streams had higher temperatures than INFISH recommendations for water temperature for spawning and incubating life stages of bull trout. Current literature stands behind INFISH's suggestions for water temperature levels for various life stages of bull trout.

Cross-Sections and Longitudinal Profiles – Central Zone

Cross-sections and longitudinal profiles continue to be collected on streams that have permanent stations. Streams that have been surveyed in previous years were again surveyed this past summer. The measurements from those surveys have not been analyzed due to the lack of funds, time, and personnel.

Forest Plan Monitoring Item G-4: Fish Population Trends

In conjunction with the Idaho Fish and Game Department we conduct annual surveys of a subset of streams on the IPNF. The primary focus of these surveys has been westslope cutthroat and bull trout. Some of these surveys are only conducted once, while others have been surveyed multiple years at the same location. In addition at least three masters students from the University of Idaho, and the Rocky Mountain Research Station have collected information on fish populations on the IPNF. Surveys for bull trout have focused on the Priest, Pend Oreille and St. Joe basins. Extensive surveys for cutthroat trout have been conducted in the Coeur d'Alene basin.

Current Status of Bull Trout and Westslope Cutthroat Trout

Bull trout were listed on June 10, 1998 as Threatened under the Endangered Species Act (ESA). Westslope cutthroat trout are listed as "sensitive" by Region 1 of the USDA Forest Service and are listed as "species of special concern" by the State of Idaho. In addition, the U.S. Fish and Wildlife Service lists westslope cutthroat trout as a "Species of Concern with respect to section 7(c) of the 1973 Endangered Species Act. This species is also under review for listing under the Endangered Species Act.

General Population Trends

Based on current information, bull trout and westslope cutthroat trout populations appear to be stable throughout most of north Idaho. Expanding lake trout populations in Lake Pend Oreille, however, pose a potential threat to bull trout in the future. In Priest Lake, bull trout numbers appear to be declining. Current estimates put the number of adult bull trout in Upper Priest Lake at approximately 100. To increase bull trout numbers, a lake trout eradication program began in 1997 and continued in 1998.

To better understand bull trout movement, the Forest plans a cooperative project with the Idaho Fish and Game Department within the St. Joe Basin in 1998. Combined efforts will focus on tracking fish throughout this basin.

Surveys of Stream Habitat and Fish Populations – St. Joe Ranger District

Objectives: Provide baseline information for establishing existing conditions of fish habitat and fish assemblages in the various watersheds.

Summary of Results: Stream habitat surveys were conducted by U.S. Forest Service crews in portions of Gold Creek (4 miles), Quartz Creek (4 miles), West Fork St. Maries River (3.5 miles), Keeler Creek (1 mile), and Hidden Creek (1 mile) during the summer of 1998. Electro-fishing surveys were conducted in Quartz Creek (1 mile), East Fork Bluff Creek (1 mile), Big Dick Creek (0.5 mile), Boulder Creek (0.5 mile), West Fork St. Maries River (1 mile), Keeler Creek (0.5 mile), and Hidden Creek (0.5 mile) by Forest Service crews. Sculpin (Cottus sp.) were found in all sampled streams. Westslope cutthroat trout (Oncorhynchus clarki lewisi) were found in all sampled streams except

Hidden Creek. Redside shiner (Richardsonius balteatus), northern pikeminnow (Ptchocheilus oregonesis), and brook trout (Salvelinus fontinalis) were sampled in the West Fork St. Maries River. In addition, tailed frogs (Ascaphus truei) were sampled in Quartz Creek, East Fork Bluff Creek, and Boulder Creek and Idaho giant salamanders (Dicamptodon ensatus) were sampled in Quartz Creek, Big Dick Creek, Boulder Creek, and Hidden Creek. Information from fish habitat and population surveys is being used as part of the ecosystem analyses being conducted for the respective watersheds. This watershed analysis process will help determine what, if any, actions may be appropriate for managing for desired ecosystems benefits. Other results of the analyses are not available at the time of this report but will be disclosed in the National Environmental Policy Act (NEPA) documentation that is forth-coming.

Electro-fishing surveys were also conducted in the Adair Creek, Twin Creek, Canyon Creek, and Spotted Louis Creek. These surveys were conducted in a cooperative effort between U.S. Forest Service and the Nez Perce Tribe. Westslope cutthroat trout (or cutthroat/rainbow trout hybrids) and sculpin were found in all sampled stream transects except Spotted Louis Creek. Curiously, no fish were sampled in Spotted Louis Creek on September 24, 1998 despite repeated attempts along a quarter mile stretch in T.43N., R. 6E., section 24. One bull trout was found in Adair Creek at which time electro-fishing was terminated. Tailed frogs (adults and/or larvae) and Idaho giant salamanders were noted in Adair Creek. In addition to learning more about species distributions in the various streams, tissue samples were collected from a sub-sample of the salmonids in Twin Creek and Canyon Creek for genetic analysis. Results of the genetic analysis from tissue samples will be available sometime after the summer of 1999.

Snorkel techniques were used to assess the fish population assemblage in Lost Lake Creek, a tributary to the Little North Fork Clearwater River. Fish species encountered include westslope cutthroat trout and sculpin. The majority of the trout ranged in size from 3 to 6 inches. No bull trout were encountered during the survey despite previous information received from anglers stating that bull trout were present in the stream. Tailed frog larva (Ascaphus truei) were also found.

Conclusions: Aquatic habitat inventories were conducted in more than 13 miles of stream and fish populations sampled in approximately 5 miles of stream on the St. Joe Ranger District during the 1998 fiscal year. These surveys indicate that habitat and populations of westslope cutthroat trout and sculpin are well distributed across the District. Westslope cutthroat trout were detected in 10 out of 12 streams surveyed. By contrast, survey results continue to support previous evidence that habitat and rearing populations of bull trout have a limited distribution across the District. Bull trout were only detected in 1 out of 12 streams surveyed with snorkeling or electro-fishing techniques. The differences in distribution for westslope cutthroat trout and bull trout, both native salmonids, may best be explained by the more specialized habitat requirements of bull trout.

Surveys of stream habitat and fish populations – North Zone

Objectives: Provide baseline information for establishing existing conditions of fish habitat and fish populations in various watersheds where data is needed for current and future projects.

Summary of Results

U.S. Forest Service fisheries crews conducted twenty-two stream habitat surveys on the north zone in 1998. On the Sandpoint Ranger District, habitat surveys were conducted on: Chute Creek (0.5 miles), Granite Creek (6.2 miles), Johnson Creek (4.9 miles), Plank Creek (1.0 miles) and West Fork Johnson Creek (1.2 miles). On the Bonners Ferry Ranger District, habitat surveys were conducted on: Brass Creek (2.4 miles), Copper Creek (1.9 miles), Cow Creek (8.0 miles), Kriest Creek (1.5 miles), Parker Creek (2.0 miles), Placer Creek (1.5 miles), Spruce Creek (4.4 miles) and Trout Creek (8.0 miles). On the Priest Lake Ranger District, habitat surveys were conducted on: Bearpaw Creek (2.2 miles), Cedar Creek (3.0 miles), Jackson Creek (2.4 miles), Lime Creek (4.8 miles), Media Creek (2.5 miles), Ojibway Creek (2.0 miles), Upper West Branch (16.3 miles) and West Moores Creek (3.0 miles).

The habitat surveys were completed using the IPNF habitat survey methodologies developed by David Cross (IPNF-1992) and walkthrough surveys developed on the north zone. Summary reports and habitat analysis have been completed from these surveys and are located on the computer and hard copied in the fish filing cabinet. The plan is to incorporate this information into current and future NEPA (National Environmental Policy Act) documentation for specific projects within these watersheds.

Thirty four streams were sampled with either electroshocker or by snorkeling. Of this total, Westslope cutthroat trout (Oncorhynchus clarki lewisi) were found in 23 of these streams (67. percent); eastern brook trout (Salvelinus fontinalis) in 15 (44.1 percent ; bull trout (Oncorhynchus confluentus) in 3 (8.8 percent); and rainbow trout (Oncorhynchus mykiss) in only one stream (3.0 percent). Sculpin (Cottus sp.) and tadpoles/amphibians were found in just a few streams, but these were not always noted on the field forms as being captured. Information from population surveys is being used as part of the ecosystem analysis being conducted for the respective watersheds. This watershed analysis process will help determine what, if any, actions may be appropriate for managing for desired ecosystems benefits.

Conclusions: Stream habitat surveys were conducted in more than 79.7 miles of stream, and fish populations sampled in approximately 26.5 miles of stream on the North Zone of the IPNF during the 1998 fiscal year. These surveys indicate that habitat and populations of westslope cutthroat trout and eastern brook trout are well distributed across the zone. Westslope cutthroat trout were detected in 23 out of 34 streams surveyed. By contrast, survey results continue to support previous evidence that habitat and rearing populations of bull trout have a limited distribution across the zone. Bull trout were only detected in 3 out of 34 streams surveyed with snorkeling or electro-fishing techniques.

Mountain Lakes Surveys – St. Joe Ranger District

Objectives: Conduct a follow-up study in Bacon Lake and obtain baseline physical and biological information of “Timber Lake", an adjacent lake.

Summary of Results: Surveys were conducted on two alpine lakes within the Bacon Creek drainage on August 26 and 27, 1998: Bacon Lake (T42N, R9E, Sec 24, SW 1/4) and "Timber Lake" (T42N, R9E, Sec 23, N1/2).

Bacon Lake: Bacon Lake was visited again in 1998 to follow up on fisheries and amphibian surveys and a human use impact assessment conducted in 1997. Information on the physical components of Bacon Lake was documented in a 1997 report. This year, fifteen fish were caught and released in approximately 1 hour using hook-and-line sampling. All fish caught in the lake were westslope cutthroat trout (Oncorhynchus clarki lewisi) although anterior spot patterns gave the appearance that some fish may have been the product of cross-hybridization with rainbow trout (Oncorhynchus mykiss). The mean length of fish caught was 10.0 inches. This is an increase of about 2 inches from the estimated average length of fish observed while snorkeling during the 1997 survey.

The amphibian survey was conducted around the entire perimeter of the lake except for approximately 120 feet at the southern edge that was impassible due to bedrock ledges extending into the water. Nine frogs, all spotted frogs (Rana pretiosa), were caught in about 2.5 hours. All frogs were found in areas with silty substrate and abundant woody debris except 1 frog that was found in an area with boulder/cobble substrate. Six of the 9 frogs (67%) were caught on the eastern edge of the lake and the remaining three frogs were found along the northern edge. The left, front, outer toe was clipped on all frogs caught from this lake to be consistent with the identifying mark established on the 9 frogs caught from this lake during 1997. None of the frogs captured last year were re-captured this year (no clipped toes).

The human use assessment revealed that campsite #1, which was also examined in the 1997, had been used this year prior to this survey and continued to exhibit relatively high use impact. Human and horse presence was very evident in and around this area. A second campsite, campsite #2, was found during this survey that was not discovered in 1997. It is located just to the east of the Bacon creek outlet of the lake. Campsite #2 is approximately 30 feet x 15 feet and exhibits moderate impact and disturbance to the area. A 3 feet diameter fire pit has been used previously this year and some burned, metal cans remain in the pit. Light grasses and shrub seedlings are starting to grow where tents were pitched. Overall, the site was clean and well kept. Aside from the cans, no other refuse was evident. There were anglers or campers at the lake during this survey.

"Timber Lake": This is known by local citizens as Timber Lake although it is not named on area maps. Timber Lake is a small, high mountain, cirque lake of shallow depth located at an elevation of 5,550 feet in the Bacon Creek drainage. The lake basin has a

northeastern exposure with the southwest side surrounded by steep terrain primarily of talus, bedrock, and boulder substrate. This lake is very remote and no human use or impact sites other than that of moose were found during this survey.

There is one primary outlet and two primary inlets for Timber Lake, all of which were dry during this survey. The primary lake outlet is located on the northeastern edge of the lake and has an active channel width of 4 feet and an estimated mean depth of 0.5 feet. The gradient is high to extreme changing from variable range of 10-60 percent within 100 feet of the lake to an estimated 70 percent gradient as it continues down the drainage to Bacon Creek. The dominant substrates are cobble and boulder. Other than the steep channel gradient, no fish passage barriers were observed within the distance surveyed. One lake inlet, located on the southeastern side of the lake, has an active channel width of 2 feet and an estimated mean depth of 0.3 feet. This channel has a gradient of approximately 30-40 percent about 100 feet up-stream from the lake before entering Timber Lake at a 5 percent gradient. The dominant substrate is a combination of gravel and silt. The other lake inlet, located on the northwestern side of the lake, has an active channel width of 1 foot and an estimated mean depth of 0.5 feet. The inlet has a gradient of 1-5 percent throughout the distance surveyed and the dominant substrate is silt. Only the primary outlet and inlets were surveyed.

The entire perimeter of Timber Lake, with the exception of the southwest edge, is covered with grasses. Beyond the shoreline, huckleberry (Vaccinium spp.), alder (Alnus spp.), mountain hemlock (Tsuga mertensiana), lodgepole pine (Pinus contorta), and subalpine fir (Abies lasiocarpa) cover the majority of the landscape. Lake depth measurements taken along transects averaged about 7 feet deep with a maximum depth of 9.8 feet. Water chemistry parameters were measured at 6 sites in the lake. Water temperature measurements varied between 24.4-18.2° C with a mean temperature of 20.2° C. Conductivity (<10 uohms), dissolved oxygen (7.6-9.7 ppm), and pH (5.82-6.58) were all within a normal range when compared with other alpine lakes in the area. Large woody debris exists at moderate levels around the entire perimeter of the lake. Sizes of LWD ranged from approximately 3-25 inches in diameter and lengths from approximately 2-55 feet in length. Some boulders and bedrock at the southern edge of the lake contribute to aquatic cover. Sparse aquatic vegetation covered most of the lake bed and offers additional cover. Lake substrate composition was estimated to be more than 90 percent silt with the remainder being boulder and bedrock in the area of the lake that was 10 feet and farther away from the shore. Substrate composition around the perimeter of the Lake (within 10 feet of the shore) was estimated to be over 75 percent silt, nearly 15 percent bedrock, with the remainder split between cobble and boulder.

Snorkel surveys and hook-and-line surveys did not detect fish in Timber Lake. Six frogs were seen during the amphibian inventory but only one was caught, a small spotted frog. Due to the small sample size, no toe was clipped for identification purposes. The 6 observed frogs were scattered around the lake although five were found in silty substrate at the waters edge and one was seen swimming close to shore during the snorkel survey. In addition, two adult and eight larval long-toed salamanders (Ambystoma macrodactylum) were observed during the snorkel survey. Dragonfly adults (Order

Odonata), caddis fly larvae and adults (Order Trichoptera), water striders (Family Gerridae), water boatmen (Family Corixidae), other various true aquatic bugs (Order Hemiptera), water beetles (Order Coleoptera), and various species of flies (Order Diptera) were among the aquatic invertebrates observed during the lake perimeter survey.

Conclusions: Alpine lake surveys conducted in 1998 marked the second consecutive year that lakes in the Bacon Creek headwaters were monitored to establish baseline information and investigate questions about the relationships between fish and amphibian populations in alpine lakes with and without fish. Alpine lake surveys in 1997 revealed a low abundance of frogs in Bacon Lake that contains a fishable population of cutthroat trout. Surveys in the adjacent yet much smaller "Red Bug Lake" during the same year detected no evidence of frog life despite the absence of fish from this lake. Repeated surveys in Bacon Lake in 1998 found the same low abundance of frogs (none of them re-captures) as the previous year. However, the fishless "Timber Lake" also exhibited a low abundance of frogs. Although the monitoring duration and sample sizes are limited, the distribution and abundance of frog populations using alpine lakes in the Bacon Creek headwaters does not appear to be influenced by the status of these lakes with regards to the presence of fish populations.

In summary, Timber Lake appears to have marginal conditions for supporting fish populations. The shallow depth of the lake makes it unlikely that fish can persistently survive the long, hard winters at this elevation. The steep gradient of the primary outlet stream suggests that recruitment from downstream populations is unlikely. In addition, the steep gradient and intermittent nature of feeder streams to Timber Lake indicate that natural reproduction would not be able to sustain an isolated population.

Redd Surveys – St. Joe Ranger District

Objectives: Monitor the abundance and distribution of spawning activity in selected streams in the St. Joe River watershed.

Summary of Results

Bull Trout: The bull trout spawning season in the St. Joe River drainage was monitored by the U.S. Forest Service and representatives from various organizations (Idaho Department of Fish and Game, Panhandle Chapter of Trout Unlimited, University of Idaho, Washington Water Power, and other volunteers) on September 19, 1998. This year's Great Bull Trout Redd Hunt marked the seventh consecutive fall season that such an effort has occurred in an attempt to monitor the state of knowledge regarding bull trout use of spawning and rearing habitat in the St. Joe River and its tributary streams. The information collected during these surveys includes the number and approximate locations of adult bull trout and bull trout redds as well as the stream distances surveyed. General habitat conditions (e.g. habitat type, cover, and substrate) associated with redds have also been recorded. More than 20 miles of streams were surveyed during the Great Bull Trout Redd Hunt in 1998. A total of 38 bull trout redds were counted with 32 of these occurring in 1 stream. Redds were found in Beaver Creek, Fly Creek, Medicine

Creek, Mosquito Creek, and upper Simmons Creek. Redds were not found in Gold Creek, Heller Creek, Red Ives Creek, and Sherlock Creek despite being surveyed.

Westslope Cutthroat Trout: Forest Service crews conducted redd surveys for Westslope cutthroat trout (Oncorhynchus clarki lewisi) in various areas across the St. Joe River basin between May 14 and May 26, 1998. Streams surveyed in the St. Maries River sub-basin were more suited to finding redds since the majority of spring run-off had occurred. No redds were found in Hidden Creek, Keeler Creek, and Wood Creek were approximately 800 feet, 500 feet, and 0.25 miles were surveyed, respectively. A total of 7 redds were identified in a 1 mile section of the West Fork St. Maries River. Tributary streams in the middle and upper reaches of the St. Joe River possessed higher water levels and velocities due to a later spring snow-melt making it more difficult to survey and locate redds during this period. However, 2 redds were identified in 0.8 miles of the West Fork Eagle Creek and 1 redd was found in 0.75 miles of Bruin Creek. More detailed information other stream observations are available in District files.

Chinook: The St. Joe River was surveyed on September 30, 1998 by Forest Service crews to evaluate habitat utilization of chinook (Oncorhynchus tshawytscha) during spawning. The St. Joe River was examined between the bridge at St. Joe City (Sec.21 R.1E, T.45N.) to an area down stream known as the "Big Eddy" (Sec.24 R.1E.,T.45N.). Most of this area is composed of runs and glides with cobble and gravel substrate although meander pools are also present. The fine layer of silt that covers most of the substrate can aid in locating spawning activity because disturbed substrate becomes more easily identifiable. Suitable spawning areas were identified from the road and then snorkeled by having one person on each side of the channel. To avoid disturbing possible redds, snorkelers drifted down stream over potential spawning sites. Some areas near St. Joe City showed bank erosion where grazing activity of free-roaming cattle have river access. Close examination of disturbed river substrate (which is indicative of spawning activity) revealed that disturbance was primarily linked to cattle walking in the river. No chinook or chinook redds were found in this section of the St. Joe River so habitat utilization could not be evaluated.

Bull Trout Redd Survey's and Trapping – Sandpoint RD

Objectives: Monitor the abundance and distribution of spawning activity in selected streams in the Pend Orielle Lake system.

Summary of Results

Bull Trout: The bull trout spawning season in the Pend Orielle Lake drainage was monitored by the Idaho Department of Fish and Game, U.S. Forest Service and representatives from various organizations (Rocky Mountain Research Station, Panhandle Chapter of Trout Unlimited, University of Idaho, Washington Water Power, and other volunteers) in 1998. During this cooperative effort, bull trout redd surveys were primarily conducted in Trestle Creek and Lightning Creek and its tributaries to monitor bull trout spawning and rearing habitat in these drainages for the Pend Orielle

Lake system. The information collected during these surveys includes the number and approximate locations of adult bull trout and bull trout redds as well as the stream distances surveyed. General habitat conditions (e.g. habitat type, cover, and substrate) associated with redds have also been recorded. More than 15 miles of streams were surveyed in 1998. A total of 432 bull trout redds were counted for these watersheds, with 333 (77.0%) of these occurring in Trestle Creek, 3 (0.7%) in Lightning Creek, and 64 (14.8%) in E.F. Lightning Creek, and 32 (7.4%) in the remaining Lightning Creek tributaries. Redd surveys were also conducted in Grass Creek (tributary to Boundary Creek), but none were found.

In the fall of 1998 a cooperative project between Sandpoint Ranger District and the Rocky Mountain Research Station was initiated to collect specific bull trout information in Trestle, Lightning, and E.F. Lightning Creeks and Lightning Creek tributaries. The information collected included: genetic sampling, specific habitat variables, temperature data, substrate data, redd surveys, and using weir traps to obtain counts of post-spawners as they left these watersheds. The data collection for genetic sampling began in July; preceded by snorkeling specific habitat segments where bull trout were known to stage prior to spawning; followed by trap counts of post spawners and redd surveys. This data is currently being analyzed by the Rocky Mountain Research Team and results are pending based on completion of statistics from data collection, which will be used for future management decisions in these watersheds.

Fish Populations – Central Zone

The limited fish population monitoring efforts were an attempt to see if the forest is meeting the Forest Plan goal to manage fisheries habitat to provide a carrying capacity that will allow an increase in the Forest's trout population, and the Forest Plan objective to maintain and improve fish habitat capacities in order to achieve cooperative goals with the State Fish and Game Department and to comply with state water quality standards.

Several unroaded stream and river segments will be managed as low public access areas to maintain a diversity of fishing experiences. Three streams that met those criteria were surveyed for cutthroat in 1998 for fish population. Fish population surveys give age distribution, use of macrohabitat and microhabitat, abundance, and density of fish. Only fish density (fish/m2) and abundance could be analyzed on all the streams due to the lack of funds and time.

1) Jordan Creek

Eight electrofishing units were established in Jordan Creek, to determine if population densities could be used to track enhancement work, in 1992 between the confluence with the North Fork Coeur d'Alene River and the bridge crossing. The electrofishing units have been sampled annually except in 1995. Units 1 and 2 are downstream of the restoration work and Units 7 and 8 are upstream of the restoration work. The lower end of Unit 7 had LWD and rock rip-rap installed to protect a bridge footing creating better

habitat than previously existed. Only cutthroat trout data has been analyzed over the years. Young of the year cutthrout trout were not counted in the electrofishing surveys.

Units 3-6 have had higher densities of cutthroat trout than units 1 and 2 and approximately the same as Units 7 and 8. Units 7 and 8 have better quality habitat than Units 1 and 2 which could explain for the higher densities observed. The 1998 survey observed the highest fish densities of record for Units 3-8. Estimated cutthroat trout populations in 1998 ranged from 6 fish per square mile in Unit 5 to 12 fish per square mile in Unit 6. Units 1 and 2 had estimated cutthroat trout populations of 3 fish per square mile and 2 fish per square mile. The estimated cutthroat trout population in 1998 for Units 7 and 8 were 14 fish per square mile and 12 fish per square mile.

Age distribution data for cutthroat trout was also analyzed for Jordan Creek. Lengths of trout were placed in 10 mm categories starting at 40 mm. Lengths were then compared to Hortons (1985) findings of age-length relationship. Age of fish observed in Jordan Creek ranged from 0+ to 3 year old fish. The age class most observed was 0+. A possibility for not observing trout in the 4 year class or older might be from the electrofishing technique or if these are fluvial fish they could be appearing to be moving out and entering the river by age 3.

Population densities naturally fluctuate over time in response to stream habitat conditions. Cutthroat trout in Jordan Creek are possibly exhibiting this natural population fluctuation in response to habitat variation. Fish population in compared to stream habitat type, amount of cover, type of cover should be analyzed. The question is: are the observed levels of fluctuation at or above carrying capacity?

2) Independence Creek

Fish populations in Independence Creek have not been surveyed by the US Forest Service. The plan in 1998 was to establish possible base line data for fish abundance, fish population compared to stream habitat type, fish population compared to percent cover, fish population to type of cover. Due to logistics only four pools, three runs, and one glide, in Reach 5 were snorkel surveyed.

Using the Hunt and Bjornn method (1995) the pools had a density of 0.025 fish/m2 . There appeared to be a relationship between cover and fish density. The more percent cover the great the fish density. Pool 1 and Pool 2 were formed by LWD, Pool 3 was formed by stream meander, and Pool 4 was formed by bedrock. Pool 1 had 25 percent cover and 0.066 fish per squre mile, Pool 2 had 49 percent cover and 0.131 fish square mile, Pool 3 had 30 percent cover and 0.026 fish square mile, and Pool 4 had 11 percent cover and 0.003 fish square mile.

The one glide was combined with the three runs to determine trout density of flat water. Using the Hunt and Bjornn method (1995) the runs and glide had a density of 0.005 fish square mile. Run 1 had 35 percent cover and 0.018 fish per square mile, Run 2 had 11

percent cover and 0.0 fish per square mile, Run 3 had 39 percent cover and 0.005 fish square mile, and Glide 1 had 3 percent cover and 0.04 fish per square mile.

Though the sample size was small there seems to be an association between fish density, habitat type, and % cover. Pool 1 and Pool 2 were formed by LWD, Pool 3 was formed by stream meander, and Pool 4 was formed by bedrock. Pool 1 had 25 pecent cover and 0.066 fish per square mile, Pool 2 had 49 percent cover and 0.131 fish per square mile, Pool 3 had 30 percent cover and 0.026 fish per square mile, and Pool 4 had 11 percent cover and 0.003 fish per square mile. Pools created by wood with more than 25 percent cover had great fish density than pools formed from non-LWD with more than 25 percent cover. Large woody debris and small woody debris accounted for 16 percent cover in Pool 1 and 35 percent cover in Pool 2. Runs with cover had less fish per square mile than pools with little cover.

The increase in trout density could possibly be from LWD affecting antagonistic behavior within cutthroat trout. Large and small woody debris within the wetted perimeter could be creating microhabitat within a pool that reduces antagonistic behavior amongst cutthroat trout. The concept of cutthroat trout density dependent on stream habitat types, percent cover, and type of cover has been studied intensely. Our limited data seems to agree with the studies that cutthroat trout are dependent on stream habitat type, percent cover, and type of cover.

3) Little North Fork Coeur d'Alene from Laverne Creek to Deception Creek

The intent of the snorkel survey in the Little North Fork Coeur d'Alene was to compare cutthroat trout population data to the 1982 cutthroat trout population survey and the 1998 Independence Creek survey. The Idaho Department of Fish and Game has snorkel survey transects located within this reach that is surveyed annually. The snorkel survey location was between the confluence with Laverne Creek and the confluence with Deception Creek. The 1992 survey snorkeled 2 pocket water units, 10 pools, and 6 runs. The 1998 survey snorkeled 2 pools and 6 runs, because of funding and logistics.

In 1982 the mean trout density, using Hunt and Bjornn method, in pocket water was 0.032 fish per square mile, in pools 0.038 fish per square mile, and in runs 0.01 fish per square mile. The small sample size of pocket water had 0.041 fish square mile for the unit with 25 percent overhead vegetation cover and 0.013 fish per square mile for the unit with 40 percent boulder cover. Pools with LWD or overhanging vegetation had higher densities of cutthroat trout compared to pools with the same percent cover formed by boulders. The mean density for pools with a LWD/overhanging vegetation as cover was 0.045 fish/m2 and the mean density for pools with boulder as cover was 0.035 fish per square mile. Runs with LWD as cover had 0.03 fish per square mile, with overhead vegetation as cover had 0.013 fish square mile, and 0.017 fish per square mile with boulders as cover. Calculated cutthroat trout abundance for the reach between Laverne Creek and Deception Creek was 849 fish.

The 1998 survey failed to collect cover data for all of the stream habitat types snorkel surveyed due to logistics, therefore trout population correlation with cover could not be analyzed. A correlation between trout and LWD was analyzed because a LWD inventory was surveyed for the units snorkeled. Using the Hunt and Bjorrn method pools had 0.02 fish per square mile and runs had 0.01 fish per square mile. Pool 1, formed by boulders, with no LWD had 0.015 fish per square mile and Pool 2, formed by meandering, with LWD had 0.045 fish per square mile. Fish density in the glide and runs did not seem to be dependent on the presence of LWD. Run 2 and Run 4 were the only habitat units to have stable pieces of LWD, size class 5-6, the rest of the units had pieces of LWD in size class 1. We can only assume there is no correlation between LWD and cutthroat trout density in runs. The calculated cutthroat trout abundance for the reach between Laverne Creek and Deception creek was 859 fish. The small sample size in 1998 showed a decrease in density from 1982 and an increase in abundance since 1982 in cutthroat trout populations. The increase in abundance is from a larger surface area estimated for the reach in 1998 compared to 1982.

Forest Plan Monitoring Item H-1: Threatened and Endangered Plants

Forest Plan direction for sensitive and rare species, including plants, are to manage habitat to maintain population viability, prevent the need for federal listing, and to determine the status and distribution of Threatened, Endangered and Sensitive (TES) and other rare plants.

Threatened Species

Prior to 1998, only one threatened plant was listed for the Idaho Panhandle, *Howellia aquatilis* (water howellia). This species was historically (1892) known to occur within the Pend Oreille sub-basin, near Spirit Lake, Idaho, on private land. Surveys conducted by the Idaho Conservation data center (ICDC) Botanists in 1988 failed to relocate this population. It is believed to be locally extinct. Existing populations are known for adjacent areas in eastern Washington, western Montana, and south in the headwaters of the Palouse River in north-central Idaho. Surveys of suitable habitat (vernal pools) across northern Idaho by USFS and ICDC botanists in subsequent years have failed to find additional populations. Surveys of suitable habitat on federal lands will continue following requirements found in the Endangered Species Act of 1974 and Forest Service policy. In early 1998, the USFWS listed the orchid, *Spiranthes diluvialis* (Ute's ladies'-tress), as threatened. Based on populations that occur in inter-montane valleys of Montana, the shores of an alkaline lake in Washington, and populations in southern Idaho, Utah, Nevada, Wyoming, and Colorado, consequently Northern Idaho was thought to have some potential habitat by the USFWS. Surveys of habitat (deciduous cottonwood and open meadow riparian areas) by USFS and Idaho Conservation Data Center Botanists have yet to document populations, nor any highly suitable habitat in northern Idaho. In a recent report by the Idaho Conservation Data Center on predicting the distribution of potential habitat, very few of the plant associations known to host Ute's ladies-tresses occur in northern Idaho. The likelihood of Ute's ladies-tresses actually occurring in northern Idaho is remote. Removal of this species from the IPNF threatened list will likely occur in the future, based on concurrence from the USFWS which has the responsibility for this species.

Sensitive Species

Currently, there are 58 species as listed as ‘Sensitive’ by the USFS, according to the June 1994 Regional Foresters sensitive species list. A new sensitive species list is currently in draft and will be released prior to field season in 1999. The Idaho Conservation Data Center ‘tracks’ a larger list of rare vascular and non-vascular plants in the State, of which the USFS sensitive list is a subset. Currently, the ICDC lists 94 vascular plants and 16 non-vascular plants (lichens, mosses and liverworts) for the IPNF. Generally, the USFS sensitive contains the species most at risk on federal lands. The additional 52 species on the ICDC list can be thought of as ‘species of concern’; plants that are rare at the state scale, but for which there either are few identifiable threats, some large, secure populations, or no occurrences are known for federal lands. More information on the species on the ICDC lists can be found on the internet at http://state.id.us/fishgame/cdchome.htm.

Since the Forest plan was released in late 1987, there have been 3 USFS sensitive species lists: 1988, 1991, and 1994. The 1988 and contained 29 species known or suspected to occur on the IPNF. The 1991 sensitive species contained 42 species, and the most current list (1994) has 58 species as sensitive. These lists are not static, species have been dropped, and new species have been added based on field information and new discoveries.

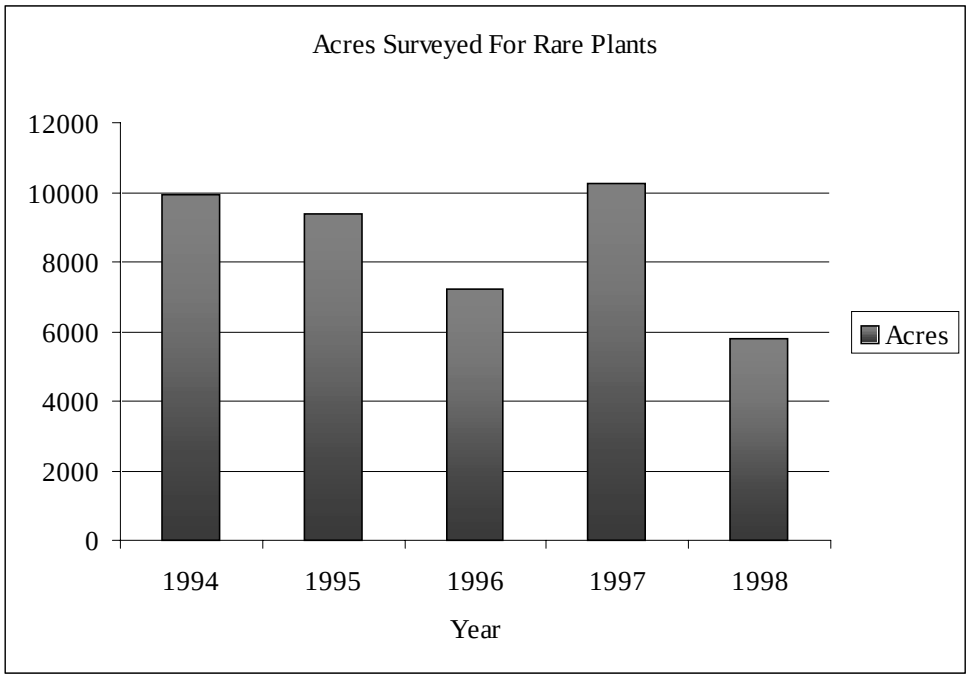
Surveys

All sensitive plant habitats on the IPNF are assessed for the suitability to support rare plants. Habitat found to be suitable within project areas, which would be affected by a project, is surveyed to determine the presence of rare plant species. In 1998, Forest botany personnel performed on the ground clearance surveys in 5,789 acres of high potential habitats for TES and rare plants in support of various projects including, timber, watershed, fisheries, KV, trails, grazing, special use, and land exchange projects. This also includes 426 acres of landscape level surveys not associated with any project. These landscape level surveys are especially important as they generally occur in areas that have a very high potential to support populations (e.g. old growth cedar groves, remote peatlands, Research Natural Areas), and that likely will not have projects in the future that would require surveys.

Survey trends

The number of acres surveyed for rare plants is a measure of the Forest Plan commitment to determine the status and distribution of rare plants within the Idaho Panhandle National Forests. Qualified botanists and other personnel that have had training in botany and sensitive plant identification conduct botanical surveys.

Figure 4. Acres Surveyed on the IPNF from 1994 – 1998.



Good records of the number of acres surveyed by botany personnel have been kept since 1994. From 1988 until 1993 the exact number of acres surveyed was not well documented, but is estimated to be about 5000 acres. Prior to 1988, the IPNF did not conduct surveys and rare plant observations reported to the ICDC were incidental. From 1994 to 1998, surveys occurred on 36,759 acres of federal lands with the express purpose of documenting and protecting rare plant populations from management activities and mitigating potential adverse effects. Recent estimates of sensitive plant habitat (IPNF Geographic assessments) have determined that approximately 625,000 acres (~25%) of the total land base of the IPNF has a potential to support sensitive plant species in a wide array of plant communities. To date, about 7% of all suitable sensitive plant habitats have been surveyed, or about 41,759 acres.

Survey recommendations

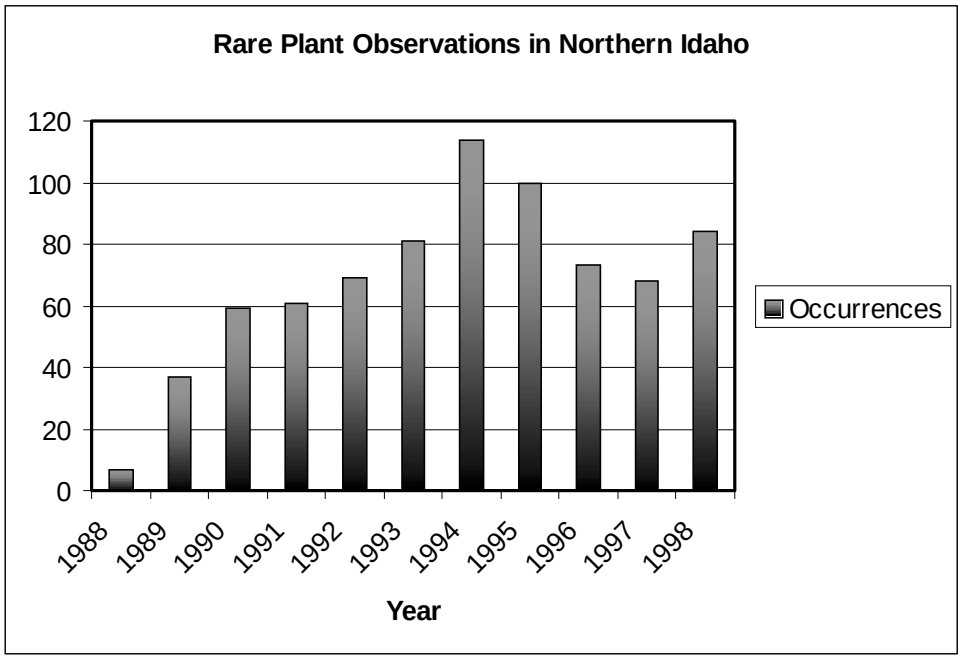
At the current ten year survey rate with existing personnel, (3 full time botanists, and 4 support technicians), it will take about a 100 years to meet the goal of determining the status and distribution of all rare plants on the IPNF in highly suitable habitat. Determining the status and distribution of rare plants is a good long-term goal. However, it is not obtainable in the life of a forest plan. Rare plants, unfortunately, are not found on every acre of suitable habitat surveyed; they wouldn't be rare if they were. The number of acres surveyed in order to find an occurrence varies widely. Based on the last few years of surveys, for every 100-200 acres of suitable habitat surveyed, one occurrence can be found, on average. The vast majority of surveys are associated with project level activities so as to document populations and protect them to mitigate effects under existing laws. In the future, along with project specific surveys, more landscape level surveys need to occur in those habitats that have a high likelihood to support rare plants.

Observations

Another measure of the status and distribution of rare plants is the number of occurrences documented for the five northern counties of Idaho. Information was compiled from the Idaho Conservation Data Center (ICDC, 1998), which is the repository of all information relating to rare species in the State. The information below includes some sightings on non-federal lands. However, the vast majority of observations come from lands under federal management. Sightings on adjacent private lands are important in understanding the distribution of occurrences in the ecosystem as a whole. There are no laws governing rare plants on non-federal lands in the State of Idaho, subsequently few surveys have occurred on non-federal lands; observations have generally been incidental discoveries. The recording processes that the ICDC uses often aggregate multiple observations together into one occurrence if they occur in close enough proximity together, and are likely to be portions of larger populations. In past Forest Plan monitoring reports any observation was counted independently, so counts between the ICDC information and the information in past Forest Plans is not directly comparable. What is important is the trend from 1988 – 1998. Between 1892 and 1987 there were 119 observations documented for rare plants in the 5 northern counties, federal and non-federal lands. Since 1988, Botanists and other personnel from the USFS, the Bureau of Land Management, and the Idaho Conservation Data Center have documented over 766

occurrences, for 80 rare species, mostly on federal lands. Prior to 1988, and the advent of the first USFS Sensitive species list, no surveys occurred to ensure that rare plants were protected from adverse affects resulting from management activities. One needs to understand that a reported occurrence is not always, nor usually, an independent population. Many populations of plants have a colonial nature, with scattered colonies that are in close enough proximity to interact with each other. The variables that define separate populations vary between all the 110 plants listed either as rare by the ICDC or the 58 listed as sensitive by the Forest Service. The exact number of independent breeding populations of rare plants on the IPNF is not known.

Figure 5. Rare Plant Observations, 1988 – 1998, based on Idaho Conservation Database records.



Some sightings of certain species counted in past monitoring reports have been removed from the Forest Service sensitive list and the State ICDC list through time. The main reasons for removal has been that species have been found to be more abundant that previously thought or not really "rare', and in some cases, the perceived threats were found to be based on erroneous information. A few species were initially suspected to occur here, but based on surveys and new information on habitat requirements, are no longer expected to be found on the IPNF. All the 1998 surveys documented and protected 84 new occurrences for 24 species of rare plants on federal lands. See the table in the appendix.

Formal Population Monitoring:
ICDC and USFS Botanists have installed a number of formal, permanent monitoring plots over the last ten years, and baseline information has been collected. Only a few of the formal monitoring plots however have actually had multiple year, repeated measures to evaluate population trends. The species name, location, establishment date and years of

data and scheduled monitoring is displayed below. The data for monitoring performed in 1998 is displayed in the appendix. The baseline data for plots that have not had repeated measures yet is not displayed.

1) Deerfern, Priest Lake Ranger District, Distillary Bay. Established 1991. Data 1991, 1994, 1997, scheduled for 2000 (final).
2) Deerfern, Coeur d'alene Ranger District, Skookum creek, Established 1997. Data 1997, scheduled for 1999, 2001, 2003.
3) Howell's gumweed, St. Joe Ranger District, Linstrom peak, Originally established 1987, Re-established 1995. Data 1987 (non-comparative), 1995, 1996, 1997, 1998, annual reading scheduled for 1999 – 2004 (final).
4) Clustered lady's slipper, St. Joe Ranger District, Eagle creek, Established 1996. Data, 1996, 1997, scheduled for 2000.
5) Moonworts, Priest Lake Ranger District, Hannah Flats, Established 1994. Data 1994, 1995, 1996, 1997, unscheduled.
6) Salmonberry, Priest Lake Ranger District, Beaver Creek, Established 1995. Data 1995, unscheduled, never re-measured. Proposed to be dropped form the USFS sensitive species list.
7) Groundpine, Priest Lake Ranger District, Nordman, Established 1995. Data 1995, 1996, scheduled for 2000, 2005.
8) Dwarf-redblackberry, Priest Lake Ranger District, Butch creek Timber sale, Established 1995. Data 1995, scheduled for 2000, 2005. Proposed to be dropped from the USFS sensitive list.
9) Peatland Fens, Bonner's ferry Ranger district, Grass Creek, Established 1998. Data 1998, scheduled 2000, 2005.
10) Peatland Fens, Bonner's ferry Ranger District, Cow creek and Smith Creek RNA. Established 1992. Data 1992, unscheduled, never re-measured.
11) Deerfern, St. Joe Ranger Station, Allen Ridge. Established 1998. Data 1998, scheduled 2000.
12) Deerfern, St. Joe Ranger Station, Emerald creek, Established 1998, Data 1998, scheduled 2000.

Several new monitoring plots were established in 1997 and 1998. One deerfern plot on the Coeur d'Alene District was established in 1997 and re-measures are scheduled for 1999. Two deerfern plots on the St. Joe District (different sites) and a Peatland plot on the Bonner's ferry district were established in 1998. Baseline data was collected and repeated measures are scheduled for FY 2000 and beyond. The baseline and comparative data will be reported when re-measures are taken. Most of the formal monitoring plots have not been associated with project activities (e.g. timber or watershed projects) and occurred in habitats that are not immediately threatened by management activities. These do have utility in providing baseline data for the species.

Several of the plots are evaluating affects of timber harvesting activities; the deerfern plots at Priest Lake (#1), the Groundpine (#7) and dwarf redblackberry (#8) plots at Priest lake. The Priest Lake deerfern plots are scheduled for the final, ten year reading in FY 2000 (see the 1997 monitoring report). Results from this monitoring demonstrate that

deerfern has some tolerance to timber harvesting activities (see 1997 monitoring report). The Priest Lake Groundpine plots were originally scheduled for annual monitoring for 4 years, then every other year until year ten. Only two years of data were collected 1995 and 1996. Results are not conclusive at this time. Due to budget and time constraints, the 1997 and 1998 measures were not done. Measures are rescheduled for FY 2000, 2002, 2004. The dwarf redblackberry plots were likewise scheduled for re-measures, however delays in the sale (upon which monitoring dollars depended) have delayed the project. This species also has been proposed for de-listing as a sensitive species and is no longer tracked as rare by the ICDC. Compelling reasons to monitor this species are no longer present. Locally abundant populations are documented for the Priest Lake area and this species has been observed to be thriving in disturbed habitats, and is believed to have few threats.

The clustered ladies slipper plots on the St. Joe (#4), and the moonwort plots at Priest lake (#5) were not monitored in 1998 and will be re-measured in FY 2000. (See 1997 monitoring report.)

Monitoring recommendations

The standard response when species have been discovered within project areas has been to protect the occurrence by buffering the habitat from effects. For many species this is reasonable, however, some species may actually benefit from some level of disturbance (e.g. increased light levels as the case of deerfern). Future formal monitoring of the affects on occurrences from some activity will provide information that will assist the IPNF in managing sensitive and rare plant populations. This has not occurred to any meaningful extent to date. Protecting populations from all disturbances in the long run may be as detrimental as not managing for them at all. Several monitoring projects, #1, Deerfern, #7 groundpine, and #8 dwarf redblackberry, are evaluating affects of an activity on existing occurrences.

Repeated formal monitoring of occurrences in 'undisturbed' habitats generally can be viewed as baseline information, which provide important demographic information for that occurrence, some insights into population dynamics, and the response to climatic variation. Several monitoring plots have been established in relatively undisturbed habitat over the last 10 years, but have never been read (Salmonberry, Priest Lake; Peatland fens, Cow creek, Bonners ferry Ranger District). These plots would provide some good baseline data for the species associated with them. The peatland plots especially contain an array of rare species that can be monitored at once. However, to truly understand population variation and viability, long term, randomly selected, repeated measures on multiple occurrences for each of the 58 sensitive species would have to occur to be statistically meaningful, a complex endeavor that is well beyond the means of the congressionally allocated budgets for threatened, endangered, and sensitive species management. Little discretionary funding exists for monitoring of the sensitive or state rare plants and additional sources of funding to meet monitoring goals will have to be found. Project level monitoring of the affects from management activities rather than just blanket protection of all occurrences also must be instituted to validate assumptions of the needs for various species. This involves some risk, as many of the

assumptions regarding the response of these species to disturbance are based on scant information. Little monitoring has occurred to validate the effectiveness of buffering populations in project areas either. In the future, population trend monitoring on a subset of all sensitive and rare plant species, combined with monitoring other 'surrogate' elements, like suitable habitat, or 'sensitive focal species' must occur across a broader range of species than it currently does. Not all species will be able to be monitored, and priority must be assigned to those species with the highest threats that are vulnerable to local extinction.

Informal monitoring

This type of monitoring does occurs on the IPNF and involves re-visiting existing occurrences, documenting the population and submitting the information to the ICDC for compilation into the database. This type of monitoring asks a qualitative question, "Is the population still there, and how is it doing?" Unfortunately, the IPNF has no formal protocols for this type of monitoring. Revisits are incidental, and not consistently applied across the forest. No formal documentation occurs other than a sighting report submitted to the ICDC, which does not always occur. Some occurrences are checked fairly frequently, usually ones in close proximity to roads, off frequently used trails, or sites used for rare plant identification training. Updated sighting reports are not always filed, especially when the occurrence appears stable (i.e. there is nothing to report). This type of monitoring must be improved. The species most at risk and occurrences that have not been visited in a long time should be the target of visits in a systematic manner to validate the assumption of continued presence. It is known from the ICDC rare plant database that there are 119 sensitive plant occurrences on federal and non-federal lands in northern Idaho for which the last observation occurred sometime between 1892 and 1987. The majority of occurrences are on federal lands. In 1998, there were 26 existing occurrences that were visited by IPNF botanists (see the appendix for a list).

Species trends

Most of the monitoring plots only provide quantitative information for that specific occurrence, not the species as a whole. In general, the few established monitoring plots do not adequately represent the multiple populations that occur on the forest, and population assumptions made from very small, non-replicated samples are often erroneous.

Quantitative information to document population trends for all of the 58 Forest service sensitive species or the additional 44 species tracked by the ICDC as rare is not available. Of the 12 monitoring projects established, only the Howell's gumweed plots on the St. Joe District provide some information to objectively talk about the species as a whole, as this is the only population occurring in all of Idaho and replicated plots were established in portions of the population. No other populations outside those found along the breaks of the St. Maries River are known to exist in Idaho, despite years of surveys. These were also the only formal monitoring plots read in 1998 (see data below).

Only qualitative measures can be used to talk about rare plant species trends across the Forest. Based on the best information available, known population sizes, distribution, threats, a display of trends by species is given below. Most sensitive and rare plant populations are currently stable, or have segments of their populations for which there is some concern. No populations are known to have gone locally extinct since the advent of the sensitive species list in 1988 due to USFS management activities. Of the 110 rare and sensitive plant species, 23 have secure, stable populations with few concerns or threats, 51 species have mostly stable populations with some concerns and some threats, and there is a serious concern for about 24 species. The remaining 12 species are either historical sightings or ones suspected but never documented in northern Idaho.

Table 26 below displays a qualitative measure of species trends for USFS sensitive plants and the additional rare plants tracked by the ICDC. A "0" describes fairly secure, populations with stable trends, few observed threats; a '1' indicates some concern and threats, with potential declines to some population segments, habitat or populations through time; and a '2' indicates a serious concern for long term trends based on known threats, declines or very small population size that are vulnerable to extirpation. An * indicates no occurrences have ever been documented for the IPNF. An H indicates an historical occurrence that may be extirpated.

Table 26. Quantitative measure of species Trends

USFS Sensitive Species		**ICDC Rare Species**	
Species	**Trend**	**Species**	**Trend**
Howellia aquatilis (Threatened)	2 (H)	Andromeda polifolia	2
Spiranthes diluvialis (Threatened)	*	Astragalus bourgovii	1
Adiantum pedatum var. novum	0	Astragalus microcystis	1
Agrostis oregonensis	*	Aster junciformis	1
Allotropa virgata	*	Botrychium lineare	2 (H)
Arnica alpina	0	Botrychium paradoxum	2
Asplenium trichomanes	2	Botrychium pendunculosum	2
Betula pumila	1	Buxbaumia aphylla	*
Blechnum spicant	1	Buxbaumia viridis	1
Botrychium ascendens	2	Cassiope mertensiana	0
Botrychium crenulatum	2	Carex aenea	2 (H)
Botrychium lanceolatum	0	Carex flava	1
Botrychium minganense	1	Carex xerantica	2
Botrychium montanum	2	Cetraria sepincola	1
Botrychium pinnatum	1	Cetraria subalpina	1
Botrychium simplex	2	Cladonia imbricarica	1
Calochortus nitidus	*	Cladonia transcendens	1
Cardamine constancei	2	Cladonia uncialis	1
Carex buxbaumii	1	Collema curtisporum	1
Carex californica	0	Collema furfuraceum	0
Carex chordorrhiza	1	Cordydalis caseana	0

USFS Sensitive Species		ICDC Rare Species	
Species	**Trend**	**Species**	**Trend**
Carex comosa	2	Dodecatheon dentatum	0
Carex hendersonii	1	Draba incerta	1
Carex leptalea	1	Eburophyton austiniae	2
Carex livida	2	Hookeria lucens	1
Carex paupercula	1	Hypogymnia appinata	0
Cicuta bulbifera	1	Iris versicolor	2
Cypripedium fasciculatum	2	Ivesia tweedyi	1
Cypripedium parviflorum	2	Lobaria hallii	0
Drosera intermedia	2	Lobaria scrobiculata	1
Dryopteris cristata	1	Lugwigia polycarpa	1
Epilobium palustre	1	Maianthemum dilatatum	2
Epipactis gigantea	2	Meesia longiseta	2 (H)
Eriophorum viridicarinatum	2	Mimulus alsinoides	2
Gaultheria hispidula	1	Nymphaea liebergii	2 (H)
Grindelia howellii	2	Oxalis trillifolia	1
Hypericum majus	1	Petasites sagittatus	1
Lycopodiella inundata	1	Platanthera orbiculata	0
Lycopodium dendroideum	1	Psilocarpus tenellus	0
Lycopodium sitchense	1	Rhinanthus minor	0
Mimulus clivicola	0	Ribes sanguineum	0
Muhlenbergia racemosa	1	Salix candida	1
Phegopteris connectilis	1	Scirpus fluviatilis	1
Polystichum braunii	1	Silene spauldingii	*
Rhynchospora alba	1	Sphaerophorus globosus	1
Romanzoffia sitchensis	1	Sphagnum mendocinum	2 (H)
Rubus pubescens	0	Tauschia tenuissima	0
Rubus spectablis	0	Thalictrum dasycarpum	2
Salix pedicellaris	1	Thamnolia vermicularis	*
Sanicula marilandica	0	Triantha occidentalis	1
Scheuchzeria palustris	1	Vallisneria americana	0
Scirpus hudsonianus	2	Waldsteinia idahoensis	1
Scirpus subterminalis	1		
Sedum rupicolum	0		
Streptopus streptopoides	1		
Thelypteris nevadensis	*		
Tellima grandiflora	0		
Trientalis arctica	1		
Trientalis latifolia	0		
Vaccinium oxycoccos	1		

Several species with historical occurrences are no longer present in northern Idaho, most notably water howellia (*Howellia aquatilis*) from near Spirit Lake, pygmy waterlily (*Nymphaea liebergii*) near Granite Lake, Linear-leaved moonwort (*Botrychium lineare*), and Bronze sedge (*Carex aenea*) near Coeur d'Alene, Idaho. None of these species have ever been found again in northern Idaho since their original sightings. The listed species Ute's ladies tresses (*Spiranthes diluvialis*), which the USFWS has determined could be in northern Idaho, have never been found here. Several other species have had historically documented occurrences disappear, mostly on non-federal lands; several deerfern sightings (*Blechnum spicant*) near Rathdrum and Athol; clustered lady's slipper (*Cypripedium fasciculatum*) near Lake Fernan, and helleborine orchid (*Epipactis gigantea*) near Hope Idaho. It is thought that habitat conversion resulting from development on non-federal lands lead to these extirpations. The helleborine orchid is now only known for a single site in the Kootenai River valley on private land. A study done in the 1956 by J. H. Rumely (Master's Thesis, Washington State University) in a peatland fen in Priest Lake was re-measured in the 1990's (Moseley and Bursik, 1992). It documented the disappearance of four rare plants and ten 'common' plants associated with those peatland fens from changes in the hydrology of the site (wetland ditching) and changes in water chemistry of the peatland (from nutrient inputs). Sensitive and rare plant occurrences, population segments, and entire populations of have experienced decline since the turn of the century.

Some revisits (informal monitoring) and observations have documented widely fluctuating and low occurrence/population numbers in rare plant species that have obligate soil mycorrhizal associations (mycotrophic) like the moonworts (Botrychium species) and the rare orchids like clustered and yellow lady's slipper (Cypripedium fasciculatum, C. parviflorum) and phantom orchid (Eburophyton austiniae). However, fluctuating population numbers in common mycotrophic species have also been observed. A climate dependent, cyclical, and dynamic pattern of plants remaining subterranean for periods of time may be 'normal' for these species. However, small breeding populations, especially ones less than 25 individuals, are a concern from an evolutionary standpoint. Small populations are inherently at risk of losing genetic diversity due to genetic drift, and are much more vulnerable to extinction from human and natural causes than larger populations.

Many species are known from less than three occurrences in the entire Idaho Panhandle, most notably bog rosemary, (*Andromeda polifolia*), maidenhair spleenwort (*Asplenium trichomanes*), Bourgov's milkvetch (*Astragalus bourgovii*), dainty moonwort (*Botrychium crenulatum*), dainty moonwort (*Botrychium paradoxum*), stalked moonwort (*Botrychium pendunculosum*), spoon-leaved sundew (*Drosera intermedia*), Helleborine orchid (*Epipactis gigantea*), Howell's gumweed (*Grindelia howellii*), many-fruited loosestrife (*Ludwigia polycarpa*), beadruby (*Maianthemum dilatatum*), Chickweed monkey flower (*Mimulus alsinoides*), green muhly (*Muhlenbergia racemosa*), red-flowered current (*Ribes sanguineum*), Hudson's bulrush (*Scirpus hudsonianus*), and purple meadow rue (*Thalictrum dasycarpum*). There are only 12 of the 102 rare plant

species (including the 58 sensitive species) with more than 20 occurrences documented since 1988.

For the last 100 years, habitat alteration from man's activities has likely been the dominant factor in the patterns of rarity for most rare species. For instance, species with strong affinities for late successional stands of cedar and hemlock (old growth) are more rare now simply because their habitat is rare compared to recent history (last 1000 years). Much of this habitat has been diminished over the last 100 years from timber harvesting and development. Rare plants found in boreal peatlands are restricted to these habitats and have experienced habitat loss and impacts from ditching, draining, and development. A few rare plants (lichens especially) have strong affinities for the large cottonwood communities that inhabited the large river systems on the Idaho Panhandle, most on non-federal lands. Much of this historical habitat has been lost or altered from development and dike building. Many species likewise can be found in upland riparian systems, areas that have also experienced timber harvesting and road building. Over the last 10 years however, since the 1987 forest plan, impacts to many highly suitable habitats have diminished with the implementation of laws and policies protecting riparian areas, wetland and peatland habitats, and policies designed to maintain features like old growth cedar groves. Occurrences that remain on federal lands are now more secure than they were. Occurrences remaining in suitable habitat on non-federal lands are far less secure, as State laws do not address sensitive or rare plants. Development through time will likely diminish habitat and populations on non-federal lands, which increases the importance of the remaining populations on federal lands for the continued existence of these species within the ecosystem. Rare plant species with wider habitat amplitudes, ones not restricted to specific habitats, ones with small populations, and ones in isolated habitat patches, are still at risk.

T**able 27.** Rare plant occurrences documented on federal lands in 1998. Species with an * are listed on the USFS 1994 sensitive species list. All the species listed are tracked by the Idaho Conservation Data Center.

Species	Occurrences	Species	Occurrences
Hall's lungwort	6	Northern starflower*	2
Roundleaf rein orchid	18	Groundpine*	2
Deerfern*	7	Western goblin*	1
Mingan moonwort*	3	Dwarf redblackberry*	1
Kruhsea*	1	Black snakeroot*	2
Northern beechfern*	2	Constance's bittercress*	3
Blue-flag iris	1	White shooting star	8
Triangle moonwort*	3	California sedge*	3
Short-spored jelly lichen	1	Clustered lady's slipper*	7
Creeping snowberry*	1	Northwestern moonwort*	1
Dwarf-birch lichen	1	Ball-bearing lichen	1
Henderson's sedge*	7	Bank monkey flower*	2
		Total Occurrences	84

Table 28. Existing occurrences revisited in 1998

Species	Occurrences	Species	Occurrences
Deerfern*	6	Northwestern moonwort*	1
Mingan moonwort*	3	Constance's bittercress*	3
Stalked moonwort	1	Howell's gumweed	1
Triangle moonwort*	1	California sedge*	3
Chickweed monkey flower	1	Clustered lady's slipper*	2
Henderson's sedge*	1	Bank monkey flower*	3
		Total	26

Grindelia howellii (Howell's gumweed) monitoring.
Howell's gumweed is a former candidate for listing by the U.S. Fish and Wildlife Service and is known only from a single location in Idaho, along the St. Maries River, and several locations in western Montana. Two permanent plots were established in 1995 for this rare plant and a third additional plot was established in 1996. A single plot was established in 1987 by the ICDC, however the exact plot location has been lost, and the data is not quantitatively comparable. The following is a summary of the plot information from 1995 - 1998.

Table 29. Grindelis howellii monitoring

Plot #	Year	Juvenile	Non-Flowering Adults	Flowering Adults	Total Plants
1	1995	221	48	4	273
2	1995	739	257	74	1070
Total	1995	960	305	78	1343
1	1996	30	99	10	139
2	1996	137	276	100	513
3	1996	91	166	25	282
Total	1996	258	541	135	934
1	1997	23	121	8	152
2	1997	415	354	33	802
3	1997	282	219	22	523
Total	1997	720	694	63	1477
1	1998	21	89	20	129
2	1998	189	332	60	581
3	1998	error	Error	error	error
Total	1998	210	421	80	710

The Howell's gumweed population is quite dynamic, with a slight decrease compared to baseline. Serious noxious weed populations, especially sulfur cinguefoil (*Potentilla recta*), are encroaching on the colonies. Information is unavailable for plot 3 due to a botched reading rendering the data unusable. Plot three will be re-measured in 1999. Both plots one and two saw a decrease in total plants in 1998 compared to 1997, and compared to the baseline reading in 1995. However, more reproductive adults were documented in both plots one and two and it will be interesting to see if there is an increase in juveniles in 1999. Fewer juveniles were seen in plot 2 compared to 1997. Climatic patterns undoubtedly play a large role in germination, survival of juveniles, and the triggers prompting reproduction in this perennial plant. The presence of a seed bank is likely, but not quantified. Only a small percentage of the population on any given year reproduces (1995: 6%, 1996: 14%, 1997: 4%, 1998 11%), and observations show that mature individuals may not bloom every year. Long term concerns still exist for this plant. The plot established in 1987, was burnt over in 1994, the year prior to the establishment of plots 1 and 2. Plot 1 was burnt over, and based on 1987 data, which occupied at least a portion of plot 1, contained many more individuals than currently.

Monitoring will continue in 1999.

Forest Plan Monitoring Item I-1: Minerals

Most current mining activity on the IPNF consists of placer mining for gold in alluvial bottoms on the central part of the Forest. There is a small amount of exploration for vein deposits of metals (sometimes referred to as hard rock mining). There are no active hard rock mining operations on national forest land on the IPNF. There is garnet recreation mining on the southern part of the Forest with some saleable/lease activity for commercial garnet removal.

For the summary of activities listed below the following explanations are needed. Exploration or mining activity that is likely to result in a significant amount of land disturbance requires a reclamation bond to insure that funds are available to reclaim the site. If the amount of resource damage would be negligible no bond is required. When the term "processing" is used it means that the Plan submitted by the miner has been processed by the Forest Service and a decision has been made on whether they can proceed with the exploration or mining activity.

1998 Activities

Number of non-bonded operations processed (most are associated with recreational garnet mining on Emerald Creek on the St. Joe District) - 1,787

Number of bonded operations processed - 12

Number of bonded operations administered to ensure that operating plans are in compliance with standards - 25

Number of acres processed (forwarded to BLM for leasing, prospecting, permitting, lease readjustment/modification, etc.) - 80

Forest Plan Monitoring Item J-1: Land Ownership Adjustment

The following table shows the acreage of federal land disposed and non-federal land acquired for the period of 1981-1998. There has been a net gain during that period of time of 22,868 acres.

Table 30. Land Ownership Adjustment

Year	Acres of Federal Land Disposed	Acres of Non-federal Land Acquired
1981	8,582	12,187
1982	2,960	5,728
1983	2,277	520
1984	3,718	3,126
1985	7,556	15,775
1986	8,044	9,815
1987	2,779	4,632
1988	3,097	3,164
1989	3,692	4,062
1990	2,376	3,281
1991	630	1,080
1992	0	10
1993	11,282	14,009
1994	294	370
1995	1,965	3,229
1996	35	40
1997	4,755	7,533
1998	3,728	2,077
Total	**67,770**	**90,638**

Forest Plan Monitoring Item K-1: Prescriptions and Effects on Land Productivity

Purpose: The objectives of this review are (1) to determine if management prescriptions and practices are following direction contained in the Forest Plan to achieve Desired Future Condition. (2) To determine if BMPs, standards and guidelines are being implemented and are effective in protecting resource values while working toward Desired Future Condition.

This item has commonly been monitored in two ways:

1) project inspections by IPNF ID teams to see if projects meet BMPs and Forest Plan standards, and

2) soil quality monitoring

Project Inspections

Project inspections by IPNF ID teams were conducted annually from 1988 to 1992, and in 1994 and 1995. The results of these inspections have been reported in Forest Plan Monitoring Reports for those years.

Results of Multi-year Soil Monitoring

This section summarizes the results of multi-year monitoring of the Forest's soil resources. It also discusses some of the practices we have adopted to maintain long-term soil productivity. The soil monitoring results for 1998 are located at the end of this section.

Our forest soil resource objective is to maintain and restore long-term productivity, to support healthy vegetative communities, and protect watersheds. Key elements of maintaining long-term soil productivity include retaining surface organic layers and surface volcanic ash, and maintaining the bulk density of the surface volcanic ash within natural ranges of variability.

We have monitored the full range of our management activities over the last twelve years and have identified the major detrimental impacts and associated practices, which negatively affect the soil quality standards listed in the Forest Plan.

The major detrimental impacts to long-term soil productivity are:

- compaction
- removal of topsoil (displacement)
- land taken out of production by roads, landings and skidtrails
- units with insufficient woody-debris left on-site
- areas that have been severely burned

Detrimental impacts are defined as follows:

-Detrimental Compaction: More than 20% increase in bulk density over natural for volcanic ash surface soils.

-Detrimental Displacement: Removal of the forest floor and one inch or more of the surface mineral soil over a 25 sq.ft. or more area.

-Severely Burned: The soil surface is in a condition where most woody debris and the entire forest floor is consumed down to mineral soil. The soil surface may have turned red due to extreme heat. Also, fine roots and organic matter are consumed or charred in the upper inch of mineral soil.

-Insufficient woody-debris left on-site consists of:
- -Douglas-fir sites with less than 5 tons per acre
- -grand fir sites with less than 10 tons per acre
- -western hemlock/cedar sites with less than 20 tons per acre
- -subalpine fir sites with less than 15 tons per acre

When Forest monitoring of soil quality standards began in 1985, tractor yarding and piling were the most common practices used on gently to moderate sloping lands. Our soil monitoring found these practices to result in up to 40 to 90 percent detrimental compaction and displacement. Most of this damage occurred in the piling phase of the operation.

Based on our monitoring knowledge, we have adjusted our management practices by implementing the following actions:

1. Manage ecosystems to maintain acceptable soil productivity potential for trees and other managed vegetation over a minimum of 80 percent of an activity area.

Protection of long-term soil productivity: The following are practices that have been implemented to minimize the impacts of soil compaction, displacement of topsoil and severe burning on long-term soil productivity. The use of these practices in almost all cases has resulted in meeting or exceeding the soil quality standards listed nationally, regionally and within the Forest Plan.

a. Equipment Operations: Cable logging, tractor/skidder yarding and harvester-forwarder/feller-buncher operations over slash, winter logging, using designated skidtrails, broadcast burning during moist soil conditions, leaving slash on the ground (where it will not be a fire hazard), and grapple piling are all practices which minimize soil impacts and protect long term productivity.

On the average, cable logging is the least impactive and will detrimentally affect about 2 percent of an activity area. Dozer and skidder yarding on designated skidtrails and then

grapple piling over slash, tends to have the highest impact, while still meeting soil quality standards. This practice detrimentally affects about 18 percent of an activity area. Operating all forms of heavy equipment on designated skidtrails, or on a cushioning layer of slash produces detrimental ground disturbance that ranges between 10 to 20 percent of an activity area depending on distance between skidtrails and amount of slash being operated on. Most of the detrimental impact to the ground is in the form of surface soil compaction.

Many of the designated skidtrails used in timber harvest are restored to near natural conditions after the harvest operation. Numerous decompaction methods have proved to be successful, they are as follows:

-The winged subsoiler has done a good job of breaking up compaction over a full range of soils and compaction depths on the Forest.

-The forest cultivator has worked well on compacted surface volcanic ash layers, but was ineffective in breaking up compaction in heavy soils, deeply compacted soils, or on soils with high rock fragment contents.

-Rock rippers have been effective in restoring hydrologic function to compacted roadbeds that contain high rock fragment content.

b. Residue Management

-Coarse woody-debris recommendations are as follows:

-Douglas-fir sites need 7 to 13 tons per acre
-grand fir sites need 7 to 14 tons per acre
-western hemlock/cedar sites need 17 to 33 tons per acre
-subalpine fir sites need 10 to 19 tons per acre

Maintenance of fine woody debris is also essential to long-term productivity. In North Idaho many of our soils are nutrient limiting, especially in relation to nitrigen and potassium. Over half of all nutrients contained in trees are tied up in the branches and foliage. Nitrogen tends to be limiting on all soils and potassium appears to be particularly deficient in very weakly weathered soils developing within the Prichard, St. Regis formations, the siltite portions of the Burke formation, and the argillite and carbonatic siltite portion of the Wallace formation. All of these geologic formations are part of the Precambrian metasedimentary Belts. Significant deficiencies of potassium appear to be a major factor in explaining some of our root rot problems. Whole tree yarding can remove up to 40 percent of the soil systems entire reservior of potassium. Research recommends that up to 12 tons per acre of fine woody debris be left on site to help maintain potassium levels. A balance between fire hazard risk and nutrient cycling needs to be evaluated on sites that are mechanically treated.

-Optimum levels of fine organic matter is 21 to 30 percent in Douglas fir and grand fir habitat types. In subalpine fir, moist western hemlock and western red-cedar

habitat types, strong levels of fine organic matter exists at 30 percent or greater (Graham et, al, 1994).

c. Burning: Prescribed burning during dry conditions creates a mosaic of microsites consisting of severely burned, moderately burned and slightly burned, along with some that remain unburned. This wide range of microsites is the result of differing fuel load and volume, soil and fuel moisture, weather factors and timing.

We have found that by limiting prescribed burning to those times when surface soil moisture is above 25 percent, we will reduce the potential of hot burns producing detrimental burn conditions.

98 Soils Monitoring Report

The 1998 monitoring focused on: 1) existing conditions of coarse woody debris and fine organic matter levels within ten proposed harvest units on the proposed Kalispell Timber Sale area on the Priest Lake District. 2) two harvest operations (on St. Maries and Priest Lake Districts) where a feller/buncher with a processor head prebunched logs in partial cuts and then line skidded these logs up a corridor to a landing. 3) a harvest operation on the Sandpoint District which consisted of a mid-sized feller/buncher and a conventional rubber tired skidder operating on snow.

1) Eight of the ten monitored units on the proposed Kalispell Timber Sale area do not presently meet the recommended standard for coarse woody debris, and seven of the ten units are below the optimum levels for fine organic matter.

All ten units were in the western hemlock habitat type and the recommended range of coarse woody debris for this habitat type is 17 to 33 tons per acre, with the natural average being about 30 tons per acre. Eight of the ten monitored units were below 17 tons per acre, with the lowest being 5 tons per acre.

The optimum levels of fine organic matter for this habitat type is 30 percent or greater and again seven units were less than 30 percent with the lowest being 13 percent. Recommendations on these deficient sites would be to provide coarse woody recruitment to meet recommended levels, preferably 30 tons per acre. Burning on the sites with deficient fine organic matter levels will reduce these levels even more. The recommendation would be to grapple pile just enough slash to reduce the fire hazard within acceptable limits. The grapple piling should be done on top of the slash to protect against compaction. Grapple piling should also be done when soil moistures are above 25 percent to minimize the amount of fine organic matter consumption that will occur under the burning slash piles.

2) Monitoring of the two harvest operations where a feller/buncher with a processor head pre-bunched logs in partial cuts and then line skidded these logs up a corridor to a landing produced excellent results.

The monitoring unit on the St. Joe District was on the Muddy Fran timber sale. This unit was a species designated unit where lodgepole pine was taken out. Slopes in this unit ran from about 30 to 50 percent. Corridors were established on about a 70 foot spacing and the feller-buncher harvested up these corridors laying slash in front of the machine as it moved. The slash mat was sparse to light over about 30 percent of the area and light to moderate over the remaining area (moderate being about one foot of compressed slash). The limbed logs were bunched in a herring-bone pattern facing up-hill and then yarded with a Linkbelt cable system. Detrimental compaction from this operation amounted to 6 percent and there was virtually no displacement.

The monitoring unit on the Priest Lake District was on the Rogers-Mosquito timber sale. This unit was logged on snow and slash with a feller-buncher and again the bunched logs were line skidded. This unit had slopes that went up to 55 percent. The monitored results were beautiful in that there was no compaction or displacement.

3) The monitoring unit on the Sandpoint District was on the Can Haul timber sale. This unit was harvested mostly on snow. Slopes in this unit ran from about 10 to 40 percent. Corridors were established on about a 60 foot spacing and a mid sized feller buncher harvested up these corridors laying slash in front of the machine as it moved. The logs were moved down the corridors with a conventional rubber tired skidder. Detrimental compaction from this operation amounted to 10 percent and no displacement.

Summary: In summarizing the soil monitoring results for 1998, we found that areas that have had a history of multiple burns or near complete slash cleanup after harvesting generally will not meet recommended levels of coarse woody debris of fine organic matter. Future management will have to account for this shortage in the organic component. Feller buncher operations with line skidding and rubber tired skidding on snow all did an excellent job of meeting Forest and Regional soil quality standards.

IV. OTHER 1998 MONITORING

Old Growth

The goal of the IPNF Forest Plan is to maintain at least 10 percent of the 2,500,00 acres of the Forest (250,000 acres) in old growth status. Lands on the IPNF that have been allocated to old growth management are classified as one of three categories. The first category is existing old growth - lands that currently meet the criteria and have been allocated to old growth management. The second category is replacement old growth - lands that do not meet old growth criteria but provide corridors, or meet habitat requirements. The third category consists of ancient cedar groves - lands that contain very large and very old cedar meeting the old growth criteria. Table 31 shows that as of December 1999 there were 254,986 acres allocated to these three categories. This slightly exceeds the 10 percent goal of the Forest Plan.

Table 31. Acres of Allocated Old Growth by Basin

Basin Areas	Allocated Existing Old Growth	Allocated Replacement Old Growth	Ancient Cedar Groves
St. Joe River	63,575	13,556	223
Coeur d'Alene River	56,081	3,790	0
Pend Oreille River	18,511	5,007	63
Kootenai River	50,939	1,098	485
Priest River	39,557	2,360	69
Forest Totals	**228,335**	**25,811**	**840**

Inventoried Roadless Areas

Table 32 on the following pages shows the acreage of each IPNF Roadless Area when the Forest Plan was adopted in 1987 and the current acreage. These areas were defined by the Roadless Area Review and Evaluation process (RARE II) during the 1970's. Net Roadless Area acreages have changed from 853,532 in 1987 to 814,016 in 1998. This is slightly less than a five percent change from 1987 to 1998.

IPNF Roadless Information
(As of 09/10/97)

Roadless Name	Area No.	Forest Plan Acres Net.	Forest Plan Acres Gross	Changed Acres Net (Est.)	Changed Acres Gross (Est.)	Reason for Change	Current Acres Net (Est.)	Current Acres Gross (Est.)
Little Grass Mtn.	121	7867	7867				7867	7867
Blacktail Mtn.	122	5140	5140				5140	5140
Upper Priest	123	14333	14333	350	350	Timber Sale	13983	13983
South Fork Mtn.	124	5400	7033				5400	7033
Selkirk (w/ Long Canyon)	125	101996	109375	7750	7750	3 Timber Sales	94246	101625 5/
Kootenai Peak	126	5974	5974	2000	2000	2 Timber Sales	3974	3974 4/
White Mtn.	127	7764	8694				7764	8694
Hellroaring	128	11746	11746	8000 +	8000 +	2 Timber Sales	0	0 4/
Trestle Peak	129	7137	7137				7137	7137
Beetop	130	11180	11210				11180	11210
East Cathedral Peak	131	22338	22338				22338	22338
Magee	132	34747	34917				34747	34917 6/
Teepee Creek	133	5100	5100				5100	5100 6/
Skitwish Ridge	135	6330	6330	2200	2200	Timber Sale	4130	4130 4/
Spion Kop	136	23714	23714				23714	23714
Lost Creek	137	11308	11308				11308	11308
Trouble Creek	138	6100	6100				6100	6100
Graham Coal	139	10832	11252				10832	11252
Maple Creek	141	8674	9192				8674	9192
Stevens Peak	142	4370	4831				4370	4831
Big Creek	143	74940	79340	1350	1350	Timber Sale	73590	77990
Storm Creek	144	8211	9400				8211	9400
Hammond Creek	145	16100	16100	4400	4400	2 Timber Sales	11700	11700
Rolland Point	146	6300	6400				6300	6400
North Fork	147	32100	32100				32100	32100
Grandmother Mtn.	148	16392	40610	2100 1/	2100	Timber Sale (EIS also planned)	14292	38510
Pinchot Butte	149	7011	12860				7011	12860
Mosquito Fly	150	15437	21510	160 2/	160	Road Construction, Pvt., Access	15187	21350
Midget Peak	151	6973	6973	580	580		6393	6393
Wonderful Peak	152	5070	5549				5070	5549
Continental Mountain	153	6850	6974				6850	6974
Saddle Mtn.	154	8589	8589	520	520	Timber Sale	8069	8069
Packsaddle	155	18656	19278	1520 3/	1520	Timber Sale (EIS also planned)	17136	17758
Hungry Mtn.	156	9584	10073				9584	10073
Katka	157	12369	12571	1400	1400	3 Sales (includes Katka – 1996)	10969	
Schafer Peak	160	6614	6812				6814	6812

Blacktail Mtn.	161	4719	5465				4719	5465
Mt. Willard/ Lake Estelle	173	35275	38646	3200	3200	Timber Sale	32075	35446
Buckhorn Ridge	661	9600	9600				9600	9600
Scotchman Peaks	662	31842	33849				31842	33849
Northwest Peaks	663	5670	5670				5670	5670
Trout Creek	664	8300	8360				8300	8360
Giltedge/ Silver Creek	792	300	300				300	300
Sheep Mtn./ Stateline	799	27979	27979				27979	27979
Mallard Larkins	300	127062	143341	150	150	Road Construction, Pvt., Access	126912	143191
Meadow Creek/ Upr. North	302	6100	6100				6100	6100
Salmo - Priest	981	20543	20543			9440 Ac of IPNF in WA Wilderness	20543	20543
Grassy Top	982	12896	13781				12896	13781
Totals		***853532***	***932364***	***23900***	***27680***		***814016***	***732021***

Note: Proposed Actions with current decision notices – NOT included *in Current Acres column above.*

1/ Timber Sale Planned – Hobo Cornwall EIS – Sept. 1996 decision. Sale proposal has units adjacent to existing roads within roadless area; But no new records to be constructed within roadless area and units to be Parcel cut using helicopter logging. Roadless character should not be changed.

2/ Mosquito/ Fly ANLCA – ROW ACCESS & LAND EXCHANGE EIS – Land exchange in the process of completion, will result in increase in net Forest Service acres within roadless area.

3/ Timber Sale – Packsaddle EIS – decision issued in June, 1997- Current proposal calls for 3.1 miles of temporary roads constructed, which would be pulled out after the sale. Current proposal comprises 1,073 acres of irregular group shelterwood harvest. An already existing road within the roadless area is also proposed to have further work to close road. The overall roadless character should not be changed.

4/ Roadless Acreage is now below 5000 acres.

5/ Salvage Sale Plan – Smith Helicopter – Some road reconstruction, no new roads, helicopter. The overall roadless character should not be changed. About 1,000 acres treated.

6/ Salvage Sale Plan – Short-Magee-Mcpherson Ice Project – Salvage adjacent to existing road on boundary of roadless area, no new roads.

7/ Salvage Sale Plan – Kit Katkee Salvage – No new roads, around 200 acres of ponderosa pine enhancement work.

Note: The net Forest Plan acreages are from the IPNF Forest Plan Record of Decision dated 09/17/87.

Overview of IPNF Range Program

The range program currently manages 25 allotments which very in size from 6 to 100 animals. The program produced 3,575 animal unit months and collected $5,100.00 in grazing fees for 1998. NEPA analysis was initiated on 10 of the forests allotments during 1998 and completion is expected in the spring of 1999. During the last 3 years the IPNF has had access to the BLM's range staff position to provide technical oversight on range management questions. This has been effective in general program support, but the IPNF has identified additional support needs to address emerging issues, develop allotment management plans (AMP's) based on current NEPA analysis, and work directly with permittees to implement those plans. During the summer of 1998 the IPNF approved a term Range Conservationist position to be filled in 1999. This position will provide needed technical expertise to develop AMP's, coordinate with permittees, and update the forests range records and reports.

Cow Creek Allotment Inspection

On October 21, 1998, the permittee and I walked the Cow Creek Allotment to inspect utilization and distribution of livestock on the allotment. We concentrated our efforts on the lower pasture on Cow Creek that he grazes, but we did inspect a few areas of the upper pasture.

We started near Saddle Pass and walked through the plantations on the north side of the pasture. There was evidence of livestock use distributed throughout the plantations (and burn areas) and there were good trails available form the old skid roads across the hillside. There was a surprising amount of forage in the understory and the trees are still young enough and thinned out enough to not cause significant shading of the grass species. Bunch grasses showed light (10-20%) utilization, with heavier utilization (30-50%) on seeded species (bluegrass, clover) on the skidtrails. Frequent streams and seeps provide ample water and salting on the Dead Cow Road helps to draw the cattle up the slopes. There is plenty of forage under these plantations and some of the bunchgrass crowns showed enough dead grass to be benefitted by heavier use.

I helped spray weeds in the plantations above the Dead Cow Road this summer and know that there is more meadow hawkweed under the trees than is apparent from the road. The distribution of these weeds did not appear to be strongly linked to the cattle trails or grazing and probably was the result of logging, burning, and thinning operations. Livestock can spread seed within the allotment and hawkweed populations are developing near saddle pass that probably are being spread by livestock trailing. The permittee did not do any weed control this year, although he said that he looked for weeds when he was on the allotment and did not see a problem. We will need more cooperation with the weed problem from the permittees if we are to attack all sources of infestation and distribution. I did meet an individual on the allotment once this summer controlling weeds.

We walked all the way up the creek, through about all the meadows, on both sides of the stream, to the old range exclosure. The forage utilization cage results showed a range of 30% to 87% utilization on four meadow locations. These cages have been positioned for years to measure use in the areas that traditionally have the heaviest use. The heavy use areas tend to be dry meadows where livestock can congregate all season, and I have found about 4-5 heavily used meadows that amount to less than 5 acres total. I do not know the complete history of these dry meadows (whether they have been compacted or disturbed by logging, glacial compaction, seeding etc.), but it appears that we are slowly losing the bunchgrass component of these limited areas and increasing the bluegrass, cinquefoil, and strawberry species. There is a good fenceline contrast with the riparian exclosure on Cow Creek that shows more bunchgrasses and grass cover in the fenced area. I did not see evidence of bare ground, erosion or pedestalling of the soils in these dry meadows. The main concern is species conversion over time and loss of forage value, but since these dry meadows are so limited in size and distributions, it is not significant. The fence that the permittee is building to help hold the animals on the hill will help prevent most of the animals from camping in the dry meadows all season.

The other meadow systems are well-watered and averaged about 30-40% utilization. There were plenty of seedheads available to rejuvenate the forage, little sign of increaser species (undesirable plants with poor forage value, non-native species, etc.) I saw no sign of noxious weeds in the meadows. Livestock use was well distributed in these bunchgrass meadows. I have seen five places where cows and wildlife paw the ground repeatedly and keep it raw. There has been no salt placed in these spots and my best guess is that these are natural mineral/salt licks that the animals are attracted to. The amount of pawing on the banks around these depressions, the degree of compaction and disturbance make it appear that way but it would be interesting to test the soils.
The "kegging up" of livestock at the electric fence and blue gate was much less this year. The use on the portion the upper pasture that I walked looked similar to the lower pasture with moderate (30-40%) use season-long, no heavy concentrations of use and no decline in the forage value. The rehabilitation of the Cow Creek Road is slowly working, with a clear livestock/wildlife trail established, and yarrow, pussytoes, lodgepole pine, alder, seeded grasses and white Dutch clover getting established on the flatter areas. The drainage crossings will rehabilitate faster with the slash that was placed this spring to prevent animals from walking and grazing the steeper slopes and wetter areas.

Most of Cow Creek is well protected by trees that prevent trailing and crossing along the creek. There are a few exposed areas, especially where logging trails crossed, that show signed of bank trampling and sloughing due to livestock trails. This is made worse by the fact that there are pockets of sandy decomposed granite soils near the creek that easily wash into the creek and do not easily revegetate if disturbed. The fenced off portion of Cow Creek protected an area that was having some bank sloughing and appears to have retarded the lost of bank stability and promoted revegetation. The fence being built will help reduce the pressure on the creek. The remaining areas with exposed bank are limited compared with the total miles of streambank, and we may be able to prevent further trailing by falling and dragging a few trees to protect key spots.

Stream surveys were completed on Cow Creek this summer and one interesting thing that they found was that the point bars formed in the stream due to sediment building up in the channel also show up, for the most part, in the 1930's aerial photos. Although the 1967 fire and logging operations, road and road obliteration work, and to a lesser extent the livestock trailing and crossings, have added sediment to the stream, there apparently was always some nature sediment content due to the sandy nature of some of the soils along the stream. No cause for the fish declines have been found yet but we will do some chemical analysis of the water to see if we can rule of heavy metals or other chemical agents.

Future Management: The new fence should reduce the use along the stream and help prevent bank damage or loss of forage value in the dry meadows. We hope to have a range conservationist available next year to help us evaluate forage capacity and trend, and set up a new monitoring system that represents that primary and transitory range, riparian areas and different types of meadows. I recommend that we discontinue use of the utilization cages and use an annual allotment walk-through survey for utilization, with photopoints for comparison every few years, in representative areas around the allotment. Key things to monitor with these inspections would be change in forage composition, presence of seedheads and revegetation opportunities, amount of riparian grazing, trailing and bank sloughing, bare ground created by livestock concentrations, successional changes in forage in the transitory range as tree crown increase, and changes in noxious weed populations associated with grazing (along trails, salt areas, more heavily grazed areas). There appears to be ample forage in this allotment and some fine-tuning, such as the new fence, noxious weed control, and some "brush fences" along some vulnerable stretches of streambank will help us improve the sore spots.

Submitted by Elaine Zieroth, District Ranger

Whitebark Pine Regeneration Field Reviews

The following information is compiled from three field reviews done to ascertain the success of natural whitebark pine regeneration establishment on the North Zone of the Idaho Panhandle National Forest. The areas reviewed have had recent natural wildfires in the whitebark pine zone on the Priest Lake, Bonners Ferry, and Sandpoint Ranger Districts.

On July 7th and 8th, Art Zack and Bob Ralphs, from the IPNF Forest Supervisors Office, Tim Layser, Roger Steerman and Don Gunter, from the North Zone, and Mark Sprengel, a private individual reviewed three high elevation burned areas in the Salmo-Priest Wilderness area. In the process of reviewing these burns, a walkthru survey was done to evaluate the success of white bark pine regeneration.

Pass Creek Fire--Lethal stand replacement fire in August 1994. No evidence of Whitebark pine regeneration. No apparent seed source close by. A few scattered living whitebark pine trees capable of cone production exist along the ridge to the north of this fire.

Ace Creek Fire--Primarily a lethal stand replacement fire in the summer of 1985. Art Zack, Bob Stutz and I reviewed approximately 2-3 acres in the most likely areas for WBP regeneration and found a minimal number of trees established since the burn (counted 3-6 trees in burned areas with some residual WBP regeneration in areas that had not burned). No apparent seed source close by. A few scattered living white bark pine trees capable of cone production exist along the ridge north and south of this fire.

Mankato fire--Primarily lethal stand replacement fire in the summer of 1994. Reviewed several acres of this fire and did not find any newly established whitebark pine regeneration. Scattered living whitebark pine capable of cone production on the south edge of this fire. Very little regeneration was found in areas that did not burn.

On July 12th Elaine Zieroth, Allen Chrisman, Mark Grant, Lydia Allen, and Don Gunter from the North Zone flew into Fisher Peak on the Bonners Ferry RD to review the 1994 Fisher Peak fire area and an adjacent site that is estimated to have burned in the late 1940's to early 1950's. We started the day by taking four 1/10th acre stocking plots in the 1940's/1950's burn to evaluate the amount of white bark pine and the blister rust infection levels in these trees. We broke the inventory down in size classes of trees and infection levels of blister rust. The results of those plots are shown below:

Table 33. Plot Number 1

	<18 inches ht	<1 inch dia.	1-3 in. dia.	3-5 in. dia.	5 in. + dia.
Clean WBP	-	121	25	11	0
Nonlethal	-	0	7	11	0
lethal	-	18	27	16	2
Dead WBP	-	26	23	13	0
Alpine fir	-	15	1		
Spruce	-	3			

On Plot #1 trees less than 18 inches were not broken out from trees less than 1 inch diameter. On all plots, lethal blister rust cankers were defined as bole infection cankers and limb cankers <18 inches from the bole. Non-lethal cankers are limb infections > 18 inches from the bole. Note: Many apparent unsuccessful/ inactive limb infections were noted on Plot 1.

Table 34. Plot Number 2

	<18 inches ht	<1 inch dia.	1-3 in. dia.	3-5 in. dia.	5 in. + dia.
Clean WBP	114	45	3	1	1
Nonlethal	0	0	0	0	0
lethal	0	13	21	2	0
Dead WBP	1	5	15	3	0
Alpine fir	5	2	5	0	1
Spruce	0	3	1	0	0

Table 35. Plot Number 3

	<18 inches ht	<1 inch dia.	1-3 in. dia.	3-5 in. dia.	5 in. + dia.
Clean WBP	33	18	2	0	0
Nonlethal	0	0	0	0	0
lethal	0	38	7	2	0
Dead WBP	0	23	9	5	3
Alpine fir	1	2	1	0	1
Spruce	1	2	1	1	0
lodgepole	0	1	0	0	0

Table 36. Plot Number 4

Plot #4	<18 inches ht	<1 inch dia.	1-3 in. dia.	3-5 in. dia.	5 in. + dia.
Clean WBP	27	43	10	4	1
Nonlethal	0	0	0	0	0
lethal	0	62	29	6	7
Dead WBP	0	24	22	6	3
Alpine fir	5	3	0	2	1
Spruce	4	10	3	2	2

Table 37. Average # of Trees per Acre = Plot averages x 10

	<18 inches ht	<1 inch dia.	1-3 in. dia.	3-5 in. dia.	5 in. + dia.	Totals
Clean WBP	430	570	100	40	5	1145
Nonlethal	0	0	17	27	0	44
lethal	0	327	210	65	22	624
Dead WBP	2	195	173	68	11	449
Alpine fir	27	55	17	5	7	111
Spruce	12	45	5	7	5	62
Lodgepole	0	2	0	0	0	2

* Total Live WBP =1813 T/A
* Total Dead WBP= 449 T/A
* Total AF & S = 175 T/A

Note: Several of the 3-5 inch diameter and 5 inch + diameter whitebark pine trees were cone producing this year. It is also evident that this burn has had successive plantings done by the Clark's Nutcracker.

After taking these inventory plots in the 1940's/1950's burn area we hiked down the north ridge of the 1994 Fisher Peak Fire and searched for any WBP seedling establishment. Scattered clumps and individual seedlings from 1-2 inches high were found along this ridge. One 1/10th acre plot was taken to try to determine the number of seedlings per acre that were becoming established. This plot yielded 41 WBP seedlings, 4 AF, and 1 Spruce seedling for a total of 410 WBP, 40 Alpine Fir, and 10 Spruce per acre. This plot was representative of the upper portion of the fire area.

It appears that the adjacent stand of cone producing WBP and maybe others further up this drainage are supplying an adequate seed source for the Clarks Nutcracker to plant this new burn. I expect continued plantings and seedling establishment over the next several years in portions of this burn that has good site preparation and little vegetative competition.

On August 28th Kevin Naffin and Don Gunter of the North Zone flew into Blue Creek to review the 1988 Spar Lake Fire and the 1994 Scotchman Peak Fire.

Spar Lake Fire--Primarily a lethal stand replacement fire in the summer of 1988 in a very rocky area. Kevin and I were only able to review this fire area for approximately 45 minutes due to the late flight time. We landed on the center ridge in this fire and reviewed a portion of the burn and a portion of an unburned ridge. We found a total of 4 newly established WBP seedlings (6-8 inch heights) in the burned areas and considerable alpine fir regeneration becoming established. On the unburned ridge, scattered WBP seedling in the 2 to 4 ft. range were found with some blister rust infection present. One >6 inch diameter living WBP was found but no cones were observed. The area has scattered old WBP snags along this ridge but the site is presently occupied by alpine fir. No adjacent seed source was seen although while flying down the drainage, some larger living WBP were observed approximately 2-4 miles away from the burn

Scotchman Peak Fire--A lethal stand replacement fire in the summer of 1994 just below the peak. Kevin and I walked several acres of this burn and found no evidence of any regeneration occurring following the fire. The site is a harsh south exposure that was primarily occupied by alpine fir, rock, and scattered WBP prior to the burn. A few WPB seedlings 2-6 ft. , some saplings 1-3 inches in diameter, and a few living whitebark pine > 6 inches exist in areas adjacent to the fire or in a few unburned islands near the northwest side of the fire. The adjacent unburned stands appear to have very little WBP capable of cone production. The few individuals observed did not have cones this year.

Summary

After reviewing these naturally burned areas, it is my estimation that some scattered white bark pine seedlings will become established in the Ace Creek, Mankato, Spar Lake and Scotchman Peak Fire sites. It is also my opinion that due to the lack of adequate seed source, blister rust infection, and the competition from alpine fir, grasses, and shrub species, whitebark pine will be a very minor species present. The Fisher Peak sites appear to be capable of regenerating naturally to a major composition of whitebark pine even though blister rust is active. There appears to be enough seed source for the Clarks Nutcracker to reforest these areas with several plantings as the seed crop is available. If we are to attempt to naturally regenerate any substantial amount of White Bark Pine on the North Zone, the only areas that I have observed that may accomplish this is in the Trout/Fisher/Ball and maybe Parker/Long Canyon/Cutoff Peak areas on the Bonners Ferry Ranger District.

Submitted by Don Gunter, Silviculturist / Insect and Disease Coordinator

Special Use Permits

Rocky Mountain Academy & Northwest Academy Outfitter & Guide Permit

The school facilities and operations of the Rocky Mountain Academy, Northwest Academy and Ascent institutional schools were monitored on January 12, 1998. It was monitored because portions of the schools programs are operated on National Forest System lands. As a result of the monitoring we gained a better understanding of the schools programs, the services they provide, and how they incorporate the use of the backcountry into their programs. This should lead to a better working relationship and understanding of the role of institutional outfitting on National Forest System lands.

Western Pleasure Guest Ranch - Outfitter & Guide Permit

One of the trails they use from their ranch was monitored on April 29, 1998. The trail is on their private property and National Forest, and takes about one and one-half hours to ride the loop trail. Forest Service personnel rode horseback along the trail with the permit holders, to explore opportunities for interpretation along the trail, since the trail passes through the Grouse Creek Seed Orchard area and several logging units. Also the permit holder was interested in using an irrigation pond at the seed orchard as a fishing pond for guests.

Part of the special use permit administration process is to know what kind of opportunities are provided for the public, help educate the permit holders (i.e. questions on the Seed Orchard and logging operations), and build better partnerships with the permit holders by knowing what services they provide, how they handle the horses, and equipment and ensure they are providing safe services to the public.

The permit holders had some misinformation on the Seed Orchard and the logging operations that took place in the area, and this could reflect what they are telling the public. The permit holder also had misinformation on the irrigation pond by the seed orchard and how it is used. There is an opportunity for the permit holders to work closely with the Forest Service on some interpretive rides through the logging area and explain to guests why the logging was done. Also, tours of the seed orchard could be incorporated into an interpretive ride to educate people about seed orchard operations.

Moyie River Outfitters - Outfitter & Guide Permit

A campsite that is under permit as an assigned site (Dead Cow Camp) was monitored on June 27. 1998. A field review was made with the outfitter. The outfitter had submitted a proposal to improve the site by building up a log wall, bringing in fill material and leveling the site. This would enable him to have more room to better position the facilities and have a better turn around at the site for unloading and loading gear and horses.

This monitoring was done because part of the permit administration process is to ensure that the permit holder is operating according to their special use permit and operating plan, and to learn about their operations.

The monitoring indicated that in its present condition, the campsite is not big enough for the sleeping tent and cook tent to be 100 feet apart, which is recommended as part of the outfitters Grizzly Bear Protection Plan. The outfitter was not aware of this requirement and was very concerned about mitigating the situation.

The expansion was approved since it will be a benefit to the outfitter, his guests and the Forest Service by providing a larger camp space, and meeting safety factors such as moving the sleeping and eating areas further from each other and providing adequate parking space and space to unload and load horses and gear.

Moyie River Outfitters - Outfitter & Guide Permit

A campsite that is under permit as an assigned site (Dead Cow Camp) was monitored on September 7, 1998. A field review of the campsite itself was conducted to check for compliance with the terms of approval for his requested modifications to the site.

The monitoring indicated that most of the work had been completed. The log retaining wall was in place and fill material had been brought in. The outfitter performed the work that he had requested and was approved for.

Submitted by Debbie Butler, North Zone

Fire Occurrence

To sustain the diversity of our forests we need to understand the natural disturbance processes that historically affected these ecosystems. Fire history studies in the Coeur d'Alene Basin indicate that between 1542 and 1931, a major fire event (a fire or fires cumulatively covering at least 20,000 acres) occurred somewhere every 19 years on the average. For example, in the Coeur d'Alene Basin major fire events occurred in 1904, 1896, 1889 (may have been larger than the 1910 fire), 1878, 1870, 1859, 1844, 1830, 1814 (burned 1/3 of the basin), 1790, 1772, 1764, 1654, 1580 and 1542.

A combination of both mixed severity and stand replacing fires were the dominant disturbance force shaping the historic natural forest. Stand replacing fires as the name indicates cause high mortality in canopy trees throughout most of the stand. Mixed severity fires have varying effects on the canopy, both lethal and nonlethal, and produce irregular, patchy mosaics. Low severity fires cause little mortality in mature trees.

Before the arrival of Europeans, the mid elevation hillsides of the IPNF were covered with mixed conifer forests. Western white pine comprised roughly 35% of the forest, with western larch, ponderosa pine, and Douglas-fir as the other most common trees. These tree species are adapted to both wildfire and droughts, and these forest types were largely created and maintained by forest fires. Grand fir and hemlock were also present, but these species are more fire and drought sensitive, and consequently were less common. The sites along rivers and in stream side zones burned less frequently and less severely, and were commonly dominated by large old growth western red cedar.

The drier sites and lower elevations on south facing slopes and on the Rathdrum Prairie burned more frequently, but usually with low severity fires. On these drier sites, open stands of large ponderosa pine, larch, and Douglas-fir were common and were maintained by low-intensity ground fires. These species mixes and forest communities evolved with wildfire disturbance as the predominant force of change.

Over the past 55 years the IPNF has seen major changes in forest tree species composition and structure as a result of fire suppression, the introduction of white pine blister rust in the early part of the century, and past timber harvest practices. Blister rust has been one of the most significant factors. This introduced disease has killed over 90% of the formerly dominant white pine, and pushed forest succession toward fir and hemlock forests.

Fire suppression has also changed the landscape. Extrapolating from a fire study of the Coeur d'Alene Forest, the historic mean fire return interval for stand replacing fires was approximately 190 years. Given the 2.5 million acres of the Idaho Panhandle National Forests an average historic fire year would have burned approximately 31,000 acres. Of these average historic annual burned acres, approximately 13,000 acres would have burned in stand replacing fires, and 18,000 acres would have burned in low and mixed severity fires.

The table on the following page shows historical fire occurrence on the IPNF for 1959 through 1998. It shows that the total number of fires per year has ranged from 44 in 1993 to 586 in 1994. The total number of acres burned per year varies from 3 in 1993 to 3221 in 1970.

Wildfires are now largely suppressed by human beings (especially low and mixed severity fires). In 1998, the IPNF responded to 198 wildfires which were suppressed after only burning a total of 62 acres. About 84% of the fires were natural (lightning caused) and 16% were human caused. We also disposed of brush and slash from timber harvest activities on 4977 acres, and natural fuels from 6465 acres.

For the 11 years since the Forest Plan was adopted, the IPNF has responded to 1709 wildfires, which burned 7265 acres. Our last major stand replacing wildfire occurred in 1968. Without human suppression, over a historically typical 7 year period, wildfires might have burned 217,000 acres (although only 91,000 would have been severe stand replacing fires).

Wildfire vs. Human Disturbance

With the suppression of wildfire, human timber harvest and prescribed burning are the primary vegetation disturbance forces shaping the landscape. In terms of converting vegetation to an early successional condition, regeneration timber harvests partially imitate the effects of stand replacing fire. In terms of thinning stands, partial cut harvests partially imitate the effects of mixed severity fires. Human induced vegetation disturbance from timber harvest opens a much smaller number of acres than we would have expected from historic wildfire regimes. This combined with white pine blister rust is converting the forest to dominance by fire and drought sensitive firs and hemlock.

Table 38. Idaho Panhandle National Forest Historical Fire Occurrence

YEAR	TOTAL FIRES	LIGHTNING FIRES	PERSON FIRES	LIGHTNING ACRES	PERSON ACRES	TOTAL ACRES
1998	198	166	32	61	1	62
1997	78	66	12	11	6	17
1996	117	87	30	30	290	319
1995	87	56	31	8	15	21
1994	586	530	56	2417	74	2490
1993	44	23	21	1	3	3
1992	127	106	31	30	232	407
1991	122	76	46	11	2530	2541
1990	97	48	49	5	140	145
1989	138	99	39	92	86	176
1988	115	58	39	316	706	1084
1987	126	56	70	11	274	285
1986	171	125	46	31	852	882
1985	138	93	44	771	12	784
1984	254	182	72	33	16	49
1983	59	24	5	0	374	374
1982	140	91	49	13	20	33
1981	142	94	48	10	14	24
1980	75	52	23	10	12	22
1979	321	201	120	110	2585	2695
1978	71	40	31	5	47	52
1977	267	188	79	23	67	90
1976	106	59	47	2	84	86
1975	101	58	43	9	79	88
1974	278	158	120	183	1735	1918
1973	155	69	86	13	1526	1539
1972	181	148	33	7	117	124
1971	151	105	46	49	112	161
1970	328	267	61	51	3170	3221
1969	108	37	71	96	171	267
1968	109	64	45			
1967	237	172	65			
1966	154	105	49			
1965	141	102	39			
1964	137	113	24			
1963	432	372	60			
1962	268	205	63			
1961	309	259	50			
1960	137	65	72			
1959	123	86	37			

Overall, since 1940 we have been very successful at eliminating wildfires as a major ecological process on the IPNF. We're still working at understanding how this balances with the large number of wildfire acres burned during the drought years between 1910 and 1934.

Although we're cutting fewer acres than we would have expected to burn from naturally occurring wildfires, the widely dispersed nature of our harvests has impacted a large number of watersheds. Where historic wildfires would have burned large patches, our harvests have been laid out in 5 to 40 acre openings scattered over a much broader area. Extensive road systems are used to access and link these harvest patches. Thus, both the watershed and visual impacts of our harvest systems exceed what we'd expect simply from the number of acres harvested.

Today 90%+ of the historic white pine forest has been lost, and the amount of larch has been significantly reduced. The large open grown ponderosa pine stands are largely gone. These formerly dominant forest species have largely been replaced by grand fir, Douglas-fir, and western hemlock, which have doubled or tripled in their coverage. These new forests of fir and hemlock are much more drought and fire sensitive than the historic forest, and are at risk from root disease and defoliating insects. The Scientific Assessment of the Interior Columbia Basin identified this conversion to dominance by late seral tree species as both a cause of increased susceptibility to severe fires, insects and pathogens, and a basin-wide concern.

In some places, root diseases have been converted from their historic ecological role as thinning agents, to a new role as significant disturbance agents shaping the landscapes. In the Coeur d'Alene Basin, extremely high root disease mortality rates are creating large-scale forest canopy openings and accelerating succession towards drought and fire sensitive grand fir and hemlock. On drier sites, in place of the stands of large, open ponderosa pine, we now have dense stands of lodgepole pine, or a mix of firs that is at high risk from potentially very severe wildfires.

Noxious Weeds

The 1998 summary of noxious weed acreages by National Forest lists the IPNF with 248,800 acres. This put the IPNF in the "top 3" among National Forests. As a result, efforts were made to establish and develop a large scale program. The Panhandle Weed Management Area (PWMA) has emerged to represent the multi-state, multi-agency and multi-county based group dedicated to the control and management of weeds. The PWMA has 20 cooperative partners operating under a signed Memorandum of Understanding. It is lead by a multi-agency steering committee and operates through 3 functional subgroups. The IPNF has been an active member in the development and implementation of the PWMA.

In the first year, the PWMA has organized itself, developed program goals and objectives, and through its subgroups implemented 3 projects. The projects included the treatment of Eurasia Milfoil on the Priest River, an educational tour for Master Gardeners and interested individuals to see first hand the "weed problem" and some of the efforts to manage and control weeds, and the introduction of a biological agent (insects) to help control an expanding Purple Loosestrife infestation.

1998 saw the weeds program budget increase by 36 percent with additional work accomplished through the KV program. The Forest directly treated 593 acres in the weeds program and an additional 1255 acres through the KV program. Treatment methods were integrated using a combination of mechanical (hand pulling), chemical spraying, and approved biological agents (insects that attack specific weeds). The Forest also surveyed 500 acres for new weed infestations during the year. The IPNF had 2 approved weed EIS's for Priest Lake and Bonners Ranger Districts starting FY98. Efforts by the 3 Zones resulted in an approved weed EIS for Sandpoint RD, and draft weed EIS's for the Coeur d'Alene River and the St. Joe Ranger Districts by the end of the year. The Forest also sponsored Dr. Peter Rice, University of Montana, to provide an information session to the Forest Lead Team and PWMA on the Invaders Noxious Weed Data Base and the impacts of weeds in the Western U.S.

Ecosystem Restoration Activities

The scientific assessment of the interior Columbia River basin summarizes the findings about the status of the ecological integrity of the basin. Ecological integrity was defined in the assessment as "the degree to which all ecosystem components and their interactions are represented, functioning, and able to renew themselves."
To us in northern Idaho, ecological integrity is based on the condition of forest, stream, and lake habitats, and the presence of fish and wildlife that depend on these habitats. We need to know how they interact, and about possibilities for restoration if not functioning.

The scientific assessment describes north Idaho as dominated by heavily roaded moist forest types. The area is rated as having low forest, aquatic, and composite integrity. It is rated as having moderate to high hydrologic integrity.

Our forest land problems include the large-scale loss of long-lived shade-intolerant tree species, such as white pine, western larch and ponderosa pine. These species have been replaced with species such as grand fir and hemlock, which are less drought tolerant and more prone to attacks from insects and disease, and less fire resistant. Besides replacing white pine and larch, the stocking, the number of trees per acre, may have increased markedly. We also have fewer large trees and more uniform areas dominated by small and medium-sized trees. Combined, these two factors greatly increase the risk of severe fire, drought damage, and insect and disease attack.

Watershed and hydrologic functions can be impaired by weakened stream channel stability interacting with roads and normal flood events. This can result in excessive erosion rates and downstream sedimentation.

Our aquatic resource problems include the loss of quality fish habitat, the introduction of exotic species, such as brook trout, and potential damage from severe fires.

The assessment identified three future options to portray possibilities for management. Some of these options included broad restoration actions that could be taken:

1) Increase mature and old forest structures, reduce stand densities, increase the proportion of white pine, larch, and ponderosa pine, create larger stands, and allow larger areas to rest for longer times between disturbances.

2) Restore watershed function and aquatic habitats to provide a connection between aquatic strongholds (existing populations of native fish species).

3) Reduce fire, insect, disease (root rot, blister rust) susceptibility through treatment of forested areas.

White Pine Restoration

The major cause of the loss of the white pine forests has been the introduction of the exotic disease, white pine blister rust. We have a two part long-term strategy to restore these important forests. Natural white pine has a very low level of resistance to the blister rust disease. For the first part of our strategy, the Northern Region of the U.S. Forest Service has used selected resistant trees in a multi-generational breeding program to accelerate the development of rust resistance in white pine.

In 1998 the IPNF planted over 825,300 rust resistant white pine seedlings.

The second part of our strategy involves maintaining a landscape-wide, naturally breeding, genetically diverse population of wild white pine that can develop blister rust resistance through natural selection. We have cooperated with the U.S. Forest Service, Northern Region, Forest Health Protection Staff in publishing White Pine Leave Tree Guidelines (Schwandt and Zack, Forest Health protection Report 96-3, March 1996) to assure that even where we are harvesting trees, we will maintain a naturally breeding white pine population that has a high probability of capturing the available blister rust resistant genes. We began using these guidelines in 1996.

Restoration Activities, 1992-1998

The assessment findings validate treatment practices already employed on the IPNF. From 1992-1998 the forest implemented many restoration projects. A brief summary of some of these activities follows.

1) Increasing the proportion of white pine, larch, and ponderosa pine.

   - Approximately 6940 acres were planted to these species in 1998. (This includes the new, more rust resistant white pine). These three species tend to be more resistant to root rot disease. From 1992-1998 there were 56,840acres planted to these species.

2) Reducing stocking

   - 8,964 acres were thinned in 1998. Most of the thinning has released larch, white pine, and ponderosa pine. From 1992-1998, 52,502 acres were thinned.

3) Restoring the role of fire in the ecosystem thereby reducing risk of severe fires

   - 6,465 acres of prescribed burning were accomplished in 1998. From 1992-1998 there were 56,271 acres of prescribed burning on the IPNF.

4) Watershed Improvement and Improved Fish Habitat

- 1,036 acres of watershed improvement and 29 miles of improved fish habitat were accomplished in 1998. From 1992-98 there were 7,536 acres of watershed improvment and 182 miles of fish habitat improvement.

5) Road obliteration

- There were 74.3 miles of road obliterated in 1998 as part of ecosystem restoration work, using a variety of funds. Table 7 shows figures for road obliteration of system and non-system roads from 1991-1998. System roads are generally the ones that are inventoried, maintained and managed by the forest. The other roads are not.

Table 39. Number of miles of roads obliterated, 1991-1998

YEAR	SYSTEM ROADS	OTHER ROADS	TOTAL MILES OBLITERATED PER YEAR
1991	0	8.0	8.0
1992	141.8	28.3	170.1
1993	115.2	27.6	142.8
1994	119.3	59.9	179.2
1995	95.9	25.7	121.6
1996	58.9	14.3	73.2
1997	79.2	1.1	80.3
1998	71.5	2.8	74.3
TOTALS	**681.8**	**167.7**	**849.5**

Future Restoration Activities

In the future, our ecosystem restoration activities will focus on the following types of activities:

- Concentrating vegetation treatments in larger blocks, coupled with allowing other large blocks to remain undisturbed for longer intervals.

- Increasing the use of prescribed fire to reduce severe fire risk and restore the role of fire in the ecosystem.

- Reducing road densities, especially in areas with high densities.

- Stabilizing and improving channel stability.

- Creating openings for the reintroduction of white pine, ponderosa pine, larch and whitebark pine.

- Thinning dense stands to favor white pine, ponderosa pine, and larch. To promote large trees and reduce competition for moisture on dry sites.

- Restoring riparian areas and protecting inland native fish strongholds.

- Protecting habitat for threatened and endangered species, such as woodland caribou, gray wolf, grizzly bear, and bald eagle.

- An important aspect of our ecosystem management strategy is to focus restoration activities in priority areas where multiple ecological problems can be addressed. The objective is to improve the condition of several ecosystem components and not just a single one, such as vegetation or aquatics.

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Appendices

Appendix A. IPNF Forest Plan Monitoring Requirements

Appendix B. Forest Plan Amendments

Appendix C. Table of cooperator agreements signed in 1998

Appendix D. List of contributors to monitoring report

Appendix A. Table 40. IPNF Forest Plan Monitoring Requirements

Item Number	Standards, Practices, Activities, Outputs or Effects to be Monitored	Data Source	Frequency of Measurement	Reporting Period	Threshold to Initate Further Action
A.	All RESOURCE ACTIVITIES				
A-1	**Quantitative estimate of outputs and services**	Annual program accomplishment report	annually	annually	A trend established after 5 years that indicates less than 80% of Forest Plan goal has been accomplished
A-2	**Effects of other government agency activities on the national forests**	Other agency plans	annually	annually	When other agency programs affect attainment of Forest Plan Goals
B.	TIMBER				
B-1	**Harvested lands restocked within 5 years**	Stand records	1,3,5 years	5 years	10% of harvest lands not adequtely restocked 5 years

					following site preparation
B-2	**Timberland suitability**	Timber Stand Data Base and Forest Data Base, EAs	5 years	5 years	10% change in timberland currently classed as physically suitable
B-3	**Validate maximum size limits for harvest areas**	EAs	5 years	5 years	10% of openings exceed Forest Plan size limits
B-4	**Insect and disease hazard**	Insect and disease surveys	5 years	5 years	Insect and disease conditions are predicted to reach epidemic or serious levels on 5 % of the Forest
B-5	**Road construction**	Timber appraisals, construction contracts	Annually	5 years	Unit costs exceed estimates by 20% in two or more years
B-6	**Actual sell area and volume**	Cut and sold reports	annually	5 years cumulation	Sell volume and acres less than 75% of Forest Plan goal
C.	VISUAL RESOURCES				
C-1	**Meeting Visual Quality Objectives**	Eas, field sampling	ongoing	annually	10% departure from Forest Plan direction after 5

					years initiates further evaluation
D	RECREATION				
D-1	**Off-road vehicle effects**	Field evaluation, traval plan	continuing	annually	Conflicts with management area goals or between users
E	CULTURAL RESOURCES				
E-1	**Measure potential impacts of land disturbing projects on known cultural resources**	Field monitoring	Annually	annually	Any unmitigated adverse impact
F	WILDLIFE				
F-1	**Population trends of management indicator species**	State Fish and Game Dept	annually	5 years	Downward population trends
F-2	**Grizzly bear recovery objectives**	Idaho Fish and Game, USFWS	annually	annually	Not working toward recovery
F-3	**Caribou recovery objectives**	Idaho Fish and Game, USFWS	annually	annually	Not working toward recovery
G	WATER AND FISH				
G-1	**Greater than 80% of potential emergence success**	58 streams monitored at 29 streams per year	2 years	annually	When more than 10% of high value streams –

					below 80%. When more than 20% of importnt streams – below 80%. A 4 year declining trend on any stream
G-2	**Are BMPS protecting water quality, are they: implemented as designed; effective in controling nonpoint sources of pollution; protecting beneficial uses.**	Baseline stations on 11 streams. implementation 10% timber sales; effectiveness on-site 0ff-site measurement; WATSED validation	annually	annually	1 – used for resource characateerization and background data for predictive purposes 2- evaluate 10% of timber sales per year. Deviation from prescribed BMPs; 3- ineffective on-site nonpoint source pollution control. Off-site watershed system degrading due to lack of effectiveness of BMPs in use.

					4 – Actual more than plus or minus 20% of model prediction
G-3	**Validate fish habitat trends**	Stream surveys	annually	5 years	A declining trend in habitat quality
G-4	**Fish population trends**	Cooperative with Idaho Fish and Game	2 years	2 years	Downward trend
H	THREATENED AND ENDANGERED PLANTS				
H-1	**Threatened and endangered plants**	Field observations incidental to project planning	annually	annually	Any plan adversely affected.
I	MINERALS				
I-1	**Environmental concerns affect operating plans**	Open plan compliance checks	Minimum one inspection of operating plan active season	annually	Exceeds any Forest Plan Standard; any amend operating plan
J	LANDS				
J-1	**Land Ownership Adjustments**	Eas for land exchanges, land	annually	5 years	Program is not contributing to

		ownership records			Forest Plan goals. Less than 75% of program accomplishment.
K	ENVIRONMENTAL QUALITY				
K-1	**Prescriptions and effects on land productivity**	Field reviews	annually	annually	Non-compliance with BMPs or significant departure or effects significantly different than predicted

Appendix B. Forest Plan Amendments

The Idaho Panhandle Forest Plan Record of Decision was signed in September 1987. Since then there have been the following amendments to the plan:

1) The purpose of this amendment was to incorporate the document "Idaho Panhandle National Forests Water Quality Monitoring Program", Appendix JJ, as agreed to with the State of Idaho in the Joint Memorandum of Understanding dated September 19, 1988, and replace Forest Plan Appendix S (Best Management Practices) with Forest Service Handbook 2509.22 (Soil and Water Conservation Practice Handbook).

2) On March 12, 1991, the Regional Forester issued a Decision to Partition the allowable sale quantity (ASQ) into two non-interchangeable components, the quantity that would come from inventoried roadless areas and the amount that would come from existing roaded areas (this amendment applied to 11 of 13 Forest Plans in Region One)

3) On August 21, 1992 agreement was reached with American Rivers on an amendment that clarified the Forest's intent to protect eligible Wild and Scenic Rivers until suitability studies were completed.

4) The purpose of this amendment was to comply with the Arkansas-Idaho Land Exchange Act of 1992. Through this land exchange, the IPNF acquired a total of 10,026 acres of land (9,114.44 acres from the Bureau of Land Management and 912.1 acres from Potlatch Corporation). In turn, the IPNF disposed of 7,978.91 acres to Potlatch Corporation. The Act directed the IPNF to manage those lands acquired within the boundaries of the BLM's Grandmother Mountain Wilderness Study Area to preserve the suitability for wilderness until the Forest completes a wilderness study as part of its Forest Plan revision process.

5) Another amendment updated standards and guidelines for the Salmo-Priest Wilderness Area. (This applied to both the Colville and Idaho Panhandle National Forests portions of the wilderness area).

6) The most recent amendment is associated with the Interim Strategies for managing fish-producing watersheds in eastern Oregon and Washington, Idaho, Western Montana and portions of Nevada (Inland Native Fish Strategy). This interim direction is in the form of riparian management objectives, standards and guidelines, and monitoring requirements. This action amends the management direction established in the Regional Guides and all existing land and resource management plans for the area covered by the assessment.

Appendix C. List of cooperator agreements signed in 1998

We would like to thank all those who have contributed to the management and enhancement of the Idaho Panhandle National Forests. During 1998 the following agreements were signed between the Forest and cooperators to accomplish a wide variety of work. Many other agreements which were signed in previous years are still in effect.

Table 41. 1998 Cooperator agreements

TYPE OF AGREEMENT	COOPERATOR	PURPOSE	COOPERATIVE AMOUNT
Collection Agreement	Rocky Mountain Elk Foundation	Master Collection Agreement	
Collection Agreement	Idaho Dept Parks and Recreation	Ruby Ridge Trail re-route	$31,493
Collection Agreement	Idaho Dept Parks and Recreation	Lake Darling Trail reconstruction	$16,490
Collection Agreement	Idaho Dept Parks and Recreation	Canfield Access improvements	$59,670
Collection Agreement	Idaho Dept Parks and Recreation	Fernan Saddle Parking Lot	$60,900
Collection Agreement	Idaho Dept Parks and Recreation	Sam Owen Pend O. Buoys	$590
Challenge Cost Share	Panhandle Backcountry Horsemen	Develop/maintain trails, public education	$1,150
Operating Plan	Benewah County	Sheriff's Dept Joint Operating Plan	
Operating Plan	Bonner County	Sheriff's Dept Joint Operating Plan	
Operating Plan	Kootenai County	Sheriff's Dept Joint Operating Plan	
Collection Agreement	Idaho Dept Parks & Recreation	Branch N Gold Creek Trail #111	$14,559
Collection Agreement	Idaho Dept Parks & Recreation	Central zone trailbike purchase	$7,000
Collection Agreement	Callahan-Zeller Foundation	Restoration of Cabin at Shoshone Park	$500
Challenge Cost Share	WWP/DEQ/ID Fish and Game	Fish Survey – Lower Clark Fork River	$96,528
Challenge Cost Share	Western Environ. Research	Bat survey in inactive mines	$5,000

Collection Agreement	Magnuson Family Foundation	Restoration of cabin at Shoshone Park	$500
Challenge Cost Share	North Idaho Travel Committee	Develop recreation brochures	$18,675
Challenge Cost Share	Hills Resort	Groom and maintain Cross country ski trails	$1,500
Cooperative Agreement	Union Pacific Railroad	Road maintenance agreement; ID Eastport Inter	
Participating Agreement	Idaho Forest Products Commission	Dickensheet Interpretive display and sign	$7,450
Challenge Cost Share	University of Idaho	Design recreation tourism plan	$13,130
Interagency Agreement	Department of the Army	Albeni Falls Dam – Pend Oreille Lake	$59,500
Interagency Agreement	Federal Highways Administration	Fernan Lake Road Bunco Road Survey	$8,000
Collection Agreement	Trout Unlimited	Keno Creek project	$5,000
Grant	City of Sandpoint	Feasibility study convention center	$5,600
Collection Agreement	Idaho Dept Parks and Recreation	Emerald Creek Renovation	94,900
Interagency Agreement	Bureau of Land Management	Blanket Agreement with local office	
Challenge Cost Share	Selkirk School	Maintain trail, natural resoure education, wildlife surveys	$25,458
Challenge Cost Share	Panhandle Backcountry horsemen	Dev and maintain specified trails, education	$1,470
Collection Agreement	Idaho Community Foundation	Restoration 2 historic cabins	$2,000
Challenge Cost Share	Stimson Lumber Company	Cadastral Survey, Granite Creek Survey	$8,700
Challenge Cost Share	William and Mary Hays	FS Roads 2219 and 2219A reconstruction	$2,900
Memorandum of Understanding	Idaho Forest Products Commission	Coop and coordinate projects and programs	
Challenge Cost	National Forest	Mutual projects	

Share	Foundation		
Cooperative Agreement	Kootenai County Eastside Highway District	Forest Development Road coop Agreement	
Challenge Cost Share	Montana Conservation Corps	Conservation Service projects	
Collection Agreement	Bat Conservation International	Bethlehem Mine bat habitat project	$3,000
Challenge Cost Share	Wildlife Conservation Society	Sensitive Wildlife Surveys	$3,100
Challenge Cost Share	Panhandle Back Country Horsemen	Develop, maintain roads and trails; education	$2,000

Appendix D. List of Contributors to Monitoring Report

The following people contributed their ideas, time, and information to this report. Indeed the report would not have been possible without them!

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