(24)

Forest Plan Monitoring and Evaluation Report FISCAL YEAR 1997 August 1998

Kootenai National Forest

United States
Department
of Agriculture

Forest Service
Kootenai National Forest

Table of Contents

FOREST PLAN MONITORING

and

EVALUATION REPORT
Fiscal Year 1997
Kootenai National Forest

SUMMARY

INTRODUCTION

The Kootenai Forest Plan was approved on September 14, 1987. It established management direction for a 10-15 year period that began on October 1, 1987 (Fiscal Year (FY) 1988). This direction was the result of a comprehensive analysis of land capabilities, public issues, and environmental effects along with a balancing of legal requirements.

We have completed the monitoring of Forest Plan implementation for FY 1997. This report evaluates the field data collected by the end of September 30, 1997 that pertain to the 39 reported monitoring items. In addition, the Regional Forester assigned an additional monitoring item in 1991 (E-9, Clear-cut Acres Sold), to bring the total monitoring items to 40. Our monitoring and evaluation process is shown in Chapter IV of the 1987 Kootenai National Forest Land and Resource Management Plan (Forest Plan). This year's report evaluates 40 monitoring items, including 14 annual items, four biannual items and 22 five year reporting items.

We have completed ten years of implementing the Forest Plan. Information from our monitoring will help identify what we need to change during Forest Plan revision. We have found some methods work well, and some do not. We found that some of our projections were accomplished and some have not been. The summary explains the Forest Plan itself, describes the monitoring methods, and summarizes ten years of monitoring practices, standards, and outputs under the Forest Plan.

FOREST PLAN DECISIONS

The Forest Plan is a set of decisions that guide management of the Forest. Taken broadly, it contains three types of decisions:

- **Goals, Objectives, and Desired Conditions** (pages II-1 through II-17 of the Forest Plan) provide general direction regarding where we should be headed as we put the Plan into practice.
- **Standards** (Pages II-20 through II-33, Chapter III of the Forest Plan, and Forest Plan amendments) tell us how to put the Plan into practice, or give us conditions we must meet while we implement the Plan.
- **Land Allocation - Management Areas** (MAs), as described in the Forest Plan Chapter III and displayed on the Forest Plan Map, are those areas of the Forest which are allocated for different types of land management and resource production.

MONITORING

As we've found over the last ten years, land management occurs in complex and changing situations, and our results will not always be totally predictable, definitive, or certain. Management results are affected by many things, including natural events that cannot be predicted. The purpose of monitoring is to determine answers to the following questions: Are we doing what the Plan envisioned (implementation monitoring)? Are we seeing the effects and outputs predicted in the Plan (effectiveness monitoring)? Are the standards working (validation monitoring)? Do we need to adjust practices to meet the standards? Does the monitoring process need adjusting?

Monitoring data for most items is reported yearly by the District or responsible Staff areas at the Supervisor's Office. Monitoring forms are used to assist in collecting consistent data from the various sources.

Monitoring and evaluation information will be used as we begin Forest Plan revision. Part of the reason we decided to issue a "Notice of Intent" to revise the Forest Plan, which was issued in November, 1996, was because of our findings in the monitoring program.

SUMMARY OF NEED FOR CHANGE

In our evaluation we found that some areas need further review during Forest Plan revision. One of the main findings is that, in some cases, it is inappropriate for management direction to be applied equally over an entire Forest. We have learned that there are differences in goods and services an area will provide, that the land capabilities are different, and what we have to manage is different. For example, a watershed with checkerboard ownership versus one with entirely federal ownership provides a different set of opportunities. Streams in one portion of the Forest don't react to disturbance the same as streams in other parts of the Forest. These area-specific factors will be considered during revision. In addition, we have found many resource-specific areas which need consideration:

Recreation: Overall, the Forest is providing for the appropriate amounts of dispersed and developed recreation areas. Site specific effects have been noted in some areas and specific actions are being taken to address these issues. One area of continuing conflict is in regards to roadless areas. The Forest Plan predicted a certain level of development (primarily timber harvest and minerals activities) in roadless areas. This development has not occurred to the extent expected. This is due to many factors including consideration for wildlife and watershed needs. The revision process will provide an opportunity to assess the future levels of development in roadless areas. Until the Forest Plan revision is completed, any additional major projects in roadless areas will be deferred, except those noted in Monitoring Item A-6, Roadless Area Changes. Some minor projects, such as roadside salvage may still occur. This direction will remain in effect until the Forest Plan is revised or if circumstances change, such as a wildfire that would cause us to review this direction.

Wildlife: Generally, habitat conditions and big game wildlife populations are improving on the Kootenai. In addition, conditions and populations are improving for threatened and endangered species. Wildlife populations tend to fluctuate based on weather influences, predation, and other factors out of our control. We will review habitat needs and trends for all species, including needs for sensitive species and species proposed for listing as threatened or endangered. We will work closely with Montana Fish, Wildlife and Parks and the US Fish and Wildlife Service to integrate management plans and recovery plans with the revised Forest Plan.

One area we will review more closely is new scientific information concerning snags. The initial analysis indicates we may need to provide more snags than originally indicated in the Forest Plan. We have determined interim direction is not warranted at this time (see Monitoring Item C-4).

Range: Range use has decreased since approval of the Forest Plan and some allotments have not been active for many years. During revision, we will review the status of allotments and determine if any changes need to be made.

Noxious weeds have increased beyond the variability limits set in the Forest Plan. However, the Forest completed several actions in the past few years to provide more tools for control. We will continue to monitor this item to see if any new direction is needed in the revised Forest Plan.

Timber: As noted in previous years' monitoring reports, timber sale volumes and acres of timber sold for harvest have declined substantially. Revision of the Forest Plan will provide the opportunity to assess appropriate levels of harvest volume and acreage including review of the land base designated as suitable for timber management. It is also very likely that new yield tables will need to be established as silvicultural prescriptions and management activities are adapted to meet emerging direction. We have a backlog of approximately 8,000 acres of pre-commercial thinning that has not occurred due to a lack of budgets and workforce. This will also need to be factored into revision.

Watershed and Fisheries: Monitoring Item F-3 (Water Yield Increases) and E-7 (Timber Harvest Deferrals) identify that the model-predicted water yield is higher in many areas than is desired. In some cases, this higher water yield was created by harvest on private lands. During revision, harvest on private lands will be factored into the Forest Plan.

In addition, we have learned more about how to provide for water quality and fisheries habitat than originally was considered in the Forest Plan. The Inland Native Fish (INFS) Forest Plan amendment provided guidance based on this new information. We will revisit INFS to evaluate if and how it should apply to the Kootenai.

Human and Community Development: We noted in the monitoring report that small variations in the role of the Forest's economically important programs will have relatively larger effects on local people in comparison to the effects they had in the first ten years of Forest Plan implementation. Understanding of our Forest's role in the economics and well-being of our communities will be a key component of revision.

We have identified many emerging issues over the last ten years of implementation. We will review the issues that have been reported and assess them for their applicability. If they are still relevant, we will consider them during revision.

During the last ten years we have gained a better understanding of costs to implement the Forest Plan and budget levels received from Congress. During the revision process, we will factor in this understanding.

Facilities: *Although we have met the Forest Plan projections for road closures, many of these closures have occurred on existing roads versus roads that the Forest Plan projected to be built. Access management is an important issue which will be evaluated during revision.*

SUMMARY OF MONITORING RESULTS

Roadless Area Use (A-1): The Kootenai Forest had 32 Inventoried Roadless Areas (IRAs), one wilderness study area, and one designated wilderness area when the Forest Plan was approved in September, 1987. The primary non-motorized recreation use of these areas is hiking, fishing, hunting, and camping. The primary motorized use of these areas is snowmobiling (where allowed).

The Plan's estimate for total non-motorized recreation use is 65,000 Recreation Visitor Days (RVDs) per year. This includes 18,000 RVDs per year in the wilderness and 47,000 RVDs in the remaining non-wilderness roadless areas. Roadless Area use is within expected ranges. There has been much variation, with use levels greatest during 1994 and 1995 for total use, and wilderness greatest in 1990. Much of the variation has to do with weather conditions. Use level in the Cabinet Wilderness exceeds the average projected amount, while non-wilderness roadless use is less than projected levels. Overuse in certain popular areas in the Cabinet Wilderness have caused problems, and Action Plans are in place to manage these impacts. (See Monitoring A-2 for further information). Based on this evaluation it appears that an adequate amount of area has been designated for those people seeking an unroaded environment. As use-related problems are identified, we will develop management actions to reduce impacts.

Roadless Area Overuse (A-2): Instead of providing quantitative variability thresholds for evaluating this monitoring item, the Forest Plan calls for a qualitative evaluation. This qualitative review is based on whether site conditions are of such a nature that they damage soil and water resources, permanently affect the sites ability to recover, become a safety hazard, or detract from the recreational experience. The review of this item indicates that visitor use is currently managed at an acceptable level, with some exceptions. Action has been taken in areas where heavy use was reported in FY 96. Twenty-two out of twenty-four site's were found to be stable or improving since 1996. The two sites that showed some decline (Wolverine Cabin and Minor Lake) will take time to show improvement. Both have Action Plans that have been implemented, therefore, it is not anticipated that further resource effects will occur. We will continue to implement Action Plans associated with the various sites..

Visual Quality Objectives (VQO) Effectiveness (A-3): Each management area on the Forest has a prescribed VQO to be maintained whenever timber sales or other development projects are proposed. There are exceptions to this requirement when disturbances occur such as insect or disease epidemics, large fires, extensive blowdown from severe windstorms, etc. In these instances, the prescribed VQO may not be achievable in the short-term, but an effort is made to obtain the closest compliance possible with the long-term goal of meeting VQOs.

A total of 218,507 acres of various projects were reported over the last ten years, most of which were timber sales. Of that total, 1,594 acres did not meet the prescribed VQO. The most common reason for not meeting the VQO was because of timber salvage in fire-killed stands and in mountain pine beetle-killed lodgepole pine stands. The monitoring information does not show any direct evidence of visual quality problems since the Forest Plan was approved in September, 1987, even though there is localized evidence where the visual quality has been diminished by the harvest of beetle-killed or fire-killed timber. This item is within the prescribed range stated in the Monitoring Plan (+/-10%) as currently defined.

Developed Site Use (A-4): The Forest Plan estimate for developed site use is 297,000 Recreation Visitor Days (RVDs) per year. A total of 2,583,000 RVDs was reported for the ten years since 1987, or an average of 258,300 per year. This is an

average of 87% of the use projected in the Plan. We experienced low use in FY 1989-90 due to major reconstruction work occurring on US Highway 2 between Libby and Troy, Montana, and the poor fishing success experienced at Lake Koocanusa. This discouraged some incoming tourist travel because of the long delays, rough road surfaces, and the lack of "keeper-size" kokanee salmon. After a significant increase between 1990 and 1993, developed site use has leveled, with only slight increase in visits from 1993 to 1997. In spite of the increased use levels, capacity at developed recreation sites has been sufficient to accommodate all users, with the exception of a few major holiday periods, such as Labor Day. This item is within the prescribed range stated in the Monitoring Plan (+/-20%). No additional action is needed at this time. We will continue to monitor and evaluate whether additional sites may be necessary in the future.

Off Road Vehicle (ORV) Use Effects (A-5): This monitoring item was evaluated in the FY 96 Monitoring Report. Review in FY 96 found that the effects of ORV use on the Forest appeared to be minor; however, use of the Lake Koocanusa drawdown area, the adjacent non-motorized area, and the low-elevation lakes near Eureka appears to be increasing. It also found that because ORV use is limited in nature and effective actions have been taken to reduce effects, that ORV use was being managed at an acceptable level. Monitoring completed in FY 97 found similar results as in FY 96. The FY 96 Monitoring Report identified a need to update the monitoring form to provide consistency in collecting and recording data. The monitoring forms were updated and used in FY 97. As noted in FY 96, the ORV use is limited in nature and effective actions have been taken to reduce effects, therefore this monitoring item is currently being managed at an acceptable level. As use-related problems are identified we will implement management actions to reduce effects.

Roadless Area Changes (A-6) and Appendix G: The Forest Plan anticipated that 10,500 acres would be developed through timber harvest and road construction during the 10 year period in roadless areas. To date only 5,270 acres have been developed and this is much below acres that were estimated to be developed in the Plan. In addition, no roadless areas have been affected due to mineral activity. This is also outside the levels estimated by the Plan. It is apparent that the predicted level of development within the roadless areas has not occurred. This is due to many factors including consideration for wildlife, watershed and other needs. The Forest Plan revision process will provide the opportunity to assess the future levels of development in roadless areas.

Other factors relating to roadless areas: Between 1996 and 1997, the Kootenai National Forest and the Montana Fish, Wildlife and Parks (MFWP) met to discuss how the Forest could integrate the MFWP Elk Management Plan consistently with the Kootenai Forest Plan. Based on potential areas of conflict, the Forest agreed to: (1) No timber harvest or road construction in the Northwest Peak, Grizzly Peak, Roderick Mountain, Trout Creek, Cataract, Gold Hill West and Scotchman Peak (Pellick Ridge) inventoried roadless areas. This agreement may be reconsidered if catastrophic events occur or if an unforeseen legal mandate creates a need to enter these areas. No sales were planned in these areas at the time of agreement; (2) The Ranger Districts will complete assessments of Buckhorn Ridge (Pine Project), Gold Hill, and East & West Fork Elk Creek (Jacks Gulch) to determine if entries are needed at this time. If a need is identified, then the Districts will work with MFWP to develop a proposed action acceptable to both agencies. If a mutually acceptable action cannot be developed, the Forest Supervisor and MFWP director will consult before deciding how to proceed. This agreement resolved potential conflicts in roadless areas named in the MFWP Regional Elk Management Plan until the Forest Plan can be revised and both plans are more closely integrated.

In addition, because of the growing concern over proposing timber harvest and road construction in roadless areas, any additional major projects in roadless areas have been deferred, except those noted in Monitoring Item A6. Some minor projects, such as roadside salvage, may still occur. This direction will remain in effect until the Forest Plan is revised, or if there are changed circumstances, such as a wildfire, that would cause us to review this direction.

Cultural Resource Management (A-7): The National Historic Preservation Act (NHPA) and the implementing regulation (36 CFR 800) direct the federal government to locate, inventory, and protect the historic and prehistoric properties (cultural resources) from activities occurring on all federal lands. Over the last ten years a total of 2,078 projects were proposed that required consideration under 36 CFR 800. Of this total, 1,914 projects successfully completed the required consultation before the project was implemented. The annual accomplishments for the first three years were below the desired level of 90 percent, but the steady upward trend that began in FY 88 reached and exceeded the desired level during the next seven years. The average annual accomplishment level for the last ten years is 92%, which meets the 90% level prescribed in the Forest Plan. This item is within the prescribed range stated in the Monitoring Plan (-10%).

Elk Habitat (C-1): The overall elk habitat capability has improved. Habitat effectiveness continues to improve Forest-wide. Although the open road densities in the primary summer range (MA 12) do not meet Forest Plan standards in some areas, the biological summer range is providing the overall desired habitat effectiveness throughout the Forest. Elk security

is provided Forest-wide and generally planning unit wide. Based on these factors elk habitat is in an improving condition. We will continue to evaluate elk security and habitat effectiveness at both the Forest-wide and planning unit level. These will be evaluated every five years to determine trends in habitat condition.

Elk Populations (C-2): Three factors were used to assess elk populations over the past decade: number of elk observed in aerial surveys, number of elk harvested by hunters, and number of elk checked through check stations. All three factors show a similar trend. Elk populations increased through about 1990 or 1991 and have shown a gradual decrease since that time. The likely cause of the downward trend is a combination of weather conditions which have made elk more vulnerable to hunters in certain years and also directly impacted elk survival during the severe 1996-97 winter. Calf production has also been lower than desired in some years, possibly due to weather or predation. We will continue monitoring elk populations to determine future trends. In addition, we will coordinate with MFWP on changes in hunting regulations which may be needed to produce the desired trend in elk population and provide for a desired age structure in the bull populations.

Other Big Game Habitat and Populations (C-3a and b) and Management Indicator Species (C-8):

Whitetail Deer: This species is the most widespread and abundant big game animal on the Forest. Vegetative succession, which has worked against the mule deer, has been a long-term positive factor in whitetail deer habitat. Other positive influences include timber harvest, especially in small units, which increases habitat diversity and edge; and direct habitat improvements such as prescribed burning and slashing in overgrown browse areas. Negative influences include extensive timber harvest in large units on portions of the Forest to salvage insect-infested lodgepole pine stands, and several large wildfires which have occurred in the past decade. These events reduce cover and habitat diversity favored by whitetail deer.

The proportion of mature bucks in the harvest remained relatively constant over the last decade, indicating a healthy population structure. The population increased for most of the last ten years, which is reflective of a positive trend in habitat. This steadily increasing trend was reversed, however, during the severe winter of 1996-97 when a significant portion of the whitetail population died. In addition to this winter mortality, the poor physical condition of surviving does resulted in a below-average fawn crop in 1997. An up-and-down pattern in whitetail populations is typical of how the species responds to weather conditions in northern heavy-snow regions, and does not appear to be directly related to management actions of the Kootenai National Forest. Forest Plan standards for winter range, which emphasize small opening sizes and retention of cover, tend to buffer winter population fluctuations to some degree.

Mountain Goat: This species is limited primarily to rugged topography in the East and West Cabinet Mountain ranges. The habitat trend is static to possibly decreasing in the long term. Any decrease is due to continuing vegetative succession resulting from a lack of periodic wildfires or prescribed burning at higher elevations. Hunter harvest statistics and aerial survey data support a conclusion that goat populations have been relatively stable over the past decade with minor annual fluctuations. The hunter effort required to harvest a goat increased near the end of the decade. Further monitoring is needed to determine if this represents a recent downward trend or if it is due to other factors such as weather.

Other Big Game Habitat and Populations (C-3a and b) that are not Management Indicator Species:

Mule Deer: Mule deer are widespread across the Forest. There has been no measurable positive or negative trend in habitat capability in the past 10 years; however, the long term trend (several decades) may be downward. In the past decade, offsetting factors have served to maintain habitat in an essentially static condition. Factors positively affecting mule deer habitat include wildfires and timber harvest on summer range, prescribed burning and forage planting on winter range, and road closures. Negative factors include additional road construction (which reduces habitat security) and the continuing vegetative succession of grasses, forbs, and shrubs to trees. In the long term, forest succession may be resulting in a downward trend in mule deer habitat by providing more closed canopy forests which are favored by other big game species such as whitetail deer.

The long-term trend in mule deer populations has been up since the 1970s. Based on harvest statistics the population appeared stable over the first half of the past decade, reaching a maximum harvest in 1992. Harvest declined rapidly in the second half of the decade, however. The relationship of this harvest decline to actual population levels is unclear. It is likely that severe winter weather such as experienced in 1996-97 did reduce the mule deer population. However, the weather may have also curtailed hunter access to mule deer ranges, thus reducing harvest. Further monitoring of mule deer populations is warranted to determine population trend.

The long-term trend in mule deer populations has been up since the 1970s. Based on harvest statistics the population appeared stable over the first half of the past decade, reaching a maximum harvest in 1992. Harvest declined rapidly in the second half of the decade, however. The relationship of this harvest decline to actual population levels is unclear. It is likely that severe winter weather such as experienced in 1996-97 did reduce the mule deer population. However, the weather may have also curtailed hunter access to mule deer ranges, thus reducing harvest. Further monitoring of mule deer populations is warranted to determine population trend.

Bighorn Sheep: Four distinct populations exist on the Forest: the Berray Mountain herd, the Kootenai Falls herd, the Ural/Tweed herd, and a herd in the Ten Lakes Scenic Area. Population trend among these herds has been variable, with some herds remaining static over the past decade and other herds declining. Aerial surveys are annually performed on the Ural/Tweed, Kootenai Falls and Berray Mountain herds. These surveys indicate a stable population in the Berray Mountain herd and declines in the Ural/Tweed and Kootenai Falls herds. The reasons for the declines are unknown, but predation may be a factor. The Kootenai Falls decline seemed to follow the large wildfires in that area in 1994. Lamb production has also been low in this herd in recent years. Other possible contributing factors in the decline may include competition from other ungulates or disease.

The overall habitat trend on the Forest has been increasing during the past decade because of major accomplishments in habitat improvements (primarily prescribed burning) in the Kootenai Falls, Berray Mountain, and Ural/Tweed areas, and due to wildfires in the Kootenai Falls area. Slow decreases in habitat capability occurred in the Cabinet Wilderness and Ten Lakes areas due to continuing vegetative succession resulting from the absence of fire. The overall trend for sheep habitat on the Forest has been positive. Bighorn sheep populations are infamous for gradual population increases followed by marked declines. The sheep declines observed on the Kootenai in the second half of the past decade do not appear to be broadly associated with habitat problems or forest management activities.

Moose: Moose are a pioneer species, thriving where fires or other disturbance events such as timber harvest create early forest successional conditions. Timber harvest during the past several decades, and wildfires during the past 10 years, created large areas of habitat that are beneficial for moose. Although forest succession continues to advance, the overall habitat trend for moose has been positive during the past decade. Moose harvest increased during the first half of the past decade and then declined somewhat thereafter. Moose harvest is controlled by a permit system, and the harvest reflects the number of permits issued. However, the number of permits also relates to the observed population level. The number of days required to harvest a moose increased slightly near the end of the decade. These indicators point towards a minor decline in moose populations in the second half of the past 10 years.

Black Bear - Black bear are widespread across the Forest and their overall habitat trend for the past decade is positive. Timber harvest, wildfires, and prescribed burning have positively influenced habitat by encouraging the growth of desirable forage plants for bears. Conversely, new road construction has reduced habitat security in some areas, while continuing vegetative succession has served to reduce forage. The biggest factor in black bear habitat capability over the past decade, however, has been additional road access restrictions. While these restrictions have generally been applied for other reasons, they have had the effect of greatly increasing habitat security for black bears. The net effect of all these factors is a positive trend in black bear habitat.

The long term (20+ years) population trend for black bears in northwestern Montana has been downward (USFS 1993). This trend appears to have continued into the first half of the past decade on the Kootenai National Forest. In the past few years, however, the downward trend in the black bear population may have reversed. The number of bears observed per hour of aerial survey effort has increased. This agrees with a concurrent increase in reports of casual observations of bears.

Mountain Lion - The mountain lion is a predator and habitat generalist. Therefore, its existence depends largely on the abundance of prey animals, primarily ungulates such as deer and elk. Since the populations of whitetail deer and elk increased throughout most of the past decade to near-record levels, mountain lions have prospered. The decline of deer and elk populations due to severe weather conditions during winter 1996-97 reduced habitat capability (prey base) for mountain lions, at least temporarily, and warrants further monitoring.

Old Growth Dependent Species (C-4) and Management Indicator Species (C-8):

Pileated Woodpecker: Personal observation by Forest biologists indicate that pileated woodpeckers are observed frequently on the Kootenai, and these informal observations provide no indication of any major population change for the species. Additional information is being collected through the R-1 Landbird Monitoring Program and through sampling special paired

Old Growth Habitat (C-5): Approximately 1,115,113 acres below 5,500 feet have been evaluated for old growth (there are about 1,865,000 acres below 5,500 feet Forest-wide). Of the designated old growth, 9.0 percent are effective old growth and 2.2 percent are replacement old growth, for a total of 124,757 acres (11.2 percent) now designated. One factor which affected old growth validation survey results for FY 88-97 is the Checkerboard Land Exchange, which resulted in a net loss of just over 400 acres of validated old growth. Two of the compartments that had lands disposed had been completely surveyed and validated. These will now need to be redone, and the acreage for those compartments has been removed from the total "Validated" acres. The level of old growth designated for the compartments validated to date is above the 10 percent level required in the Forest Plan.

After ten years of old growth validation, 136 of the 250 compartments (54 percent) have been completely reviewed and an additional 52 compartments (21 percent) are partially done. Much of the unsurveyed areas are in wilderness, proposed wilderness, or areas with very little Forest Service ownership. Accordingly we are confident that the Forest is meeting old growth direction. Based on review of this monitoring item, no changes are needed in the Forest Plan at this time. Good progress is being made in the validation effort and will continue.

Cavity Habitat (C-6): The available monitoring data indicates the Forest is providing sufficient cavity habitat at a drainage or compartment level. Exceptions are in areas where forest management predating the Plan or historic conditions such as the widespread turn-of-the-century fires make this impossible. Based on this information, the creation of numerous snags by the 1994 fires, and the existence of ample cavity habitat in the majority of the Forest that is outside the suitable timber base, this monitoring item is within acceptable limits of the Forest Plan.

New scientific information concerning snags (Bull et. al. 1997 and Harris unpub.) has become available and may apply to snag management on the Kootenai. The Forest Plan snag standards and guidelines are primarily based on Thomas (1979). Bull documents that the assumptions used by Thomas were in error and that additional snag habitat, more snags and replacement trees, may be needed to ensure there is adequate habitat for cavity nesting species. Analysis of snag levels in uncut stands on the Kootenai is ongoing.

We have reviewed whether new interim standards are needed at this time. We conclude that interim standards are not needed, but that a review of the snag requirements should be completed during Forest Plan revision. Our monitoring data indicates that snag habitat capability has only decreased 5% Forest-wide, since 1987 (89 to 85%), and the snag habitat has been locally improved by the 1994 fires. In addition, our monitoring of pileated woodpecker (Monitoring Item C-4) does not indicate a significant downward trend toward 40% population level. Based on these items, immediate action is not warranted.

Threatened and Endangered Species (C-7) and Management Indicator Species (C-8):

Grizzly Bear: The Kootenai National Forest contains portions of two grizzly bear recovery zones: the Cabinet-Yaak Ecosystem (CYE) and the Northern Continental Divide Ecosystem (NCDE). About 72 percent of the CYE is located on the western portion of the Forest and about 4 percent of the NCDE is located in the extreme northeast corner (see Figure C-7-3). Grizzly bear habitat effectiveness improved over the last ten years and is above the desired level of 70 percent Forest-wide, although some BMUs remain below this level. Sightings of female grizzly bears have increased, as well as their distribution. There was one mortality in the last six years in the CYE and three in the NCDE. Based on this analysis grizzly bear habitat is improving in condition and the population appears to be on a slow trend towards recovery.

Gray Wolf: There is one recovery area within or adjacent to the Kootenai Forest (the Northwest Montana Recovery Area). The recovery goal for this area is 10 wolf packs. A small portion of this recovery area (about 10 percent) is located in the northeast corner of the Forest, east of US Highway 93.

Over the past decade, reports of wolf sightings have varied with a slight increase this fiscal year. Sightings were noted in areas on the Fortine Ranger District and portions of Libby and Cabinet Ranger Districts. Many of these were sightings of individuals from the Murphy Lake and Upper Thompson River packs. In addition, new pack activity was suspected on the Three Rivers Ranger District. Most of the components of wolf habitat on the Kootenai did not change significantly in 1997 compared to previous years. However, big game populations, which are the primary prey for wolves, declined during the severe winter of 1996-97 (see monitoring items C-2, C-3b and C-7). At this time, wolf populations are increasing and adequate habitat is provided for their primary prey base.

Bald Eagle: Bald eagle habitat is generally within one mile of major lakes and rivers. Habitat quality and quantity on the Kootenai is stable, and may be increasing in the long term as potential nest trees mature. Monitoring Item C-7 shows the

results of mid-winter bald eagle surveys which occur mostly along major watercourses both on the Forest and on adjacent ownerships. Although the results vary somewhat from year to year due to varying weather conditions, the surveys indicate stable numbers of wintering bald eagles during the reporting period. Nesting surveys also show an increasing nesting eagle population during the first half of the reporting period, and a relatively stable population thereafter.

Peregrine Falcon: One or two peregrine falcons per year are observed on average on the Kootenai National Forest. Nesting activity has not been confirmed. Peregrine sightings on the Kootenai may be the result of a hacking (release) program further down the Clark Fork River on the Idaho Panhandle National Forest. Suitable nesting habitat on the Kootenai is localized and not abundant. Due to the steep, cliffy nature of peregrine nesting habitat, activities which could lead to adverse impacts are rare. Peregrine falcons appear to be maintaining their presence on the Kootenai.

White sturgeon: The US Fish and Wildlife Service released a draft Recovery Plan for the Kootenai River white sturgeon in FY 97. The short-term goal of the Recovery Plan is to prevent extinction and to begin restoring natural reproduction in this population. The status of the Kootenai River white sturgeon improved in FY 97. A new population estimate (based on better data) from the Idaho Department of Fish and Game indicates there are approximately 1,469 adult sturgeon in the population. This is a 589-fish increase in the estimated size of the population due (in part) to new data from Kootenay Lake in Canada. Also, 342 fertilized sturgeon eggs were recovered during the FY 97 spawning season; however, no larvae or juveniles from the FY 97 year-class have been found to date.

Range Use (D-1): Livestock use on the Kootenai was anticipated to be about 12,600 Animal Unit Months (AUMs) per year. The FY 97 level of grazing use was 9,415 AUMs or 75 percent of the projected level. The reason for this drop is because several of the allotments had later turnout dates than normal due to snow pack and the late spring. One allotment was not stocked in FY 97 because of flooding. Monitoring indicates that riparian protection measures identified in the new grazing permits are being implemented. During the last ten years, grazing use has averaged 92 percent of projected use which is within the range anticipated in the Plan. This lower level results from permittee requests for non-use and from Forest requests to defer grazing to prevent stream bank deterioration and overgrazing. In review of this monitoring item, no changes are needed to the Forest Plan at this time. During Forest Plan revision, the status of allotments will be reviewed.

Noxious Weeds (D-2): The Forest Plan states that noxious weed infestations will be monitored for increases in total acreage, increases in weed density and the introduction of new weed species on the Forest. Monitoring indicates that several noxious weeds have increased more than 10% in the numbers of acres affected and some have had a 10% or more increase in density of existing infestation since the Forest Plan was signed in 1987. In addition, with the discovery of several new invaders over the last several years, it is apparent that the diversity of noxious weed species has increased. Based on this, this monitoring item is outside the range prescribed in the Forest Plan. Prior to 1997 emphasis in weed control focused on the use of biological and cultural controls (cultural control uses plant competition to maintain or enhance desired plants) and the use of herbicides on the north end of the Forest. In 1996, a Noxious Weed Control Provision was added to the timber sale contracts. In 1997, the Herbicide Weed Control Decision Notice was issued giving the Forest another tool for control. These actions are occurring under the direction of the Forest Plan and should help improve the noxious weed situation on the Forest. Because of this, no changes are needed in the Forest Plan at this time.

Allowable Sale Quantity (E-1): The Forest's projected total maximum timber sell volume for the decade from suitable management areas is 2,270 million board feet (MMBF), which is an average of 227 MMBF per year. In addition, 60 MMBF was estimated to be sold from unsuitable management areas, averaging six MMBF per year. Timber sale volumes have declined from approximately 200 MMBF/yr to less than 100 MMBF/yr between FY 88 and FY 97. The average yearly amount sold has been 120 MMBF from suitable lands, and 1.4 MMBF from unsuitable lands. This actual sell volume is well below the ASQ limit as set in the Forest Plan.

In the past 5 years, additional factors have influenced the timber sales program. The most significant was additional streamside protection measures as required by the Inland Native Fish (INFS) Decision of July, 1995. Also, the US Fish and Wildlife Service amended biological opinion for grizzly bear recovery was issued July, 1995, and changed how recovery processes would take place on the Forest. In general, in the past five years, it has become more difficult to plan and execute sales due to public controversy and scheduling requirements necessary to meet resource needs.

The Forest has not exceeded the ASQ in 10 years of implementation. However, large changes in the actual program levels versus the projections of the Forest Plan indicate that revision of the Plan will need to address the sustainability of the timber sale program. This will be a part of the initial issues for scoping during the revision of the Forest Plan.

Acres of Timber Sold for Timber Harvest (E-2): The Forest Plan projected 15,740 acres of annual regeneration harvests to achieve the ASQ. During FY 97, approximately 5,430 acres were cut which resumed the general downward trend that had been established during the period from FY 88 to FY 95. The acreage cut during FY 96 (approximately 7,000 acres) deviated from the longer term trend due to the salvage of areas affected by the 1994 wildfire events. The ten-year average for MA 15 is approximately at the Plan's projected level, while five other suitable timber MAs (11, 12, 14, 16, and 17) are significantly below Forest Plan projected amounts.

Many of the factors affecting this monitoring item are similar to those affecting item E-1, Allowable Sale Quantity. As stated in the evaluation for that item, wildlife habitat management, watershed concerns, litigation, appeals, deferrals, and changes in management area designation based on ground verification have all affected the potential to meet the Plan's projected regeneration harvest. Since harvest has focused on MA 15 lands during the last ten years, it indicates that there are efficiencies present for that MA that are not present for the other MAs. Assessment work for Forest Plan revision will need to determine both future opportunities for MA 15 and the problems which prevented greater utilization of the other management areas for timber harvest.

It is apparent that the acres sold for harvest will not meet the acreage projected in the Forest Plan. This is a result of many factors which are influencing the Forest's timber sales program (see E-1 for details). The upcoming revision of the Forest Plan will provide the opportunity to assess appropriate levels of harvest volume and acreage.

Suitable Timber Management Area Changes (E-3): Management areas are validated during site-specific project analysis. When inaccuracies are found, MA boundaries are corrected to keep the Forest Plan MA map and acreage current. In FY 97 the total net loss in the suitable timber land was 17, 055 acres. The largest change in FY 97 was a net loss of 13,735 acres of MA 15. The Checkerboard Land Exchange accounted for the most significant changes in FY 97. As a result of the exchange, there was a net change of 3,711 acres from public to private land, contributing in a net decrease in suitable lands of 11,628 acres (mostly MA 15) and an increase of 7,917 acres in unsuitable land (mostly MA 2). Other than this large land exchange, the most significant changes were due to designation of MA 13 (old growth) in several large watersheds. Since 1988, approximately 58,000 acres have been changed from the suitable base to the unsuitable base or were affected by land exchanges. This monitoring item is outside the prescribed range for MAs 11 and 15 (more than 5,000 acres of change), and MA 16 is approaching this variability threshold. The remaining suitable timber MAs are within evaluation limits (MAs 12, 14, 17).

The degree to which changes have been made to management area designations indicate continuing validation of Forest Plan MAs. The large change in the suitable management area category (nearly 58,000 acres) amounts to approximately 3% of the total suitable base. At this time, it is not apparent that this is significant in terms of the calculation of the long term sustainability of the timber harvest program or ASQ. During revision of the Forest Plan, sustainability and ASQ calculations will be made using the validated management areas. This will allow for an assessment of the effect of changed management area designations.

Suitability Review: The National Forest Management Act, 36 CFR 219.14(d) requires that the designation of lands not suited for timber production be reviewed at least every ten years. We have completed this review and determined that no changes are necessary at this time. This is based on the fact that (1) corrections to management areas, based on site-specific conditions, have been made during the last 10 years, where appropriate; (2) changes in market conditions have not occurred enough to warrant a change in management direction; and (3) other changes in the decisions regarding proposed wilderness, roadless recreation, etc., are not warranted at this time. All of these factors will be further evaluated during Forest Plan revision.

Timber Growth Trends (E-4): The result of measurements taken in permanent growth plots and timber stand improvement (TSI) benchmark exams indicate that growth trends in stands managed as even-aged and single-storied are consistent with Forest Plan timber yield tables and parameters further defined in "KNF Target Stands", (USFS 1993). This monitoring item is within the range prescribed in the Plan. As silvicultural prescriptions and management activities are adapted to meet emerging direction and a host of new or different objectives, the need to revise yield tables is very likely.

Reforestation (E-5): The Forest Plan estimates that about 14,100 acres per year will require reforestation to achieve successful regeneration. An average of 10,494 acres have been planted over the last ten years. The total acreage reforested has decreased steadily since FY 93. This is a direct result of less acres being harvested, therefore less reforestation needs. It is apparent that the acres regenerated will not meet the acreage projected in the Forest Plan (See E-1, Allowable Sale Quantity, E-2, Acres of Timber Sold for Timber Harvest, and E-7, Timber Harvest Deferrals for further discussion). This is a result of

many factors which are influencing the Forest's timber sale program . The Forest Plan revision will provide the opportunity to assess appropriate levels of harvest volume and acreage.

Service visits continue to show timely and effective reforestation activities for lands in a regeneration harvest phase. The 10 year average of satisfactorily restocked stands within 5 years of final harvest is 96 percent. Reforestation efforts are meeting the requirements of NFMA. This portion of the monitoring item is on-track and no changes are needed in this effort at this time.

Timber Stand Improvement (TSI) (E-6): The Forest Plan estimates 5,000 acres of TSI activities will be needed each year to achieve the future growth levels predicted. The amount of TSI work accomplished has been variable, depending on available workforce and budget. At the end of ten years, this monitoring item shows an average of 4,294 acres accomplished per year and 86 percent of predicted targets, but within the +/- 20 percent range prescribed in the Plan (from 2,820 to 5,890 acres). Approximately 8,400 acres of TSI opportunities over the last five years have not been accomplished due to lack of funding. If budget reductions continue, the amount of TSI work accomplished in the future will be reduced. Based on the information stated above, the monitoring item is on-track. We will continue to pursue budgets to accomplish the backlog of TSI that has not been accomplished.

Timber Harvest Deferrals (E-7): To determine the effect of harvest deferrals on the timber sale program, monitoring is done in two different categories. Category A deferrals are those that result from our project-specific conclusions. Category B deferrals are those that result from an externally imposed situation.

In FY 97, 1,359 acres in Category A were deferred, and none were deferred in Category B. For FY 97, less acres were deferred in Category A in comparison to several preceding years. Deferrals took place due to a variety of reasons, including potential impact to watershed, fisheries, and roadless resources, economically infeasible harvest units, or difficulty in finding an appropriate logging system to fit the situation.

Approximately 33,700 acres have been deferred for both A and B categories between 1988 and 1997. The largest amount for a single MA is 22,074 acres which were deferred in MA 12. This is beyond the prescribed evaluation range of 10,000 acres. MA 14 and 15 also had large amounts of harvest deferred, although they did not exceed the 10,000 acre evaluation range.

This item indicates that many more factors affect harvest than was accounted for during the preparation of the Forest Plan. Since the Forest now has detailed records of such factors, it will be more able to assess those effects during Forest Plan revision. These factors will continue to be monitored, and brought forward in the revision process.

Harvest Area Size (E-8 and Appendix C): The average size of units harvested between 1988-1997 is well below the objectives of 20 acres for MA 11 and 40 acres for MA 12. Average size for the other suitable MAs is also below 40 acres. As discussed in the FY 96 Monitoring Report, there were occasional instances of a single year's average value extending beyond 40 acres. These instances occurred when there were relatively few harvest units in a given year, and the units had been approved to exceed 40 acres. Based on review of the monitoring information, no changes are needed to the Forest Plan. Projects approved to exceed 40 acres were done with the appropriate documentation and analysis and, therefore, are consistent with the Plan.

Clearcut Acres Sold (E-9): Clearcut harvest acres sold steadily declined from FY 90 to FY 97, with the exception of FY 96. In FY 96, the amount of clear cutting increased, primarily due to emphasis on salvaging fire-killed timber created by the 1994 fires and dead lodgepole pine killed by the mountain pine beetle epidemic. In FY 97, the amount of clearcutting declined again. When it was possible to do so, the Forest reduced the amount of clear cutting. As a result, the Chief's goal for reducing clearcutting has been fully met.

Riparian Areas (C-9):

Miles of stream classes and/or stream categories identified and mapped: Almost 4,400 lineal miles of riparian habitat have been categorized and mapped since 1988. Over 2,500 of these miles are perennial streams (Stream Classes 1 and 2, INFS Categories 1 and 2). The rest are intermittent and ephemeral streams (Stream Classes III, INFS Category 4).

Determining whether INFS standards and guidelines were applied during projects: Twenty-eight projects were evaluated in FY 97 to determine how INFS- Riparian Habitat Conservation Areas (RHCAs) and Riparian Management Objectives (RMOs) were applied. All 28 projects either meet or exceed the default RHCA width. The default INFS

RHCA width was used along 53 miles of stream, and one project increased the width for one mile to better protect riparian values and functions. All 28 projects applied the default RMOs.

In 1997, a little over 70 miles of RHCA had some level of activity. Almost 95 percent of the work was for trail maintenance where blown-down trees were cut up and removed. Most of the remainder was for road reconstruction and improvement of road crossings. A total of 111 crossings were either constructed or replaced. The total area involved was 47 acres.

In 1997, watershed restoration activities were accomplished on over 122 miles of stream, totaling almost 205 acres. Ninety-nine stream crossings were removed, and a total of 85 other small sites had improvements such as ditch relief culverts, stream channel veins (near bridges), or large woody debris addition to reaches where woody debris is lacking. Since 1990, watershed restoration on the Forest has totaled almost 6,500 acres.

Evaluation of the implementation and effectiveness of applicable riparian Best Management Practices (BMPs) that were used during management activities in or near the riparian zone: In FY 97, 254 practices were evaluated. Acceptable implementation was accomplished 97 percent of the time. Approximately 225 effectiveness evaluations were completed for this same period, of which 95 percent of the BMPs were deemed to be effective. For the 2,293 practices evaluated over the eight-year period, acceptable implementation was accomplished 91 percent of the time. Approximately 1,567 effectiveness evaluations were completed for this same period, of which 92 percent were deemed to be effective. An abnormal year was 1995 when only 83% of the implementation evaluations and 82 percent of the effectiveness evaluations were scored as acceptable.

We are effectively applying the Riparian Area Guidelines, INFS direction, and riparian BMPs on projects; therefore, we are on-track with the Forest Plan. This is a change from FY 92 (last reporting period) because of the increased effort to map riparian areas, apply INFS guidelines and effectively implement BMPs. Because of the new direction from INFS, no change to Forest Plan direction is needed at this time.

Fish Habitat and Populations (C-10): The Forest Plan indicated that stream surveys, streambed coring, water temperature, woody debris counts, redd counts, and/or embeddedness sampling could be used as data sources to assess the effects of implementation on fish and habitat. After FY 92 we added channel geometry, particle size distribution and riffle stability index (RSI) as data sources. We determined that data would be collected using these methods on a number of watersheds across the Forest including areas that had not been harvested or roaded. The FY 96 Monitoring Report included a nine-year evaluation of the monitoring results for this element. The nine-year evaluation concluded that a need for change in C-10/F-2 monitoring was apparent, and that a team should be assembled to identify the best course of action. This report, incorporates by reference, the nine-year evaluation of C-10 and updates that evaluation with any new information from 1997.

At this point in time we cannot determine whether implementation of existing Forest Plan prescribed practices results in stream conditions that are outside the variability limits set in the Forest Plan. It is difficult to distinguish between a variety of possible causes for change in streams such as natural variation and management-induced change. As indicated in the FY 96 Monitoring Report, a Forest interdisciplinary team was convened in 1997. This group of fish and watershed experts recommended a complete update of the Forest Plan C-10 monitoring requirements because of the substantive changes in management direction (INFS) and the nine-year monitoring evaluation.

The team is in the process of developing a new monitoring program for fish and fish habitat. We are still exploring options for monitoring bull trout and water quality limited segments. In addition, we have been developing aquatic data bases which are providing a better insight on what type of data is useful and where it can be most effectively applied. Once we have evaluated what additional items we may need to monitor, what questions we are really trying to answer, and how we can best collect the data to answer those questions, then we will develop a proposal to amend the Forest Plan.

Soil and Water Conservation Practices (F-1): Approximately 90 separate projects were audited in FY 97 by KNF personnel. In FY 97, implementation evaluations were completed for 4,635 Best Management Practices (BMPs). Implementation evaluations met the requirement of acceptable 98 percent of the time in FY 97. Effectiveness evaluations were completed for 2,960 BMPs in FY 97 and were effective 99 percent of the time.

The results of the FY 97 BMP monitoring indicate consistent improvement in the BMP program relative to 1995 (see Table F-1-2). No BMPs were rated as "grossly unacceptable" in FY 97 and only nine individual practices were rated as "very unacceptable", five during implementation and four during effectiveness evaluations The scores of 98 percent for acceptable

implementation and 99 percent for acceptable effectiveness point to the overall success of the Forest BMP Program. Only three practices seemed to be mis-applied or in-effective: 14.15, Erosion Control on Skid Trails; 15.2 (f), Drainage from Roads and Trails; and 15.7, Control of Permanent Road Drainage. These will be particularly emphasized in the 1998 Training Program.

In review of this item, we are generally meeting state standards and protecting beneficial uses. Additional emphasis is needed on "high risk BMPs," particularly bringing existing roads up to standards. With the continuing emphasis on BMPs, this item is on-track with the Forest Plan.

Sedimentation (F-2): The Forest Plan identified seven streams that would be monitored for this item. They are Big, Sunday, Bristow, Red Top, Rock, Granite, and Flower Creeks. The data to be collected include bedload and suspended sediment concentrations and streamflow. Nearly all of the Forest's monitoring effort for this item has been dedicated to suspended sediment monitoring for timber harvest and road construction activities. This data is to be used to look for evidence of a change in streambed and water quality conditions, and thus probable effects on beneficial uses related to present management direction. After FY 92 we added channel geometry, particle size distribution, and riffle stability index (RSI) as data sources. We determined that data would be collected using these methods on a number of watersheds across the Forest including areas that had not been harvested or roaded. The FY 96 Monitoring Report included a nine-year evaluation of the monitoring results for this element. The nine-year evaluation concluded that a need for change in C-10/F-2 monitoring was apparent, and that a team should be assembled to identify the best course of action. This report incorporates by reference the nine-year evaluation of F-2 and updates that evaluation with any new information from 1997.

At this point in time we cannot determine whether implementation of Forest Plan prescribed practices has resulted in stream conditions that are outside the variability limits set in the Forest Plan. It is difficult to distinguish between natural variation and management-induced changes in streams. As noted in C-10, an interdisciplinary team was formed in 1997 to recommend a course of action to change the C-10 and F-2 monitoring programs. Once we have evaluated what additional items we may need to monitor, what questions we are trying to answer, and how we can best collect the data to answer those questions, then we will develop a proposal to amend the Forest Plan.

Water Yield Increases (F-3): Approximately 20 percent of the analyzed watershed acreage for FY 97 exceeds the peak flow water yield guidelines. Channel damage has not necessarily occurred in watershed shown to be exceeding water yield guidelines since this monitoring item is based on computer modeling and not field observations and measurements. As in prior years, the reasons for these current conditions are usually related to harvesting of timber in years prior to the implementation of the Plan, timber harvest on private lands, and relatively slow recovery of vegetation in certain watersheds. In addition, natural events such as wildfire have caused high mortality of trees in certain areas, resulting in conditions which cause increased runoff and peak flow increases. When such conditions are encountered in the project planning process, projects are designed so that peak flows still meet the Plan guidelines to protect water quality and beneficial uses.

For the period from FY 88 to FY 97, about 23 percent of the watershed acreage, including private land, is exceeding predicted water yield guidelines. This monitoring item continues to be off-track with the Forest Plan. It is important to note, however, that when projects are proposed in watersheds that are over the standard, they are designed to improve the long-term watershed condition, rescheduled, or dropped (See Monitoring Items E-1 and E-7). This element of monitoring is showing that water yield calculations and stream channel analysis is an important part of the analysis needed before projects can be implemented by Ranger Districts.

Soil Productivity (F-4): Region One has a policy that allows up to 15 percent detrimental disturbance (FSH 2509.18, 5/1/94). The Kootenai Forest uses the 15 percent detrimental disturbance as a measure to track the impact on site productivity. If 15 percent of an area is detrimentally disturbed, then we can say that it has probably incurred a decrease in long-term site productivity.

The total of 2,499 acres surveyed from 1987-1997 represents about 7 percent of the annual harvest acres. Of the 2,499 acres surveyed during the 10 year period, approximately 11 percent (266 acres) are beyond the variability limit, and 77 percent (1926 acres) resulted in less than 10 percent detrimental disturbance. Significant progress has been made since 1992, as only 1 percent (21 acres) has resulted in more than 15 percent detrimental disturbance. Because substantial improvement has occurred since 1992 and no unit has been greater than 10 percent in the last three monitoring seasons, this monitoring item is within the recommended range stated in the Forest Plan (no acres should measure more than 15 percent of detrimental disturbance).

Mineral Activity Effects (G-1): During the 10 year review period one major project, the Montanore Mine - has been approved. However, to date there have been no surface resource disturbances associated with the project. 1,540 acres of MA changes were associated with the decision. In addition, the Montanore Mine would affect approximately 25 acres of the Cabinet Face East Roadless area. After ten years, the total MA changes needed are less than the projections outlined in the Forest Plan. This monitoring item is within the range prescribed.

Effects to Local Economy (H-1): The result of 10 years of Forest Plan implementation has been a substantial positive economic influence to local counties. In Montana, Lincoln and Sanders counties have been the main beneficiaries, but there have been some effects in Boundary County, Idaho, and Flathead County, Montana. As discussed under item E-1 of this report, there is a very clear trend established of reduced volume sold from the Forest. Economic impacts of this change have been mitigated by harvesting volume under contract at higher than historic market rates. This, along with high national demand for lumber and pulp throughout much of the second 5 years of Forest Plan implementation, has been helpful in offsetting mill and mine closures which occurred in the early 1990s. Also, there has been an influx of people to the area who depend on transfer payments rather than a job for their income, and property values and personal income levels have remained stable or increased as a result.

Since the volume under contract has been reduced to the level of about one year's capacity and current sell volumes are lower, the economic situation for local communities is not as resilient as in the first 10 years of the Forest Plan. The buffering capacity of the large timber sell and harvest programs of the 1980s and early 1990s is no longer present, so the role of the Forest to mitigate potential negative effects in the local economy (such as closings of privately owned mills and mines) will be much more limited in the near future. This implies that national and international influences (wood and pulp prices, recessions, and demographic shifts) will have continuing strong and increasing influence on local economies. In addition, it is expected that even small variations in the role of the Forest's economically important programs will have relatively larger effects on local people in comparison to the effects they had in the first 10 years of Forest Plan implementation. The only apparent offset to such an effect would be a continuing trend of immigration of retirees and other people not dependent on local economic traffic to generate personal income.

Emerging Issues (H-2): This item identifies those issues that appear to be developing since the Forest Plan was initiated, and also monitors the original Forest Plan issues that are still of concern. Emerging issues include: the increased awareness of fuel buildups as it pertains to the wildland/urban interface, management needs in ponderosa pine old growth, balancing road closures to meet Forest Plan standards while providing access to the National Forests for the public, monitoring needs related to the effects of wildfires, particularly tree mortality, vegetative succession, fuel accumulations, and access to private lands. Forest Plan issues that are still current issues: grizzly bear management, timber supply (local economic impact), road management and public access, potential mineral development, visual (scenic) quality, and community stability (in the broader sense of using the natural resources of National Forest lands to provide jobs related to recreation, tourism, and forest products other than timber). These emerging issues will be reviewed during Forest Plan revision to determine if and how they should be resolved.

Forest Plan Costs (H-3): Timber sale costs are about three times greater than projected, which is well outside the +/-10 percent range prescribed in the Forest Plan. These unit costs are now declining from a peak reached in FY 94. This increase is due to the increasing complexity in timber sale preparation along with a concurrent decrease in the amount of timber volume being sold. Since unit costs have increased significantly in timber sale preparation, timber roads, and reforestation, there will be a need to factor in such changes during Forest Plan revision. The Forest's accounting systems are continuing to effectively track these trends. During the revision process, cost efficiency analysis will include these elements and others as appropriate.

Forest Plan Budget Levels (H-4 and Appendix D): As in prior years, there is a great deal of variation in the level of funding for various program areas in comparison to the projected amounts. Notable areas where funding has increased beyond expected are fire suppression, fuels management, law enforcement, tree improvement, and salvage sales. Most other program areas are remaining at budget levels below those projected. However, given major trends now seen since 1988, it is apparent that many programs and costs have changed substantially, and the Forest Plan predictions are no longer fully valid. This analysis will be helpful in budget analysis for Forest Plan revision.

Road Access Management (L-1): Just prior to the time the Forest Plan was approved in September, 1987, about 27 percent of the Forest system roads were being restricted either yearlong or seasonally (Forest Plan FEIS, pave IV-51). The Forest Plan projected that in order to provide the issue resolution desired, about 57 percent of the roads, or 2,300 miles, would eventually need some form of restriction.

By FY 97, enough roads have been restricted to meet the goal of having closures on approximately 57 percent of the Forest's roads. The closed roads have been both yearlong and seasonal closures. During implementation of the Forest Plan, we have found that to comply with the standards, many of the existing roads need to be closed. Since 1987 we have restricted approximately 2,600 miles of road in order to comply with the Forest Plan. We also have approved five programmatic Forest Plan amendments which change the open road density requirements for certain drainages. These have been approved in situations where we would need to close the main access roads to meet the requirements for big game habitat.

Although the percentage of closures have been achieved as expected, the total amount of road access is less than expected. This is because road construction has been less than expected due to reductions in the timber sale program (see section E-1 for details). The road closures have been placed not only on new logging roads, but also on older roads, which were not anticipated for closure in the Forest Plan. The reasons for closures (including road obliteration) include: providing for wildlife habitat security, to save maintenance costs, to decrease erosion, and to improve hydrological conditions. We will continue to monitor the mileage of roads restricted and the reasons for the restrictions. During Forest Plan revision we will revisit access management considerations.

Road Density (L-2): The actual road density on suitable lands has been measured to be 3.53 miles per square mile, which is significantly less than the road density which would be necessary to fully access all the suitable lands on the Forest. Given the decreased harvest levels of the Forest's current program in comparison to its program of 10 years ago, it is unlikely that there will be any significant increase in road density in the near term. In addition, watershed restoration work is being done to obliterate unstable and unneeded roads, so road density may decrease in some areas.

Insect and Disease Status (P-1): Insect and disease survey flights, activity reviews, service visits, stand exams, reforestation exams, permanent plot (growth plots) remeasurements, and benchmark exams indicate that stands have been regeneration harvested and those treated with some form of intermediate treatment are generally healthy. Only minor amounts of insect or disease are expected to cause significant problems. Based on the information stated above, insect and disease levels are at low levels in managed stands. We will continue monitoring using the above surveys.

Project Specific Amendments (Appendix E): Project specific amendments are changes in a standard that only apply to that project. They do not change the standard for the long term. The Forest Plan states, "If it is determined during project design that the best way to meet the goals of the Forest Plan conflicts with a Forest Plan standard, the Forest Supervisor may approve an exception to that standard for the project." Approximately 87 project decisions were issued in FY 97. Eleven project specific amendments were approved for five different projects in FY 97 for the following reasons: to allow higher open road densities during activities in MA 12 (big game summer range); to allow harvest within movement corridors (MA 12); and to allow harvest adjacent to existing openings that were not certified as restocked in MA 15 (timber).

Programmatic Forest Plan Amendments (Appendix F): Two Programmatic Forest Plan Amendments were approved in FY 97. One modified MA 24, Range Standard #1 to state that domestic livestock grazing is permitted, the other modified MA 21, Research Natural Areas. This amendment formally established Norman-Parmenter, Lower Ross Creek and LeBeau as Research Natural Areas and Hidden Lake as a Special Interest Area.

RECREATION: Roadless Area Use; Monitoring Item A-1

ACTION OR EFFECT TO BE MEASURED:	Determine trends in roadless area use including wilderness and non-wilderness.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	+/- 20% of anticipated RVDs by type of use (non-motorized and motorized).

Purpose: This monitoring item was established to evaluate whether appropriate amounts of roadless areas were designated for the using public. There was a concern that too much roadless area was being provided at the expense of other resource uses such as timber production and semi-primitive motorized recreation. The areas being monitored are only those portions of the inventoried roadless areas (IRAs) that are designated to remain roadless during the 10 year life of the Forest Plan (wilderness, recommended wilderness, wilderness study areas, roadless recreation areas, etc.). The Plan requires that this item be reported once every five years. The expected accuracy and reliability of the information is low.

Background: The Kootenai Forest had 32 IRAs, one wilderness study area, and one designated wilderness area when the Plan was approved in September, 1987. The primary non-motorized recreation use of these areas is hiking, fishing, hunting, and camping. The primary motorized use of these areas is snowmobiling (where allowed).

The Plan's estimate for total non-motorized recreation use is 65,000 Recreation Visitor Days (RVDs) per year. This includes 18,000 RVDs per year in the wilderness and 47,000 RVDs in the remaining non-wilderness roadless areas. An RVD is the standard recreation-visitor-day of 12 hours use by any combination of people and time. For example: 12 hours use by one person; 6 hours use by two people; 4 hours use by three people, etc., would all equal one RVD.

Results: Tables A-1-1 to A-1-3 display the results of non-motorized use in wilderness and designated roadless areas for the last ten years. Wilderness use peaked in 1990 at approximately 30,000 RVDs. Since then use has leveled out to approximately 23,000 to 26,000 RVDs. The 10 year average is 24,600 RVDs. Use in non-wilderness roadless areas increased until 1994, which peaked at 40,900 RVDs. During Fiscal Years 1996 and 1997, there was a dramatic decrease in use. This occurred as a result of early snows in the fall of 1996 restricting hunter access, and late melting of a deep snowpack decreasing early-season use in the spring of 1997. In addition, one road, which provided access to a popular area, was washed out in the spring of 1996. The 10 year average for use in non-wilderness areas is 29,780 RVDs. Total non-motorized use in all roadless areas, including wilderness, averaged 54,300 RVDs for the 10 year period.

Evaluation: Roadless Area use is within expected ranges. There has been much variation, with use levels greatest during 1994 and 1995 for total use, and wilderness greatest in 1990. Much of the variation has to do with weather conditions. Use level in the Cabinet Wilderness Area exceeds the average projected amount, while non-wilderness roadless use is less than projected levels. Overuse in certain popular areas in the Cabinet Wilderness has caused problems, and Action Plans are in place to manage these impacts. (See Monitoring A-2 for further information). Based on this evaluation it appears that an adequate amount of area has been designated for those people seeking an unroaded environment.

Recommended Actions: Continue to monitor. As use-related problems are identified, develop management actions to reduce impacts.

Table A-1-1 Total Roadless Area Use (RVDs)[1]		
Fiscal Year	Total Roadless Area Use	Total Use as a % of Estimated Use*
88	45,700	70%
89	48,600	75%
90	58,300	90%
91	56,800	87%
92	58,900	91%
93	59,500	92%
94	65,300	100%
95	61,800	95%
96	44,800	69%
97	44,000	68%
10-Yr Ave	54,380	84%

[1] Non-motorized use only (including wilderness)
*The Forest Plan estimate is 65,000 RVDs per year.

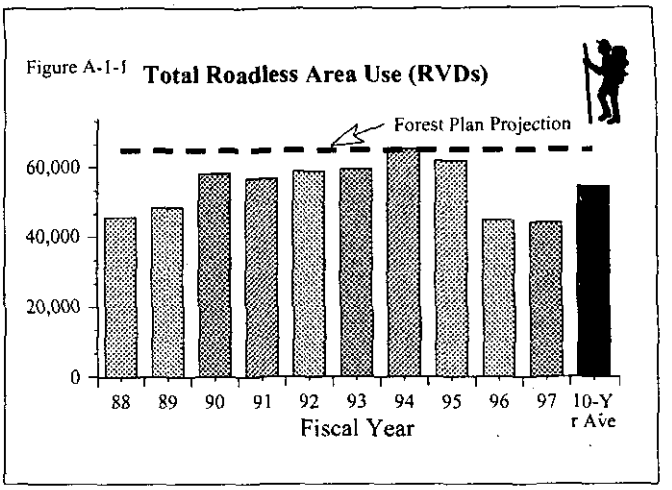


Table A-1-2 Non-Wilderness Roadless Use (RVDs)		
Fiscal Year	Non-Wilderness Roadless Area Use	Actual Use as a % of Estimated Use*
88	23,100	49%
89	24,400	52%
90	28,600	61%
91	30,000	64%
92	33,800	72%
93	36,000	77%
94	40,900	87%
95	37,100	79%
96	20,900	44%
97	23,000	49%
10-Yr Ave	29,780	63%

[1] Non-motorized use only.
*The Forest Plan estimate is 47,000 RVDs per year.

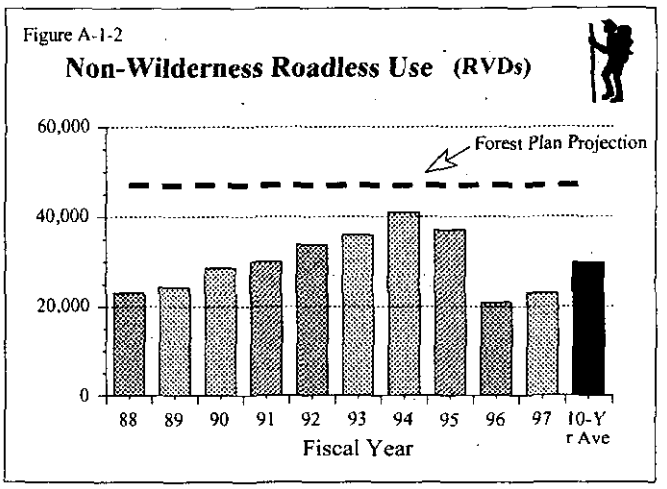
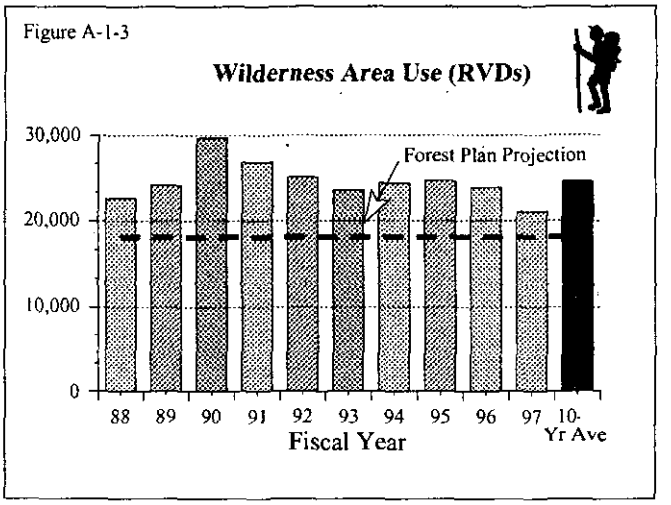


Table A-1-3 Total Wilderness Use (RVDs)[1]		
Fiscal Year	Wilderness Recreation Use	Actual Use as a % of Estimated Use*
88	22,600	126%
89	24,200	134%
90	29,700	165%
91	26,800	149%
92	25,100	139%
93	23,600	131%
94	24,400	136%
95	24,700	137%
96	23,900	133%
97	21,000	117%
10-Yr Ave	24,600	137%

[1] Non-motorized use only (including wilderness)
*The Forest Plan estimate is 18,000 RVDs per year.



RECREATION: Roadless Area Overuse; Monitoring Item A-2

ACTION OR EFFECT TO BE MEASURED:	Determine whether roadless areas are being over used, including semi-primitive motorized areas.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	Deterioration of site conditions sufficient to damage soil and water resources, to permanently affect the site's ability to recover, to become a safety hazard, or to detract from the recreational experience.

Purpose: This monitoring item was established to track changes in the patterns of use by people and horses in areas designated for roadless recreation. These include designated wilderness, recommended wilderness, a wilderness study area, and designated roadless recreation areas. The Forest Plan requires that this item be reported once every five years. The expected accuracy and reliability of the information is low-to-moderate.

Background: There is one wilderness, 32 inventoried roadless areas, and one wilderness study area on the Forest. The 10 year average for use is slightly lower in the wilderness areas versus the non-wilderness areas (see Monitoring Item A-1). This lower level of use results in a much higher use per acre within the wilderness because of the difference in total acres (approximately 94,000 in the wilderness and over 400,000 in recommended wilderness, wilderness study, and designated roadless recreation areas). Because of the higher use per acre in the wilderness, the potential for overuse and possible impacts there is also higher.

This monitoring item was reported in FY 96 and some effects to the Cabinet Mountain Wilderness and Ten Lakes Wilderness Study area were noted. Site conditions had not deteriorated to the point of sufficient damage to the soil or water resource, or to detract from the recreational experience. The FY 96 Monitoring Report also identified recommended actions to help address data collection, and site improvement needs.

Results: In FY 96 we reported that some effects to resources had been observed in the Cabinet Mountains Wilderness and Ten Lakes Wilderness Study Area. In the eastern portion of the Cabinet Mountains Wilderness there are seven sites that have had vegetation loss, primarily due to stock use. All but one of these sites improved slightly in condition or remained stable in FY 97. These sites received continuing onsite rehabilitation and signing. One site showed intermittent recovery, meaning during certain times of the year vegetation was allowed to recover, but loss of vegetation would occur during other times.

In the western portion of the Cabinet Mountain Wilderness, there are nine sites that have had vegetation loss, or tree damage, primarily due to stock use. As reported in FY 96, most of this use is around Wanless Lake. In FY 97 an Action Plan for improving conditions at Wanless Lake was developed and implemented. Additional patrols were used to make more visitor contacts and inform those visitors on the importance of using the provided stock facilities or other acceptable minimum impact stock practices. In addition, the District installed two new highlines (places where users can hitch their horses) and placed additional signs to encourage stock users to use the provided facilities. Based on these efforts conditions remained stable at these sites.

Within the Ten Lakes Wilderness Study Area, effects on resources reported in FY 96 included rutting of trails by horses and hikers (especially when the trails are wet), impacts on lake shores by campers, and littering. These effects were most noted at Bluebird Lake and Wolverine Cabin and the trails associated with these areas. In FY 97 an Action Plan was completed which outlines identification, enforcement and maintenance of the sites. Actions taken in FY 97 include concentrating camping activity at Bluebird Lake, breaking up fire rings, improving the condition of Wolverine Cabin, installing a new hitching rail, repairing waterbars, and relocating the trail to Bluebird lake to avoid wet or overly steep areas and improving the tread. All but one site was found to be stable or improving. The area near Wolverine Cabin was found to be in a continuing decline.

Use in other roadless areas is low to moderate; therefore, the effects seen in the Wilderness areas have not been found. No significant site deterioration has resulted in impacts on soil and water nor permanently affected the sites' ability to recover or detract from the recreational experience.

In addition to the Action Plans developed for Wanless and Ten Lakes, the monitoring form for this item was updated as recommended in FY 96.

Evaluation: Instead of providing quantitative variability thresholds for evaluating this monitoring item, the Forest Plan calls for a qualitative evaluation. This qualitative review is based on whether site conditions are of such a nature that they damage soil and water resources, permanently affect the site's ability to recover, become a safety hazard, or detract from the recreational experience. The review of this item indicates that visitor use is currently managed at an acceptable level, with some exceptions. Action has been taken in areas where heavy use was reported in FY 96. Twenty-two out of twenty-four sites were found to be stable or improving since 1996. The two sites that showed some decline (Wolverine Cabin and Minor Lake) will take time to show improvement. Both have Action Plans that have been implemented, therefore it is not anticipated that further resource effects will occur.

Recommended Actions: Continue to implement Action Plans associated with the various sites. Continue to monitor and use new monitoring forms. These actions can take place without modifying the Forest Plan, therefore no changes are needed to the Forest Plan at this time.

RECREATION: VQO Effectiveness; Monitoring Item A-3

ACTION OR EFFECT TO BE MEASURED: Determine if the prescribed Forest Plan Visual Quality Objectives (VQOs) are being accomplished.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: +/- 10% of acres treated do not meet the prescribed VQOs

Purpose: This monitoring item was established to test whether the conflicts between Forest Plan implementation and the prescribed visual quality objectives are being resolved at an acceptable level. Potential conflicts are mostly anticipated within the suitable timber areas of which about 15,740 acres per year were projected for sale (see Monitoring Item E-2). The Plan requires that this item be reported once every five years. The expected accuracy and reliability of the information is moderate.

Background: Each management area on the Forest has a prescribed visual quality objective (VQO) to be maintained whenever timber sales or other development projects are proposed. There are exceptions to this requirement when disturbance occur such as insect or disease epidemics, large fires, extensive blowdown from severe windstorms, etc. In these instances, the prescribed VQO may not be achievable but an effort is made to obtain the closest compliance possible and to achieve the VQO in the long term.

Results: Table A-3-1 displays the results of the last ten years of monitoring. A total of 218,507 acres of various projects were reported, most of which were timber sales. Of that total, 1,998 acres did not meet the prescribed VQO. The most common reason for not meeting the VQO was because of timber salvage harvest in fire-killed stands and in mountain pine beetle-killed lodgepole pine stands.

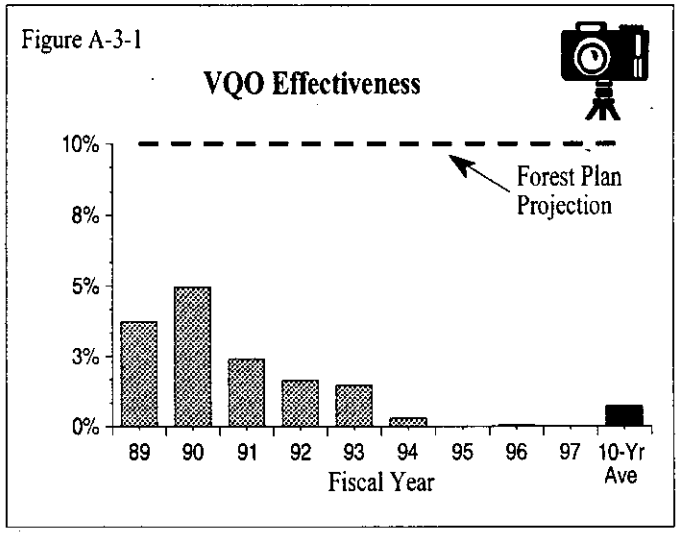
Evaluation: The monitoring information does not show any significant amount of visual quality problems since the Plan was approved in September 1987, even though there are localized areas where the visual quality has been diminished in the short-term by the harvest of beetle-killed or fire-killed timber. Long-term, these areas will move towards meeting VQO.

Recommended Actions: This item is within the prescribed range stated in the Monitoring Plan (+/-10%) as currently defined. Continue monitoring.

Table A-3-1 VQO Effectiveness

Fiscal Year	Total Acres Reported	Acres Not Meeting VQO	Percent Not Meeting VQO
89	23,679	885	3.7%
90	5,053	250	4.9%
91	7,425	179	2.4%
92	9,074	150	1.7%
93	4,067	60	1.5%
94	14,183	40	0.3%
95	61,068	0	0%
96	75,933	30	0.04%
97	18,025	0	0%
10-Yr Ave	21,851	1,594	0.7%

Figure A-3-1



RECREATION: Developed Site Use; Monitoring Item A-4

ACTION OR EFFECT TO BE MEASURED: Determine if the use in developed sites meets Forest Plan projections.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: +/- 20% of anticipated RVDs.

Purpose: This monitoring item was established to evaluate whether adequate amounts of developed recreation are available to the public. The Forest Plan requires that this item be reported once every five years. The expected accuracy and reliability of the information is high.

Background: There were about 80 developed recreation sites when the Plan was approved in September, 1987. Included were campgrounds, picnic areas, boat launching sites, etc. During the ten years that the Plan has been in effect, some of the developed sites have been expanded and improved. The sites that receive the highest levels of use are campgrounds along Koocanusa Reservoir, particularly those with boat access.

The Forest Plan estimate for developed site use is 297,000 RVDs per year. An RVD is the standard recreation-visitor-day of 12 hours' use by any combination of people and time. For example, 12 hours by one person, 6 hours use by two people, 4 hours use by three people, etc., would all equal one RVD. This information is collected by Campground Hosts, District compliance officers, Wilderness Rangers, fee site registries and estimates made at non-fee sites when cleaning and maintaining the areas.

Results: Table A-4-1 displays the results of the last ten years of monitoring. A total of 2,583,000 RVDs wasreported for the ten years since 1987, or an average of 258,300 per year. This is an average of 87 percent of the use projected in the Forest Plan.

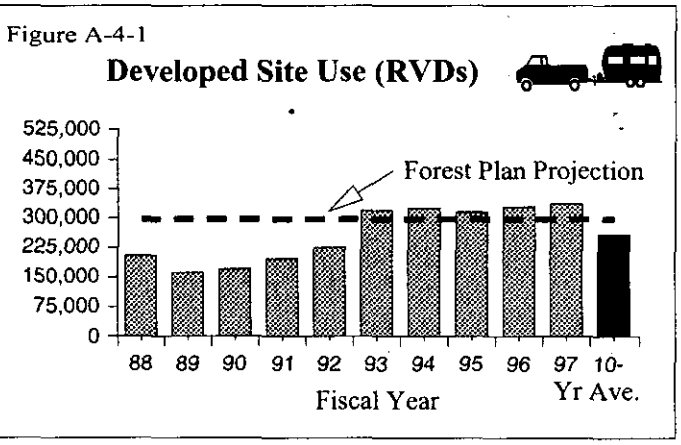
Evaluation: The low use experienced in FY 1989-90 was due to major reconstruction work occurring on US Highway 2 between Libby and Troy, Montana and the poor fishing success experienced at Lake Koocanusa. This discouraged some incoming tourist travel because of the long delays, rough road surfaces and the lack of "keeper-size" Kokanee salmon. After a significant increase between 1990 and 1993, developed site use has leveled, with only slight increase in visits from 1993 to 1997. In spite of the increased use levels, capacity at developed recreation sites has been sufficient to accommodate all users, with the exception of a few major holiday periods, such as Labor Day.

Recommended Actions: This item is within the prescribed range stated in the Monitoring Plan (+/-20%). No additional action is needed at this time. Continue to monitor and evaluate whether additional sites may be necessary in the future.

Table A-4-1 Developed Site Use (RVDs)

Fiscal Year	Actual Use	Actual Use as a %of Estimated Use
88	204,000	69%
89	162,000	55%
90	171,000	58%
91	196,000	66%
92	225,000	76%
93	319,000	107%
94	325,000	109%
95	315,000	106%
96	329,000	111%
97	337,000	113%
10- Yr Ave.	258,300	87%

Figure A-4-1



RECREATION: ORV Use Effects; Monitoring Item A-5

ACTION OR EFFECT TO BE MEASURED:	Determine the environmental effects of Off-Road Vehicle (ORV) use and conflicts with other uses, if any.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	Site deterioration to soil and water resources permanently affects a site's ability to recover, results in a safety hazard, or detracts from the recreation experience.

Purpose: This monitoring item was established because of a concern over potential increase in ORV use on the Forest. The Forest Plan requires that this item be reported once every five years. The expected accuracy and reliability of the information is low-to-moderate.

Background: The combination of dense vegetation and steep terrain in many areas on the Forest discourages the use of ORVs except on the constructed road system. There are reports of some all-terrain-vehicle (ATV) use off the Forest road system and/or on restricted roads during hunting season. In less densely vegetated and more gentle terrain where ORVs can be used, some effects have been reported. One such area is below the full pool of Lake Koocanusa, north of Rexford. ORV activity occurs on this 800-acre "drawdown area" during the early spring months following snow melt when the sandy soil dries out. Use of the area continues until approximately mid-June when the lake begins to refill and access is eliminated. Typically, many ORVs are present during weekends, while only a few ORVs are present during weekdays. Other areas receiving use are the low-elevation lakes near Eureka which are used by ORVs when they become dry areas in the summer.

Instead of providing quantitative variability thresholds for evaluating this monitoring item, the Plan calls for a qualitative judgement. This qualitative review is based on whether site conditions are of such a nature that they damage soil and water resources, permanently affect the site's ability to recover, become a safety hazard, or detract from the recreational experience.

Results: This monitoring item was evaluated in the FY 96 Monitoring Report. Review in FY 96 found that the effects of ORV use on the Forest appeared to be minor; however, use of the Lake Koocanusa drawdown area, the adjacent non-motorized area and the low-elevation lakes near Eureka appears to be increasing. It also found that because ORV use is limited in nature and effective actions have been taken to reduce effects, that ORV use was being managed at an acceptable level. Monitoring completed in FY 97 found similar results as in FY 96. The FY 96 Monitoring Report identified a need to update the monitoring form to provide consistency in collecting and recording data. The monitoring forms were updated and used in FY 97.

Evaluation: As noted in FY 96, because the ORV use is limited in nature and effective actions have been taken to reduce effects, therefore this monitoring item is currently being managed at an acceptable level. .

Recommended Actions: No changes in Forest Plan direction are needed at this time. As use related problems are identified implement management actions to reduce effects. Continue monitoring.

RECREATION: Roadless Area Changes; Monitoring Item A-6

ACTION OR EFFECT TO BE MEASURED:	Determine the changes in the size and location of the roadless areas, if any.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	+/- 5% in the acreage on the Forest. +/- 5% in the distribution by Ranger District.

Purpose: This monitoring item was established because of two concerns. One concern was that any inventoried roadless area (IRA) that wasn't recommended for wilderness would probably be developed before the Forest Plan was revised (10-15 years) and would not be eligible for reconsideration as wilderness. The other concern was that the roadless areas which were designated for development would not be accessed on schedule because of delays due to appeals, litigation, etc. The Plan requires that this item be reported once every five years. The expected accuracy and reliability of the information is high.

Background: There were 32 IRAs evaluated during the preparation of the Plan. (An IRA, by definition, contains about 5,000 acres or more of Federal land that do not contain any permanent signs of man's developments, such as timber harvest or roads). Theses 32 IRAs cover almost 400,000 acres. Of this total, about 334,000 acres (84 percent) were designated to remain roadless and were not available for development. The other 66,000 acres (16 percent) were designated to be available for possible development. (See Forest Plan Appendix C for detailed information on the IRAs.)

Of the 66,000 acres of IRAs designated for development, the Forest Plan EIS estimated that 10,500 acres would be developed through timber harvesting and road construction during the 10 year period (EIS, pg. II-96). This is an average of 1,050 acres per year. In addition, about 10,000 acres of the Forest were estimated to be developed as a result of mining development (See Monitoring Item G-1). Much of this mineral-rich land is located within IRAs. As a result of these combined activities (timber harvesting, road construction and mining) 20,000 acres or 5 percent of the total 400,000 acres of IRAs was anticipated for development.

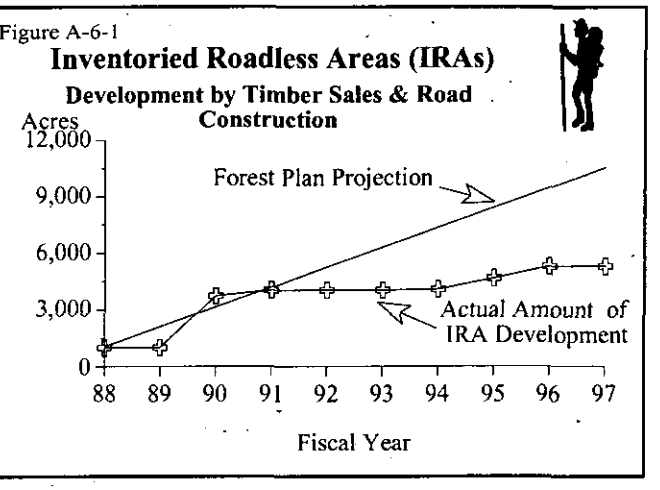
Results: Table A-6-1 displays results of activities within roadless areas in the last ten years. The activities reported are those that would change the character of the roadless area to some degree. A total of 5,270 acres of inventoried roadless areas has been developed in the last ten years. The changes shown are actual changes on-the-ground, not just approved changes. All of the roadless entries are associated with timber harvest and/or road construction. Some of the harvest that has occurred in the roadless areas did not result in changes to the roadless area boundary because of the design of the timber sales. No road construction within the roadless area was associated with these projects (See Appendix G for a listing of projects that have affected roadless areas). No changes in IRAs occurred because of mining (see Monitoring Item G-1). Note: the Montanore Mine would affect 25 acres of the Cabinet Face East Roadless Area (Montanore FEIS, pg 340), but this effect will not be reported until the change actually occurs on the ground.

Approximately 410 acres timber harvest occurred in roadless areas not considered as roadless in the Plan. The North Fork Fire Recovery Project affected the Mt Henry Roadless area which was not considered in the Plan because it was released from wilderness consideration by Congress in 1983. The North Fork Fire Recovery project also affected the Big Creek roadless area, which was not considered as roadless in the Plan because of previously approved timber sales that were never implemented.

The FY 92 Monitoring Report stated that one roadless area (Gold Hill #668) had been reduced below 5,000 acres size in the last ten years. The FY 92 Monitoring Report, Appendix C-1 states that 6,200 acres have been developed, leaving 4,500 acres in a roadless condition. Since this area was below the 5,000 acre limit it was dropped from the inventory. We have recently reassessed this area based on our geographic information system capabilities (computer mapping) and found that the area, after consideration of all past harvest, is 6,451 acres in size, therefore it has been added back to the inventory.

Table A-6-1 Inventoried Roadless Area Changes		
Fiscal Year	FP Estimated Development (cumulative)	Actual Amount of Development (cumulative)
1988	1,050	1,000
1989	2,100	1,000
1990	3,150	3,730
1991	4,200	4,049
1992	5,250	4,049
1993	6,300	4,049
1994	7,350	4,095
1995	8,400	4,652
1996	9,450	5,270
1997	10,500	5,270

Figure A-6-1



Other factors: Between 1996 and 1997, the Kootenai Forest and the Montana Fish, Wildlife and Parks (MFWP) met to discuss how the Forest could integrate the MFWP *Elk Management Plan* consistently with the Kootenai Forest Plan. A primary area of conflict between the Elk Management Plan and the Forest Plan relates to management direction in existing unroaded areas. The Elk Plan identified 90,000 acres of roadless elk security in five specific areas (inventoried roadless areas). The Forest Plan allocated approximately 100,000 acres to roadless recreation but only 42,000 of those acres were part of the 90,000 acres identified in the MFWP Elk Plan. Roadless areas provide excellent elk security and roadless recreation opportunities. Elk security is defined as the ability of an area to support mature bulls that are at least 4 years old.

Based on potential areas of conflict, the Forest agreed to: (1) No timber harvest or road construction in the Northwest Peak, Grizzly Peak, Roderick Mountain, Trout Creek, Cataract, Gold Hill West and Scotchman Peak (Pellick Ridge) inventoried roadless areas. This agreement may be reconsidered if catastrophic events occur or if an unforeseen legal mandate creates a need to enter these areas. No sales were planned in these areas at the time of agreement; (2) The Ranger Districts will complete assessments of Buckhorn Ridge (Pine Project), Gold Hill, and East & West Fork Elk Creek (Jacks Gulch) to determine if entries are needed at this time. If a need is identified, then the Districts will work with MFWP to develop a proposed action acceptable to both agencies. If a mutually acceptable action can not be developed, the Forest Supervisor and MFWP director will consult before deciding how to proceed. This agreement resolved potential conflicts in roadless areas named in the MFWP Elk Management Plan until the Forest Plan can be revised and both plans are more closely integrated.

In addition, because of the growing concern over proposing timber harvest and road construction in roadless areas, any additional major projects in roadless areas will be deferred, except those noted above, and the Sheep Range Project, Treasure Mountain and other projects needed to meet private property needs. Some minor projects, such as roadside salvage may still occur. This direction will remain in effect until the Forest Plan is revised, or if there are changed circumstances, such as a wildfire, that would cause us to review this direction.

Forest Service proposal for Temporary Suspension of Road Construction in Roadless Areas: On January 22, 1998, the Chief of the Forest Service announced a proposed policy to temporarily suspend road construction and reconstruction in roadless areas. This policy is proposed as a temporary measure, not to exceed 18 months, until procedures are put in place concerning the management of the National Forest Transportation System. These procedures would address changes in how the road system is developed, used, maintained and funded. The Washington Office is developing an Environmental Assessment and intends to issue a decision regarding the Temporary suspension during summer or early fall, 1998.

Evaluation: The Forest Plan anticipated that 10,500 acres would be developed through timber harvest and road construction during the 10 year period in roadless areas. To date only 5,270 acres have been developed; below the acres estimated to be developed in the Plan. In addition, no roadless areas have been affected due to mineral activity. This is also outside the levels estimated by the Plan.

Recommended Actions: It is apparent that the predicted level of development within the roadless areas has not occurred. This is due to many factors including consideration for wildlife, watershed and other needs. The Forest Plan revision process will provide the opportunity to assess the future levels of development in roadless areas.

ARCHEOLOGY: Cultural Resource Management; Monitoring Item A-7

ACTION OR EFFECT TO BE MEASURED: Determine the degree of compliance with 36 CFR 800 (Protection of Cultural Resources).

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: More than 10% variance from cultural resource management standards as directed by 36 CFR 800.

Purpose: This monitoring item was established to help ensure that eligible cultural resources (both historic and prehistoric) were adequately protected. The Forest Plan requires that this item be reported once every five years. The expected accuracy and reliability of the information is high.

Background: The National Historic Preservation Act (NHPA) and the implementing regulation (36 CFR 800) direct the federal government to locate, inventory, and protect the historic and prehistoric properties (cultural resources) from activities occurring on all federal lands. The implementing regulations direct us to consult with the respective State Historic Preservation officer (SHPO) in making eligibility determinations, and in making recommendations for those properties found eligible for nomination to the National Register of Historic Places. To ensure that potentially eligible properties are protected by project undertakings, inventories and consultation are conducted before any projects are implemented (such as timber sales, recreational development, etc.).

Results: Table A-7-1 displays the results of the last ten years of monitoring. A total of 2,078 projects were proposed that required consideration under 36 CFR 800. Of this total, 1,914 projects successfully completed the required consultation before the project was implemented.

Evaluation: The annual accomplishments for the first three years were below the desired level of 90 percent, but the steady upward trend that began in FY 88 reached and exceeded the desired level during the next seven years. The average annual accomplishment level for the last ten years is 92 percent, which meets the 90 percent level prescribed in the Plan.

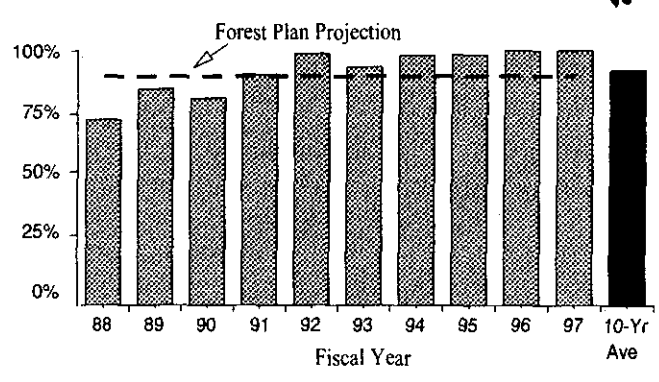
Recommended Actions: This item is within the prescribed range stated in the Monitoring Plan (-10%). Continue monitoring.

Table A-7-1 Cultural Resource Management

Fiscal Year	Projects Requiring 36CFR800 Consideration	Projects Completing 36CFR800 Process	
88	211	154	73%
89	163	139	85%
90	197	161	82%
91	216	196	91%
92	344	340	99%
93	258	241	93%
94	152	149	98%
95	179	176	98%
96	229	229	100%
97	129	129	100%
Totals	2,078	1,914	92%

Figure A-7-1 **Cultural Resource Coordination**

Projects Completing 36CFR800 Process



WILDLIFE & FISHERIES: Elk Habitat; Monitoring Item C-1

ACTION OR EFFECT TO BE MEASURED: Changes in elk habitat capability.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: Any downward trend in elk summer range habitat effectiveness.

Purpose: This monitoring item was established to help ensure that elk summer range habitat capability is improved to provide for an increase in the elk population from 5,000 in 1988 to 8,000 in 2017. The Forest Plan requires that this item be reported once every five years. The expected precision and reliability of the information are moderate.

Background: Potential changes to habitat are analyzed when projects are proposed. This analysis uses the habitat effectiveness determination process outlined in the *Elk Habitat and Timber Management Relations, Central Zone.* The process evaluates such factors as open road density, the amount of hiding cover, and the amount forage. These factors are compared against the existing condition to determine whether the habitat is improving, maintaining, or declining in overall capability. There are about 1,393,000 acres of elk biological summer range on the Forest. Of this, 466,982 acres are allocated primarily for big game summer range (Management Area 12). The other MAs that make up the biological summer range include: 2, 3, 5, 7, 8, 9, 13, 18, 14, 21, and 29. While MAs 15 and 16 can provide summer range habitat, they were not included in the Plan elk output projections due to the anticipated timber harvest levels and resulting low habitat values. In addition to summarizing the overall elk habitat capability, we have evaluated elk habitat effectiveness, and elk security.

Evaluation:
Elk Habitat Capability: Baseline measurements are not available for comparison prior to the Plan. The first five years of Forest Plan implementation (1988-1992) monitoring are summarized in Table C-1-1 along with the second five years (1993-1997) and the ten year totals.

During the last five years, the Forest analyzed 1,260,614 acres of elk summer range. This is about 90 percent of the total summer range on the Forest. About 25 percent was improving, with an average improvement of 9 percent in habitat effectiveness. About 70 percent were maintained in the existing condition. The remaining 4 percent were in a declining condition, with an average habitat effectiveness decline of 12 percent.

Over the past ten years, elk habitat capability has been improving on 35 percent of the lands analyzed, with an average improvement of 17 percent. An additional 59 percent are maintaining habitat capability, while only 6 percent show a decline. The average decline was 15 percent. The net change is an improvement of 6 percent in habitat capability on the lands analyzed.

Table C-1-1 Elk Habitat Capability Analysis

Time Period	Area Analyzed *	Area Improving	Area Maintained	Area Declining
1988-1992	472,000	282,000	138,000	52,000
1993-1997	1,260,614	320,736	835,961	53,918
1988-1997	1,732,615	602,735	1,023,961	105,918

* Some duplication of acres analyzed occurred between first and second five year period.

Elk Habitat Effectiveness: Elk habitat effectiveness directly correlates with open road density. The higher the open road density, the less effective the habitat. Road density data was not available Forest-wide for the primary elk summer range (MA 12) for the time period prior to 1997.

MA 12: The Plan specifies that 0.75 miles per square mile of road would be open to the public on MA 12 lands, which correlates to a 68 percent habitat effectiveness level. Currently the open road density (ORD) on MA 12 is an average of 1.2 miles per square mile. This is higher than the desired 0.75 miles per square mile specified in the Plan. The current ORD (1.2 mi./sq.mi.) reflects a habitat effectiveness level of 56 percent. There have been five programmatic Forest Plan amendments that allowed increases in MA 12 ORDs. The amendments affected only 3 percent of the MA 12 lands.

Biological summer range (MAs 2, 3, 5, 7, 8, 9, 12 13, 18, 14, 21, and 29): The biological summer range has an ORD of 0.74 miles per square mile, which provides a 68 percent habitat effectiveness level.

Forest-wide (including MAs 15 and 16): Since there are no historical (past 10 years) data available for just MA 12 or the biological summer range on habitat effectiveness, the information for all Forest lands (all MAs) is used to show the probable trend. The trend in habitat effectiveness shows an improving condition (shown in Table C-1-2). This same trend is likely on summer range (both MA 12 and biological). While the Forest Plan ORD level in MA 12 is not met on the Forest as a whole (ORD = 1.2 mi./sq.mi.), the trend is improving. In addition, the biological summer range is providing the overall desired habitat effectiveness level (68 percent).

Table C-1-2. Forest-wide Elk Habitat Effectiveness Trend

Year	Open Miles	Closed Miles	Total Miles	% Closed	ORD.* (Mi./Sq.mi.)	Habitat Effectiveness%**
1987	4,530	1,670	6,200	27	1.3	56
1988	3,707	3,195	6,972	46	1.1	58
1992	3,364	3,785	7,149	53	1.0	60
1997	3,082	4,275	7,357	57	0.9	62

* ORD = Open miles/3,373 square miles (Area of KNF capable of providing elk habitat- summer and winter)
** *Figure 2 pg. 13 in:* USDA FS, MFWP, C S & K Tribes, PC Timber Inc. 1985. Elk Habitat Timber Management Relations Central Zone Northern Region. 20 pp.

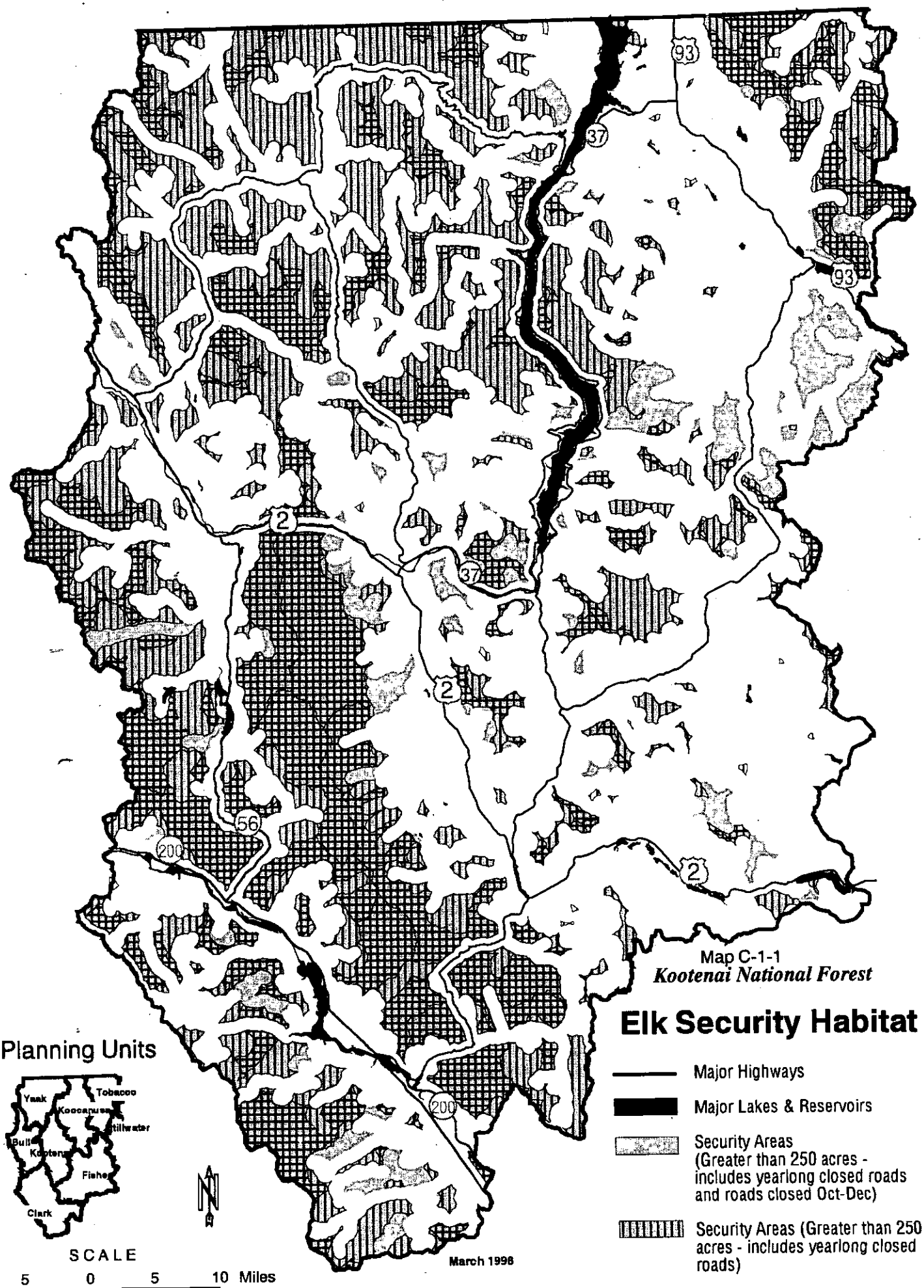
In 1988, when Forest-wide habitat effectiveness was 58 percent, the elk population potential index was 5,000 elk. At the end of the 10 year monitoring period (1997) habitat effectiveness has reached 62 percent, with a resulting increase (31 percent) in the elk population potential index (6,555 elk). The Plan projected a population potential increase of 3,000 elk over a 30 year time frame. At the present rate of increase, the population potential objective could be reached in only 20 years (2007). See monitoring item C-2 for more information on the elk population. One reason is the less than expected timber harvest rate, and associated road construction on MA 16 and others (see Table E-2-1). These lands have been able to provide higher summer range habitat values than projected in the Plan.

Elk Security: Elk security has been identified by Montana Fish, Wildlife and Parks as an increasing area of concern. No baseline data are available for comparison prior to this year because data was not available. We evaluated elk security habitat at two levels (forest-wide and Forest Planning Unit). Hillis et. al. (1991) suggests that hunting season security habitat be no less than 30 percent of the analysis unit. At a Forest-wide basis this level of security is provided (see Table C-1-3). Seven of eight Planning Units provide adequate security habitat (see Table C-1-3 and Map C-1-1). The one Planning Unit that does not meet the recommended 30 percent security level includes large amounts of private land. Security on federal lands only would be higher than the amount shown in Table C-1-3.

Table C-1-3 Security Habitat by Planning Unit**

Planning Unit	Planning Unit Area	Unroaded Area (%)	Unroaded + Closed Roads Area (%)	Unroaded + Closed Roads +Restricted Rds Area (%) *
Bull	301,153	75,363 (25)	140,059 (47)	150,856 (50)
Clark	520,130	163,312 (31)	246,918 (48)	265,842 (51)
Fisher	578,520	52,491 (9)	95,041 (16)	105,413 (18)
Koocanusa	443,858	25,304 (6)	131,803 (30)	143,200 (32)
Kootenai	364,810	79,020 (22)	109,388 (30)	137,285 (38)
Stillwater	46,075	6,427 (14)	6,502 (14)	24,801 (54)
Tobacco	331,037	38,767 (12)	71,136 (22)	100,265 (30)
Yaak	400,227	60,247 (15)	234,629 (59)	234,646 (59)
Forest-wide	2,986,218	500,931 (17)	1,035,476 (35)	1,162,308 (39)

* This column equates to hunting season security habitat.
** These figures include private land. Forest lands generally provide higher levels of security than indicated by this table.


93
37
93
2
37
2
56
200
2
200
Map C-1-1
Kootenai National Forest
Elk Security Habitat
Major Highways
Major Lakes & Reservoirs
Security Areas
(Greater than 250 acres -
includes yearlong closed roads
and roads closed Oct-Dec)
Security Areas (Greater than 250
acres - includes yearlong closed
roads)
Unroaded Security Areas
(Greater than 250 acres)
Planning Units
Yaak
Tobacco
Koocanusa
Stillwater
Bull
Kootenai
Fisher
Clark
N
SCALE
5 0 5 10 Miles
March 1996

Summary: The overall elk habitat capability has improved. Habitat effectiveness continues to improve Forest-wide. Although the open road densities in the primary summer range (MA 12) may not be met, the biological summer range is providing the overall desired habitat effectiveness. Elk security is provided Forest-wide and generally Planning Unit wide. Based on these factors elk habitat is in an improving condition.

Recommended Actions: Continue monitoring. Continue to evaluate elk security and habitat effectiveness at both the Forest-wide and Planning Unit level. Evaluate these every five years to determine trends in habitat management.

Forest Plan revision : Coordinate elk population potential levels with Montana Fish, Wildlife and Parks Elk Management Plan goals and objectives.

Definitions:

Planning Unit: is a subdivision of the Forest. The Kootenai Forest has been divided into seven Planning Units that lie entirely on the Forest and one Planning Unit that crosses forest administrative boundaries. The Planning Units on the Forest include: Yaak, Koocanusa, Tobacco, Bull, Kootenai, Fisher, and Clark. The one Planning unit that crosses the Forest boundary to the Flathead is the Stillwater. Planning Units were delineated on the basis of 4th code hydrologic units. These areas may be used in the Forest Plan revision to identify specific objectives that are different from neighboring areas.

WILDLIFE & FISHERIES: Elk Populations; Monitoring Item C-2

ACTION OR EFFECT TO BE MEASURED:	Determine changes in elk populations.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	Any downward trend in elk populations

Purpose: This monitoring item was established to determine if the Forest Plan's projected increase in elk populations actually occurs. The Plan did not establish a numerical population goal for elk, but rather projected an increasing trend in response to improving habitat conditions. The Plan requires that this item be reported once every five years. The expected precision and reliability of the information are moderate and low, respectively.

Background: Elk population and hunting statistics are based on the *Elk Hunting and Harvest Report,* hunter-check station information, and aerial surveys. The figures represent the Hunting Districts that are generally encompassed by the Kootenai National Forest (100, 101, 103, 104, and 121). Montana Fish, Wildlife and Parks (MFWP) provided the data used in this monitoring item, and we thank them for their cooperation. Please note, however, that the conclusions drawn from the data are the responsibility of the Kootenai National Forest.

Elk populations are the product of many factors including habitat conditions, weather severity, and hunting regulations. The elk population trends observed over the last ten years generally reflect the changes occurring in all these factors.

Evaluation: Three factors were used to assess elk populations on the Kootenai National Forest over the past decade: number of elk observed in aerial surveys, number of elk harvested by hunters, and number of elk checked through check stations. The results of this analysis are shown in Figure C-2-1. All three factors show a similar trend. Elk populations increased through 1990 or 1991 and have shown a gradual decrease since that time. This trend is also substantiated by observations of MFWP biologists (J. Brown, pers. comm.). The likely cause of the downward trend is a combination of weather conditions which have made elk more vulnerable to hunters in certain years and also directly impacted elk survival during the severe 1996-97 winter. Calf production has also been lower than desired in some years, possibly due to weather or predation.

Figure C-2-1

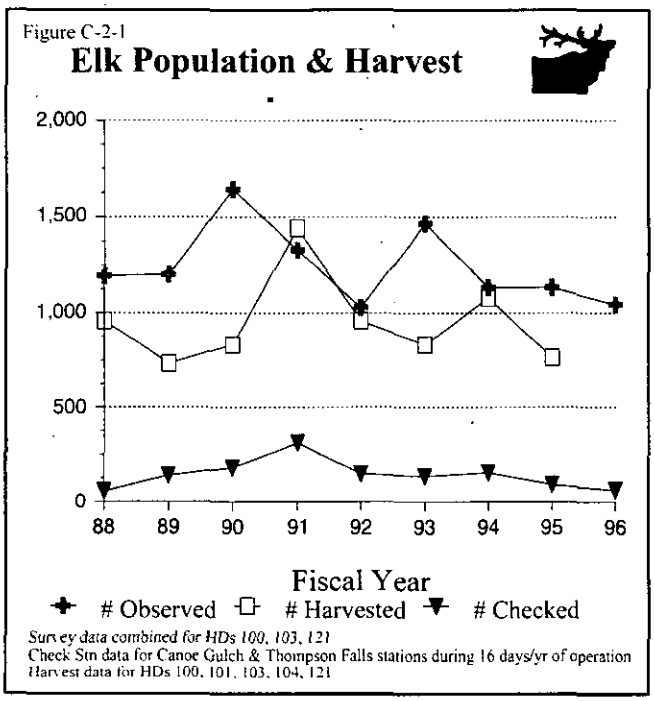
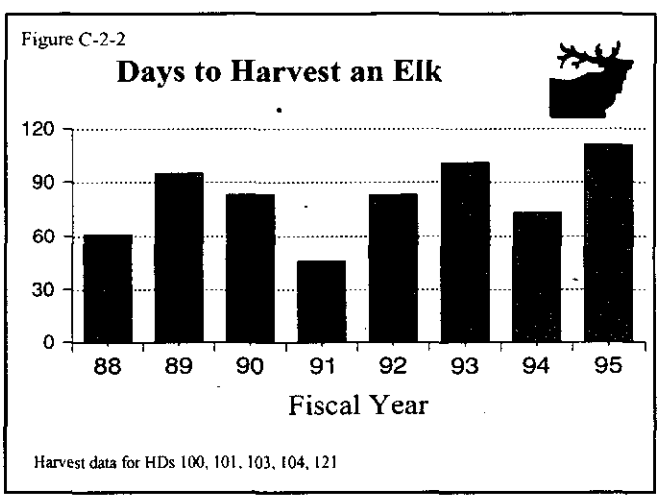


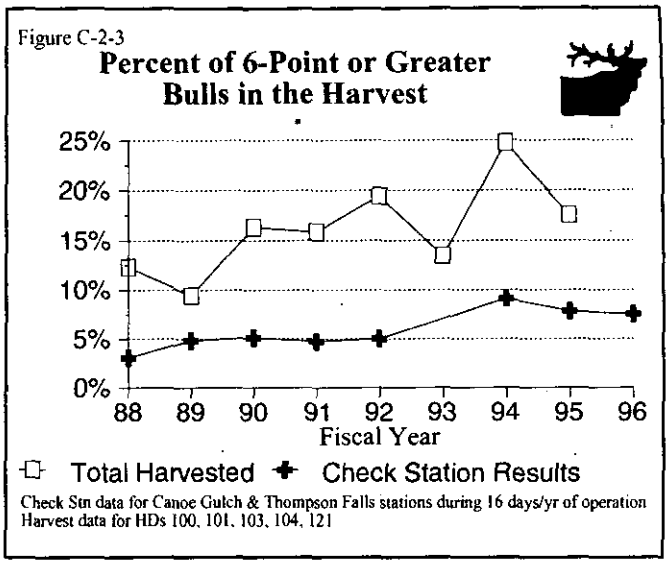
Figure C-2-2



The average number of days required to harvest an elk has been variable through the evaluation period, probably reflecting annual weather differences more than any change in the elk population (Figure C-2-2).

The percentage of 6-point or greater bulls in the bull elk harvest has steadily increased during the period (Figure C-2-3), reflecting an increasing age structure among bulls. This is likely due to increased elk security on the Forest as a result of the road restrictions which have been implemented over the past decade. Improvement in hunting technology and skill level of hunters, and an increased emphasis on trophy bull harvest, may also be contributing to the increasing proportion of mature bulls in the harvest. The number of hunter days increased approximately 45 percent during the decade (from 58,000 in 1988 to 85,000 in 1996), which also applies increased pressure on the mature bull segment of the population.

Figure C-2-3



Check Stn data for Canoe Gulch & Thompson Falls stations during 16 days/yr of operation
Harvest data for HDs 100, 101, 103, 104, 121

Although elk populations appear to be declining in the last few years, it is likely this has been caused by factors other than habitat. (See Monitoring Item C-1, which indicates habitat conditions are improving). At this time, no changes in habitat management is warranted.

Recommended Actions: Continue monitoring elk populations to determine future trends. Coordinate with MFWP on changes in hunting regulations which may be needed to produce a desired trend in the elk population and provide for a desired age structure in the bull segment. Integrate the State's Montana Elk Management Plan with the Kootenai Forest Plan Revision.

WILDLIFE & FISHERIES: Other Big Game Habitat; Monitoring Item C-3a

ACTION OR EFFECT TO BE MEASURED: Determine changes in other big game habitat besides elk.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: Any downward trend in habitat capability

Purpose: This monitoring item was established to help ensure that habitat for other big game species was maintained or enhanced. The Forest Plan requires that this item be reported once every five years. The expected precision and reliability of the information are moderate and low, respectively.

Background: Habitat capability trends have been monitored for seven big game species other than elk on the Kootenai National Forest. These seven species are mule deer, whitetail deer, bighorn sheep, mountain goat, moose, black bear, and mountain lion.

Evaluation:

Mule Deer: Mule deer are widespread across the Forest. There has been no measurable positive or negative trend in habitat capability in the past 10 years; however, the long term trend (several decades) may be downward. In the past decade, offsetting factors have served to maintain habitat in an essentially static condition. Factors positively affecting mule deer habitat include wildfires and timber harvest on summer range, prescribed burning and forage planting on winter range, and road closures. Negative factors include additional road construction (which reduces habitat security) and the continuing vegetative succession of grasses, forbs, and shrubs to trees. In the long term, forest succession may be resulting in a downward trend in mule deer habitat by providing more closed canopy forests which are favored by other big game species such as whitetail deer.

Whitetail Deer: This species is the most widespread and abundant big game animal on the Forest. Populations steadily increased to record numbers over the past decade, which is reflective of a positive trend in habitat. Vegetative succession, which has worked against the mule deer, has been a long-term positive factor in whitetail deer habitat. Other positive influences include timber harvest, especially in small units, which increases habitat diversity and edge; and direct habitat improvements such as prescribed burning and slashing in overgrown browse areas. Negative influences include extensive timber harvest in large units on portions of the Forest to salvage insect-infested lodgepole pine stands, and several large wildfires which have occurred in the past decade. These events reduce cover and habitat diversity favored by whitetail deer. The record snowfall during winter 1996-97 caused a reduction in the whitetail deer population (see item C-3b), but this decline resulted from a climatic extreme rather than any general deficiency in habitat.

Bighorn Sheep: Four distinct populations exist on the Forest: the Berray Mountain herd, the Kootenai Falls herd, the Ural Tweed herd, and a herd in the Ten Lakes Scenic Area. These herds occupy the primary bighorn sheep habitats on the Forest.

The overall habitat trend on the Forest has been increasing during the past decade because of major accomplishments in habitat improvements (primarily prescribed burning) in the Kootenai Falls, Berray Mountain, and Ural Tweed areas, and due to wildfires in the Kootenai Falls area. Slow decreases in habitat capability occurred in the Cabinet Wilderness and Ten Lakes areas due to continuing vegetative succession resulting from the absence of fire.

Mountain Goat: This species is limited primarily to rugged topography in the East and West Cabinet Mountain ranges. The habitat trend is static to possibly decreasing in the long term. Any decrease would be due to continuing vegetative succession resulting from a lack of periodic wildfires or prescribed burning at higher elevations.

Moose: Moose are a pioneer species, thriving where fires or other disturbance events such as timber harvest create early forest successional conditions. Timber harvest during the past several decades, and wildfires during the past 10 years, created large areas of habitat that are beneficial for moose. Although forest succession continues to advance, the overall habitat trend for moose has been positive during the past decade.

Black Bear: Black bear are widespread across the Forest and their overall habitat trend for the past decade is positive. Timber harvest, wildfires, and prescribed burning have positively influenced habitat by encouraging the growth of desirable forage plants for bears. Conversely, new road construction has reduced habitat security in some areas, while continuing vegetative succession has served to reduce forage. The biggest factor in black bear habitat capability over the past decade, however, has been additional road access restrictions. While these restrictions have generally been applied for other reasons, they have had the effect of greatly increasing habitat security for black bears. The net effect of all these factors is a positive trend in black bear habitat.

Mountain Lion: The mountain lion is a predator and habitat generalist. Therefore, its existence depends largely on the abundance of prey animals, primarily ungulates such as deer and elk. Since the populations of whitetail deer and elk increased throughout most of the past decade to near-record levels, mountain lions have prospered. The decline of deer and elk populations due to severe weather conditions during winter 1996-97 reduced habitat capability (prey base) for mountain lions, at least temporarily, and warrants further monitoring.

Recommended Actions: For mule deer and mountain goats, continue to explore opportunities for habitat improvement. For the remaining species, no action items are necessary beyond the continued monitoring of habitat.

WILDLIFE & FISHERIES: Other Big Game Habitat; Monitoring Item C-3b

ACTION OR EFFECT TO BE MEASURED: Changes in populations of big game species other than elk.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: Any downward trend in populations

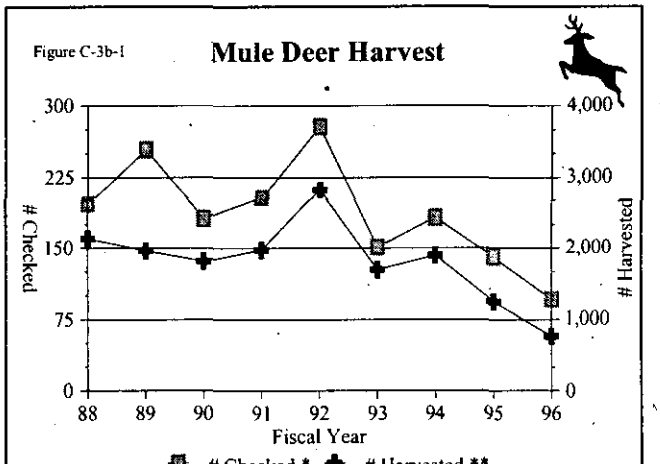
Purpose: *This monitoring item was established to determine if populations of other big game species (mule and whitetail deer, bighorn sheep, mountain goat, moose, black bear, and mountain lion) were being maintained or enhanced. The Forest Plan requires that this item be reported once every five years. The expected precision and reliability of the information are moderate and low, respectively.*

Background: Big game population and hunting statistics are based on Hunting and Harvest Reports (phone surveys), hunter check station information, aerial surveys, and causal observations. The figures for each species represent Hunting Districts that are generally encompassed by the Kootenai National Forest. MFWP provided most of the data used in this monitoring item and we thank them for their cooperation. Data from the fall of 1997 was not available at the time of preparing this report. Please note, however, that conclusions drawn from the data are the responsibility of the Kootenai National Forest.

Evaluation:

Mule Deer: The long-term trend in mule deer populations has been up since the 1970s (J.Brown, MFWP, pers. comm.). Based on harvest statistics (Figure C-3b-1) the population appeared stable over the first half of the past decade, reaching a maximum harvest in 1992. Harvest declined rapidly in the second half of the decade, however. The relationship of this harvest decline to actual population levels is unclear. It is likely that severe winter weather such as experienced in 1996-97 did reduce the mule deer population. However, the weather may have also curtailed hunter access to mule deer ranges, thus reducing harvest. Further monitoring of mule deer populations is warranted to determine population trend.

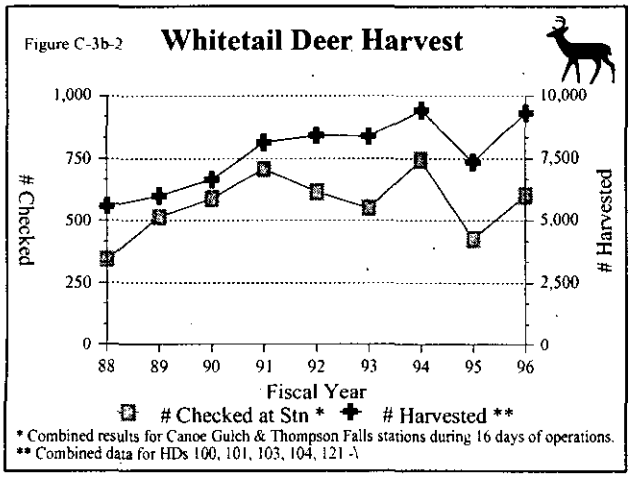
Figure C-3b-1 **Mule Deer Harvest**



* Combined results for Canoe Gulch & Thompson Falls stations during the 16 days of operation.
** Combined data for HDs 100, 101, 103, 104, 121

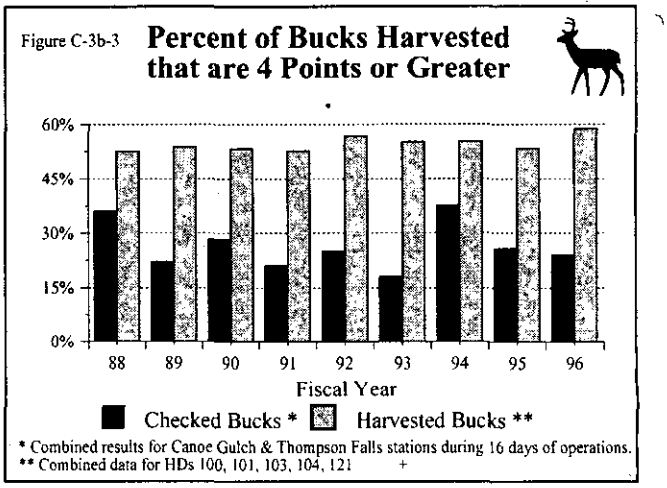
Whitetail Deer: Check station and hunter survey results, as well as informal observations, indicate a steadily increasing whitetail deer population over most of the past decade. The high population level was reflected in all-time high harvests of whitetails during the period (Figure C-3b-2). The proportion of mature bucks in the harvest remained relatively constant, indicating a healthy population structure (C-3b-3).

Figure C-3b-2 **Whitetail Deer Harvest**



* Combined results for Canoe Gulch & Thompson Falls stations during 16 days of operations.
** Combined data for HDs 100, 101, 103, 104, 121

Figure C-3b-3 **Percent of Bucks Harvested that are 4 Points or Greater**



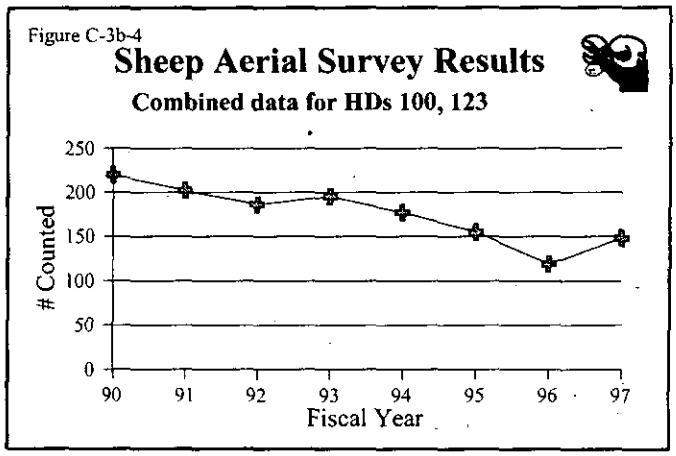
* Combined results for Canoe Gulch & Thompson Falls stations during 16 days of operations.
** Combined data for HDs 100, 101, 103, 104, 121

The population increase was due in part to several years of favorable weather. This steadily increasing trend was reversed, however, during the severe winter of 1996-97 when a significant portion of the whitetail population died. In addition to this winter mortality, the poor physical condition of surviving does resulted in a below average fawn crop in 1997.

An up-and-down pattern in whitetail populations is typical of how the species responds to weather conditions in northern heavy-snow regions, and does not appear to be directly related to management actions of the Forest Plan standards for winter range, which emphasize small opening sizes and retention of cover, and tend to buffer winter population fluctuations to some degree.

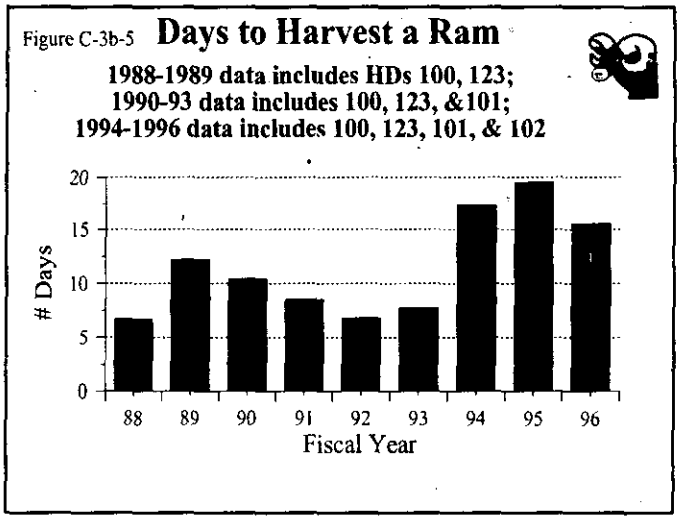
Bighorn Sheep: Population trend among the four bighorn sheep herds occupying the Kootenai has been variable, with some herds remaining static over the past decade and other herds declining. Aerial surveys are annually performed on the Ural/Tweed, Kootenai Falls and Berray Mountain herds. These surveys indicate a stable population in the Berray Mountain herd and declines in the Ural/Tweed and Kootenai Falls herds. The reasons for the declines are unknown, but predation may be a factor, and the Kootenai Falls decline seemed to follow the large wildfires in that area in 1994. Lamb production has also been low in this herd in recent years. Other possible contributing factors in the decline may include competition from other ungulates or disease.

Figure C-3b-4



Stansberry (1996) analyzed data on the Ural/Tweed herd collected between 1986 and 1995 and concluded that the herd increased through 1990 and then subsequently decreased. This was in an area where much habitat improvement work (slashing, timber harvest, prescribed burning) had been accomplished as mitigation for the effects of Libby dam, yet the sheep population apparently failed to respond to the improved habitat. Potential reasons include those listed above.

Figure C-3b-5



The Ten Lakes herd is the smallest on the Forest, and it migrates between the U.S. and Canada. This herd is not regularly monitored, and it's trend is undetermined.

As noted in C-3a, the overall trend for sheep habitat on the Forest has been positive. Bighorn sheep populations are infamous for gradual population increases followed by marked declines. The sheep declines observed on the Kootenai in the second half of the past decade do not appear to be broadly associated with habitat problems or forest management activities. Figure C-3b-4 shows the overall sheep population trend on the Forest based on aerial survey data. The decline in sheep populations is substantiated by the number of hunter days required to harvest a ram, which increased substantially in the latter part of the decade (Figure C-3b-5)

Mountain Goat: This species is limited primarily to the East and West Cabinet Mountain ranges on the Kootenai Forest. Hunter harvest statistics (Figure C-3b-6) and aerial survey data support a conclusion that goat populations have been relatively stable over the past decade with minor annual fluctuations. The hunter effort required to harvest a goat increased near the end of the decade (Figure C-3b-7). Further monitoring is needed to determine if this represents a recent downward trend or if it is due to other factors such as weather.

Figure C-3b-6

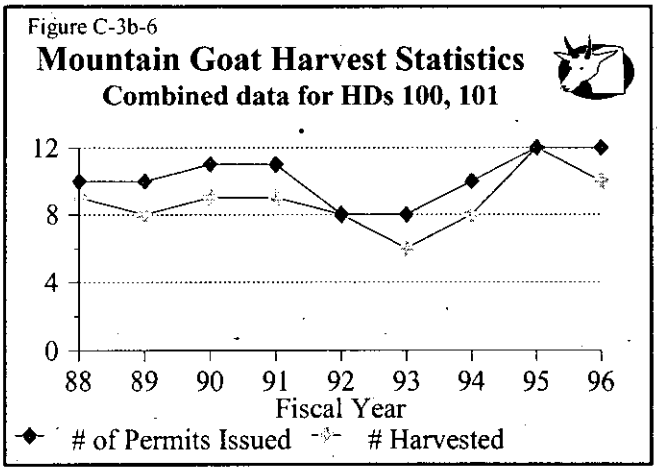
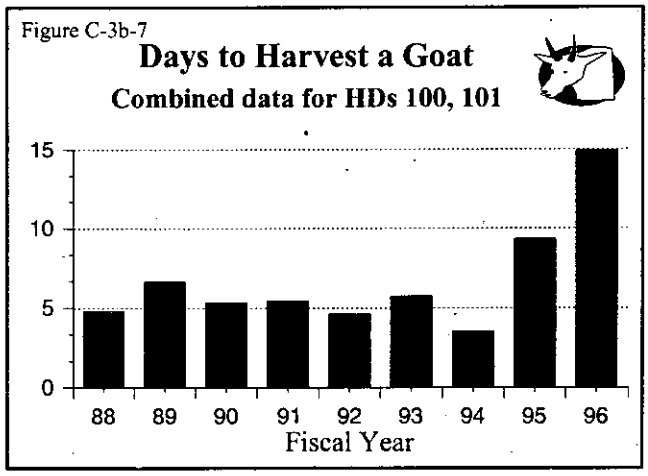


Figure C-3b-7



Moose: Moose harvest increased during the first half of the past decade and then declined somewhat thereafter. Moose harvest is controlled by a permit system, and the harvest reflects the number of permits issued. However, the number of permits also relates to the observed population level (see Figure C-3b-8). The number of days required to harvest a moose increased slightly near the end of the decade (Figure C-3b-9) These indicators point towards a minor decline in moose populations in the second half of the past 10 years.

Figure C-3b-8

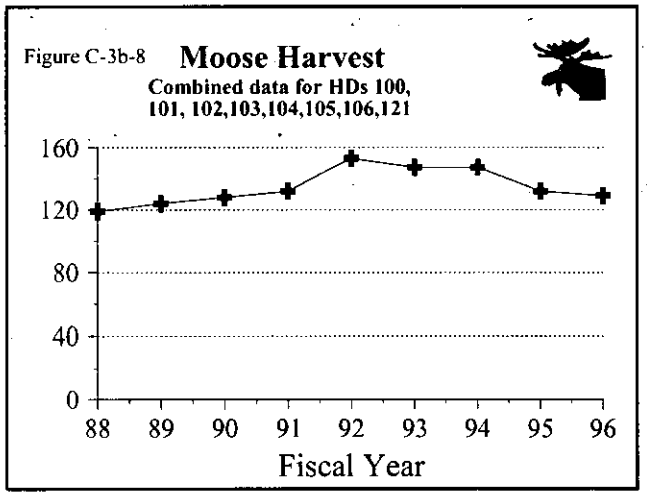
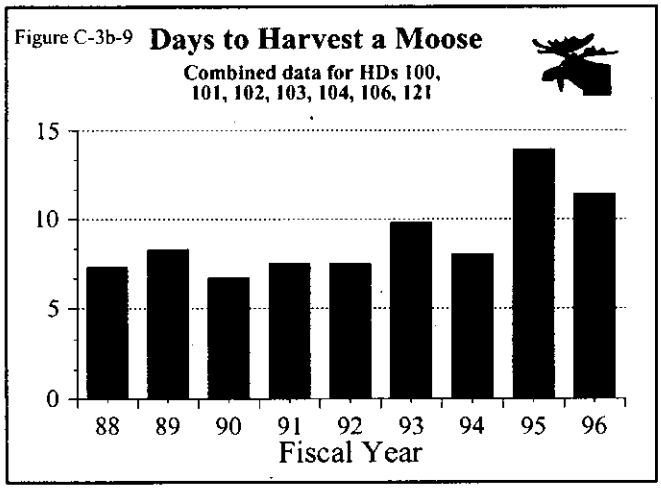


Figure C-3b-9

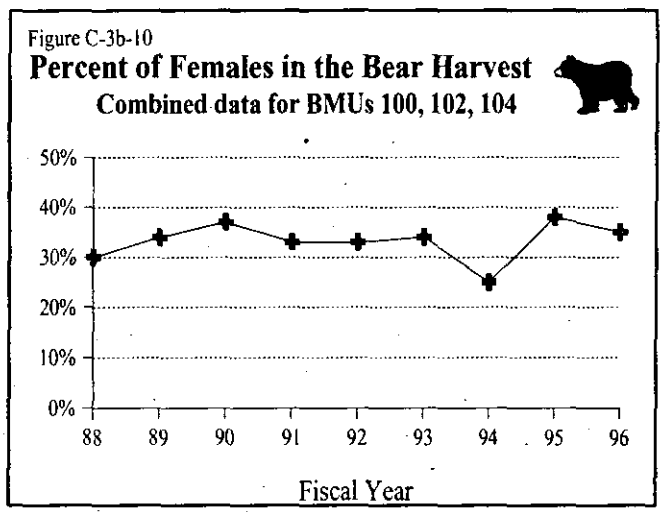


Black Bear: The long term (20+ years) population trend for black bears in northwestern Montana has been downward (USFS 1993). This trend appears to have continued into the first half of the past decade on the Kootenai National Forest. Kasworm and Thier (1994) suggested that black bear survival rates in their Cabinet Mountains and Yaak River study areas were lower than the minimum sustainable levels. Montana Fish, Wildlife, and Parks established the following management targets for black bears (MFWP 1994):

- no more than 40 percent of the annual harvest comprised of females
- median age of harvested bears at least 6.5 years for females and 4.5 years for males

On the Kootenai National Forest during the period 1988 to 1996, the percent of female bears in the harvest ranged between 25 and 38 percent, meeting MFWP's target (Figure C-3b-10). However, the median age of female bears harvested was less than 6 years in 8 of the past 9 years in Bear Management Unit (BMU) 100; 9 of the past 9 years in BMU 102; and 6 of the past 9 years in BMU 104. This target criteria was not met.

Figure C-3b-10



In the past few years, however, the downward trend in the black bear population may have reversed. The number of bears observed per hour of aerial survey effort has increased (Figure C-3b-11). This agrees with a concurrent increase in reports of casual observations of bears.

The number of harvested bears checked has not increased (Figure C-3b-12), but this is explained by more restrictive hunting seasons in recent years and decreased hunter access resulting from administrative road restrictions, as well as natural spring access restrictions caused by the floods in 1996 and heavy snowpack in 1997. Continued black bear monitoring is warranted to determine if the current upward trend can be sustained.

Figure C-3b-11

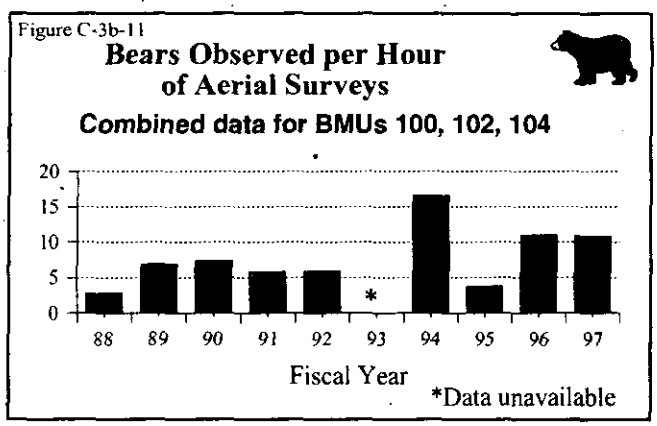
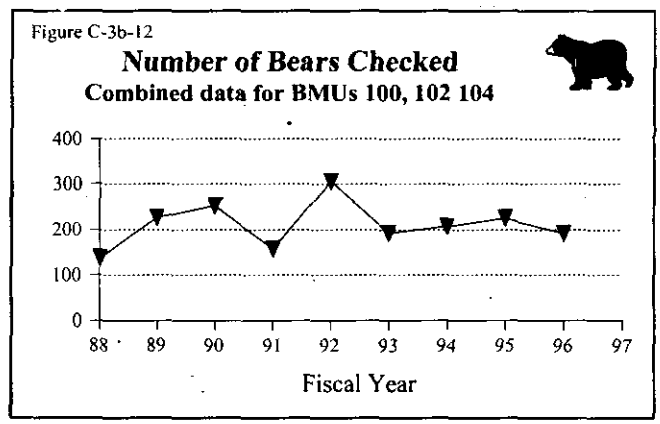


Figure C-3b-12



Mountain Lion: Mountain lion populations have increased significantly during the past decade. This conclusion is supported by an increasing number of lion observations and encounters with humans, increases in harvest quotas, and the rate at which the quotas are filled. Being a predator of big game, an increasing lion population would be expected concurrently with the increasing big game populations of the past decade. The reduced big game populations following the winter of 1996-97 will likely result in decreasing lion populations within 1-2 years. This situation warrants further monitoring.

Recommended Actions: Continue cooperating with MFWP to monitor big game populations, particularly as they respond following winter die-offs in 1996-97.

WILDLIFE & FISHERIES: Old Growth Dependent Species; Monitoring Item C-4

ACTION OR EFFECT TO BE MEASURED:	Population levels of old growth dependent species.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	Any downward trend approaching 40% of population potential

Purpose: This monitoring item was established to help ensure that viable populations of species dependent on old growth habitats were maintained. The expected precision and reliability of the information are moderate and low, respectively. The Forest Plan requires that this item be reported every five years.

Background: The pileated woodpecker (*Dryocopus pileatus*) is the designated old growth habitat management indicator species on the Forest. Old growth forests and cavity habitat are key components of the species' habitat. The National Forest Management Act states that "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area....In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area." 36 CFR 219.19. Monitoring items C-5 Old Growth Habitat, and C-6 Cavity Habitat evaluate the habitat needed to support a viable population of pileated woodpeckers. Both of these items indicate that we are on-track with providing the necessary habitat.

The purpose of this monitoring item is to evaluate population levels of the pileated woodpecker. There are several different approaches to assessing population viability, ranging from subjective assessments to detailed quantitative models requiring substantial demographic data. The scientific community accepts each of these approaches as valid depending on the circumstances, such as the amount of data available, and the habitat associations, behavior, and demographic characteristics of the individual species being assessed. In March 1997, the Northern Region of the USFS approved a six-step strategy for assessing and managing population viability. This strategy incorporates a review of twelve potential methods or tools for assessing population viability which were identified and described through a contract with a leading academic scientist. The strategy and methods are documented in a Forest Service paper titled *Population Viability Protocol* (Samson et. al. 1997) which establishes future guidance for population viability assessment in the Northern Region.

The Forest Plan monitoring item indicated that personal observations and transects may be used as data sources to analyze population viability. As noted in the FY 92 Monitoring Report, technically reliable and cost efficient techniques for conducting population trend surveys for pileated woodpecker were not established and discussions among wildlife professionals were continuing on the subject. It goes on to state that it had not been determined if the Forest should independently survey for this species, or if efforts on the Kootenai should only contribute toward a much larger combined-forest or Regional survey effort.

Based on discussions with wildlife professionals and the Regional Office, the Kootenai became a participant in the Region 1 Landbird Monitoring Program which started in 1993. In this program, transects consisting of multiple bird monitoring points are set up within a wide range of habitats distributed geographically across the Kootenai National Forest. All migratory and resident bird species detected by specialists trained in bird identification are recorded at each point on each transect. These points are established as permanent points. The information from these points is transmitted to Dr. Richard Hutto, internationally recognized bird expert, at the University of Montana, where it is tabulated for each participating National Forest and for the Region overall. Data have now been collected for several thousand points within the Region, including on the Kootenai Forest, and the data is statistically valid to provide information on bird species presence, distribution, and habitat associations. Over a period of years, the data will also provide information on bird species population trends.

Results: Personal observation by Forest biologists indicate that pileated woodpeckers are observed frequently on the Kootenai, and these informal observations provide no indication of any major population change for the species.

Data collected in the R-1 Landbird Monitoring Program during 1994-1996 is summarized in Table C-4. It will take many years of monitoring to determine population trends.

Table C-4-1 Pileated Woodpecker Observations on KNF Bird Monitoring Points

Fiscal Year	Number Points Sampled	Number & Percent Observed on Sampled Points
1994	530	49 9.2%
1995	579	32 5.5%
1996	545	48 8.8%

In 1997, a regional decision was made to change the long term landbird monitoring sampling effort to every other year, with a different sampling approach in intermediate years used to assess various management questions. In 1997, special paired monitoring sites were selected to begin assessing the effects of intermediate timber harvest on pileated woodpeckers (J. Young, unpublished). Twelve treated and 12 control sites, each containing 3 sample points, were selected on the Kootenai. A total of 45 pileated woodpeckers were detected at these sites. Because the study design for this effort called for differences in data collection compared to the data shown in Table C-4, the results are not directly comparable. However, the results of this study will be summarized in a future report by University of Montana personnel.

The landbird monitoring results for the Northern Region showed pileated woodpeckers present to varying degrees in all vegetation types sampled except agricultural and residential (Hutto 1995). Based on these results, Hutto concluded:

> "Pileated woodpeckers are widespread throughout the western third of the region. They are relatively common in both uncut and cut mid-elevation conifer forests. Their abundance in harvested forest types is, in part, a consequence of their mobility; 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 (6.0 percent) and dead/down (5.1 percent) than on points without those characteristics (2.1 percent and 1.1 percent respectively).
>
> The species appears to do well in a matrix of forest types, but the inclusion of some older forest with large trees is probably necessary. There's generally...an intact forest near where these birds are detected (though not necessarily within 100 m). Thus, detecting them in clearcuts and seed-tree cuts should not be taken to mean they can do well with homogeneous stands of those kinds."

Evaluation: Hutto's report, the preliminary population transects, and Forest staff observations all point to the same consistent interpretation that pileated woodpeckers are widespread and are relatively common on the Kootenai National Forest. The information available at this time does not indicate that a significant downward trend approaching 40 percent of population potential is occurring.

Recommended Actions: In review of this monitoring item, no changes are needed in Forest Plan direction. The Forest will continue to document personal observations and data collection through the Kootenai's participation in the R-1 Landbird Monitoring Program contingent on available funding.

WILDLIFE & FISHERIES: Old Growth Habitat; Monitoring Item C-5

ACTION OR EFFECT TO BE MEASURED: Maintain habitat capable of supporting viable populations of old growth-dependent species (10 percent old growth in each drainage).

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: Reduction below 10 percent in a drainage which was previously over minimum or any reduction in a drainage previously under minimum.

Purpose: This monitoring item was established to help ensure that an adequate amount of old growth habitat is designated on the Forest. The Forest Plan requires that this item be reported every two years. The expected accuracy and reliability of the information is moderate to high.

Background: Old growth habitat is recognized as an important and necessary element of diversity that supports a myriad of wildlife species. Maintenance of adequate old growth will assist in ensuring viable populations of native species and in maintaining diversity as required by the National Forest Management Act of 1976 (16 U.S.C. 1600) (FP, Appendix A17-14). To provide habitat for viable populations, the Plan specifies that 10 percent of the Forest land below 5,500 feet elevation would be managed as old growth habitat for dependent wildlife species. This commitment amounts to a minimum of 186,500 acres and ideally would be equally distributed in all drainages on the Forest.

Forest Service Manual 2400, Timber Management, Kootenai Forest Supplement number 85 issued in January, 1991 provides the direction for validation of old growth on the Forest. This supplement clarifies standards for old growth habitat validation on the Forest before any timber sales containing mixed conifer can be sold. One of the requirements established is that old growth habitat be validated and protected at the 10 percent level in each third order drainage or compartment. If 10 percent old growth does not exist within a compartment, then old growth from an adjacent compartment can be used to make up the 10 percent, as long as there is 10 percent old growth when both compartments are combined. This is shown as "Effective Old Growth" in Tables C-5-1 and C-5-2.

If no other effective old growth is available then the best available soon-to-be old growth is identified to bring the third order drainage or compartment up to 10 percent. These protected, mature stands are known as old growth replacement stands because they are replacing a current deficiency of high-quality old growth habitat and will provide for old growth habitat in the future as they age and gain the desirable attributes. This is shown as "Acres of Replacement Old Growth" in table C-5-2. Management emphasis is to provide the best possible distribution of old growth habitat wherever possible, and high-quality old growth is to be a priority for protection (see the Forest Plan Glossary and Appendix 17 of the Plan for more detail on the description of old growth attributes, including desired distribution patterns).

Results: Table C-5-1 displays the result of the old growth validation surveys for each fiscal year from FY 88 through FY 97. In 1997 158,495 acres were surveyed and old growth was designated for 16,948 acres (10.7 percent) in those areas. Some of these areas include reassessments of previously completed compartments because of changed conditions, such as the fires of 1994 or large land exchanges. Because of these reassessments, the information in Table C-5-1 cannot be totalled as this would result in double-accounting of some acres.

Table C-5-1 Old-Growth Habitat and Condition Survey Results

FY	Acres Surveyed	Protected Old Growth Habitat		Fully Effective Old Growth Habitat	
89	94,210	12,730	13.5%	8,450	66%
90	176,560	18,770	10.6%	17,030	91%
91	334,300	39,410	11.8%	36,520	93%
92	212,380	20,930	9.9%	15,500	74%
93	72,253	10,393	14.4%	8,455	81%
94	49,381	5,474	11.1%	4,312	79%
95	158,736	19,416	12.2%	14,340	74%
96	215,483	24,080	11.2%	17,954	75%
97	158,495	16,948	10.7%	15,650	92%

Whenever an area is resurveyed, the information for the new survey is used in place of previous survey information. The table below reflects the current Forest-wide summary of surveyed areas and protected old growth. The accompanying map has been shaded to show where old growth evaluation is completed, partially completed, or is still undone.

Table C-5-2 Summary of Total Protected Old Growth for Areas Validated

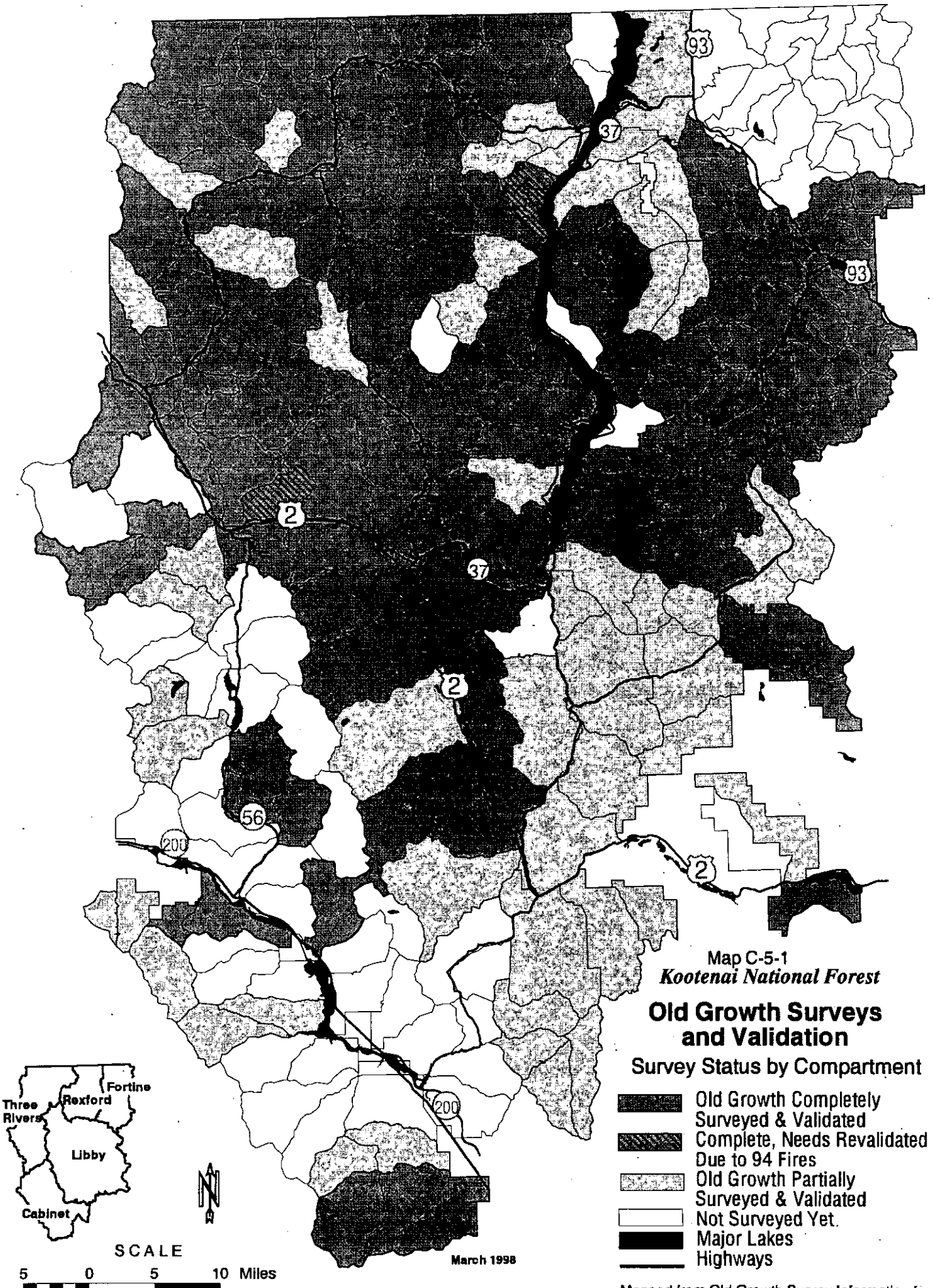
Fiscal Years	Acres Below 5500 Feet	Effective Old Growth		Replacement Old Growth*		Total Protected Old Growth	
		Acres	Percent	Acres	Percent	Acres	Percent
1988-97	1,115,113	100,581	9.0%	24,176	2.2%	124,757	11.2%

* Soon-to-be old growth that is designated when no other old growth is available to meet the 10% requirement

Evaluation: As noted in table C-5-2, approximately 1,115,113 acres below 5,500 feet have been evaluated for old growth (there are about 1,865,000 acres below 5,500 feet Forest-wide). Of the designated old growth, 9.0 percent are effective old growth and 2.2 percent are replacement old growth, for a total of 124,757 acres (11.2 percent) now designated. One factor which affected old growth validation survey results for FY 88-97 is the Checkerboard Land Exchange, which resulted in a net loss of just over 400 acres of validated old growth. Two of the compartments involved in the exchange had been completely surveyed and validated. These will now need to be redone, and the acreage for those compartments has been removed from the total "Validated" acres. (These are shown with other "Partially Completed" compartments on Map C-5-1.) The level of old growth designated for the compartments validated to date is above the 10 percent level required in the Plan.

The map shows how many areas across the Forest have been surveyed and/or validated for old growth. After ten years of old growth validation work, 136 of the 250 compartments (54 percent) have been completely reviewed and an additional 52 compartments (21 percent) are partially done. Map C-5-1 indicates those compartments completely and partially reviewed and also shows that much of the unsurveyed areas are in wilderness, proposed wilderness, or areas with very little Forest Service ownership. Accordingly we are confident that the Forest is meeting old growth direction.

Recommended Actions: Based on review of this monitoring item, no changes are needed in the Forest Plan at this time. Good progress is being made in the validation effort and will continue.



Map C-5-1
Kootenai National Forest

Old Growth Surveys and Validation

Survey Status by Compartment

- Old Growth Completely Surveyed & Validated
- Complete, Needs Revalidated Due to 94 Fires
- Old Growth Partially Surveyed & Validated
- Not Surveyed Yet.
- Major Lakes
- Highways

Mapped from Old Growth Survey Information for Fiscal Year 1997, shown by Compartment.

WILDLIFE & FISHERIES: Cavity Habitat; Monitoring Item C-6

ACTION OR EFFECT TO BE MEASURED: Amount and condition of habitat for cavity-dependent wildlife.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: Any reduction in habitat capability approaching 40 percent of potential.

Purpose: This monitoring item was established to help ensure that adequate amounts of habitat are provided for cavity-nesting species. The expected accuracy and reliability of the information is moderate. The Forest Plan requires that this item be reported once every five years.

Background: Appendix 16 of the Plan contains the standards and guidelines for maintaining habitat capable of supporting populations of cavity-nesting wildlife at 40 percent or greater of their population potential. The 40 percent population level is considered the minimum level necessary to maintain viable populations. The management indicator species for cavity nesters is the pileated woodpecker, which is discussed in Monitoring Item C-4. Appendix 16 provides the Forest with the option of achieving cavity habitat requirements at either the stand level or the drainage or compartment level. It identifies the minimum density of dead trees (snags) or live cull trees within certain height and diameter criteria needed to meet 40 percent of population potential. Live cull trees are usually broken-topped, or have significant amounts of decayed wood. These dead and dying trees are considered to be the critical habitat indicator for cavity nesters.

Results: A total of 238 projects were evaluated for effects on cavity habitat during the reporting period (1993-1997). Monitoring these projects provided information on 624 individual harvest units (Table C-6-1) and 66 compartments (Table C-6-2).

Individual Harvest Unit Results: Pre-treatment habitat capability within harvest units ranged from a low of five percent of potential to a high of 100 percent of potential habitat. Post-treatment habitat capability ranged from zero percent of potential to 100 percent of potential (habitat potential cannot exceed 100 percent, but some stands contained more than twice the number of snags needed to achieve this level). Monitoring results showed a high level of variation from District to District and project to project, both in analysis method and in success of meeting the Forest Plan standard of maintaining greater than 40 percent habitat potential on individual units. Some Districts marked snags for retention at the 100 percent level with the expectation that, through attrition during logging, the 40 percent level would be achieved post-harvest. On one District almost half (49.3 percent) of the units met standards only when seedtrees or shelterwood trees were included as part of the replacement trees.

Table C-6-1 **Individual Units Monitored 1988-1997**

Year	Units Monitored	Units Meeting FP Standards	Units Not Meeting FP Standards
1988-1992	303	177 (58.4%)	126 (41.6%)
1993-1997	624	390 (62.5%)	234 (37.5%)
1988-1997	927	567 (61.2%)	360 (38.8%)

Note: While individual units may not meet Forest Plan Standards, they are part of Compartments which generally do meet standards

Compartment Level Results: Evaluation of cavity habitat trend was completed on 633,071 acres (140 compartments - see Table C-6-2) during the reporting period (1993-1997). A total of 294,620 (46.5 percent) acres maintained existing snag levels (average 70 percent habitat capability). There were 338,451 acres (53.5 percent) that showed a decline in snag levels but still remained at or above the 40 percent capability level (average 64 percent habitat capability).

Table C-6-2 **Compartments Monitored 1988-1998**

Year	Compartments Monitored	Compartments Meeting FP Standards	Compartments Not Meeting FP Standards
1988-1992	74	68 (91.9%)	6 (8.1%)
1993-1997	66	64 (97%)	2 (3%)
1988-1997	140	132 (94.3%)	8 (5.7%)

Forest-wide Results: Monitoring data indicates that units harvested prior to 1988 average 15 percent habitat capability. Units harvested between 1988-92 average 27 percent, and units harvest between 1993-1997 average 53 percent habitat capability. This indicates a gradual improvement of retaining cavity habitat on-site, Forest-wide. Approximately 70 percent habitat capability has been retained on areas partially harvested. Areas untreated have 100 percent habitat capability.

Utilizing the above information (Table C-6-3), we determined that pre-Forest Plan (pre-1988) Forest-wide cavity habitat capability was 88.7 percent. At the end of the first five year reporting period (1992) it had dropped to 85.4 percent (a 3.7 percent decline). At the end of the second five year period (1997) habitat capability is approximately 84.7 percent (a 0.8 percent decline from 1992 or an overall decline since the start of Plan implementation of 4.5 percent). The decline since the start of the Plan is slightly elevated due to the assumption that all partial cut treatment took place in the first five year reporting period. Partial cutting took place during all three periods, however the acres treated in each time period was not available.

Table C-6-3 Forest-wide Snag Habitat - acres by potential

National Forest Lands	Non-forest Lands	Potential Habitat Acres	Harvested Pre-1988 (15%)	Harvested 1988-92 (27%)	Harvested 1993-97 (53%)	Partial Cut (70%)	Untreated Acres (in 1998) (100%)
2,244,837	378,130	1,866,707	247,279	45,866	29,783	94,826	1,448,953

Acres do not include private lands. Non-forest lands (e.g. rock, water, etc.). % = % cavity habitat capability

Other factors: New OSHA safety requirements implemented during the reporting period resulted in some changes in approaches to providing cavity habitat. For example, live snag-replacement trees were provided instead of snags more often than in the past. More clumping of snags within safe zones was also utilized.

The 1994 wildfires that burned across 53,000 acres of the Kootenai created large numbers of snags. Nearly 47,000 acres (89 percent) of burned area was not harvested and, thus, all fire-created snags in these areas were retained. Approximately 7,400 acres have been harvested and many snags were retained in harvest units or in adjacent clumps and stringers. Not all of these acres were included in projects due to roadless area and other resource concerns.

Evaluation: Variation in successfully meeting the 40 percent requirement is likely due to several factors, including:

- different stand vegetation types and pre-treatment availability of snags
- differing emphasis placed on snag retention during project planning and implementation, including post-sale activities
- differences in logging systems and their effects on snag retention
- sensitivity of operators to cavity habitat needs

Monitoring results to date provide evidence that there are mixed results in providing the minimum desired density of snags in harvest units (Table C-6-1). This is due to several factors including the felling of snags for safety reasons during harvest, lack of available snags to begin with in certain vegetation types, and loss of snags to firewood cutters. Improvement in retaining snags is occurring. In the future, with the new OSHA regulations, the emphasis will be on leaving snags in clumps or stringers that are not harvested and retaining green replacement snags versus existing snags.

Monitoring that has been completed on a compartment or drainage basis indicates that we are meeting the intent of the Plan by providing cavity habitat at a level sufficient to maintain viable populations of dependent wildlife (40 percent or more of population potential). However, in some drainages, due to historic conditions and forest management activities approved prior to the Plan, the availability of cavity habitat is less than desired (Table C-6-2).

Another consideration is the fact that over 50 percent of the Forest is not within the suitable timber base and will not be logged, plus the fact that much of the suitable timber base has also not yet been logged. This provides assurance that there has not been a Forest-wide reduction in habitat capability approaching 40 percent of potential.

In summary, the available monitoring data indicates the Forest is providing sufficient cavity habitat at a drainage or compartment level. Exceptions are in areas where forest management predating the Plan or historic conditions, such as the widespread turn-of-the-century fires make this impossible. Based on this information, the creation of numerous snags by the 1994 fires, and the existence of ample cavity habitat in the majority of the Forest that is outside the suitable timber base, this monitoring item is within acceptable limits of the Plan.

Validation Monitoring: (Assesses the continuing validity of the Forest Plan in light of new information)
New scientific information concerning snags (Bull et. al. 1997 and Harris unpub.) has become available and may apply to snag management on the Kootenai. The Plan snag standards and guidelines are primarily based on Thomas (1979). Bull documents that the assumptions used by Thomas were in error and that additional snag habitat, more snags and replacement trees, may be needed to provide adequate habitat for cavity nesters. Analysis of snag levels in uncut stands on the Kootenai is on going.

Recommended Actions: We have reviewed whether new interim standards are needed at this time. We conclude that interim standards are not needed, but that a review of the snag requirements should be completed during Forest Plan revision. Our monitoring data indicates that snag habitat capability has only decreased 5 percent Forest-wide, since 1987 (89 to 85 percent), and the snag habitat has been locally improved by the 1994 fires. In addition, our monitoring of pileated woodpecker (Monitoring Item C-4) does not indicate a significant downward trend toward 40 percent population level. Based on these items, immediate action is not needed.

Forest Plan revision :

- The R-1 protocol for course filter analysis will be used in conducting landscape-level vegetation analyses for Forest Plan revision. This will include analysis of standing and down dead woody material and live cull material which provides habitat for cavity-dependent wildlife.

- Use the above analyses and current information from research to develop geographically and ecologically relevant guidance for cavity habitat management (including down woody material) for revision of the Plan.

- Develop monitoring methodologies which will be consistently applied across the Forest on a sample basis to provide meaningful, quantified data to determine success in meeting revised Forest Plan guidance.

- Through periodic evaluation and adaptive management, modify cavity habitat guidance and forest management practices as necessary to ensure maintenance of healthy populations of native cavity-dependent wildlife species.

WILDLIFE & FISHERIES: T & E Species Habitat; Monitoring Item C-7

ACTION OR EFFECT TO BE MEASURED:	Provide habitat adequate to ensure Kootenai NF's contribution to recovery of Threatened and Endangered (T&E) Species including: Peregrine Falcon, Gray Wolf, Bald Eagle, Grizzly Bear, & White sturgeon.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	Any downward population trend. Any Forest-wide decrease in habitat quantity or quality. Failure to meet recovery plan goals for the Kootenai NF.

Purpose: This monitoring item was established to help ensure that the Kootenai National Forest contributes to the recovery of listed threatened and endangered species. The Forest Plan requires that this item be reported annually. The expected precision and reliability of the information are high and moderate, respectively.

Evaluation:

Peregrine Falcon: There are no specific recovery goals for the Forest, but the goal for Montana is 20 nesting pairs (USFWS, 1984).

In FY 97, two peregrine falcons were observed on the Cabinet Ranger District in the Vermilion drainage. Nesting activity was not confirmed. This number is consistent with the average number of sightings over the past decade. Peregrine sightings on the Kootenai may be the result of a hacking (release) program further down the Clark Fork River on the Idaho Panhandle National Forest. Suitable nesting habitat on the Kootenai is localized and not abundant. Due to the steep, cliffy nature of peregrine nesting habitat, activities which could lead to adverse impacts are rare.

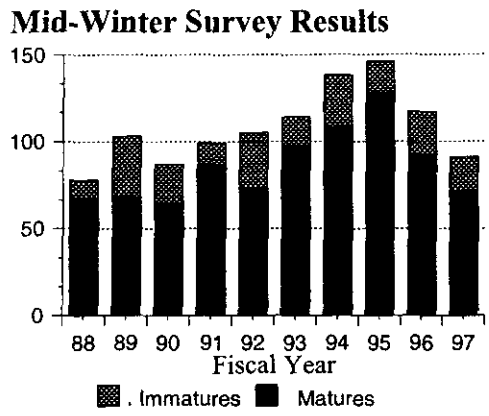
Gray Wolf: The Wolf Recovery Plan (USFWS, 1987) provides guidance for the recovery of the gray wolf. There is one recovery area within or adjacent to the Kootenai Forest (the Northwest Montana Recovery Area). The recovery goal for this area is 10 wolf packs. A small portion of this recovery area (about 10 percent) is located in the northeast corner of the Forest, east of US Highway 93.

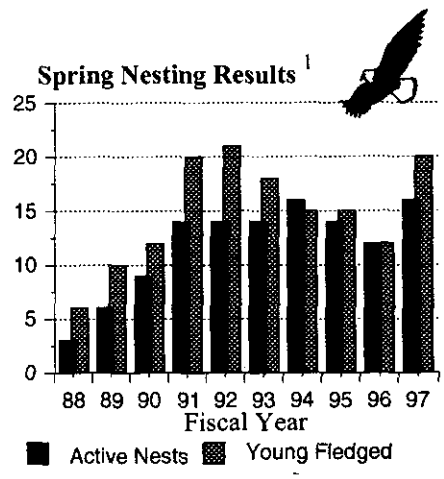
In 1997, reports of wolf sightings continued at slightly increased levels compared to recent years. Sightings were noted in areas on the Fortine Ranger District and portions of Libby and Cabinet Ranger Districts. Many of these were sightings of individuals from the Murphy Lake and Upper Thompson River packs. In addition, new pack activity was suspected on Three Rivers Ranger District. Most of the components of wolf habitat on the Kootenai did not change significantly in 1997 compared to previous years. However, big game populations, which are the primary prey for wolves, declined during the severe winter of 1996-97 (see monitoring items C-2 and C-3b). Further monitoring will be needed to determine how this ultimately affects wolf populations.

Bald Eagle: The Montana Bald Eagle Management Plan (MBEWG, 1994) and the Pacific States Bald Eagle Recovery Plan (USFWS, 1986) provide guidance for bald eagle recovery. These plans call for the establishment of 52 nesting pairs within Recovery Zone 7, which is the Montana section of the upper Columbia River Basin. This recovery zone includes all public and private land west of the continental divide in Montana, and the Kootenai Forest area is about 15 percent of the zone.

Bald eagle habitat is generally within one mile of major lakes and rivers. Habitat quality and quantity on the Kootenai is stable, and may be increasing in the long term as potential nest trees mature. Table C-7-1 shows the results of mid-winter bald eagle surveys which occur mostly along major watercourses both on the Forest and on adjacent ownerships. Although the results vary somewhat from year to year due to varying weather conditions, the surveys indicate stable numbers of wintering bald eagles during the reporting period. Numbers of active eagle nests and young eagles fledged are also shown in Table C-7-1. Nesting surveys show an increasing nesting eagle population during the first half of the reporting period, and a relatively stable population thereafter.

Figure C-7-1 **Bald Eagle Status**





[1] Beginning in FY 96, eagle nest results reflect only nests occurring on National Forest lands. Previous years' data reflect nests on other ownerships as well as National Forest.

Grizzly Bear: The Kootenai National Forest contains portions of two grizzly bear recovery zones: the Cabinet-Yaak Ecosystem (CYE) and the Northern Continental Divide Ecosystem (NCDE). About 72 percent of the CYE is located on the western portion of the Forest and about 4 percent of the NCDE is located in the extreme northeast corner (see Figure C-7-3). Each of these ecosystems are further subdivided into smaller areas for analysis and monitoring, known as bear management units (BMUs).

The Forest's primary efforts in grizzly bear recovery are in habitat management, cooperating in grizzly bear studies within the Yaak River area, assisting with bear augmentation tests and monitoring in the Cabinet Mountains, and working with local citizens and interest groups to achieve understanding and consensus on grizzly bear management issues.

Recovery goals for each recovery zone are based on the Grizzly Bear Recovery Plan (USFWS, 1993). Three main criteria are used to evaluate grizzly bear recovery. These are: 1) the number of unduplicated sightings of females with cubs averaged over a six-year period; 2) the distribution of females with cubs, yearlings, or two-year-olds measured as the number of BMUs occupied over a six-year period; and 3) the level of known human-caused mortality measured as a percentage of the estimated population average for the past three years. Habitat is also an important factor in grizzly bear recovery, and the Forest monitors habitat effectiveness in each BMU as an indicator of habitat trend.

Habitat Effectiveness: Table C-7-2 shows habitat effectiveness values for each of the BMUs evaluated during fiscal years 1988-97. Effectiveness is based on the percent of habitat available to bears and the desired level is 70 percent or more. Habitat effectiveness went down in seven BMUs and up in two BMUs in FY 97 compared to FY 96. Some minor changes were due to more accurate reporting rather than actual changes. The major declines were due to salvage harvest of timber killed in the 1994 wildfires, other timber harvest, and a mining operation. These BMUs will show improvement once those activities are completed. In FY 97, 12 of the 18 BMUs were at or above the desired 70 percent level, and the Forest-wide average for all BMUs was 72 percent.

Table C-7-2 **Grizzly Bear Habitat Effectiveness FY 88-97**

RD:	BMU: Grizzly Bear Management Unit	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97
3	1-NC* Murphy Lake	78%	79%	78%	78%	78%	78%	78%	78%	76%	76%
(4) 5	#1 Cedar	81%	81%	81%	82%	79%	79%	86%	81%	81%	86%
4 (5) 7	#2 Snowshoe	82%	82%	82%	81%	82%	82%	84%	85%	85%	85%
4	#3 Spar	70%	71%	70%	70%	79%	78%	77%	77%	78%	76%
7	#4 Bull	80%	78%	80%	80%	80%	92%	64%	63%	63%	62%
(5) 7	#5 Saint Paul	73%	77%	79%	80%	78%	81%	75%	74%	73%	74%
(5) 7	#6 Wanless	74%	74%	72%	74%	76%	76%	71%	72%	66%	66%
(5) 7	#7 Silver B/Fisher	87%	87%	87%	87%	87%	82%	82%	82%	82%	81%
7	#8 Vermilion	79%	80%	80%	73%	73%	71%	71%	74%	77%	77%
4	#9 Callahan	64%	55%	62%	67%	70%	74%	74%	76%	76%	76%
(4) 5	#10 Pulpit	43%	47%	62%	62%	54%	65%	65%	70%	68%	57%
(4) 5	#11 Roderick	60%	59%	66%	68%	66%	70%	70%	70%	74%	74%
4	#12 Newton	51%	42%	43%	53%	53%	49%	49%	49%	62%	57%
4	#13 Keno	68%	68%	72%	72%	69%	70%	72%	73%	72%	72%
4	#14 Northwest Pk	61%	61%	68%	68%	68%	72%	74%	72%	74%	74%
4	#15 Garver	50%	47%	62%	62%	54%	65%	65%	70%	68%	63%
1 (4)	#16 E Fork Yaak	47%	46%	59%	61%	62%	64%	64%	73%	72%	70%
(1)4 5	#17 Big Creek	51%	58%	58%	63%	64%	68%	70%	68%	68%	68%
	Forest-wide Average	66%	66%	69%	71%	71%	73%	72%	72%	73%	72%

(Shaded entries indicate BMUs were below 70% Habitat Effectiveness standard for that Fiscal Year)

* BMU 1-NC1Murphy Lake is in the Northern Continental Divide Ecosystem. All other BMUs are in the Cabinet Yaak Ecosystem.

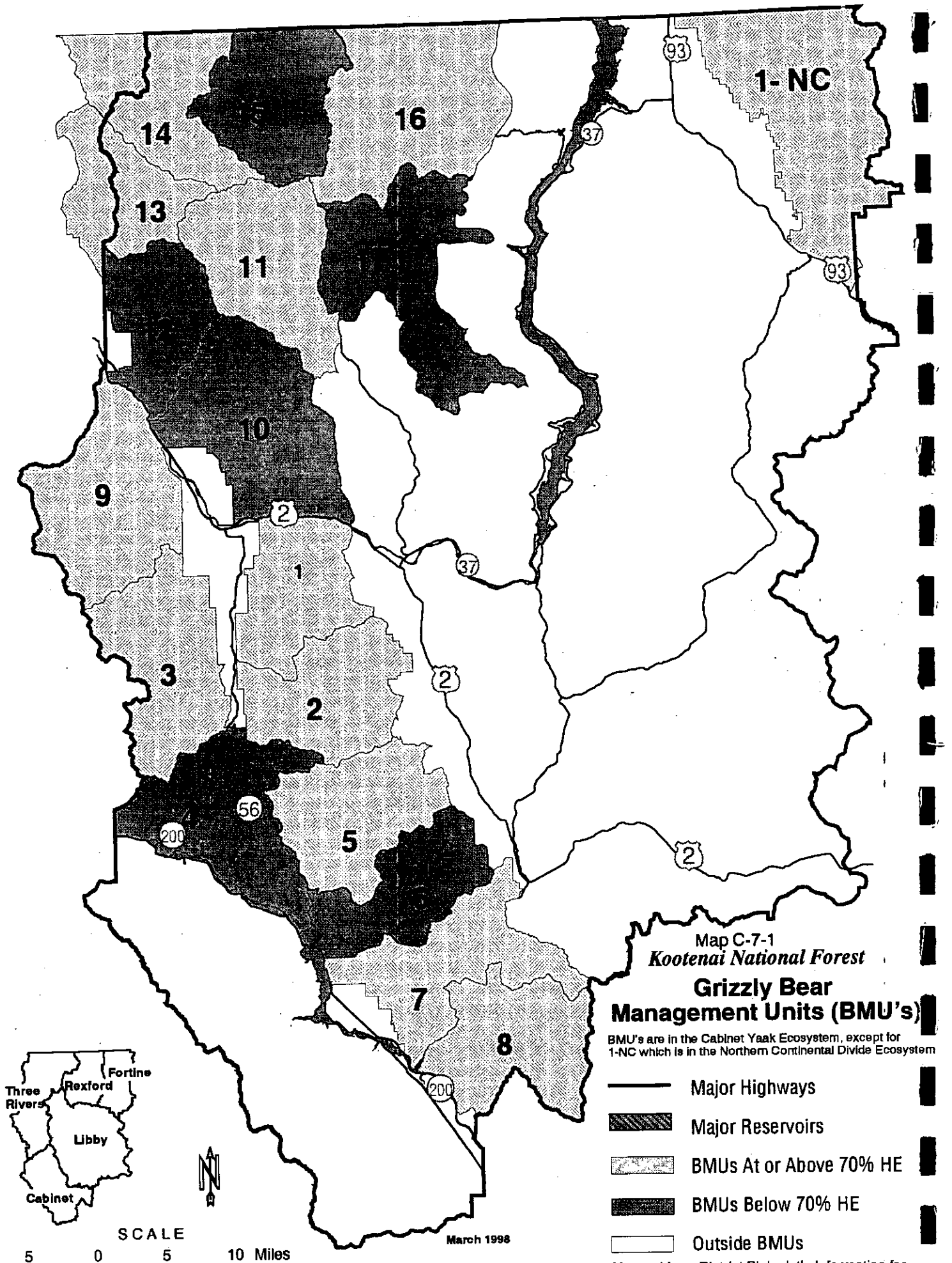
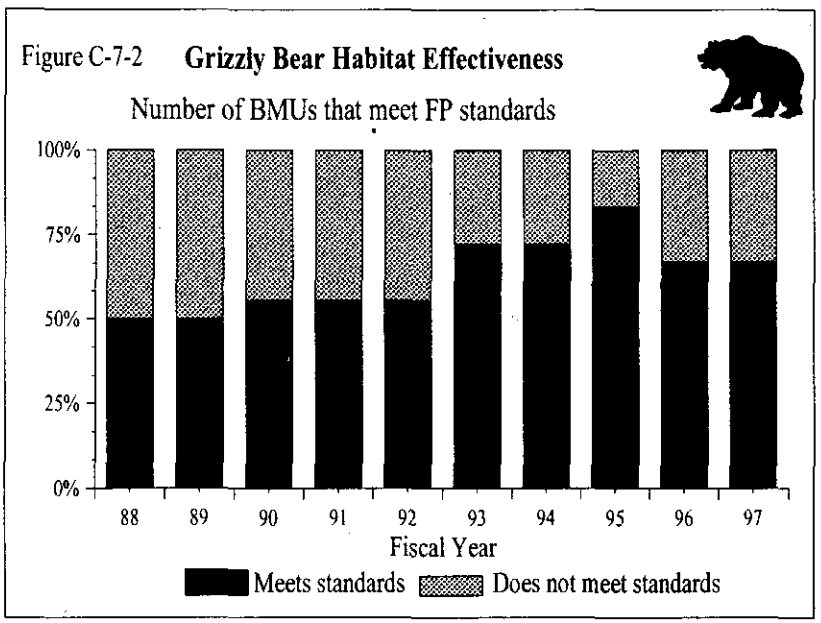

1- NC
16
14
13
11
10
9
3
2
1
5
7
8
56
200
93
37
2
Fortine
Rexford
Three Rivers
Libby
Cabinet
N
SCALE
5 0 5 10 Miles
March 1998
Map C-7-1
Kootenai National Forest
Grizzly Bear Management Units (BMU's)
BMU's are in the Cabinet Yaak Ecosystem, except for 1-NC which is in the Northern Continental Divide Ecosystem
Major Highways
Major Reservoirs
BMUs At or Above 70% HE
BMUs Below 70% HE
Outside BMUs
Mapped from District Biologist's Information for Fiscal Year 1997, shown by BMU.

Figure C-7-2 **Grizzly Bear Habitat Effectiveness**



Unduplicated Sightings of Females with Cubs: In FY 97, there were three confirmed unduplicated sightings of female grizzly bears with cubs in the Kootenai portion of the CYE. There were two confirmed unduplicated sightings of female grizzlies with cubs in the Kootenai portion of the NCDE in FY 97. This is an improvement over past years.

Distribution of Females with Young: Seven of the 17 BMUs on the Kootenai portion of the CYE were occupied by females with young in FY 97, as was the one BMU in the Kootenai's portion of the NCDE. This is an improvement over past years.

Mortality: There was one known mortality in the Kootenai National Forest portion of the CYE in FY 97 and one outside but near the Kootenai's portion of the NCDE.

Sightings of females with cubs, distribution of females with young, and human-caused moralities are summarized for the past six years in Table C-7-3.

Table C-7-3 **Grizzly Bear Females with Cubs, Distribution of Females with Young, and Human-Caused Mortalities**

Fiscal Year	NCDE			CYE		
	# Females with Cubs	#BMUs Occupied by Females with Young	# Human Caused Mortalities	# Females with Cubs	# BMUs Occupied by Females with Young	# Human Caused Mortalities
1992	1	1	1	1	2	0
1993	1	1	0	2	4	0
1994	0	1	0	1	3	0
1995	1	1	1	1	3	0
1996	0	1	0	1	4	0
1997	2	1	1*	3	7	1
Six-year Average	0.8	1	0.5	1.5	3.8	0.2

* Outside Recovery Zone

Efforts continued in FY 97 to implement Interagency Grizzly Bear Committee (IGBC) access management direction. The IGBC manager's subcommittees for the CYE and NCDE are currently working to develop access management direction for the ecosystems based on the latest scientific information on the effects of human access on local grizzly bear populations. As options for analyzing access management parameters are still under consideration by these groups, no monitoring results are available to report at this time.

Summary: Grizzly bear habitat effectiveness improved over the last ten years and is above the desired level of 70 percent Forest-wide, although some BMUs remain below this level. Sightings of female grizzly bears have increased, as well as their distribution. There was one mortality in the last six years in the Kootenai's portion of the CYE, and 3 on the NCDE. Based on this analysis grizzly bear habitat is improving in condition and the population appears to be on a slow trend towards recovery.

White Sturgeon -- The US Fish and Wildlife Service released a draft Recovery Plan for the Kootenai River white sturgeon in FY 97. The short-term goal of the Plan is to prevent extinction and to begin restoring natural reproduction in this population. This stock of fish can be considered for downlisting to threatened status after 10 years only if natural reproduction occurs in three different years prior to 2006; the estimated population is stable or increasing; enough captive-reared juveniles are added to the population for 10 consecutive years that 24 to 120 juveniles survive to maturity; and a long-term Kootenai River Flow strategy is implemented that insures natural reproduction. Delisting of this population is estimated to take at least 25 years.

The Recovery Plan for the white sturgeon outlines a comprehensive set of actions needed to begin the recovery process. The Plan does not identify actions or objectives that directly affect management of the Kootenai National Forest. However, under the Endangered Species Act (Section 7(a)(1)), the Forest is obligated to use its authorities to aid in the recovery process and to consult with the Fish and Wildlife Service on all proposed or authorized activities. All projects and activities evaluated by the Forest in FY 97 were found to have No Effect on the species.

The status of the Kootenai River white sturgeon improved in FY 97. A new population estimate (based on better data) from the Idaho Department of Fish and Game indicates there are approximately 1,469 adult sturgeon in the population. This is a 589-fish increase in the estimated size of the population due (in part) to new data from Kootenay Lake in Canada. Also, 342 fertilized sturgeon eggs were recovered during the FY 97 spawning season; however, no larvae or juveniles from the FY 97 year-class have been found to date.

Recommended Actions: The wolf, bald eagle, and grizzly bear have had increased sightings during the last ten years of monitoring. All of the threatened and endangered species' habitats being monitored appear to be maintaining or improving. The information shows that the Kootenai National Forest is progressing toward providing adequate habitat for threatened and endangered species recovery. Based on review of this item, specific changes to Forest Plan direction are not needed at this time. However, using appropriate processes including public involvement, we will implement access management recommendations when they become available from the IGBC CYE and NCDE manager's subcommittee. In addition, we will continue cooperate with other agencies to prevent additional mortalities to grizzly bears.

WILDLIFE & FISHERIES: Indicator Species; Monitoring Item C-8

ACTION OR EFFECT TO BE MEASURED:	Determine habitat and population trends for viable populations of Indicator Species.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	Any reduction approaching minimum habitat needed for viable population levels (40% of potential population).

Purpose: This monitoring item was established to help ensure that habitat was provided for the identified indicator species on the Forest. The Forest Plan requires that this item be reported once every five years. The expected accuracy and reliability of the information is moderate.

Background: The list of indicator species on the Kootenai Forest can be found in Volume 2, Appendix 12 of the Plan. The species include grizzly bear, gray wolf, bald eagle, peregrine falcon, elk, whitetail deer, mountain goat, and pileated woodpecker.

Results and Evaluation: By species.

Grizzly Bear: The Kootenai National Forest contains portions of two grizzly bear recovery zones: the Cabinet-Yaak Ecosystem (CYE) and the Northern Continental Divide Ecosystem (NCDE). About 72 percent of the CYE is located on the western portion of the Forest and about 4 percent of the NCDE is located in the extreme northeast corner (see Figure C-7-3). Grizzly bear habitat effectiveness improved over the last ten years and is above the desired level of 70 percent Forest-wide, although some BMUs remain below this level. Sightings of female grizzly bears have increased, as well as their distribution. There was one mortality in the last six years in the Kootenai portion of the CYE, and 3 in the NCDE. Based on this analysis grizzly bear habitat is improving and the population appears to be on a slow trend towards recovery. More complete information about the monitoring for grizzly bear habitat and population can be found in Monitoring Item C-7.

Gray Wolf: The Wolf Recovery Plan (USFWS, 1987) provides guidance for the recovery of the gray wolf. There is one recovery area within or adjacent to the Kootenai Forest (the Northwest Montana Recovery Area). The recovery goal for this area is 10 wolf packs. A small portion of this recovery area (about 10 percent) is located in the northeast corner of the Forest, east of US Highway 93.

Over the past decade, reports of wolf sightings have varied with a slight increase this fiscal year. Sightings were noted in areas on the Fortine Ranger District and portions of Libby and Cabinet Ranger Districts. Many of these were sightings of individuals from the Murphy Lake and upper Thompson River packs. In addition, new pack activity was suspected on Three Rivers Ranger District. Most of the components of wolf habitat on the Kootenai did not change significantly in 1997 compared to previous years. However, big game populations, which are the primary prey for wolves, declined during the severe winter of 1996-97 (see monitoring items C-2, C-3b and C-7). At this time, wolf populations are increasing and adequate habitat is provided for their primary prey base.

Bald Eagle: The Montana Bald Eagle Management Plan (MBEWG, 1994) and the Pacific States Bald Eagle Recovery Plan (USFWS, 1986) provide guidance for bald eagle recovery. These plans call for the establishment of 52 nesting pairs within Recovery Zone 7, which is the Montana section of the upper Columbia River Basin. This recovery zone includes all public and private land west of the continental divide in Montana, and the Kootenai Forest area is about 15 percent of the zone.

Bald eagle habitat is generally within one mile of major lakes and rivers. Habitat quality and quantity on the Kootenai is stable, and may be increasing in the long term as potential nest trees mature. Monitoring Item C-7 shows the results of mid-winter bald eagle surveys which occur mostly along major watercourses both on the Forest and on adjacent ownerships. Although the results vary somewhat from year to year due to varying weather conditions, the surveys indicate stable numbers of wintering bald eagles during the reporting period. Nesting surveys also show an increasing nesting eagle population during the first half of the reporting period, and a relatively stable population thereafter.

Peregrine Falcon: One or two peregrine falcons per year are observed on average on the Kootenai National Forest. Nesting activity has not been confirmed. Peregrine sightings on the Kootenai may be the result of a hacking (release) program further down the Clark Fork River on the Idaho Panhandle National Forest. Suitable nesting habitat on the Kootenai is localized and not abundant. Due to the steep, cliffy nature of peregrine nesting habitat, activities which could lead to adverse impacts are rare. Peregrine falcons appear to be maintaining their presence on the Kootenai.

Elk: Three factors were used to assess elk populations on the Kootenai National Forest over the past decade: number of elk observed in aerial surveys, number of elk harvested by hunters, and number of elk checked through check stations. Elk populations increased through about 1990 or 1991 and have shown a gradual decrease since that time. This trend is also substantiated by observations of Montana Fish, Wildlife and Parks biologists (J. Brown, pers. comm.). The likely cause of the downward trend is a combination of weather conditions which have both made elk more vulnerable to hunters in certain years and directly impacted elk survival during the severe 1996-97 winter. Calf production has also been lower than desired in some years, possibly due to weather or predation.

The average number of days required to harvest an elk has been variable through the evaluation period, probably reflecting annual weather differences more than any change in the elk population. However, the percentage of 6-point or greater bulls in the bull elk harvest has steadily increased during the period, reflecting an increasing age structure among bulls. The number of hunter days increased as well, which also applies increased pressure on the mature bull segment of the population. Although elk populations appear to be declining in the past few years, it is likely caused by factors other than habitat. Viability of elk populations is not a concern. More information may be found in Monitoring Item C-2.

Whitetail Deer: This species is the most widespread and abundant big game animal on the Forest. The proportion of mature bucks in the harvest remained relatively constant over the last decade, indicating a healthy population structure. The population increased for most of the last ten years, which is reflective of a positive trend in habitat. This steadily increasing trend was reversed, however, during the severe winter of 1996-97 when a significant portion of the whitetail population died. In addition to this winter mortality, the poor physical condition of surviving does resulted in a below average fawn crop in 1997.

An up-and-down pattern in whitetail populations is typical of how the species responds to weather conditions in northern heavy-snow regions, and does not appear to be directly related to management actions of the Forest Plan standards for winter range, which emphasize small opening sizes and retention of cover, would tend to buffer winter population fluctuations to some degree. Even with the mortality in FY 97, whitetail deer populations have not declined to a point where viability is a concern. See Monitoring Item C-3b for more information.

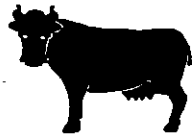
Mountain Goat: This species is limited primarily to rugged topography in the East and West Cabinet Mountain ranges. The habitat trend is static to possibly decreasing in the long term. Any decrease is due to continuing vegetative succession resulting from a lack of periodic wildfires or prescribed burning at higher elevations. Hunter harvest statistics and aerial survey data support a conclusion that goat populations have been relatively stable over the past decade with minor annual fluctuations. The hunter effort required to harvest a goat increased near the end of the decade. Further monitoring is needed to determine if this represents a recent downward trend or if it is due to other factors such as weather. Viability of mountain goat populations is not a concern. See Monitoring Item C-3b for more information.

Pileated Woodpecker: Personal observation by Forest biologists indicate that pileated woodpeckers are observed frequently on the Kootenai, and these informal observations provide no indication of any major population change for the species. Additional information is being collected through the R-1 Landbird Monitoring Program and through sampling special paired monitoring sites to begin assessing the effects of intermediate timber harvest on pileated woodpeckers. The landbird monitoring results for the Northern Region, the preliminary population transects, and Forest staff observations all point to the same consistent interpretation that pileated woodpeckers are widespread and are relatively common on the Kootenai National Forest. In addition, monitoring items C-5 Old Growth Habitat, and C-6 Cavity Habitat indicate that we are on-track with providing the necessary habitat for this species. See Monitoring Item C-4 for more information.

Recommended Actions: The results for these indicator species generally show stable or increased sightings during the last ten years of monitoring. Elk and white tail deer sustained a decline in the latter part of the reporting period, but additional monitoring is needed to determine if this trend continues. All of the species' habitats appear to be maintaining or improving, with the possible exception of mountain goat. The information shows that the Kootenai National Forest is progressing toward providing adequate habitat for these indicator species. We will continue to explore opportunities to improve mountain goat habitat. Based on review of this item, specific changes to Forest Plan direction are not needed at this time.

RANGE: Range Use; Monitoring Item D-1

ACTION OR EFFECT TO BE MEASURED:	Determine if the grazing use measured in Animal Unit Months (AUMs) meets Forest Plan projections.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	+/- 20 percent of anticipated AUMs.



Purpose: This monitoring item was established to track grazing use on the Forest. The Forest Plan requires that this item be reported annually. The expected accuracy and reliability of the information is high.

Background: Livestock use on the Kootenai was anticipated to be about 12,600 Animal Unit Months (AUMs) per year. At the time the Plan was approved, there were 41 active allotments located mostly in the northeastern portion of the Forest on the Rexford and Fortine Ranger Districts.

Currently, the Forest has 45 grazing allotments, of which 25 are active (four allotments have been split since 1987). Most of these allotments have a 10 year grazing permit with many permits coming up for review. In FY 96, nine of the allotments had NEPA analysis completed and decisions signed. In FY 97 the following allotments had NEPA analyses completed and decisions signed: Pinkham Ridge, Fairview, Five Mile, Warland, Cripple Horse, Canyon Creek, Elliot/Cowell and Green Mountain. The Swamp Creek allotment no longer exists because it was part of a land exchange. From the efforts in FY 96 and 97, 17 of the 25 active allotments have new 10 year grazing permits.

The NEPA analyses completed for the seventeen allotments showed few, if any, effects resulting from current grazing activities. Some localized effects were noted in riparian areas. As a result, the NEPA decisions for re-issuing term grazing permits included implementation of riparian area protection measures to reduce or eliminate cattle use of these site-specific impacted areas. Some of these protection measures included such things as modified turnout dates, placement of physical barriers, and water developments to attract cattle away from critical riparian areas and wetlands.

Results: The FY 97 level of grazing use was 9,415 AUMs or 75 percent of the projected level (see Table D-1-1). The reason for this drop is because several of the allotments had later turnout dates than normal due to snow pack and the late spring. One allotment was not stocked in FY 97 because of flooding. Monitoring indicates that riparian protection measures identified in the new grazing permits are being implemented.

Table D-1-1 **Range Use in AUMs**

Item	Forest Plan Projected Use	FY 97	10 year Average
AUMs	12,600	9,415	11,585
Percent	100%	75%	92%

Evaluation: During the last ten years, grazing use has averaged 92 percent of projected use which is within the range anticipated in the Plan. This lower level results from permittee requests for non-use and from Forest requests to defer grazing to prevent stream bank deterioration and overgrazing.

Recommended Actions: In review of this monitoring item, no changes are needed to the Forest Plan at this time. During Forest Plan revision, the status of allotments should be reviewed. This item will continue to be monitored.

RANGE: Noxious Weed Infestations; Monitoring Item D-2

ACTION OR EFFECT TO BE MEASURED: Determine acreage infested with noxious weeds.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: 10% increase in number of acres infested, 10% increase in density of existing infestations or a change in the diversity of noxious weed species

Purpose: This monitoring item was established to identify the changes in noxious weed infestations on the Forest. The Forest Plan requires that this item be reported annually. The expected accuracy and reliability of the information is moderate to high.

Background: The Plan states that noxious weed infestations will be monitored for increases in total acreage, increases in weed density and the introduction of new weed species on the Forest. Weed infestations have been established along many roadsides, railroad and powerline rights-of-way and other disturbed areas such as gravel pits. Spotted knapweed and others have started to migrate away from the road right-of-way onto undisturbed hillsides, especially within the drier vegetation types. Most of the weeds are brought here attached to machinery, automobiles, railcars, etc. The Kootenai Forest classifies weeds into four categories which roughly follows the system used by Lincoln County. Table D-2-1 shows the types of weeds that occur on the Forest. In FY 97, the Forest prepared an Herbicide Weed Control Environmental Assessment (EA) which documents when and where herbicides can be applied on the Forest.

Table D-2-1 **Noxious Weeds on the Kootenai National Forest**

Category	Status	Threat	Goal	Species Included*
Group Ia. Potential Invaders	not known to exist	high probability of causing severe economic or environmental damage	prevention, eradication	common crupina (*Crupina vulgaris*), Dyer's woad (*Isatis tinctoria*), purple loosestrife (*Lythrum salicaria*), yellow starthistle (*Centaurea solstitialis*), eurasian milfoil (*Myriophyllum spicatum*)
Group Ib. New Invaders	small populations at limited sites	high probability of causing severe economic or environmental damage	eradication	rush skeletonweed (*Chondrilla juncea*), musk thistle (*Carduus nutans*), leafy spruge (*Euphorbia esula*), whitetop (*Cardaria draba*), Russian knapweed (*Centaura repens*), meadow knapweed (*Centaurea pratensis*), tansy ragwort (*Senecio jacobaea*)
Group IIa. Existing Infestations	large, widespread populations	high probability of causing environmental or economic damage	containment within already infested areas, reduction of plant populations	spotted knapweed (*Centaurea maculosa*), diffuse knapweed (*C. diffusa*), dalmation toadflax (*Linaria dalmatica*), yellow toadflax (*L. vulgaris*), St. John's-wort (*Hypericum perforatum*), orange hawkweed (*Hieracium aurantiacum*), meadow hawkweed (*H. pratense*), sulfur cinquefoil (*Potentilla recta*), oxeye daisy (*Chrysanthemum leucanthemum*), hound's tongue (*Cynoglossum officinale*), Canada thistle (*Cirsuim arvense*), Japanese knotweed (Polygonum cuspidatum)
Group IIb. Existing Infestations (Watch)	small populations at limited sites	unknown but high probability of causing environmental or economic damage	containment within already existing areas, reduction of plant populations, monitor	absinth wormwood (*Artemisia absinthium*), chicory (*Cichorium intybus*), common tansy (*Tanacetum vulgare*), common speedwell (*Veronica officinalis*), Germander speedwell (*V. chamaedrys*), field bindweed (*Convolvulus arvensis*), kochia (*Kochia scoparia*), meadow knapweed (*Centaurea pratensis*), poison hemlock (*Conium maculatum*), Scot's broom (*Cytisus scoparius*), spotted cat's-ear (*Hypochaeris radicata*)

*Nomenclature for vascular plants follows Hichock and Cronquist (1973) and for bioagents follows Rees et al. (1996).

Evaluation

Introduction: All the weed species listed in Table D-2-1 are of concern on the Kootenai National Forest. These lists include the State of Montana and Lincoln County lists as well as other weed species that the Forest deems important. The State of Montana and Lincoln County are very concerned about new invaders, especially two relatively new weed invaders--tansy ragwort and rush skeletonweed. There is a strong desire to keep these two species from moving east of the Continental Divide into the large farming areas of eastern Montana. The State has provided added monies for surveys and spraying to contain the expansion of these species. Strong emphasis was placed on these two species in 1997, although concern remains for all the weed species. Treatments for all weed species include one, or a combination, of the following: biological--release of bioagents; mechanical--hand pulling, hoeing, clipping of seed heads; chemical--application of herbicides; and cultural--establishment of desirable plants as competition.

Existing weed infestations have expanded significantly over the past 10 years. The most common weed on the KNF is spotted knapweed. In 1995, county weed specialists estimated that knapweed infested over 200,000 acres across the Forest (Hirsch and Leitch 1996). Two-thirds of the total infestations are in rangelands, wildlands, or forest lands; the remaining third was in road or railway corridors. The most widespread infestations are in the Clark Fork, Fisher River, and Kootenai River valleys. Knapweed is less widespread in the Tobacco Valley because of weed control programs that include the use of herbicides (1986 Noxious Weed Treatment Program Final Environmental Impact Statement allows the use of herbicides on the Rexford and Fortine Ranger Districts). KNF specialists estimate that approximately 224,000 acres are at moderate or high risk of infestation by spotted knapweed.

Inventory: Table D-2-2 below shows the total percent of surveys with each noxious weed species as well as the predominant infestation size and cover class, or density, of each species. Weeds listed on the table below are those currently being tracked by the Kootenai National Forest. This list tiers to the Montana and Lincoln County Noxious Weed Lists and includes other species of concern on the Forest. Two types of surveys were conducted last summer. One was a road survey specifically looking for rush skeletonweed. It also noted the presence or absence of other weed species. The second survey type was an area survey confined to the upper Little Wolf Creek drainage specifically to locate tansy ragwort plants.

Table D-2-2 information was tabulated from the road surveys conducted to locate new populations of rush skeletonweed. These surveys also indicated the typical size of infestation and the average cover class or density of plants. These surveys were conducted along both open and closed roads. Infestation sizes were noted and characterized as one of the following: <.1 acre, .1 to 1 acre, 1 to 5 acres, and > 5 acres. Cover classes (plant densities) were characterized as either trace (<1 percent), low (1 to 5 percent), medium (6 to 25 percent), or high (>25 percent). The total number of noxious weed species found in the road surveys is 15. Ten additional species are known to occur on the Forest. Four new sites of rush skeletonweed were located. Over 600 miles of road were inventoried. Approximately 4500 acres were surveyed and mapped for tansy ragwort. Both the size and density were noted and provided the basis for the spraying of tansy.

Table D-2-2 **Results of Noxious Weed Surveys**

Species (*Six Letter Code*)	**% of Surveys with this Species**	**Predominant Infestation Size**	**Predominant Cover Class**
Potential Invaders			
Common crupina (*Cruvul*)	--	--	--
Dyers woad (*Isatin*)	--	--	--
Purple loosestrife (*Lytsal*)	--	--	--
Yellow starthistle (*Censol*)	--	--	--
Eurasian milfoil (*Myrspi*)	--	--	--
New Invaders			
Rush skeletonweed (*Chojun*)	4	<.1 acre	trace
Musk thistle (*Carnut*)	1	<.1 acre	trace
Tansy ragwort (*Senjac*)	*	--	--
Leafy spurge (*Eupesu*)	*	--	--
Whitetop (*Cardra*)			

Table D-2-2 (continued) **Species (*Six Letter Code*)**	**% of Surveys with this Species**	**Predominant Infestation Size**	**Predominant Cover Class**
Russian knapweed (*Cenrep*)	--	--	--
Japanese knotweed (*Polcus*)	*	--	--
Blue weed (Viper's bugloss) (*Echvul*)	*	--	--
Existing Infestations			
Spotted knapweed (*Cenmac*)	83	.1-1 acre	high
Diffuse knapweed (*Cendif*)	1	<.1 acre	trace
Canada thistle (*Cirarv*)	55	<.1 acre	trace
dalmation toadflax (*Lindal*)	12	<.1 acre	trace
Yellow toadflax (*Linvul*)	5	<.1 acre	trace
Hound's-tongue (*Cynoff*)	4	<.1 acre	trace
St. John's-wort (*Hypper*)	63	<.1 to 5 ac.**	medium
Orange hawkweed (*Hieaur*)	48	<.1 acre	trace
Meadow hawkweed (*Hiepra*)	64	.1 to 1 acre	medium
Sulfur cinquefoil (*Potrec*)	7	<.1 to 5 acres	trace
Oxeye daisy (*Chrleu*)	73	>5 acres	high
Watch Species			
Germander speedwell (Vercha)	*	--	--
Common speedwell (Veroff)	*	--	--
Scot's broom (*Cytsco*)	*	--	--
Meadow knapweed (*Cenpra*)	1	<.1 acre	low
Poison hemlock (*Conmac*)	--	--	--
Chicory (wild succory) (Cicint)	*	--	--
Spotted cat's-ear (*Hyprad*)	*	--	--
Absinth wormwood (*Artabs*)	7	<.1 acre	trace
Field bindweed (*Conarv*)	--	--	--
Kochia (*Kocsco*)	--	--	--
Common Tansy (*Tanvul*)	*	--	--

* Species known to occur on the KNF or Lincoln County but not noted on any surveys.
**Size classes for populations of this species were equally spread between the lower three size classes.

Change over time can be measured by observing changes in percent of surveys with each species present, and by observing changes in the most common size and density of those populations.

Table D-2-2 also shows that spotted knapweed, St. John's-wort, meadow hawkweed and oxeye daisy are the most common weed species present on the Kootenai National Forest, all having been recorded on over 60 percent of the surveys conducted. Spotted knapweed is the most common noxious weed species on the Forest, showing up on 83 percent of all surveys. Many weed species are just becoming established on the Kootenai National Forest, such as rush skeletonweed, meadow knapweed, and dalmation and yellow toadflaxes. St. John's-wort, orange hawkweed, rush skeletonweed, and oxeye daisy all appear to be more common on the west side of the Forest, whereas, hound's-tongue, musk thistle, and tansy ragwort are more common on the east side. Spotted cat's-ear, blue weed, leafy spurge, common tansy, and Scot's broom have been found on the Forest, but were not recorded in this year's surveys. Common and Germander speedwells and chicory were not on this year's inventory forms, but are included in this report because they are known to exist and they have the potential to expand. Common tansy is prevalent on parts of the Forest despite its not showing up on this year's surveys.

Table D-2-3 Percentage of Weed Populations in Each Infestation Size and Density by Weed Category								
	Infestation Size				Infestation Density			
Weed Category	% <.1 acre	% .1-1 acre	% 1-5 acres	% >5 acres	% Trace	% Low	% Med	% High
Potential Invaders	0	0	0	0	0	0	0	0
New Invaders	86	14	0	0	86	0	14	0
Existing Infestations	38	33	16	13	34	21	25	20
Watch Species	83	17	0	0	67	25	8	0
Overall Average	39	33	16	12	35	21	24	20

Table D-2-3 describes the average infestation size and density for each of the weed categories (New Invader, Existing Infestation, etc.) and then gives the overall average for all weeds tracked by the Forest. This table shows that the majority of weed populations noted (39 percent) are found in populations of less than .1 acre and (35 percent) in densities of trace. However, weeds in the existing infestation category are more evenly spread throughout the size and density categories, showing that they have not remained in the smaller size classes and densities, but rather trend toward larger populations and higher densities if left unchecked.

This table was calculated by dividing the total number of recorded weed infestations in each category, size class, and density class by the total number of recorded weed infestations in that weed category. This gives a percentage of the total weeds in each category found in each size and density classes. The same was done to calculate the overall average, adding up weed infestations in all categories by their infestation sizes and densities, and dividing by the total weed infestations recorded. This table will also be valuable for displaying the changes in weed populations over time.

Biological Control Agents

Implementation: The KNF's present weed management program is an Integrated Pest Management (IPM) approach that combines prevention, education, and biological, mechanical, cultural, and chemical control of weeds. Biological control (biocontrol) has been the primary method of weed control across much of the Forest. Since 1987, the KNF, in cooperation with the Western Agricultural Research Center (WARC), has made approximately 100 releases (Table D-2-4) of biocontrol agents. Most of these releases have been targeted at control of spotted and diffuse knapweed, though several biocontrol agents for St. John's-wort and toadflax have also been released. The releases have been made in approximately 75 different locations. Some releases have been made in the same sites to help build the populations faster in these areas to try to stay with the increase in the weed populations.

The banded gallfly (*Urophora affinis*) was released in Montana and Oregon in 1973. This bioagent attacks the seed heads of spotted knapweed. It has survived and become established to the point where it can be found throughout much of the Forest.

Table D-2-4 Number and Type of Bioagent Released by Year							
Year	**Number of Releases**	***Agapeta zoegana*** **(spotted knapweed)**	***Aplocera plagiata*** **(St. John's wort)**	***Brachypterolus pulicarius*** **(dalmation & yellow toadflax)**	***Calophasia lunula*** **(dalmation & yellow toadflax)**	***Cyphocleonus achates*** **(spotted knapweed)**	***Metzneria paucipunctella*** **(spotted knapweed)**
1987	1	1	--	--	--	--	--
1988	3	3	--	--	--	--	--
1989	2	2	--	--	--	--	--
1990	2	2	--	--	--	--	--
1991	5	5	--	--	--	--	--
1992	5	5	--	--	--	--	--
1993	6	4	--	--	--	2	--
1994	7	4	--	--	--	3	--
1995	16	7	--	--	--	9	--
1996	29	15	1	7	2	2	2
1997	20	16	--	--	--	4	--
Total	96	64	1	7	2	20	2

The effect of these releases has been minimal thus far, although the bioagent populations have been building and the increase in weeds has slowed in some areas. Biocontrol has not measurably reduced populations of knapweed, St. John's-wort, or toadflax on the KNF, probably because populations of biocontrol agents are still very small relative to the size of the weed infestations. There is observational evidence that seedhead flies have slowed the rate of knapweed spread and, with continued releases and reproduction, these and other biocontrol insects may, over time, begin to reduce existing weed populations. However, it is unlikely that biocontrol agents will cause any widespread reduction of spotted knapweed for at least the next 10 years, during which time knapweed, St. John's-wort, toadflax, and other existing infestations will continue spreading (USFS 1997).

Biocontrols have advantages and disadvantages. If biocontrols become established, they will increase in number and continue to attack the target organism. These controls are generally species or species group specific. Other vegetation and resources are not harmed. However, many years are required for biocontrol populations to become large enough to impact the host weed. Biocontrols may also be preyed upon by other insects and animals. Some biocontrols may be limited by climatic and environmental conditions (rainfall, cold, shade etc.). Biocontrols usually do not eradicate the host weed and are often required in very large numbers to significantly affect the host. Thus, biocontrols are best used on existing, wide-spread weed infestations and not on new invader species for which the goal is eradication (USFS 1997).

Biological control agents do not effectively control new infestations because populations are generally small and scattered or because effective biocontrol agents have not been found (USFS 1997). Biological controls are best used to decrease the density or vigor of established noxious weed infestations, but are generally not effective at stopping the spread of new invaders.

Effectiveness: No monitoring of the effectiveness of biological control agents was accomplished by the Forest in fiscal year 1997. Various spot checks have shown that larvae of the released bioagents can readily be found. The Regional Office Cooperative Forestry and Forest Health Protection department monitored the survival of *Agapeta zoegana* releases last summer. Of the 11 bioagent release sites checked, all had larvae and/or adults of the bioagent present. Only 1 larvae (4 sites) of *Cyphocleonus achates* was located. There were many less releases of *Cyphocleonus* than *Agapeta*. Monitoring, by the Kootenai National Forest, of survival and effectiveness of released biocontrol agents is planned to begin in 1998.

Herbicide Application

Implementation: In 1997 a total of 1107 acres were treated with herbicides to control rush skeletonweed, spotted knapweed, and tansy ragwort specifically. These applications also reduce populations of diffuse knapweed, wormwood, sulfur cinquefoil, oxeye daisy, Dalmation and yellow toadflax, St. John's wort, orange and meadow hawkweed, and Canadian thistle. In the last six years 3,167 acres have been sprayed for spotted knapweed, leafy spurge, dalmation toadflax, rush skeletonweed, tansy ragwort, Russian knapweed, and diffuse knapweed.

Special effort was made FY 97, in the Little Wolf drainage, in conjunction with the County, to control the spread of tansy ragwort. Several actions occurred, including inventory, spraying, hand-clipping, and closing the road to traffic to prevent the spread of this species. Efforts will continue in FY 98, as well as close monitoring of this species.

Effectiveness: No specific plots were established to monitor the effectiveness of herbicide applications, although monitoring of the rush skeletonweed populations by the county has shown that Tordon 22K is effective against this species. Follow-up spraying of individual plants that were not sprayed because they were missed earlier, or germinated later in the year has been found to be a key element of control of this species. Monitoring effectiveness of herbicide applications is planned for 1998 as time and funding allow. This monitoring will be in the form of photo points within treated areas before and after treatments and will continue for 10 years after treatment.

The KNF has used herbicides to control noxious weeds with some success. The 1986 Noxious Weed Treatment Program Final Environmental Impact Statement allowed the use of herbicides on the Rexford and Fortine Ranger Districts. Spraying of roadsides, administrative sites, and gravel pits on these Districts in recent years has visibly reduced weed populations in many areas and prevented weeds from spreading to uninfested areas. Except for emergency spraying at the Troy and Libby Airports after the 1994 fires, and for rush skeletonweed starting in 1993, the KNF has not used herbicides elsewhere on the Forest. Lincoln, Sanders, and Flathead Counties have sprayed roadsides which cross NFS lands where the county has clear right-of-way. The Forest completed an Herbicide Weed Control EA in 1997. The purpose of this EA is to provide an additional tool for eradicating new invaders and limiting the spread of existing noxious weeds.

Mechanical

Implementation: Seed heads of tansy ragwort were clipped along several hundred yards of roadway. Approximately 10 acres of dalmation toadflax were hand pulled. These plants were then burned.

Effectiveness: *The KNF's mechanical and cultural control efforts have not proven effective at containing* or reducing widespread noxious weed infestations. Some forms of mechanical and cultural control, such as tilling and mulching, have not been tried because they are not practical on the steep, forested hillsides which comprise much of the Forest. Roadside mowing has not prevented knapweed from flowering and going to seed. Roadside clipping of tansy ragwort seed heads was used this year in conjunction with spraying.

Hand-pulling, which is the principal method of mechanical control used on the KNF, has been effective on individual plants of some species or very small, isolated weed populations. Attempts to hand-pull large infestations of knapweed and toadflax have provided only temporary control because seeds remain viable in the soil for up to 12 years. Hand-pulling is completely ineffective on weeds with deep taproots and weeds which reproduce through runners or shoots, such as rush skeletonweed and leafy spurge. Pulling these species stimulates growth in the roots and fragments which remain in the soil, resulting in more plants instead of less (USFS 1997).

Most soil-disturbing activities on the KNF require reseeding of exposed soil. Though reseeding is done principally to prevent erosion, it does inhibit invasion of disturbed sites by noxious weeds. The KNF requires seed to be certified noxious "weed free". In addition, the KNF has established a native seed bank to assist in restoring disturbed sites. Reseeding and revegetation has prevented weeds from spreading onto many disturbed sites. However, these practices have not prevented existing infestations from spreading into wildlands and forests and also have not reduced existing infestations. In 1996 a clause, Noxious Weed Control Provision C(T) 6.26, was added to timber sale contracts. This is a mandatory provision that applies to all new sales and will be included when sales are modified or extended. The clause requires off-road equipment such as tractors, skidders, and processors to be washed prior to operating. This clause will help prevent bringing in new weeds to disturbed sites.

Conclusion: Monitoring indicates that several noxious weeds (see Table D-2-2) have increased more than 10 percent in the numbers of acres affected and some have had a 10 percent or more increase in density of existing infestation since the Forest Plan (September, 1987) was signed. In addition, with the discovery of several new invaders over the last several years, it is apparent that the diversity of noxious weed species has increased. Based on this, this monitoring item is outside the range prescribed in the Forest Plan.

Recommended Actions: Prior to 1997 emphasis in weed control focused on the use of biological and cultural controls (cultural control uses plant competition to maintain or enhance desired plants) and the use of herbicides on the north end of the Forest. In 1996, a Noxious Weed Control Provision was added to the timber sale contracts. In 1997, the Herbicide Weed Control EA was issued giving the Forest another tool for control. These actions are occurring under the direction of the Plan and should help improve the noxious weed situation on the Forest. Because of this no changes are needed in the Forest Plan at this time.

TIMBER: Allowable Sale Quantity (ASQ); Monitoring Item E-1

ACTION OR EFFECT TO BE MEASURED:	Determine if the sell volume meets the projections of the Forest Plan, including other permissible sale volumes.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	+/- 5 percent deviation for the ASQ volume, and +/- 10 percent deviation for the other permissible volumes.

Purpose: This monitoring item was established to help ensure that the ASQ stated in the Forest Plan is not exceeded and, if not attained, why. The Plan requires that this item be reported annually. The expected accuracy and reliability of the information is high.

Background: The ASQ is a projected maximum or ceiling and not a target to be reached at the expense of other considerations. The Forest's projected total maximum timber **sell** volume for the decade from suitable management areas is 2,270 million board feet (MMBF), which is an average of 227 MMBF per year (see Forest Plan, Appendix 11). In addition, 60 MMBF was estimated to be sold from unsuitable management areas, averaging six MMBF per year. These two components of suitable and unsuitable sell volumes comprise the total potential timber sale program of 2.3 billion board feet for the decade, which is an average of 233 MMBF per year.

Results: Table E-1-1 shows that sell volumes have declined from approximately 200 MMBF/yr to less than 100 MMBF per year between FY 88 to FY 97. The average yearly amount sold has been 120 MMBF from suitable lands, and 1.4 MMBF from unsuitable lands. In total, this amounts to 1.2 billion board feet for the decade. This actual sell volume is well below the ASQ limit as set in the Plan.

Evaluation: After 10 years of implementation, there is a clear trend of decreasing sell volume. In the FY 92 Monitoring Report, the Forest reported in detail on a number of factors which caused this decrease. Most of these factors are still influencing the sell volume. These include:

- Litigation and appeals
- Changes in utilization standards
- Wildlife snag management
- Old growth habitat designation
- Additional grizzly bear habitat designation and recovery standards
- Harvest on interspersed private lands
- Harvest deferrals (see Item E-7)
- Management Area designation changes (see Item E-3)

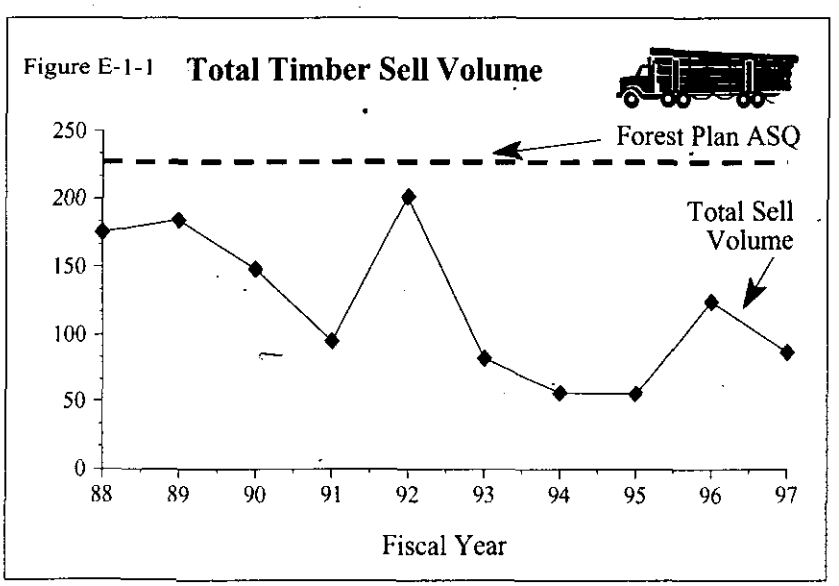
In November, 1995, the Chief of the Forest Service issued a decision on a Forest Plan appeal related to an technical error in the calculation of the Forest's ASQ. The issue centered on how timber age classes were cataloged in the inventory information used to calculate ASQ. A description of the problem is in the FY 92 Monitoring Report. The decision required that the Forest not to exceed a sell volume of 150 MMBF per year until the Plan is either amended or revised. In response, in November, 1996 the Forest issued a Notice of Intent to revise the Forest Plan. Since that time, the Forest has been preparing data and training personnel to facilitate formal preparation of a revised Plan.

In the past 5 years, additional factors have influenced the timber sales program. The most significant was additional streamside protection measures as required by the Inland Native Fish (INFS) Decision of July, 1995. Also, the US Fish and Wildlife Service amended biological opinion for grizzly bear recovery was issued July, 1995 and changed how recovery processes would take place on the Forest. In general, in the past five years, it has become more difficult to plan and execute sales due to public controversy and scheduling requirements necessary to meet resource needs.

The evaluation limit for this monitoring item is plus or minus 5 percent for suitable volumes and plus or minus 10 percent for unsuitable volumes. These limits have been exceeded, and this indicates that evaluation of these factors which started in the FY 92 Monitoring Report will need to continue during the revision of the Forest Plan.

Table E-1-1 Timber Sell Volumes (MMBF) by Category by Fiscal Year									
	Forest Plan Annual ASQ Projection	Average Sell Volume FY 88-92	FY 93	FY 94	FY 95	FY 96	FY 97	Average Sell Volume FY 93-97	Average Sell Volume FY 88-97
Suitable Lands	227	159	82	56	55	123	87	81	120
Unsuitable Lands	6	2	0.5	0.2	0.3	0.6	0.2	0.4	1.4
Total Timber Sell Program	233	161	82.5	562	55.3	123.6	87.2	81.4	121.4

Figure E-1-1 **Total Timber Sell Volume**



Recommended Actions: The Forest has not exceed the ASQ in 10 years of implementation. However, large changes in the actual program levels versus the projections of the Forest Plan indicate that revision of the Plan will need to address the sustainability of the timber sale program. This will be a part of the initial issues for scoping during the revision of the Forest Plan.

TIMBER: Acres of Timber Sold for Timber Harvest; Monitoring Item E-2

ACTION OR EFFECT TO BE MEASURED:	Determine if the regeneration harvest acres meet Forest Plan projections by management area.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	+/- 10% by management area.

Purpose: This monitoring item was established to help ensure that harvest acreages and volumes sold are closely correlated. The Forest Plan requires that this monitoring item be reported annually. The expected accuracy and reliability of the information is high.

Background: The acres to be harvested as projected by the Plan are located in six different management areas (MAs). Since each MA has different objectives and management standards, the expected costs of timber harvest will vary. Any significant deviation from the expected harvest acreage for each MA could indicate possible changes in costs, benefits, budget requirements, or environmental effects. (For more information on the Forest Plan MA requirements, see Chapters II and III of the Plan.)

The Plan projects 15,740 acres of annual regeneration harvests to achieve the ASQ. Regeneration harvests include clear cut, seed tree, and shelterwood cutting methods. Salvage and sanitation cuts are not included in the acreage figure.

Results: Table E-2-1 shows the acres sold for regeneration harvest by MA by fiscal year plus the 10 year average. During FY 97, acres cut resumed the general downward trend which had been established during the period from FY 88 to FY 95. The acreage cut during FY 96 deviated from the longer term trend due to the salvage of areas affected by the 1994 wildfire events. The 10 year average for MA 15 is approximately at the Plan's projected level, while five other suitable timber MAs (11, 12, 14, 16, and 17) are significantly below Forest Plan projected amounts.

Figure E-2-1 shows the difference between projected and accomplishment in terms of average annual acreage difference. MA 11 and 15 are closest to the projected harvest amounts while MA 12 , which is managed for a combination of timber and big game habitat, has the largest average acreage deviation. MA 14 and 16 show large percentage differences between projected and actual, although the acreage planned for harvest in these areas is much less than that planned for MA 12. Very little harvest was accomplished in MA 17 lands; however, relatively little was projected.

Evaluation: Many of the factors affecting this monitoring item are similar to those affecting item E-1, Allowable Sale Quantity. As stated in the evaluation for that item, wildlife habitat management, watershed concerns, litigation, appeals, deferrals, and changes in management area designation have all affected the potential to meet the Plan's projected regeneration harvest.

Table E-2-1 Acres of Timber Sold for Harvest by Fiscal Year (Regeneration Harvest Methods Only)

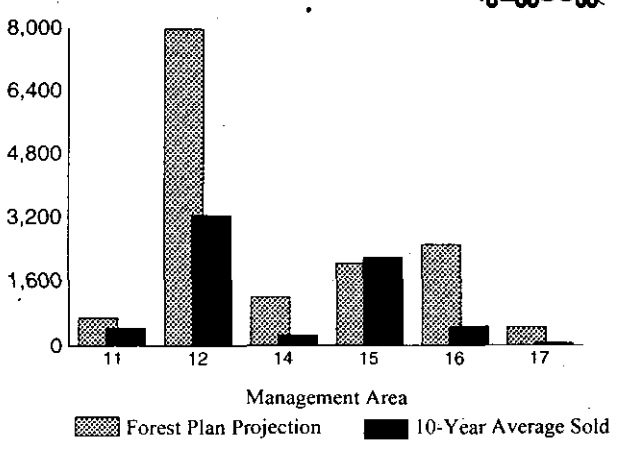
MA	FP Projection	FY88	FY89	FY90	FY91	FY92	FY93	FY94	FY95	FY96	FY97	10-Yr Ave *	% of FP **
11	690	696	665	831	521	681	105	118	17	224	421	430	62%
12	8800	6,518	5,431	3,729	2,182	5,265	1,003	685	1,398	4,130	2,361	3,270	37%
14	1,220	170	139	142	56	353	491	0	22	1,080	58	251	21%
15	2,050	3,513	4,574	3,790	1,752	2,217	1,146	770	487	1,251	2,342	2,184	107%
16	2,520	325	416	277	1,371	935	340	356	258	187	226	469	19%
17	460	55	10	47	47	30	88	228	0	36	22	56	12%
Total	15,740	11,277	11,235	8,816	5,929	9,482	3,173	2,157	2,182	6,928	5,430	6,661	42%

*Average Sold Per Year

** % of Forest Plan projection

Since harvest has focused on MA 15 lands during the last ten years, it indicates that there are efficiencies present for that MA that are not present for the other MAs. Assessment work for Forest Plan revision will need to determine both future opportunities for MA 15 and the problems which prevented greater utilization of the other management areas for timber harvest.

Figure E-2-1 **Average Annual Acres of Timber Sold for Harvest**



Recommended Actions: It is apparent that the acres sold for harvest will not meet the acreage projected in the Forest Plan. This is a result of many factors which are influencing the Forest's timber sales program (see E-1 for details). The upcoming revision of the Plan will provide the opportunity to assess appropriate levels of harvest volume and acreage.

TIMBER: Suitable Timber Management Area (MA) Changes; Monitoring Item E-3

ACTION OR EFFECT TO BE MEASURED:	Determine if significant cumulative changes are occurring in the suitable timber base by tracking management area boundary changes.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	+/- 5,000 acre cumulative total change in any suitable timber management area.

Purpose: This monitoring item was established to help ensure that the suitable timber base was being validated before any projects were authorized and to determine what influence any significant changes have on the ASQ. The Forest Plan requires that this item be reported annually. The expected accuracy and reliability of the information is high.

Background: The allowable sale quantity (ASQ) calculated for the Plan is partially dependent on the amount of suitable timber acreage. This acreage is located within MAs 11, 12, and 14-17. These MAs are validated during site-specific project analysis. When inaccuracies are found, an MA boundary correction is made to keep the Forest Plan MA Map and acreage current. MA boundary changes can result in gains or losses in MA acreage, depending on the conditions found. The important items to track are the total changes by MA and the net gains or losses in suitable timber acreage. The most common conditions that cause an MA map change are mapping and drafting errors found on the original maps, non-productive forest land located within an MA mapped as productive (the reverse situation is also found), big-game winter range habitat is nonexistent where originally mapped (the reverse is also found), or additional acreage is designated to meet the 10 percent minimum old growth standard. Differences in calculating acreages also occurred in FY 95-96 when the Management Areas were converted to GIS.

Evaluation: Table E-3-1 displays the net MA acreage changes in suitable timberland for the last ten years (FY 88-97) and the net change in all suitable timberland. The largest change in FY 97 was a net loss of 13,735 acres of MA 15. Total net loss in the suitable timber land in FY 97 was 17,055 acres. Table E-3-2 shows this information for the largest unsuitable MAs. The Checkerboard Land Exchange accounted for the most significant changes in FY 97. As a result of the exchange, there was a net change of 3,711 acres from public to private land, resulting from a decrease in suitable lands of 11,628 acres (mostly MA 15) and a increase of 7,917 acres in unsuitable land (mostly MA 2). Because of the magnitude of these MA changes, they are shown as a separate line in the tables below.

Other than this large land exchange, the most significant changes were due to designation of MA 13 (old growth) in several large watersheds. Nearly 3,000 acres originally designated as MA 15 was validated as old growth habitat and changed to MA 13 in those watersheds. The pattern of change (aside from the Checkerboard MA changes) has been fairly consistent in both magnitude and direction. This monitoring item is outside the prescribed range for MAs 11 and 15 (more than 5,000 acres of change), and MA 16 is approaching this variability threshold. The remaining suitable timber MAs are within evaluation limits (MAs 12, 14, 17).

Suitability Review: The National Forest Management Act, 36 CFR 219.14(d) requires that the designation of lands not suited for timber production be reviewed at least every ten years. We have completed this review and determined that no changes are necessary at this time. This is based on the fact that (1) corrections to management areas based on site-specific conditions have been made during the last 10 years, where appropriate; (2) changes in market conditions have not occurred enough to warrant a change in management direction; and (3) other changes in the decisions regarding proposed wilderness, roadless recreation, etc., are not warranted at this time. All of these factors will be further evaluated during Forest Plan revision.

Recommended Actions: The degree to which changes have been made to management area designations indicate continuing validation of Forest Plan data. The large change in the suitable management area category (nearly 58,000 acres) amounts to approximately three percent of the total suitable base. At this time, it is not apparent that this is significant in terms of the calculation of the long term sustainability of the timber harvest program or ASQ. During revision of the Forest Plan, sustainability and ASQ calculations will be made using the validated management areas. This will allow for an assessment of the effect of changed management area designations.

Table E-3-1 Net Acreage Changes by Management Areas (MA) in Suitable Timberland							
Fiscal Year	MA 11	MA 12	MA 14	MA 15	MA 16	MA 17	Total Chg to Suitable MAs
1988	330	0	1,070	(1,760)	(510)	0	(870)
1989	(1,142)	(345)	386	253	(22)	(48)	(918)
1990	(164)	(420)	(130)	(4,273)	916	(661)	(4,732)
1991	78	(442)	(1,050)	(3,188)	(1,414)	(281)	(6,297)
1992	(9,279)	(3,178)	(196)	(1,711)	(1,498)	(323)	(16,185)
1993	(1,329)	1,000	(705)	(7,444)	(2,271)	22	(10,727)
1994	(109)	(402)	106	524	111	(148)	82
1995	(457)	1,441	131	(1,845)	(193)	0	(923)
1996	(1,370)	2,743	(206)	(1,679)	229	440	157
97CLE*	(127)	(2,030)	2,392	(8,680)	(2,689)	(494)	(11,628)
97 other	(2,215)	2,168	(66)	(5,055)	(625)	366	(5,427)
Total Net Chg to MA	(15,784)	535	1,798	(29,803)	(7,966)	(1,127)	(57,468)

Suitable MAs indicate productive forest lands with consideration for other resources determining the difference among them. MA 15 lands are managed primarily for high timber yields. MA 11 and 12 are lands which can provide for timber and big game habitat (11 for winter range and 12 for summer range). MA 14 areas are timberlands which have been identified as essential for recovery of the grizzly bear. MA 16 and 17 indicate areas where protection of the visual resource is important.

* The Checkerboard Land Exchange is shown as a separate breakout in FY 97.

Table E-3-2 Net Acreage Changes by Management Areas (MA) in Unsuitable Timberland							
Fiscal Year	MA 2	MA 10	MA 13	MA 18	MA 19	MA 24	Total Chg to Unsuitable MAs
1988	240	1,670	(500)	190	(280)	480	1,800
1989	842	0	(149)	32	135	100	960
1990	150	1,080	1,877	381	(950)	2,564	5,102
1991	1,009	574	4,135	(140)	(231)	1,724	7,071
1992	196	3,211	7,980	2,656	231	823	15,097
1993	(338)	374	7,931	(595)	(2,115)	2,618	7,875
1994	(173)	(69)	914	(437)	(294)	177	118
1995	181	(643)	1,788	(657)	112	(128)	653
1996	32	(550)	3,290	(1,725)	(630)	(649)	(232)
97CLE*	12,777	(149)	(2,249)	(417)	(464)	(1,581)	7,917
97 other	109	(550)	8,501	(1,625)	(644)	(165)	5,626
Total Net Chg to MA	15,025	4,948	33,518	(2,337)	(5,130)	5,963	51,987

Unsuitable MAs are used for areas where timber production is not a primary consideration; for example, MA 2 is Roadless Recreation; MA 10 is big game winter range not suited for timber production; MA 13 is protected old growth habitat; MA 18, 19, and 24 are lands with little timber value or lands difficult to regenerate (rocky areas, steep slopes). Other unsuitable MAs identify Wilderness, Special Interest Areas, Administrative Sites, etc. Included within unsuitable MAs are areas of inventoried old growth not identified as MA 13.

NOTE: The differences displayed in the Fiscal Year totals and the Total MA Changes in the two tables shown above are the result of eight additional MAs which contain some minor changes (usually less than 200 acres each) plus the lands that have been acquired and disposed of in the land exchanges completed during the years since the Forest Plan was approved. In FY 95 and FY 96, there were also changes to all MAs due to the process of converting to GIS.

TIMBER: Timber Growth Trends; Monitoring Item E-4

ACTION OR EFFECT TO BE MEASURED:	Determine growth trends by timber productivity class (MIX CON I, MIX CON II, LPP) to validate the timber yield tables used in the Forest Plan.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	+/- 10% of predicted volume by productivity class.

Purpose: This monitoring item was established to help ensure that the timber volumes predicted in the long-term harvest schedule are reasonable. The Forest Plan requires that this item be reported annually. The expected accuracy and reliability of the information is high.

Background: Growth trends are monitored using two types of surveys, permanent growth plots and Timber Stand Improvement (TSI) Benchmark exams. Beginning in FY 83, 59 permanent plots have been established representing precommercial and commercial thinning activities undertaken within three productivity groups (Mix Con I, Mix Con II and LPP), and at stocking levels displayed in the Forest Plan Timber Yield Tables. These yield tables have been further defined (specific stand attributes such as trees per acre, tree heights, cubic feet growth, etc.) by the *Kootenai N.F. Habitat Type Groups and Target Stands* document in 1993. These target stands are being used as a standard to measure silvicultural treatments.

Ten percent of the stands precommercially thinned 10 years earlier are sampled annually with a TSI Benchmark exam. This currently measures silvicultural treatments prior to approval of the Plan. The information derived from this exam is used to improve our present work, adjust growth modeling, and update inventories.

Results: The permanent growth plots remeasured in FY 92 and 97 represent growth during the periods 1988-1992 and 1993-1997, respectively. These exams occurred in all three productivity groups and are the primary source of information for reporting growth trends in the 10 year period since the Plan was developed.

5 Year Review (1993-1997): Growth trends and stand attributes evaluated through recent growth plot remeasurements indicate that the present stand conditions are meeting or exceeding the parameters set by the target stands (USFS 1993) in over 90 percent of the cases. All sampled stands met or exceeded prognosis projections for stocking levels, quadratic mean diameter (QMD), and height of dominant trees. An exception is occurring in stands with reduced annual height growth due to brush competition, root disease, and/or bear damage. One of these stands is being monitored to demonstrate the effects of precommercial thinning a pole-size stand that resulted after a wildfire in 1931. The sampled growth plot established to monitor effects of overstory competition could not differentiate between the treated and control plots as the control has no overstory, nor has it been thinned.

10 Year Review (1988-1997): The permanent growth plots measured to represent growth in managed stands following precommercial and commercial thinning indicate that stand characteristics and growth trends are within the parameters set for their current stage of development. The indications are that specific stand attributes (tree heights, annual growth, number of trees per acre, QMD, etc.), modeled through growth projections and established as a standard to measure silvicultural treatments, are effectively predicting growth trends. Although not modeled in the original Forest Plan Timber Yield Tables, growth plots established in stands with residual overstory indicate a 10-25 percent reduction in volume, when compared with projections for even-aged single-storied stands. These growth trends are consistent with parameters outlined for multistoried target stands (USFS 1993).

Benchmark exams taken in FY 96 represent precommercial thinning in sampled stands prior to 1986. Information interpreted from these exams indicate that these stands are meeting growth and yield projections as outlined in the target stands. In some cases, height growth is somewhat less than optimal due to the effects of animal damage, root disease, western gall rust, and or mechanical damage (e.g.: snow, past logging). All but one stand is on a developmental course towards full potential and will benefit from the first commercial thinning entry.

Evaluation: The result of measurements taken in permanent growth plots and TSI benchmark exams indicate that growth trends in stands managed as even-aged and single storied are consistent with Forest Plan Timber Yield Tables and parameters further defined in "KNF Target Stands", 1993. This monitoring item is within the range prescribed in the Plan.

Recommended Actions: As silvicultural prescriptions and management activities are adapted to meet emerging direction and a host of new or different objectives, the need to revise yield tables is very likely.

TIMBER: Reforestation; Monitoring Item E-5

ACTION OR EFFECT TO BE MEASURED: Determine acres of reforestation and survival to track the Forest Plan's projections and insure that NFMA requirements are being met.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: +/- 10% of predicted regeneration acres.
10% of the stands are not certified as regenerated within 5 years after final harvest (5 years after clearcutting, or 5 years after the overstory has been removed after a seedtree or shelterwood cut).

Purpose: This monitoring item was established to help ensure that the allowable sale quantity (ASQ) is reasonable. The Forest Plan requires that this item be reported every 5 years. The expected accuracy and reliability of the information is high.

Background: The Plan estimates that about 14,100 acres per year will require reforestation assistance to achieve successful regeneration. These acres need to be promptly reforested to ensure that predicted future timber growth levels can be achieved. Prompt reforestation is also needed to meet the requirements of the National Forest Management Act (NFMA) which directs that it be accomplished within five years after the final harvest of trees on a site. The reforestation can be accomplished by using natural regeneration methods (seedfall from adjacent seedtrees), artificial regeneration methods (planting of nursery-grown seedlings) or a combination of both methods. Site preparation for both the natural seedfall or planting is an integral part of the total reforestation job.

Results: Table E-5-1 displays the results from the last ten years of reforestation activities. The acreage has ranged from 5,440 acres in FY 97 to 15,720 acres in FY 91. The total acreage reforested is 104,940 acres. The amount of replanting over the 10 year period was 7,380 acres, about 10 percent of the initial planting acres. Most replanting occurred in plantations damaged from fires in FY's 88, 91 and 94. There was significant mortality from the drought in FY 94 and increased big game animal damage mortality to plantations over the last 4 fiscal years.

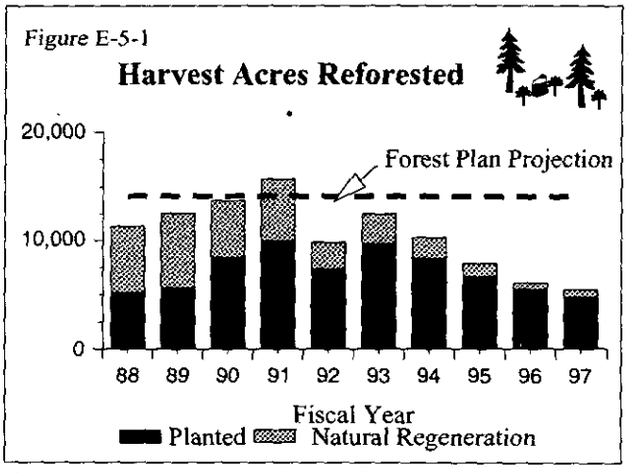
Evaluation: The total acreage reforested has decreased steadily since FY 93. This is a direct result of less acres being harvested, therefore less reforestation needs. (See E-2, Acres of Timber Sold for Timber Harvest, and E-7, Timber Harvest Deferrals for further discussion). Service visits continue to show timely and effective reforestation activities for lands in a regeneration harvest phase. The 10 year average of satisfactorily restocked stands within 5 years of final harvest is 96 percent.

Recommended Actions: It is apparent that the acres regenerated will not meet the acreage projected in the Forest Plan. This is a result of many factors which are influencing the Forest's timber sale program (see E-1 for details). The Forest Plan revision will provide the opportunity to assess appropriate levels of harvest volume and acreage. Reforestation efforts are meeting the requirements of NFMA. This portion of the monitoring item is on-track, and no changes are needed in this effort, at this time. We will continue to monitor reforestation.

Table E-5-1 Harvested Acres Reforested & Survival

Fiscal Year	Natural Regen	Planting	Total Reforestation	Replanting	Percent Survival
88	6,130	5,150	11,280	290	97%
89	6,890	5,600	12,490	280	98%
90	5,300	8,370	13,670	730	95%
91	5,790	9,930	15,720	510	97%
92	2,430	7,340	9,770	700	94%
93	2,770	9,660	12,430	550	96%
94	1,980	8,270	10,250	800	95%
95	1,200	6,630	7,830	1,030	95%
96	580	5,480	6,060	1,160	95%
97	700	4,740	5,440	1,330	95%
Totals	33,770	71,170	104,940	7,380	
Average	3,377	7,117	10,494	738	96%

Figure E-5-1



Note: Some changes were made from the first 5-year reporting data.

TIMBER: Timber Stand Improvement; Monitoring Item E-6

ACTION OR EFFECT TO BE MEASURED	Determine acres of TSI to see if the Forest Plan's targets are being met.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	+/- 20% of predicted TSI acres.

Purpose: This monitoring item was established to help ensure that the Forest Plan's target growth projections are being met. The Plan requires that this item be reported every five years. The expected accuracy and reliability of the information is high.

Background: The Plan estimates 5,000 acres of Timber Stand Improvement (TSI) activities will be needed each year to achieve the future timber growth levels predicted. TSI activities are primarily precommercial thinning and release operations. This consists of deliberately cutting unwanted tree saplings, which are about 10-20 years old, to provide a more optimum spacing for growth and species mix. TSI is done on those stands where the number of tree saplings exceed a desirable maximum (about 600 trees per acres). If precommercial thinning is not done in overstocked stands, growth stagnation can occur in all saplings in the stands.

Results: Table E-6-1 displays the results of the last ten years of TSI operations. The accomplishments total 42,940 acres and average 4,294 acres per year.

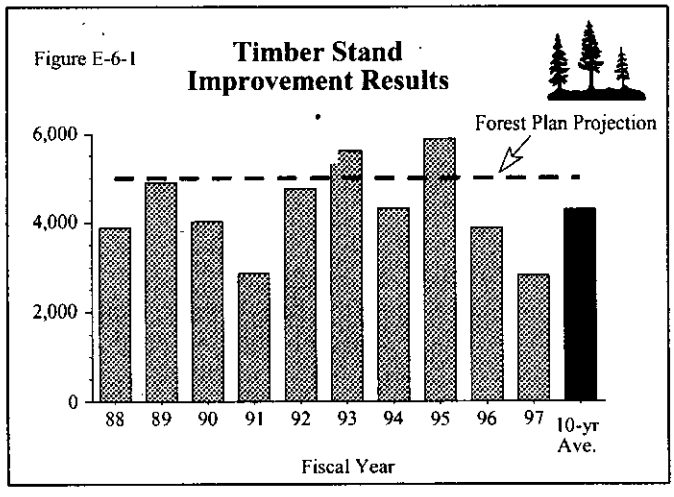
Evaluation: The amount of TSI work accomplished has been variable, depending on available workforce and budget. At the end of ten years, this monitoring item shows an average of 4,294 acres accomplished per year and 86 percent of predicted targets, but within the +/- 20 percent range prescribed in the Plan (from 2,820 to 5,890 acres). Approximately 8,400 acres of TSI opportunities over the last five years has not been accomplished due to lack of funding. If budget reductions continue, the amount of TSI work accomplished in the future will be reduced.

Recommended Actions: Based on the information stated above, the monitoring item is on-track. We will continue to pursue budgets to accomplish the backlog of TSI that has not been accomplished. *NOTE: Some changes were made from the first 5 year reporting data.*

Table E-6-1 TSI Results

Fiscal Year	TSI Acres
88	3,890
89	4,900
90	4,020
91	2,860
92	4,760
93	5,610
94	4,310
95	5,890
96	3,880
97	2,820
10-yr Ave.	4,294
Total	42,940

Figure E-6-1



TIMBER: Timber Harvest Deferrals; Monitoring Item E-7

ACTION OR EFFECT TO BE MEASURED:	Determine the suitable timber acreage deferred from timber sales because of economics, resource conflicts, or other unforeseen reasons.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	More than 10,000 acres cumulative change in any suitable management area (MA).

Purpose: This monitoring item was also established to help ensure that the allowable sale quantity (ASQ) is reasonable. Any significant changes in the acreage available for timber harvest could affect the ASQ because it was determined by estimating the maximum amount of available harvest acreage in the first decade while still meeting all the required Forest Plan standards. The Plan requires that this item be reported annually. The expected accuracy and reliability of the information is moderate.

Background: To determine the effect of harvest deferrals on the timber sale program, monitoring is done in two different categories. **Category A** deferrals are those that result from our project-specific conclusions about resource or economic conflicts that were not adequately accounted for in the Plan. Examples are road construction that is too expensive or a threatened, endangered, or sensitive species found which was unknown during Forest Planning. **Category B** deferrals are those that result from an externally imposed situation. Examples include appeals and court injunctions or significant timber harvest on adjacent private land which could exceed thresholds and may degrade watersheds if the Kootenai Forest timber is harvested before adequate watershed recovery occurs on the private land. Please note that suitable timber acres rescheduled from one year to a later year within the Forest Plan period are not considered deferred.

Results: Table E-7-1 displays deferred harvest acres by category for each suitable timber management area on the Forest for FY 88-97. In FY 97, 1,359 acres in Category A were deferred, and none were deterred in Category B.

Evaluation: For FY 97, less acres were deferred in **Category A** in comparison to several preceding years. Deferrals took place due to a variety of reasons, including potential impact to watershed, fisheries, and roadless resources, economically unfeasible harvest units, or difficulty in finding an appropriate logging system to fit the situation.

Table E-7-1 shows that for the entire period from FY 88-97, 33,754 acres were deferred for both A and B categories. The largest amount for a single MA is 22,074 acres which were deferred in MA 12. This is the largest amount of all the MAs and is beyond the prescribed evaluation range of 10,000 acres. MA 14 and 15 also had large amounts of harvest deferred, although they did not exceed the 10,000 acre evaluation range.

Recommended Actions: This item indicates that many more factors affect harvest than was accounted for during the preparation of the Forest Plan. Since the Forest now has detailed records of such factors, it will be more able to assess those effects during Plan revision. These factors will continue to be monitored, and brought forward in the revision process.

Figure E-7-1 **Harvest Acres Deferred in Suitable Timber MAs**

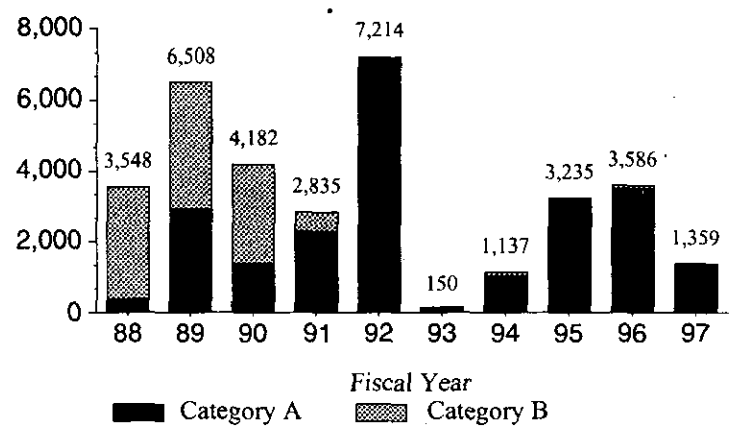


Table E-7-1 Harvest Acres Deferred in Suitable Timber Management Areas (MA's)							
Category and Fiscal Year	MA 11	MA 12	MA 14	MA 15	MA 16	MA 17	Total
Category A							
88	15	340	25	0	0	0	380
89	95	2,434	68	196	138	0	2,931
90	89	779	107	120	298	0	1,393
91	204	1,629	360	38	60	0	2,291
92	66	4,886	2,186	76	0	0	7,214
93	0	106	0	0	0	0	106
94	0	77	963	0	0	0	1,040
95	8	1,449	0	936	842	0	3,235
96	0	3,257	234	0	0	0	3,491
97	23	1,136	173	0	0	0	1,359
Subtotal Cat A	500	16,120	4,116	1,366	1,338	0	23,440
Category B							
88	0	2,580	274	314	0	0	3,168
89	198	2,274	301	766	30	8	3,577
90	403	912	62	1,164	168	80	2,789
91	7	60	0	427	50	0	544
92	0	0	0	0	0	0	0
93	0	33	0	0	11	0	44
94	0	0	0	0	0	97	97
95	0	0	0	0	0	0	0
96	0	95	0	0	0	0	95
97	0	0	0	0	0	0	0
Subtotal Cat. B	608	5,954	637	2,671	259	185	10,314
Totals A and B							
88	15	2,920	299	314	0	0	3,548
89	293	4,708	369	962	168	8	6,508
90	492	1,691	169	1,284	466	80	4,182
91	211	1,689	360	465	110	0	2,835
92	66	4,886	2,186	76	0	0	7,214
93	0	139	0	0	11	0	150
94	0	77	963	0	0	97	1,137
95	8	1,449	0	936	842	0	3,235
96	0	3,352	234	0	0	0	3,586
97	23	1,163	173	0	0	0	1,359
FY 88-97 Totals	1,108	22,074	4,753	4,037	1,597	185	33,754

TIMBER: Harvest Area Size; Monitoring Item E-8

ACTION OR EFFECT TO BE MEASURED:	Cutting unit size by forest type, management area, and District.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	Variation in trends of other resources beyond the natural variation that can be determined.

Purpose: This monitoring item was established to help ensure that the maximum regeneration harvest sizes permitted in the Forest Plan are not exceeded without appropriate documentation. The Plan requires this item be reported every two years. The expected accuracy and reliability of the information is high.

Background: The Plan provides standards and guidelines for timber harvest area sizes for individual MAs. These harvest area limitations are primarily for regeneration harvest methods which are clearcuts, seedtree and shelterwood methods. The purpose is to provide a balance for all the major resources emphasized in each of the specific MAs. In MA 11, for example, regeneration harvest area size is recommended to not exceed 20 acres to provide habitat for moose and white-tailed deer. In MA 12, the regeneration harvest area size is recommended to not exceed 40 acres to provide habitat for elk. In other MAs, no specific guides are given, but regeneration harvest area sizes need to be consistent with other management objectives for the MA.

Exceptions to these guides can be considered during an environmental analyses in which location-specific land attributes and issues are considered and the harvest area size and resultant openings are planned to best meet the management objectives of the area. The Regional Forester needs to approve any non-catastrophic harvest area request to exceed 40 acres. The Forest Supervisor can approve an opening greater than 40 acres when catastrophic events such as fire, windstorms, insect attacks, or disease damages a forest stand. Monitoring of these approved exceptions for timber harvest areas and resultant openings is done to track the amount of variation from the MA guidelines.

Results: Table E-8-1 displays the Forest-wide average harvest area size in acres for each MA by harvest method. The period shown is the last ten years, from 1988-97, including a 10 year average. The harvest methods displayed are clear cutting, seed tree cutting, shelterwood cutting, and all other harvest methods. *Clearcutting* generally leaves a few scattered live and dead trees per acre for cavity-nester use; *seedtree* harvest leaves about four to eight trees per acre for natural seeding; *shelterwood* harvest leaves about nine to 15 trees per acre for natural seeding and environmental protection such as shading. The other harvest methods include overstory removal, salvage, sanitation, thinning, preparatory cuts, and other intermediate silvicultural treatments that do not significantly open the forest canopy. Because of their more limited impact compared to the regeneration harvest methods, these other harvest methods do not have any acreage restrictions for harvest area size.

Appendix C lists the harvest areas resulting in larger than 40 acre openings approved during FY 97 as well as an estimate of how long it will take for the vegetation to regrow to meet the management area objectives. There were 38 resultant openings greater than 40 acres approved by the Forest Supervisor in FY 97. All were in response to the catastrophic results of the 1994 fires, windstorm, or dead lodgepole pine. In most cases, the newly created openings were contiguous with an existing harvest unit. Many of these openings did not provide hiding cover because of the extent of mortality.

Evaluation: Figure E-8-1 shows that the average harvest area size for FY 88 to FY 97. The average sizes are well below the objectives of 20 acres for MA 11 and 40 acres for MA 12. Average size for the other suitable MAs are also below 40 acres. As discussed in the FY 96 Monitoring Report, there where occasional instances of a single year's average value extending beyond 40 acres. These instances occurred when there were relatively few harvest units in a given year, and the units had been approved as described above.

Recommended Actions: Based on review of the monitoring information, no changes are needed to the Forest Plan. Projects approved to exceed 40 acres were done so with the appropriate documentation and analysis and, therefore, are consistent with the Plan. Continue to monitor this item.

Table E-8-1 Average Harvest Area Size in Acres by Harvest Method and Management Area (MA)

Harvest Method and Fiscal Year	MA 11	MA 12	MA 14	MA 15	MA 16	MA 17
Clearcutting						
88	17	33	7	20	4	2
89	20	31	22	30	32	0
90	15	15	0	27	14	4
91	8	21	20	19	72	8
92	10	19	30	30	42	0
93	19	18	18	9	22	21
94	6	19	4	1	21	1
95	6	22	10	8	23	0
96	21	15	32	17	0	18
97	11	23	0	14	7	21
10-yr average	13	22	14	18	24	8
Seed Tree						
88	15	39	12	37	15	13
89	8	30	16	30	34	0
90	33	20	24	35	16	20
91	23	22	17	32	20	18
92	14	18	32	31	1	0
93	4	10	3	22	0	23
94	8	26	4	22	19	1
95	6	18	12	26	13	0
96	0	32	15	74	70	0
97	0	27	0	33	18	11
10-yr average	11	24	14	34	21	9
Shelterwood						
88	32	10	12	27	0	0
89	15	15	14	25	8	0
90	15	27	0	17	20	0
91	13	25	10	28	29	0
92	24	31	25	0	14	15
93	3	1	31	1	26	0
94	8	15	0	35	1	0
95	7	20	0	0	28	0
96	12	15	0	0	48	28
97	0	7	0	7	0	0
10-yr average	13	17	9	14	17	4
All Other Methods						
88	32	32	58	31	18	28
89	31	98	54	40	113	28
90	29	22	35	27	26	8
91	43	36	45	40	38	58
92	28	48	20	38	35	45
93	20	30	23	22	23	35
94	43	22	19	20	9	9
95	26	34	17	22	21	3
96	26	24	36	31	0	0
97	15	17	18	20	23	11
10-yr average	29	36	33	29	31	23

TIMBER: Clear Cut Acres Sold; Monitoring Item E-9

ACTION OR EFFECT TO BE MEASURED: Acres of clear cut harvest sold.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: Not defined.

Purpose: This monitoring item was established to help ensure that the amount of future clear cut harvesting on the Forest is steadily reduced. The Forest Plan requires that this item be reported annually. The expected accuracy and reliability of the information is high.

Background: Congress has directed the Forest Service to reduce the amount of clear cut harvesting by 25 percent by 1995. The base line year for this comparison is FY 88. In addition, in a memo dated June 4, 1992, the Chief of the Forest Service expressed his expectation that, when considered throughout the National Forest System, clear cutting would decline by as much as 70 percent from FY 88 to FY 97. The Kootenai is implementing the Chief's guideline policy and using alternative harvest techniques when appropriate.

Results: Table E-9-1 displays the results since FY 88. As can be seen, the acres of clearcut harvest areas sold steadily declined from FY 90 to FY 97, with the exception of FY 96. In FY 96, the amount of clear cutting increased, primarily due to emphasis on salvaging fire-killed timber created by the 1994 fires and dead lodgepole pine killed by the mountain pine beetle epidemic. In many instances, the salvage of fire-killed timber or dead lodgepole pine resembled a clear cut. In FY 97, the amount of clearcutting declined again.

Evaluation: When it was possible to do so, the Forest reduced the amount of clear cutting. As a result, the Chief's goal for reducing clearcutting has been fully met.

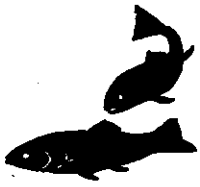
Table E-9-1 **Clear Cut Acres Sold by Fiscal Year**

	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97
Clear Cut Acres Sold	5,734	5,795	3,068	4,159	3,557	1,469	1,262	483	3,774	902
Percent Reduction from 1988	N/A	None	46%	27%	38%	74%	78%	92%	34%	84%

Recommended Actions: Continue monitoring.

RIPARIAN: Riparian Areas; Monitoring Item C-9

ACTION OR EFFECT TO BE MEASURED:	Ensure that the intent of riparian management goals are met.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	Failure to meet state and Inland Native Fish Strategy (INFS) standards.



Purpose: This monitoring item was established to help ensure that the intent of riparian management goals are met. The Forest Plan requires that this item be reported once every five years. The expected accuracy and reliability of the information is high.

Background: Riparian zone management is one of the most important practices to maintain water quality and a large number of riparian-dependent resources. Riparian management involves implementing actions that maintain or improve riparian conditions and identification and mapping so resource managers know the area of concern and application. Thus, one of the Plan objectives is to site-specifically identify and map all riparian areas before any projects such as timber sales are authorized (Forest Plan, page II-11).

Since the Plan was approved, Forest guidelines have been completed for the identification, mapping, and management standards necessary to protect riparian areas. Forest Plan Appendix 26, Riparian Area Guidelines, was issued in 1991 and was further updated in 1994 with the passage of the Montana Streamside Management Zone (SMZ) Law (HB731). These Guidelines stratify the Forest into four different stream classes. These stream classes are:

- Class I: large perennial streams
- Class II: smaller perennial streams
- Class III: intermittent streams
- Class IV: dry draws, swales

Classes I, II, and III require specific resource considerations before any activities can proceed. Some restrictions also apply to Class IV streams, wetlands, ponds, and bogs. Implementation of the Soil and Water Conservation Practices Handbook after 1988 and statewide implementation of voluntary Forestry Best Management Practices in 1989 have also aided the improvement of riparian conditions. **

In 1995, the Decision Notice for the Inland Native Fish Strategy (INFS) EA amended the Forest Plan by providing an interim strategy to protect native fisheries until a decision is issued for the Upper Columbia River Basin Environmental Impact Statement. The need to modify the existing Plan was determined, in part, from the monitoring of 28 National Forests, which indicated that many watersheds were below Forest Plan standards or exceeded thresholds of concern. INFS modified Forest Plan direction by adding additional requirements to manage fish habitat and channel conditions as well as the standard riparian vegetation zone.

INFS identified riparian management objectives (RMOs) and riparian habitat conservation areas (RHCAs) for streams depending on the size of stream and whether it contained a fishery. INFS only modified those portions of the Kootenai Forest Plan that were less restrictive than INFS.

INFS identified four stream categories, based on length of flow-period and fishery presence or absence:

- Category 1: perennial fish-bearing streams
- Category 2: perennial flowing, non-fish-bearing streams
- Category 3: ponds, lakes, reservoirs, and wetlands
- Category 4: seasonally flowing or intermittent streams

The transition from the original Forest Plan direction to INFS implementation has been a gradual increase in the restrictions placed on riparian zone activities. For instance, the 1991 Riparian Area Guidelines established, by stream class, minimum

** Please refer to Monitoring Item F-1, Soil and Water Conservation Practices, for a fuller explanation of how Best Management Practices are monitored.

width of SMZs, number of trees that had to be left after harvest, which classes had restrictions on both-side harvest, maximum unit length, and amount of total harvest per decade per mile of channel length. The 1994 update of the Riparian Area Guidelines incorporated the Montana State SMZ Law, widening the minimum-width of the SMZ, mandating that leave-trees be calculated by percent rather than number of trees, and requiring protection of all classes of channels.

With the implementation of INFS in 1995, overall riparian area activities allowed became more restricted. For instance, the width of riparian zones (RHCAs) increased. Additional standards and guidelines are applied, including requirements for extensive analysis before harvesting in some classes of watersheds. As a result, actions to date have dramatically reduced the levels of activities within riparian zones.

INFS also requires monitoring of the interim direction. The primary focus of this monitoring is to verify that the standards and guidelines were applied during project implementation. Monitoring to assess whether the standards are effective to attain Riparian Goals and Management Objectives is a lower priority given the short time frames for the interim direction. Complex ecological processes and long time frames are inherent in the Riparian Management Objectives, and it is unrealistic to expect that the monitoring would generate conclusive results within 18 months (INFS Decision Notice, Appendix A-15).

Results: With the modification of the Forest Plan by INFS, five approaches are used to track this item:

1) Riparian Mapping;
2) RHCA/RMO modification documentation;
3) RHCA activity tracking;
4) Watershed and stream restoration activities;
5) Riparian area BMP results.

1) Riparian Mapping: Miles of stream classes and/or stream categories identified and mapped. Table C-9-1 displays the miles of riparian habitat that have been classified and mapped since 1988. Almost 4,400 lineal miles of riparian habitat have been categorized and mapped since 1988. Over 2,500 of these miles are perennial streams (Stream Classes 1 and 2, INFS Categories 1 and 2). The rest are intermittent and ephemeral streams (Stream Classes III, INFS Category 4).

Table C-9-1 Miles of Stream Classes Identified and Mapped

Fiscal Year	Stream Class I & 2, INFS Category 1 & 2; (perennial streams)	Stream Class III, INFS Category 4, (intermittent and ephemeral streams)	Total Miles
1988-89	136	79	215
1990	409	246	655
1991	392	244	636
1992	363	299	662
1993	205	204	409
1994	157	87	244
1995	235	307	542
1996	451	281	732
1997	201	102	303
Totals	**2,549**	**1,849**	**4,398**

2) RHCA/RMO modification documentation, to determine whether INFS standards and guidelines were applied during projects: Twenty-eight projects were evaluated in FY 97 to determine how INFS- RHCA and RMO were applied. All 28 projects either meet or exceed the default RHCA width. The default INFS RHCA width was used along 53 miles of stream, and one project increased the width for one mile to better protect riparian values and functions. All 28 projects applied the default RMOs.

3) RHCA activity tracking: In 1997, a little over 70 miles of RHCA had some level of activity. Almost 95 percent of the work was for trail maintenance where blown-down trees were cut up and removed. Most of the remainder was for road re-construction and improvement of road crossings. A total of 111 crossings were either constructed or replaced. The total area involved was 47 acres.

4) Watershed and stream restoration activities: In 1997, watershed restoration activities were accomplished on over 122 miles of stream, totaling almost 205 acres. Ninety-nine stream crossings were removed, and a total of 85 other small sites had improvements such as ditch relief culverts, stream channel veins (near bridges), or large woody debris (LWD) addition to reaches where woody debris is lacking. Since 1990, watershed restoration on the Forest has totaled almost 6,500 acres.

5) Riparian area BMP results: This includes evaluation of implementation and effectiveness of applicable riparian BMPs that were used during management activities in or near the riparian zone (Table C-9-2). Table C-9-2 displays the results of the riparian-area BMP evaluation process from years 1990 through 1997. In even numbered years, results include information from State Audits. In odd numbered years, results are only from the on-forest BMP tracking program. The determination of proper BMP application is referred to as implementation monitoring. The determination of whether the BMP worked or not is effectiveness monitoring.

In FY 97, 254 practices were evaluated. Acceptable implementation was accomplished 97 percent of the time. Approximately 225 effectiveness evaluations were completed for this same period, of which 95 percent of the BMPs were deemed to be effective. For the 2,293 practices evaluated over the eight-year period, acceptable implementation was accomplished an 91 percent of the time. Approximately 1,567 effectiveness evaluations were completed for this same period, of which 92 percent were deemed to be effective. The abnormal year was 1995 when only 83 percent of the implementation evaluations and 82 percent of the effectiveness evaluations were scored as acceptable. There were special circumstances that account for this unusual result, as discussed below.

Table C-9-2. **Riparian Area BMP Implementation and Effectiveness**

Fiscal Year	Data Source	Implementation Evaluations	Percent Acceptable or Better	Effectiveness Evaluations	Percent Acceptable or Better
1990	Forest & Sate (EQC) MBMP Audits	201	89%	82	87%
1991	forest-wide BMP Audits	145	95%	145	95%
1992	Forest & Sate (EQC) MBMP Audits	241	88%	241	96%
1993	forest-wide BMP Audits	226	96%	120	92%
1994	Forest & Sate (EQC) MBMP Audits	295	91%	117	99%
1995	forest-wide BMP Audits	503	83%	467	82%
1996	Forest & Sate (EQC) MBMP Audits	428	96%	169	98%
1997	forest-wide BMP Audits	254	97%	226	95%
Totals		2293	91%	1567	92%

Evaluation: Riparian zones are being identified and mapped as part of Forest Plan implementation. Appendix 26, Riparian Guidelines, and INFS direction is being followed. After increased emphasis over the last five years, riparian areas discovered during layout and sale administration are being identified and protected. Review of this portion of the monitoring item indicates we are successfully applying riparian considerations to projects.

Review of BMP documentation shows that several projects approved and implemented prior to the update of the Riparian Guidelines in 1994 were not modified to be in compliance with the SMZ law. This accounted for the lower BMP ratings for 1995. However, these projects followed Regional direction which stated that we would not modify existing contracts, but would work to meet riparian requirements by negotiating with purchasers. If the purchaser would not agree to the modifications, then the changes were not made (Regional Forester's letter of May 28, 1992). Review of sales that are being implemented under current direction, such as the fire salvage sales on the Rexford, Three Rivers, and Libby Districts, indicates that riparian guidelines and INFS are being applied and the appropriate BMPs implemented.

With respect to INFS, all indications are that we are meeting the intent and requirements. We are screening projects for possible problems; implementing the criteria except where we have better information and have modified the interim defaults; and are monitoring to measure success in meeting the Riparian Management Objectives.

Conclusion: We are effectively applying the Riparian Area Guidelines, INFS direction, and riparian BMPs on projects; therefore, we are on-track with the Forest Plan. This is a change from FY 92 because of the increased effort to map riparian areas, apply INFS guidelines and effectively implement BMPs. Because of the new direction from INFS, no change to Plan direction is needed at this time.

Recommended Actions:

- Continue emphasis on BMP implementation and evaluate effectiveness.
- Continue to monitor a sample of projects where RHCAs have been site-specifically modified or harvest allowed within the RHCA to see how the activities were implemented and what, if any, long-term effect these activities had on the riparian condition.
- Monitor a sample of projects to evaluate whether the riparian guidelines/INFS are meeting their objectives or whether there is a need to change direction.

WILDLIFE & FISHERIES: Fisheries Habitat; Monitoring Item C-10

ACTION OR EFFECT TO BE MEASURED:	Determine changes in fish habitat and populations
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	+/- 10% change in redds +/- 2 degrees change in stream temperature +/- 10% change in sediment +/- 10% change in embeddedness +/- 20% change in debris accumulations

Purpose: This monitoring item was established to help ensure that changes in fish habitat and populations do not exceed certain levels. The Forest Plan requires that this item be reported every two years. The Plan expected accuracy and reliability of the information is moderate to high.

Background: Fish habitat and population concerns overlap with the Kootenai's responsibility for protecting downstream beneficial uses as required by State of Montana and Federal laws and regulations. The Plan committed to water quality protection measures and special streamside management provisions in riparian areas as the means for protecting fish habitat (see Forest Plan - Chapter II, and Appendices 25 and 26). The Plan also scheduled fish habitat improvement projects as mitigation for negative cumulative effects on the fisheries resource as a result of Plan implementation and management activities that pre-dated the Plan.

The Plan indicated that stream surveys, streambed coring, water temperature, woody debris counts, redd counts, and/or embeddedness sampling could be used as data sources to assess the effects of implementation on fish and habitat. Monitoring Item F-2 identifies seven representative watersheds where this data should be collected as a measure of Forest-wide management effectiveness. However, because most of the implementation activities have occurred outside of the seven representative watersheds, the Forest has dedicated more time to site-specific project monitoring for timber sales than to monitoring of the seven representative watersheds.

Forest Plan direction for protection of fisheries was amended in 1995 with the Inland Native Fish Strategy (INFS). INFS amended the Plan by providing additional riparian management objectives, standards and guidelines, and monitoring requirements. The revised monitoring requirement from INFS directs that we evaluate whether implementation of standards is moving towards attainment of riparian goals and objectives - however, we should not expect conclusive monitoring results in the near-term because streams respond to new riparian management practices slowly.

In 1992 we determined that this monitoring item would not allow a meaningful evaluation of the effect to fisheries habitat from Forest Plan implementation actions such as timber harvest and road construction. In 1993 we began investigating alternative ways to monitor fish and fish habitat. The FY 96 Monitoring Report included a nine-year evaluation of the monitoring results for this element. The 1996 nine-year evaluation concluded that a need for change in C-10/F-2 monitoring was apparent, and that a team should be assembled to identify the best course of action. This report, incorporates by reference, the nine-year evaluation of C-10, and updates that evaluation with any new information from 1997.

Results: Data from stream surveys, streambed coring, water temperature, woody debris counts, redd counts, and/or embeddedness sampling have been collected across the Forest. This data has been collected in one or more of the seven representative watersheds and many more watersheds not specifically identified in the Plan. The 1997 monitoring results are consistent with the summary conclusions stated in the FY 96 Monitoring Report.

> **Redd Counts** - *This task requires a field survey of streams during and immediately after fish have spawned to estimate the amount of fish reproduction that has occurred. The intent is to test whether Forest management direction and implementation activities are having adverse or beneficial effects on fish abundance.*
>
> Data on redd counts have been collected in three of the seven representative watersheds. Also, in cooperation with Montana Department of Fish, Wildlife and Parks, one representative watershed and 14 other streams were checked for fall spawning redds. The results of this monitoring suggest that bull trout population numbers may have stabilized in the last few years. The number of spawning adults continues to fluctuate, with no apparent trend either up or down.

Bull trout spawning data from Canada, however, strongly suggests that the Upper Kootenai stock of bull trout is the largest in Montana with upwards of 1000 adults spawning each year.

The fall redd count data for all watersheds indicates year to year variability in fish spawning that exceeds the limits set in the Forest Plan. This variability appears to be largely the result of inconsistent monitoring methods. The number of streams monitored for redds and the length of each stream monitored has changed each year as we seek to identify the preferred spawning areas. As we reported in 1996, it appears that the relationship between fish spawning and present forest management is obscure, and the use of redd count data is impractical as a measure of protection effectiveness. Redd counts will be used as a data source for tracking the trend in bull trout numbers, but not as a measure which would initiate further action.

Stream Temperatures - *This task involves the deployment of a recording device that can measure water temperatures on a continuous basis. The intent is to test whether Forest management and implementation activities (mainly riparian activities) are having adverse or beneficial effects on water quality.*

Stream temperature data has been collected on all seven representative watersheds. The monitoring data shows a strong relationship between stream temperature and the concurrent air temperature and rainfall (or snowfall) for the watershed. This variability in stream temperatures is unrelated to Forest management. However, data from several monitoring sites suggests that the effects of historic riparian logging practices that pre-date the Forest Plan (primarily two-sided riparian area harvest) may affect stream temperatures. The INFS amendment and the Riparian Area guidelines identified stream side management zones or riparian habitat conservation areas which require a certain amount of trees to remain adjacent to the stream. This has minimized the effect that timber harvest has on stream temperatures. The results so far are not powerful enough to identify the exact temperature change from streamside vegetation management because of a small sample size and a shortage of "natural condition" data.

Sediment Cores - *This task has required the annual removal of a fraction of the streambed to identify changes in fine sediment conditions - that is, monitoring of sediments smaller than 1/4 inch in size by taking streambed cores. This task, together with the embeddedness task (below) and Monitoring Items F-2 and F-3, look at the effects of forest management on water and fish habitat quality. The intent is to test whether Forest management direction and implementation activities (mainly road and harvest activities) are having adverse or beneficial effects on streambed quality.*

Sediment core data has been collected on four of the seven representative watersheds, plus many additional watersheds. Some of this monitoring is a result of a cooperative effort to evaluate proposed hardrock mines and the status of bull trout on the Forest. The monitoring data shows a strong relationship between stream bed sediment and the annual total water yield and highflow conditions for the watershed. Monitoring at several sites suggests there has been a 5 to 10 percent increase in fine sediment compared to undisturbed reference sites as a result of cumulative forest management. However, these findings do not answer whether present Forest Plan standards are adequate to prevent the observed change in stream bed sediments. This streambed data has been useful for answering questions about factors that may be limiting the abundance of bull trout. As we reported in 1996, we propose to discontinue using sediment cores as a data source for this monitoring item.

Embeddedness - *This task involves monitoring of the streambed surface to look for an increase or decrease in the amount of fine sediment accumulating on streambed surfaces. The results from this task, together with the streambed coring and Monitoring Items F-2 and F-3, are evaluated as a group to look for consistent trends. The intent is to test whether Forest management direction and implementation activities (mainly road and harvest activities) are having adverse or beneficial effects on streambed quality.*

Embeddedness data has been collected on four of the seven representative watersheds, plus some streams inventoried in 1997. The embeddedness monitoring data for all watersheds indicates year to year variability that is greater than the limits set in the Forest Plan. In 1997 the data shows a drop in embeddedness in most streams mainly due to the high streamflow and record snowpack. The monitoring data suggests a relationship between stream surface sediment, and the annual total water yield and highflow conditions for the watershed. This complicating factor in the embeddedness data does not answer whether present Forest standards are adequate or not to prevent an increase in streambed surface sediments.

Woody Debris - *This task involves monitoring of stream segments to look for an increase or decrease in the type or amount of logs lying in or above the stream. Woody debris (logs) plays a critical role in maintaining stream habitat*

quality and maintenance of stable stream channels. The intent is to test whether Forest management direction and implementation activities (mainly riparian and upland harvest activities) are having adverse or beneficial effects on the instream wood accumulations.

Woody debris data has been collected on four of the seven representative watersheds, with several hundred additional sites elsewhere. The woody debris monitoring data for all watersheds indicates little year to year variability in those instances where a consistent survey method was used. The 1997 and previous year's data indicate a substantial reduction in instream woody debris in most managed streams. However, most of these monitoring results cannot distinguish between historic impacts and the effect of present management direction. Other circumstantial information suggests that in nearly all instances where woody debris is absent (or nearly so), deliberate stream cleaning completed before the Forest Plan was written is the likely cause. The INFS amendment and the Riparian Area Guidelines provide direction on providing future woody debris recruitment to streams. The results to date are not suitable for drawing firm conclusions about the effect of present management direction.

Other Applicable Information: Stream survey data and monitoring over the last ten years hints that the recent INFS amendment to the Forest Plan riparian management objectives (RMOs) may not fit our local site conditions. The INFS RMOs provide objectives for different habitat features. They are numerically specific over a very large area. Our data from watersheds that have not been significantly affected by land management suggests that: local instream woody debris should be higher than INFS requirements; local abundance of stream pools should be higher than INFS requirements; and, local pool dimensions (widths and depths) should be somewhat higher than INFS requirements. We say "should be" for a reason - our sampling is not extensive enough to objectively modify the INFS RMOs for the local area at this time. This difference between INFS and local natural conditions suggests the need for validation monitoring for INFS RMOs.

In 1997 we initiated an Interior Redband trout research project in cooperation with the University of Idaho, Bonneville Power Administration and Montana Department of Fish, Wildlife and Parks. This project is looking at how redband trout interact with their habitat in a highly managed (historically) watershed, and in a portion of another watershed with no historic management activity. The results thus far suggest a strong preference for pool habitat, and little tendency for fish to move to new habitats with the arrival of winter. The 1998 results, and the Master's Thesis from the project, should answer important questions about habitat protection for this species, and allow us to evaluate whether the Forest Plan standards and objectives will promote conservation of redband habitat.

Evaluation: At this point in time we cannot determine whether implementation of existing Forest Plan prescribed practices results in stream conditions that are outside the variability limits set in the Plan. As noted in the above discussion it is difficult to distinguish among a variety of possible causes for change in streams. Our ability to detect changes in streams and habitat and identify the cause using the C-10 monitoring data is low and the risk of a faulty conclusion is high. Also, many of the monitoring variables are much more variable than assumed, and thus the accuracy and reliability of C-10 data may be moderate at best. The present Forest Plan monitoring effort and sample design can reliably identify only a 50 percent or greater impact from all causes of change. Thus, the data is not sufficient to reliably detect a change as small as the present variability limits for monitoring element C-10. In effect, some C-10 monitoring items appear to be outside the acceptable limits of change more often than not, but the cause could be natural, human-caused, natural and human-caused, or it is a result of sample error. As noted above, some monitoring procedures are not reliable indicators, and others have been significantly affected by the INFS amendment to the Forest Plan. The 1997 monitoring results reinforces the conclusions that were previously disclosed in the 1996 report, and indicate the need to change the monitoring requirements.

Recommended Actions:
Monitoring: As indicated in the FY 96 Monitoring Report, a Forest interdisciplinary team was convened in 1997. This group of water, fish and watershed experts recommended a complete update of the Forest Plan C-10 monitoring requirements because of the substantive changes in management direction (INFS) and the 10 year monitoring evaluation. The team's recommendations include:

1) Establish an INFS implementation monitoring requirement for all new projects, and merge this requirement with the C-9 monitoring element;

2) Revise the C-10 monitoring requirements to conform to INFS riparian management objectives, and shift the focus to effectiveness monitoring and attainment of habitat and native fish objectives;

3) Add a new validation monitoring option that would adapt the riparian management objectives to the local area, and/or establish additional objectives, as budgets allow;

4) Modify the monitoring evaluation requirements to emphasize trend monitoring as opposed to the present percent-change-from-1987 approach.

The team is in the process of developing a new monitoring program for fish and fish habitat. We are still exploring options for monitoring bull trout and water quality limited segments. In addition, we have been developing aquatic data bases which are providing a better insight on what type of data is useful and where it can be most effectively applied. Once we have evaluated what additional items we may need to monitor, what questions we are really trying to answer, and how we can best collect the data to answer those questions, then we will develop a proposal to amend the Forest Plan.

Forest Plan Implementation: We have revised the C-9 monitoring requirement to better track implementation of Best Management Practices and INFS standards and guides as recommended by the C-10 interdisciplinary team. We have also issued a Kootenai National Forest policy statement on how to site-specifically designate INFS riparian buffer strips to ensure Forest-wide consistency in this critical habitat protection strategy. We have also completed a Best Management Practices training program for all field personnel to improve our performance in watershed and habitat protection.

Habitat restoration efforts continue to focus on mitigation of sediment and woody debris impacts. These efforts are focusing on known sediment sources and areas lacking woody debris. We will continue restoration efforts where project analyses indicate a need.

SOIL & WATER: Soil and Water Conservation Practices; Monitoring Item F-1

ACTION OR EFFECT TO BE MEASURED: Determine if regional and project soil and water and water conservation practices, as implemented as BMP's, meet State water quality standards.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: Failure to meet State Standards and Protect Beneficial Uses.

Purpose: This monitoring item was established to help ensure that the State water quality standards are met. The Forest Plan requires that this item be reported annually. The expected accuracy and reliability of the information is high.

Background: The Forest has been monitoring the Soil and Water Conservation Best Management Practices (BMPs) since 1988. These BMPs are required Forest-wide to meet State water quality standards. The BMPs are various practices which are designed to eliminate or reduce non-point sources of pollution such as sediment, which is the primary source of non-point pollution on the Forest. BMP monitoring consists of three parts: (1) determine whether the practice (BMP) was applied on-the-ground as called for; (2) if applied correctly, did it eliminate or minimize the effect that required the BMP; and (3) spot monitor selected activities to determine effectiveness of BMPs in protecting stream channels from impacts. The determination of proper BMP application is referred to as implementation monitoring. The determination of whether the BMP worked or not is effectiveness monitoring.

Projects that are evaluated for BMP implementation and effectiveness include timber sale road construction, timber harvest, mine site rehabilitation, and other activities that expose or disturb soil or create ground conditions that could lead to water quality impacts.

Spot monitoring of selected activities is also being conducted to determine BMP effectiveness as well as determine compliance with our requirement to protect beneficial uses of water, including fisheries and aquatic habitat.

FY 97 BMP monitoring on the Forest involved BMP monitoring done by Kootenai Forest personnel during their normal work activities. During this process, BMPs were evaluated at particular sites on various projects across the Forest. The implementation and effectiveness monitoring evaluations were both rated as shown in Table F-1-1.

Table F-1-1 BMP Evaluation Rating Scale and Summary

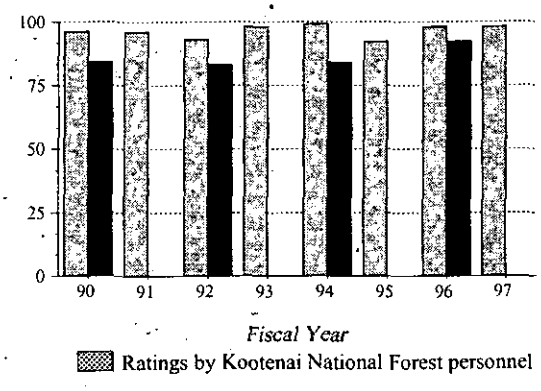
Rating	Implementation	Effectiveness
Acceptable or Better	Operation Meets Requirements	Adequate or Improved Protection of Soil and Water Resources
Unacceptable	Minor Departure from Intent	Minor and Temporary Impact
Very Unacceptable	Major Departure from Intent	Major and Temporary, or Minor and Prolonged Impact
Grossly Unacceptable	Gross Neglect or No Application At All	Major and Prolonged Impact

Table F-1-2 and Figure F-1-2 show the results of monitoring completed by the Forest and the Statewide monitoring program which is completed every other year. Results and evaluation of the Statewide program were reported in the FY 96 Monitoring Report, therefore that analysis is not repeated here.

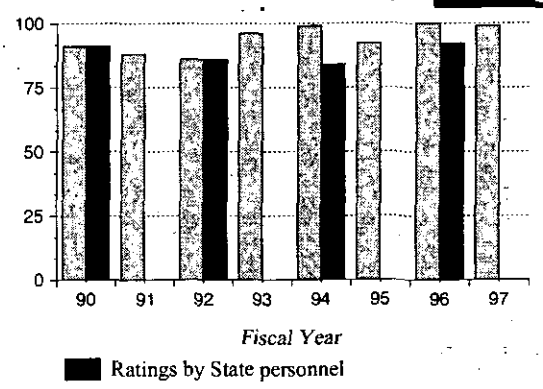
Results of BMP Monitoring Done by Kootenai Forest Personnel: Approximately 90 separate projects were audited in FY 97 by KNF personnel. In FY 97, implementation evaluations were completed for 4,635 BMPs. Implementation evaluations met the requirement of acceptable 98 percent of the time in FY 97. Effectiveness evaluations were completed for 2,960 BMPs in FY 97 and were effective 99 percent of the time (see Table F-1-2).

Table F-1-2 BMP Monitoring by Kootenai Forest Personnel																
	Implementation(%)								Effectiveness (%)							
Rating	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97
Acceptable or Better	96	96	93	98	99	92	98	98	91	88	86	96	99	92	100	99
Unacceptable	4	3	6	2	1	8	2	1.9	8	12	13	3	1	8	0	1.2
Very Unacceptable	0.4	1	0	0.2	0.02	0	0.02	0.1	1	0	2	1	0	0	0	0.14
Grossly Unacceptable	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure F-1-2 **BMP Implementation Results of Acceptable or Better**



BMP Effectiveness Ratings of Acceptable or Better



Evaluation of BMP Monitoring by Kootenai Forest Personnel: The results of the FY 97 BMP monitoring indicate consistent improvement in the BMP program relative to 1995 (see Table F-1-2). No BMPs were rated as "grossly unacceptable" in FY 97 and only nine individual practices were rated as "very unacceptable", five during implementation and four during effectiveness evaluations. The scores of 98 percent for acceptable implementation and 99 percent for acceptable effectiveness point to the overall success of the Forest BMP Program. Only three practices seemed to be mis-applied or ineffective: 14.15, Erosion Control on Skid Trails; 15.2 (f), Drainage from Roads and Trails; and 15.7, Control of Permanent Road Drainage. These will be particularly emphasized in the 1998 Training Program.

Spot Monitoring of Selected Activities: Spot monitoring of BMP effectiveness on a project basis was done on a limited number of projects in 1997. These more or less site-specific monitoring projects evaluate BMPs with respect to sediment and turbidity data collected with automatic samplers. Results indicated attainment of State standards and protection of beneficial uses in all cases in 1997. We also did some ground reviews of revegetated areas, including some of the fire and watershed restoration areas. As a result some additional seeding and fertilizing was done at these sites. We also established some photo-points on obliterated roads at stream crossings. From this we will record the success of both the obliteration work and the revegetation.

Conclusion: In review of this item, we are generally meeting state standards and protecting beneficial uses. Additional emphasis is needed on "high risk BMPs," particularly bringing existing roads up to standards as budgets allow. With the continuing emphasis on BMPs, this item is on-track with the Forest Plan.

Recommended Actions: No changes to the Forest Plan are needed at this time. The following actions will occur to improve our implementation and monitoring efforts.

1) Continue training and monitoring, emphasizing implementation, evaluation, tracking, and the feedback loop. Give special emphasis to the "high risk" BMPs.

2) Evaluate opportunities to acquire additional funding to improve road conditions, especially outside timber sale areas.

SOIL & WATER: Stream Sedimentation; Monitoring Item F-2

ACTION OR EFFECT TO BE MEASURED:	Determine sediment impacts on water quality.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	20% increase in bedload or suspended sediments.

Purpose: This monitoring item was established to help ensure that the State water quality standards are met and fish habitat is protected. The Forest Plan requires that this item be reported annually. The Plan expected accuracy and reliability of the information is moderate.

Background: The Plan identified seven stream that would be monitored for this item. They are: Big, Sunday, Bristow, Red Top, Rock, Granite and Flower Creeks. The data to be collected includes bedload and suspended sediment concentrations and streamflow. Nearly all of the Forest's monitoring effort for this item has been dedicated to suspended sediment monitoring for timber harvest and road construction activities. This data is to be used to look for evidence of a change in streambed and water quality conditions, and thus probable effects on beneficial uses, related to present management direction. In addition, a parallel goal has been to gather enough data so that the Forest's sediment predictive tool (R1-WATSED) can be validated and refined for general use before activities are implemented.

The data from this monitoring requirement must be evaluated in the context of results from Monitoring Items C-9, C-10, F-1 and F-3. As with these other monitoring items, the goal of this item is to confirm whether beneficial uses are being protected and water quality laws are being met.

In 1992 we determined that this monitoring item and monitoring item C-10 as designed would not allow a meaningful evaluation of sedimentation from Forest Plan management such as timber harvest and road construction. Based on this we determined that we would accept the intent of this monitoring item but add some additional data sources to help understand the effects of our management. The FY 96 Monitoring Report included a nine-year evaluation of the monitoring results for this element. The 1996 nine-year evaluation concluded that a need for change in C-10/F-2 monitoring was apparent, and that a team should be assembled to identify the best course of action. This report, incorporates by reference, the nine-year evaluation of F-2 and updates that evaluation with any new information from 1997.

Results: Information regarding streambeds, suspended solids and streamflow have been collected in several of the seven representative watersheds. This same data has also been collected in many more watersheds not specifically identified in the Plan. The monitoring results suggest the need for change in some areas, but the certainty of these findings are weakened by limitations in the data.

Bedload - *This task requires the placement of a collection device in a stream at the time that streamflows are at the highest point of the year. The intent is to test whether Forest management direction and implementation activities are having adverse or beneficial effects on watershed sediment production or channel stability.*

As outlined in the FY 96 Monitoring Report, we have discontinued the collection of bedload sediment samples. In lieu of bedload monitoring, several alternative monitoring methods are now in use as outlined below. The 1997 data indicates sediment relations in streams are strongly linked to the annual snowpack and resulting runoff conditions. 1997 was a year of significant change in some stations, and little change in others, for no consistent reason other than high spring streamflow.

Channel Cross Sections - *This task requires detailed measurements of a stream from bank to bank, and then repeating this procedure each year to check for changes in channel shape. The intent is to test whether forest management direction and implementation activities are having adverse or beneficial effects on water yield and sediment production and thus the condition of the stream channel.*

Since 1989, we have collected cross-section data on more than 50 streams, a few of which are reference streams (those with no past activity). In 1997 this monitoring data was collected, but the lack of a computer model to evaluate annual changes in channel shape, and a shortage of reference data, strongly inhibits our ability to draw a conclusion about the effectiveness of management direction.

Riffle Stability Index - *This task requires detailed examination of the roles in stream channels to determine whether conditions are stable or not. The intent is to test whether cumulative management activities are having adverse or beneficial effects on stream channels, watershed conditions and fish habitat via changes in streambed sediments.*

Beginning in 1989, we have applied this procedure on over 35 streams on the Forest. In 1997 we again restricted the use of this technique to larger stream streams where the technique holds promise. The 1997 data indicates the high runoff year had a noticeable effect on streambeds, but the shortage of reference data inhibits interpretation and evaluation of this data.

Particle-size Distribution - *This task requires a detailed description of the rocks in a stream channel. The intent is to test whether forest management direction and implementation are having adverse or beneficial effects on average channel conditions and movement of sediment.*

We have collected particle size distribution data on hundreds of streams since 1992, including more than 90 reference streams. However, these results have not been repeated at specific sites for a long enough time period to reach reliable conclusions. In addition, we need more trend data from reference streams so that we can determine the streams' natural variability. The results to date are not powerful enough to draw definitive conclusions. Monitoring of particle-size distribution appears to be warranted given the results to date, therefore we will continue to use this item as a data source.

Suspended Sediments - *This task involves monitoring of the fine sediment particles in flowing water to look for an increase or decrease in the suspended sediment load. The results from this task, together with Monitoring Items C-10 and F-3, are evaluated as a group to look for consistent trends. The intent is to test whether Forest management direction and implementation activities (mainly road and harvest activities) are having adverse or beneficial effects on water quality.*

Suspended sediment data collection has been implemented on all seven representative watersheds. The reliability of the data is limited primarily because of the lack of multiple-year samples and high variability in the data. The suspended sediment monitoring data for all watersheds, and that from 1997, indicates year to year variability that is greater than the limits set in the Forest Plan. The monitoring data suggests a strong relationship between suspended sediment, and the annual total water yield and highflow conditions for the watershed. This same data confirms that these elevated levels of high-flow suspended sediment only persist for a few years after a human disturbance, but do not return to pre-disturbance conditions and likely represent a long-term chronic problem. However, these results have not been replicated at enough sites or for a long enough time period to reach reliable summary conclusions. The results to date are not powerful enough to draw definitive conclusions on the present Forest management direction.

Other Applicable Information: A final report, *Validation of Water Yield Thresholds on the Kootenai National Forest,* by Colorado State University was delivered to the Forest in March 1997. This research indicated that changes in in-channel sediment were the most reliable indicator of management impacts on streams, but that further research would be needed before thresholds (RMOs) could be defined. Information from this report will be used in the revisions to the C-10 and F-2 monitoring program that evaluates whether management direction is sufficient to maintain aquatic beneficial uses.

Evaluation: The primary intent behind F-2 monitoring is to evaluate whether present management direction is sufficient to maintain water quality. For this monitoring to achieve its purpose, we must be able to distinguish between natural variation and management-induced changes. Our ability to detect changes in streams and habitat and identify the cause using the F-2 monitoring data is largely undefined and the risk of a faulty conclusion is high. Also, some of the monitoring variables are much more variable than assumed, and thus the accuracy and reliability of F-2 data may be moderate at best. The present monitoring effort and sample design generally would only reliably identify a 50 percent or greater impact from all causes of change. The available monitoring data are not sufficient to reliably identify an impact of 20 percent due to present management direction at all monitoring sites. Thus, the discriminatory power of our present monitoring effort is low and the risk of a faulty conclusion is moderate to high. Similar conclusions from the FY 96 Monitoring Report were reinforced by the 1997 monitoring effort that detected the consequences of a near-record runoff event.

Forest management direction changed in 1995 per the decision of the Inland Native Fish Strategy (INFS). As stated in the INFS monitoring requirements it will take several years of monitoring to determine whether this new management direction is sufficient to maintain aquatic beneficial uses, or whether additional objectives and protection measures are needed. These findings are consistent with findings in the study of Forest watersheds recently completed by Colorado State University.

Recommended Actions:

Monitoring: As noted in C-10, an interdisciplinary team was formed in 1997 to recommend a course of action to change the C-10 and F-2 monitoring program. The monitoring requirements from F-2 were recommended for revision in the following manner:

1) Incorporate sediment monitoring in a new C-11 monitoring element, and refocus the intent as validation monitoring;

2) Modify the monitoring evaluation requirements to emphasize trend monitoring as opposed to the present percent-change-from-1987 approach.

As noted in C-10, the team is in the process of developing a new monitoring program for C-10 and F-2. Once we have evaluated what additional items we may need to monitor, what questions we are trying to answer, and how we can best collect the data to answer those questions, then we will develop a proposal amend to the Forest Plan.

Forest Plan Implementation: We will continue to implement INFS. We will continue emphasis on BMP implementation to maintain a strong emphasis on our sediment prevention measures. In addition, we will continue habitat restoration efforts which are focused on restoration of known sediment sources.

SOIL & WATER: Water Yield Increases; Monitoring Item F-3

ACTION OR EFFECT TO BE MEASURED:	Determine the cumulative level of water yield increases and the effects on stream channels.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	20 percent of watersheds exceed hydrologic guidelines.

Purpose: This monitoring item was established to track our progress in protecting water-dependent resources from effects of management-influenced high stream flows. The Forest Plan requires that this item be reported annually. The expected accuracy and reliability of the information is moderate to high.

Background: Water yield increases can adversely affect stream channels and fisheries habitat. The Plan states that projects involving significant vegetation removal will accomplish a cumulative watershed effects analysis to ensure that water yield and sediment levels do not increase beyond acceptable limits (Forest Plan, II-24). The Plan also references the dependence of timber harvest on the rate of hydrologic recovery (Forest Plan, II-4, 7).

Forest Plan Appendix 18 (Kootenai Forest Water Yield Model Instructions and support guidance memos) was provided to guide the process of accomplishing the cumulative effects analysis. This analysis procedure estimates the peak flow increase over natural conditions for a watershed or sub-watershed based on existing and proposed activities on both the public and private lands.

Results: The Forest has employed two methods to examine this data. Table F-3-1 tracks the watersheds which are evaluated as a part of project planning. Since these analyses are not randomly distributed around the Forest, results tend to be skewed in some years depending on which watersheds are being analyzed.

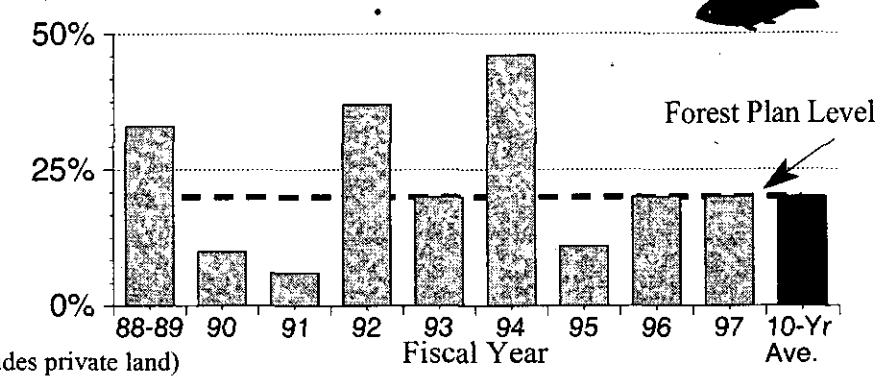
Table F-3-2 and the Water Yield Analysis Map present an estimation of the Forest-wide condition based on a master list of watersheds updated when areas are reevaluated.

Table F-3-1 shows the results for each fiscal year. In FY 97, the water yield model was used to estimate the peak flow increase on 141,171 acres of both National Forest and private land. Of the total area analyzed during this fiscal year, 20 percent of the acres exceeded the Forest water yield guidelines. Channel damage has not necessarily occurred in watersheds shown to be exceeding water yield guidelines since this monitoring item is based on computer modeling and not field observations and measurements.

Table F-3-1 Watersheds Analyzed for all Ranger Districts by Fiscal Year

Fiscal Year	Total Acres , Watersheds Analyzed	Acres of Watersheds Exceeding WY Guidelines	Percent of Analyzed Acres Exceeding WY Guidelines
88-89	944,170	314,404	33%
90	141,054	14,564	10%
91	226,836	13,020	6%
92	163,297	59,661	37%
93	83,479	16,654	20%
94	130,890	59,597	46%
95	277,229	29,682	11%
96	223,545	45,758	20%
97	141,171	16,827	20%

Figure F-3-1 **Percent of Acres Analyzed that Exceed Water Yield Guidelines**



Some of the totals in Table F-3-1 include reassessments of previously completed watersheds because of changed conditions. For instance, FY 94 includes a large number of acres that were reanalyzed following fires. Many of those acres had been analyzed earlier as part of normal operations. It is also important to note that, in areas analyzed in earlier years, hydrologic recovery has been occurring and watershed restoration projects have been implemented. Due to these changed conditions, some of these areas may not exceed water yield guidelines today. Because of the reassessments done in later years, the information in Table F-3-1 cannot be totalled since some acres would be double-counted.

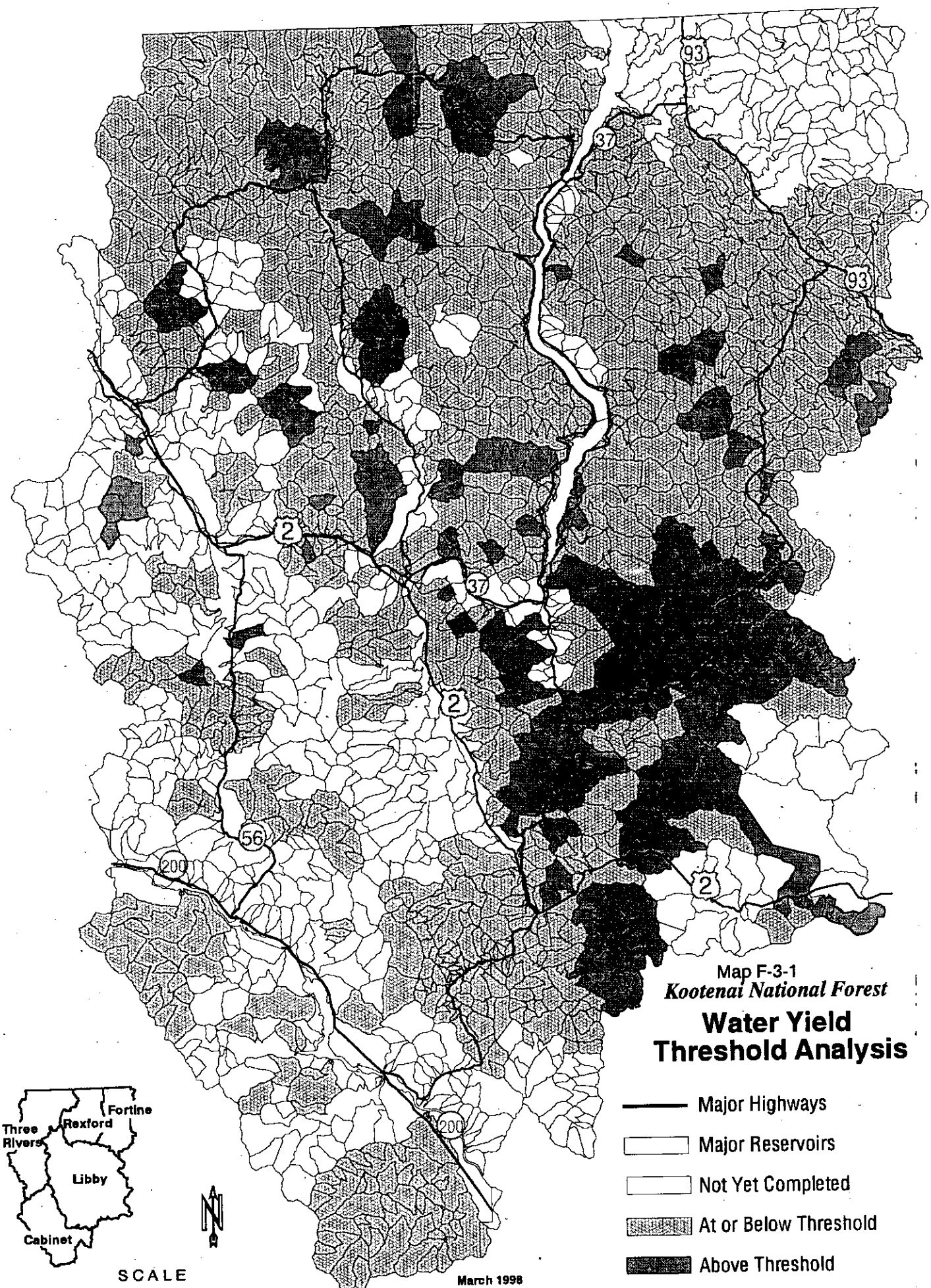
The second method used summarizes the most recent analysis results for each watershed. This enables us to show a total for the Forest. This data is summarized to generate the figures for Table F-3-2. The map on the following page (Figure F-3-1) has been shaded to show where watersheds have been analyzed and most recent analysis shows they meet or exceed Water Yield Guidelines. As noted above, some of these areas were last analyzed up to nine years ago and conditions may have changed.

As shown in Table approximately 1,944,109 acres have been analyzed for water yield conditions on the Kootenai since 1988. Of this total, 1,492,609 acres (77 percent) were found to be at or below the guidelines and 451,500 acres (23 percent) were found to be over in the year the analysis was done.

Table F-3-2 **Summary of Watershed Analysis Results** (includes private land)

Fiscal Years	Acres of Watersheds Analyzed	Acres (and percent) of Watersheds That Meet WY Guidelines	Acres (and percent) of Watersheds Exceeding WY Guidelines
FY 88- FY 97	1,944,109	1,492,609 (77%)	451,500 (23%)

Evaluation: Table F-3-1 shows 20 percent of the analyzed watershed acreage for FY 97 exceed the peak flow water yield guidelines. As in prior years, the reasons for these current conditions are usually related to harvesting of timber in years prior to the implementation of the Plan, timber harvest on private lands, and relatively slow recovery of vegetation in certain watersheds. In addition, natural events such as wildfire have caused high mortality of trees in certain areas, resulting in conditions which cause increased runoff and peak flow increases. When such conditions are encountered in the project planning process, projects are designed so that peak flows still meet the Forest Plan guidelines to protect water quality and beneficial uses.



Map F-3-1
Kootenai National Forest

Water Yield Threshold Analysis

- Major Highways
- Major Reservoirs
- Not Yet Completed
- At or Below Threshold
- Above Threshold

Mapped from District Hydrologist's Information for Fiscal Year 1997, shown by watershed.

Table F-3-2 indicates that, for the period from FY 88 to FY 97, about 23 percent of the watershed acreage, including private land, is exceeding water yield guidelines. Map F-3-1 shows the watersheds where peak flow analysis has been done in one or more Fiscal Years since 1988 and also shows the results of the most current analysis. This monitoring item continues to be off-track with the Forest Plan. It is important to note, however, that when projects are proposed in watersheds that are over the standard, they are designed to improve the long-term watershed condition, rescheduled, or dropped (See Monitoring Items E-1 and E-7). This element of monitoring is showing that water yield calculations and stream channel analysis is an important part of the analysis needed before projects can be implemented by Ranger Districts.

Recommended Actions: No changes to the Forest Plan are needed at this time. However, the above evaluation shows a continuing need to evaluate hydrologic conditions. As part of Forest Plan revision, the following will be considered:

1) Develop an enhanced watershed analysis process which better integrates stream channel condition information with the calculated data on potential peak flow increases. This will include updating methodologies and providing a consistent approach for all Ranger Districts to use.

2) Integrate the peak flow analysis process (called R1-WATSED) into the Forest's new Geographic Information System (GIS). This will increase efficiency and provide easier access to data.

3) Design a database system which will allow more efficient tracking of the watershed conditions. This data base would contain information on the current and historic condition of watersheds. This will aid in understanding recovery periods and the role of natural events in creating changes in watershed conditions.

SOIL & WATER: Soil Productivity; Monitoring Item F-4

ACTION OR EFFECT TO BE MEASURED: Determine the changes in site quality due to surface displacement and soil compaction.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: A 15 percent decrease in site productivity.

Purpose: This monitoring item was established to help ensure that the basic soil resource is not compromised in the production of other resources such as timber harvesting, grazing, etc. The Forest Plan requires this item to be reported every five years. The expected accuracy and reliability of the information is moderate.

Background: Soil resource management has the goal of maintaining or improving long-term soil productivity and soil hydrologic function. Soils can be physically damaged by erosion, displacement, compaction, puddling, and infiltration reduction due to the use of heavy equipment, especially during wet weather and wet soil conditions. They can also be physically and chemically damaged by heat during any intense burning, such as from wildfires, broadcast burning during site preparation, or by the burning of mechanically-bunched slash piles. Soils that are damaged from the above conditions incur adverse affects on their hydrologic function or sustain actual losses in soil productivity.

Ideally, the soil quality standards that would be used for measuring soil damage would be soil structure and fertility. Because these soil qualities are difficult to measure, other soil qualities are substituted. These substitutes are soil displacement, erosion, puddling, and soil compaction.

Region 1 has a policy that allows up to 15 percent detrimental disturbance (FSH 2509.18, 5/1/94). The Kootenai National Forest uses the 15 percent detrimental disturbance as a measure to track the impact on site productivity. If 15 percent of an area is significantly disturbed, then we can say that it has probably incurred a decrease in long-term site productivity.

Field monitoring is done within activity areas using the line transect method. The line transect is perpendicular to the direction of the ground-disturbing activity. Usually, three transects (an upper, middle, and lower) are completed within each activity area. Each transect represents the activity that occurred within that portion of the activity area. All of the monitoring completed so far is representative of timber harvesting operations on the Kootenai National Forest. The activities represented are cable logging, forwarder logging, and tractor logging (rubber tired skidders and tracked vehicles). Both summer and winter operational periods are included in the ground-based activities. Fuel reduction activities had occurred in some of the units.

Evaluation: Table F-4-1 displays the types of timber sales monitored during 1987-1997. Table F-4-2 displays the number of units by harvest types monitored during 1987-1997. Surveys have been completed on 88 timber harvest units scattered across the Forest between 1987 and 1997 (Table F-4-3a). These areas represent the current logging methods including the types of equipment being used for skidding, mechanical falling, yarding, and slash piling. The areas ranged in size from two to 143 acres. Areas where cable logging methods were used show little or no detrimental disturbance. The use of forwarders and winter logging, also, result in very low to low detrimental disturbance. Areas where tractors were used resulted in a higher level of detrimental disturbance, however, were generally still within the desired levels. In general, the amount of heavily disturbed area increased directly with the number of machinery operations.

Table F-4-1 Types of Timber Sales Monitored

Sale Types	Pre-1992	1993	1994	1995	1996	1997	Totals
Regular	8	2	2	4	3	3	22
Pest Control	1	1	0	0	3	0	5
Fire Salvage	0	3	0	0	1	6	10
Other Salvage	1	0	0	0	2	4	7
Totals	**10**	**6**	**2**	**4**	**9**	**13**	**44**

Table F-4-2 Number of Units by Harvest Type							
Sale Types	**Pre-1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**Totals**
Regular	15	7	4	9	6	5	**46**
Pest Control	4	2	0	0	5	0	**11**
Fire Salvage	0	6	0	0	1	10	**17**
Other Salvage	1	0	0	0	6	7	**14**
Totals	**20**	**15**	**4**	**9**	**18**	**22**	**88**

Pre-1992: The FY 92 Monitoring Report stated that 49 percent of the surveyed acres, to that point, were beyond the Forest Plan variability limits. Twenty units on 10 sales were monitored. Eight units comprised of 245 acres and contained more than 15 percent detrimental compaction. These units ranged from 19 to 27 percent. The influence of past activities was observed in one of the units. Unit One of the Good Creek P.C. Sale only had 10 percent detrimental impact from the current activities. However, a previous entry, which occurred in the early sixties, had nine percent detrimental impact. Since the previous activity built excavated trails horizontally across the terrain and the current activities were generally accomplished vertically on the landscape, the combination of the two activity periods created 19 percent detrimental impact. Tables 4-4-1 through 4-4-4 display the information of surveys completed 1992 and earlier.

Some of the reasons for the areas beyond the Forest Plan variability limit of 15 percent detrimental disturbance were: the inclusion of small areas of steep terrain within areas of more gentle terrain, inadequate designation of the proper logging equipment, the application of an approved silvicultural prescription, and level of experience of the sale administrator(s) or logging operator(s).

Post 1992: Of the 1,998 acres (68 units) surveyed since 1992, only 21 acres (one percent of measured acres) (one and one half units) (Table F-4-3b) were beyond the Forest Plan variability limits. In addition, 1,376 acres (approximately 70 percent of those surveyed) had less than 6 percent detrimental soil disturbance. This major change is mainly a result of reduction of acres that are "dozer piled". Other reasons include more winter logging, more broadcast burning, and more use of forwarder logging equipment.

Summary: The total of 2,499 acres surveyed from 1987-1997 represents about seven percent of the annual harvest acres. Of the 2,499 acres surveyed during the 10 year period, approximately 11 percent (266 acres) are beyond the variability limit, and 77 percent (1,926 acres) resulted in less than 10 percent detrimental disturbance. As noted before, significant progress has been made since 1992, as only 1 percent (21 acres) has resulted in more than 15 percent detrimental disturbance.

Table F-4-3a Units by Detrimental Soil Disturbance Category							
Disturbance Categories in %	**Pre-1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**Totals**
< 6	0	5	3	8	12	17	**45**
6 - 10	6	4	0	1	6	5	**22**
11-15	6	5	.5	0	0	0	**11.5**
15 +	8	1	.5	0	0	0	**9.5**
Total Units	**20**	**15**	**4**	**9**	**18**	**22**	**88**

Table F-4-3b Acres by Detrimental Soil Disturbance Category							
Disturbance Categories in %	**Pre-1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**Totals**
< 6	0	170	32	160	377	637	**1,376**
6 - 10	134	68	0	29	230	129	**550**
11 - 15	122	131	14	0	0	0	**267**
15 +	245	8	13	0	0	0	**266**
Total Acres	**501**	**377**	**59**	**189**	**607**	**766**	**2,499**

Based on the information stated above (the improvement that has occurred since 1992 and that no unit was greater than 10 percent in the last three monitoring seasons, also seen in Table F-4-3a), this monitoring item is within the recommended range stated in the Forest Plan (no acres should measure more than 15 percent of detrimental disturbance). Table F-4-4 is a general summary of actions of the soil monitoring on the Kootenai National Forest.

Table F-4-4 **Kootenai National Forest Soil Monitoring Summary**

Summary of Actions	Pre-1992	1993	1994	1995	1996	1997	TOTALS
Number of Sales	10	6	2	4	9	13	**44**
Number of Units	20	15	4	9	18	22	**88**
Acres	501	377	59	189	607	766	**2,499**
No. of Transects	70	31	8	17	48	42	**216**
No. of Monitor Points	6,800	7,407	1,963	4,349	14,004	15,418	**49,986**
Walk Throughs	2	8	7	5	7	8	**37**

Recommended Actions: Continue monitoring.

MINERALS: Mineral Activity Effects; Monitoring Item G-1

ACTION OR EFFECT TO BE MEASURED: Determine the amount of management area (MA) change as a result of mineral activity.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: Greater than 10,000 acres of MA change after 5 years.

Purpose: This monitoring item was established to track the amount of conflict with other resources that might occur if significant amounts of mineral development happen on the Forest. The Forest Plan requires that this item be reported every five years. The expected accuracy and reliability of the information is high.

Background: Major mining projects require a large amount of acreage to physically accommodate mine facilities (typically, 500 to 1,000 or more acres for roads, powerlines, mining and milling facilities, tailings storage facilities, etc.). One project on a Forest may not have a significant effect on the renewable surface resources. But if a Forest is strategically located in a significantly mineralized area, the potential for a significant impact on the renewable resources could occur over time because of the cumulative effect of numerous projects.

The Kootenai Forest is located within a world-class mineralized area that could prove to be of significant economic importance. Currently there is one major mine on the Forest, ASARCO's Troy Mine. Operation of the Troy Mine began in 1981, but it has been on standby status since April, 1993. A skeleton crew maintains the site in compliance with the plan of operations. There are approximately four years of ore remaining.

In 1993, the Forest issued an approval to Noranda Minerals Corp. for their Montanore Project. However, for a number of reasons Noranda has not yet begun construction and there has been no impacts to renewable surface resources. It would operate at a rate of 20,000 tons of ore each day for a sixteen year period. Construction and reclamation would add five or more years to the operation. Noranda likely will implement the Montanore Mine once legal issues associated with their mining claims are resolved.

ASARCO's Rock Creek Mine proposal is currently being analyzed, with a decision likely in early 1999. If approved, the Rock Creek project would operate for about 30 years, milling 10,000 tons of ore each day.

No other major mines are proposed, nor is there any indication that another deposit might be proposed for development in the foreseeable future. However, Cominco American continues to drill explore for minerals in the Yaak drainage area. Should another deposit be proposed for development, a lengthy analysis period would follow, followed by a three to six year NEPA process.

Results: During the 10 year review period one major project, the Montanore Mine has been approved. However, to date there have been no surface resource disturbances associated with the project. 1,540 acres of MA changes were associated with the decision. See Table G-1-1 for MA changes associated with the Montanore Mine. In addition, the Montanore Mine would affect approximately 25 acres of the Cabinet Face East Roadless Area.

Table G-1-1 Montanore Project MA Changes

MA 31	Mineral Development	1,150 acres
MA 23	Utility Corridor	230
MA 6	Recreation Area	160
Total		1,540 acres

The decision on ASARCOs Rock Creek Mine proposal is expected in early 1999. If approved, 147 acres of MA changes (under the agencies' preferred alternative) would be associated with the project. See Table G-1-2 for Rock Creek proposed MA changes.

Table G-1-2 Rock Cr Project Proposed MA Changes, Alternative 5

MA 31	Mineral Development	108 acres
MA 23	Utility Corridor	39
Total		147 acres

While the Montanore and Rock Creek projects are very similar in terms of ore deposit size, mining methods, and milling processes, they differ significantly in terms of National Forest System land surface utilization. The Montanore Project has a larger tailings facility footprint, which includes large borrow material areas. It has a 16 mile utility corridor that follows a route that is entirely different from the project access road. The project also utilizes a relatively small amount of private land. On the other hand, the Rock Creek project (preferred alternative) is relatively compact. It has a smaller tailings facility footprint which is almost entirely on private land, has considerably less borrow material needs, and the access road and utility corridor follow the same route, nearly a half of which is on private land.

Evaluation: After ten years, the total MA changes needed are less than the projections outlined in the Forest Plan. This monitoring item is within the range prescribed in the Plan

Recommended Actions: Continue monitoring.

HUMAN & COMMUNITY DEVELOPMENT: Changes in Local Economy; Monitoring Item H-1

ACTION OR EFFECT TO BE MEASURED:	Determine the changes in the local economy as a result of Forest Plan implementation.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	Further action will depend on the significance of Forest activities and will most likely be reflected after 10-15 years.

Purpose: This monitoring item provides for the collection and display of information regarding the effect of Forest Plan decisions on local economies. The Plan requires that this item be reported once every five years, and this was done in the FY 92 Monitoring Report. A preliminary report of this data was presented in the FY 96 Monitoring Report, and is updated here. The expected accuracy and reliability of the information is low to moderate.

Background: The Kootenai National Forest has substantial economic impact on 3 counties in Montana (Lincoln, Sanders, and Flathead), and on Boundary County, in Idaho. Most effects are seen in Lincoln and Sanders Counties. Historically, natural resources have been the foundation of these economies, contributing through the forest products industry, mining, agriculture, tourism, and recreation, including fishing and big-game hunting. Studies conducted during the preparation of the Plan showed that the forest products industry is the largest contributor, creating directly and indirectly about 70 percent of the two Counties' employment. Inputs to this economic sector are from both private and federal lands, and are variable from year to year depending on timber harvesting plans. In 1988, for instance, the Kootenai Forest accounted for about two-thirds of the timber harvest activity in Lincoln County. Since forest products make up such a large portion of the Counties' economic base, the trend of the local economy fundamentally mirrors the trend which is seen in the forest products industry.

Results:

First 5 years, 1988 to 1992. Evaluation of the economic effects of the Kootenai National Forest program for the first five years of Plan implementation showed a decrease in the Forest's economic impact in comparison to that initially expected when the Plan was implemented (see the Forest's FY 92 Monitoring Report for details). Harvest volume and the resulting jobs and community income was high in the first part of the period, but by 1991, the economic effect had dropped to a low coinciding with the national recession. In 1992, a recovery was initiated as the Nation emerged from the recession. Harvest volumes from the Kootenai dropped from 248 MMBF in 1987 and 1988 to 174 in 1992. In comparison with expectations, harvest volume was down by 25 percent by 1992. Percentage decreases in jobs and community income was not as large, because the harvest shifted toward smaller trees, which require more employees to harvest and process, according to analysis by the University of Montana's Bureau of Business and Economic Research (BBER). Another characteristic of timber harvest during these first five years was that the amount of volume under contract declined by over 50 percent. This occurred as a result of harvest volumes remaining at an average of 207 MMBF/year while sell volumes averaged 160 MMBF/year (see Table H-1-1). As a result, a major buffering capacity to help match demand with supply had been downgraded. Volume under contract at the end of FY 1992 was 256 MMBF.

Next 5 years, 1993 to 1997. The recovery which appeared to be underway in 1992 continued, as the National economy regained its strength. As a result, the level of jobs and income slightly exceeded the levels noted in the late 1980s. From the recovery peak in 1993 to the present time, however, jobs and income resulting from Kootenai Forest programs have steadily declined by about 30 percent. The amount of timber harvested from the Kootenai National Forest from 1993 to 1997 has decreased by 45 percent. In addition, considerable economic effects occurred in Lincoln County as the ASARCO mine in Troy closed, the Noranda Montanore adit closed, and the Champion Mill in Libby was sold and large portions of its operation dismantled. These events resulted in large layoffs. Residual effects of these closings have been spread out over a several year period but are now fully apparent in economic conditions. The effect on personal income as a result of the closings was partially offset as the level of transfer payments increased in Lincoln County. These payments consist of retirement, social security, medical insurance, unemployment insurance, income maintenance, and veterans payments. In many cases, people who relocated from the area as layoffs occurred were replaced by retirees and others who migrated in from other states to take advantage of relatively low real estate prices. This trend, however, peaked in 1996, and since then, the level of immigration has stabilized. At the current time, there is an excess capacity of homes in Lincoln County, and the real estate market has been flat, with declining residential home prices. The demographic make-up of the County has changed as a result. Elementary school enrollment is down by 13 percent since 1987, indicating a shift from young working families toward retirement-age families and individuals.

During FY 93 to 97, harvest volume from Kootenai National Forest lands averaged 104 MMBF/yr. At the end of that period, there was 146 MMBF under contract but not yet harvested. During this same time period, the amount of wood processed in Lincoln County is estimated by BBER to be down about 6 percent, indicating that products from privately-owned lands were not sufficient to maintain historical outputs as harvest levels from National Forest sources decreased. Overall, however, estimates from BBER indicate that the wood products industry directly accounts for 58.4 percent of the economy of Lincoln County.

High national demand for lumber products along with increasingly constrained supplies led to a strong increase in price for timber during the second five years of Plan implementation. This trend actually had been weakly established in 1990, but then more dramatically advanced in 1993, and peaked in 1995. This price rise stimulated more profitability from timber harvest on both public and private lands, and helped greatly to minimize potential impacts which were occurring as a result of mill and mine closings. Revenues from timber harvests on National Forest lands which are paid to the State for use in county roads and schools averaged $25.87 per MBF in the first 5 years of the Plan, and have averaged $54.78 per MBF in the next 5 years. These higher payments result in less current and future direct tax burden on County residents, thereby improving net personal income levels. As of FY 97, however, the level of payments has decreased from its high of $73.80 to $42.27.

National demand for timber declined in 1996, as evidenced by dropping prices for dimensional material and pulp. In addition, on the Kootenai, harvest shifted strongly toward salvage of wildfire killed timber, which has lower recovery rates and less mill value. By 1997, timber sale revenue dropped to $180.88/MBF from its peak of $310.07 in 1995. It is anticipated that the payments to the State will not achieve the peak levels seen in 1995 during the next few years as this type of timber remains a component of the total harvest and national prices remain low.

Table H-1-1 Changes in the Local Economy by Fiscal Year

Economic Parameter	5-Yr. Ave. FY88-92	FY 93	FY 94	FY 95	FY 96	FY97
Number of Jobs[1]	N/A	5,200	4,150	3,250	4,190	3,580
Community Income[2] (millions of dollars)	N/A	157	137	95	123	108
Timber Harvested[3] (MMBF)	207	155	111	70	100	86
Timber Volume Sold[4] (MMBF)	160	85	59	58	125	89

1- In the timber industry, including Kootenai Forest employment.
2- From the number of jobs in the timber industry and Kootenai employment, the 25% return receipts payments, and Kootenai Forest capital investments.
3- From the Kootenai Forest only.
4- The information used in this Table is taken from the 1997 TSPIRS Report and restated to use more accurate data available from recent studies by the Bureau of Business and Economic Research. The difference from other harvest volumes in this report are due to reporting procedures.

Evaluation: The result of 10 years of Forest Plan implementation has been a substantial positive economic influence to local counties. In Montana, Lincoln and Sanders counties have been the main beneficiaries, but there have been some effects in Boundary County, Idaho, and Flathead County, Montana. As discussed under item E-1 of this report, there is a very clear trend established of reduced volume sold from the Forest. Economic impacts of this change have been mitigated by harvesting volume under contract at higher than historic market rates. This, along with high national demand for lumber and pulp throughout much of the second 5 years of Plan implementation, has been helpful in offsetting mill and mine closures which occurred in the early 1990s. Also, there has been an influx of people to the area who depend on transfer payments rather than a job for their income, and property values and personal income levels have remained stable or increased as a result.

Since the volume under contract has been reduced to the level of about one year's capacity and current sell volumes are lower, the economic situation for local communities is not as resilient as in the first 10 years of the Plan. The buffering capacity of the large timber sell and harvest programs of the 1980s and early 1990s is no longer present, so the role of the Forest to mitigate potential negative effects in the local economy (such as closings of privately owned mills and mines) will be much more limited in the near future. This implies that national and international influences (wood and pulp prices, recessions, and demographic shifts) will have continuing strong and increasing influence on local economies. In addition, it is expected that even small variations in the role of the Forest's economically important programs will have relatively larger effects on local people in comparison to the effects they had in the first 10 years of Plan implementation. The only apparent offset to such an effect would be a continuing trend of immigration of retirees and other people not dependent on local economic traffic to generate personal income.

Recommended Actions: Continue monitoring and further evaluate during Forest Plan revision.

HUMAN & COMMUNITY DEVELOPMENT: Emerging Issues; Monitoring Item H-2

ACTION OR EFFECT TO BE MEASURED:	*Emerging issues.*
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	Issues surfaced that were not included in or analyzed for effect by the Forest Plan.

Purpose: This monitoring item was established to track the amount of resource management conflict that is occurring, especially those conflicts which were not foreseen during the preparation of the Forest Plan. The Plan requires that this item be reported annually. The expected accuracy and reliability of the information is moderate.

Background: New emerging issues could affect the Forest's ability to implement the Plan as intended, so they are identified as part of monitoring.

EMERGING OR POTENTIAL FOREST ISSUES NOT SPECIFICALLY EVALUATED IN THE FOREST PLAN:

Wildland/Urban Interface: Due to the fires in 1994, there is an increased awareness and concern regarding the wildland/urban interface and fuel buildups as it pertains to risk to human life and property.

Amended Forest Plan Biological Opinion: The USFWS amended biological opinion of July, 1995, states that, until new Forest-wide access management direction is issued, projects should not increase the density of open roads above the current Forest Plan standard, should not increase the density of open motorized trails, should not increase the net total motorized access route density, and should not decrease the existing amount of core area in a Bear Management Unit. Departures can be made in consultation with the USFWS and will emphasize ways to increase security for bears with a long-term goal of achieving the Access Committee's recommendations. Meeting this direction may limit the level of management that could have been realized under past direction.

Ponderosa Pine Old Growth Management: This issue was brought forward from the FY 95 Monitoring Report. Ponderosa pine stands historically evolved with disturbances such as low-intensity ground fires. Without such disturbances, the potential for attaining an old growth state is reduced due to increased understory vegetation which could carry a high-intensity fire. Due to long history of fire suppression, a need may exist to remove (through timber harvest) some of the understory vegetation prior to burning. The Forest Plan allows for prescribed burning within MA 13 old growth stands, but does not allow for removal of timber without an amendment to the Plan.

Balancing Road Closures to Meet Forest Plan Standards While Providing Access to the National Forests for the Public: Recent planning efforts indicate that the Forest Plan open road density standard of .75 miles per square mile in MA 12 cannot be achieved in some areas without closing all the roads including main collector roads and loop roads which have been traditionally used for decades. Projects which cannot meet the standard are either being winter logged, deferred, or a Forest Plan amendment (generally programmatic, meaning it is in effect for the life of the Plan) is being proposed. In addition, some projects cannot be implemented without opening a closed road. When the road is opened the open road density standards are not met. In these cases, the projects are modified, dropped or project-specific amendment (which is only for that project) is proposed. Response to road closures has included an increasing number of signs and gates being vandalized or removed.

Wildfire and Subsequent Effects: The Forest has experienced significant fire events in the last few decades (1979, 1984, 1988, 1991, and 1994) and been faced with a number of project-level proposals for rehabilitation and salvage that require an assessment of burn intensity and tree mortality levels. In response to these needs, the silviculturists have written guidelines that apply the findings of area fire research and professional experience to site-specific conditions. This effort has been without the benefit of local long-term study of post-fire conditions.

Following an extensive fire event in 1994, the Forest Management Team approved a long-term monitoring project. This project is intended to establish base line information regarding fire-caused tree mortality, vegetative succession, and fuels accumulation. Specific objectives include a refinement in the predictive guidelines used for estimating tree mortality in fire-

affected areas, and determining trends in succession of vegetation. Thirty-eight plots are established to date. Monitoring will continue on a one, two, three, five, and 10 year schedule.

Access and Easements to Private Landowners: Inhabited private land has increased in the last few years and, with it, the expectation that access across Forest Service land and maintenance of this access will be given, which is not always the case.

CONTINUING FOREST ISSUES THAT MAY STILL AFFECT THE FOREST PLAN:

The Forest Plan initially identified and addressed 13 public issues. As stated in the FY 92 Monitoring Report of these original 13 issues, the following are still current issues: grizzly bear management, timber supply (local economic impact), road management and public access, potential mineral development, visual (scenic) quality, and community stability (in the broader sense of using the natural resources of National Forest lands to provide jobs related to recreation, tourism, and forest products other than timber).

Recommended Actions: These emerging issues will be reviewed during Forest Plan revision to determine if and how they should be resolved.

HUMAN & COMMUNITY DEVELOPMENT: Forest Plan Costs; Monitoring Item H-3

ACTION OR EFFECT TO BE MEASURED:	Determine if the costs of producing outputs that were used in the Forest Plan continue to be valid.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	A deviation of more than 10 percent from the cost data used to calculate present net value in the Forest Plan.

Purpose: This monitoring item was established to track the cost of major items contributing to the present net value of the Forest Plan. The Plan requires that this item be reported annually. The expected accuracy and reliability of the information is moderate to high.

Background: During the development of the Plan, cost data were broken down into fixed, other, and variable costs. Fixed costs consisted of 45 categories of costs and these items were the same for all alternatives considered. Other costs include 16 categories of cost items which were lumped but varied by alternative. Variable costs consisted of certain recreation costs, wildlife habitat improvement costs, range management and improvement costs, and all timber-related costs. These breakdowns were consistent with analytical techniques used for the Plan, but do not compare directly with accounting classifications (different breakdowns) now in use. As a result, only some of the variable costs can be readily used to determine changes in unit costs. However, the ones used are the variable cost items which influenced land allocation and activity scheduling in the Plan and indicate trends in unit cost change for monitoring purposes.

Cost analysis was undertaken for timber sale preparation and administration (site preparation, reforestation, precommercial thinning) and roads constructed primarily for timber harvest. The base line unit cost figures (those used to calculate Present Net Value in the Plan) were extracted from the planning record and inflated to FY 97 dollars in order to provide comparability. The fiscal year unit cost values were obtained from Forest accounting reports and Forest management attainment reports and inflated to FY 97 dollars. Timber sale preparation costs include all planning, sale preparation, and sale administration expenditures for the fiscal year. Timber output is based on the amount sold in the fiscal year. Timber road costs are based on purchaser credit established and associated engineering support costs. Reforestation costs include all reforestation-related costs including cooperative work required by timber sale contractors. All acres with reforestation work are represented in the output level. Table H-3-1 shows the base line, the first five years, and FY 93-97 unit cost data for these items.

Results and Evaluation:

Timber Sales unit costs for FY 93-97 are displayed in Table H-3-1 and show an increase over the level projected in the Plan. These unit costs are now declining from a peak reached in FY 94. However, costs are about three times greater than projected, which is well outside the +/- 10 percent range prescribed in the Plan. This increase is due to the increasing complexity in timber sale preparation along with a concurrent decrease in the amount of timber volume being sold. For more detail on these aspects, please refer to Monitoring Items E-1 through E-3 and E-7.

Timber Roads unit costs were close to the level projected in the Forest Plan for the first five years of the Plan, but increased in FY 93 through FY 95 (see Table H-3-1) largely as a result of decreased volume sold, lowering cost efficiency. In FY 96, increased timber volume sold in comparison to prior years resulted in costs dropping below the predicted levels in the Plan. Much of the increase in timber sold was a result of salvage of timber killed in 1994 wildfires. Harvest was focused on areas in which minimal road construction was required. As anticipated, road unit costs have increased again in FY 97, as much of the timber salvage work has been completed. Work is not as focused toward harvest in areas which required little road construction.

Reforestation unit costs were also higher than projected in the Forest Plan for FY 97 (see Table H-3-1). This continues the slight upward trend that began in FY 90. Due to changes in accounting procedures, there is some inaccuracy in these cost figures; however, it appears that reforestation costs are about 30 percent higher than predicted. Since reforestation is a relatively large component of the timber program, this additional cost is a potentially significant change in the economic efficiency levels of the Forest.

Precommercial thinning unit costs continue to stay below projected costs, helping the Forest to minimize overall costs (see Table H-3-1). However, in terms of the total PNV of the Plan, precommercial thinning accounts for only 0.2 percent of the total contribution to PNV costs, so the overall economic efficiency is only slightly affected.

Recommended Actions: Since unit costs have increased significantly in timber, timber roads, and reforestation, there will be a need to factor in such changes during Forest Plan revision. The Forest's accounting systems are continuing to effectively track these trends. During the revision process, cost efficiency analysis will include these elements and others as appropriate.

Table H-3-1 Forest Plan Unit Costs by Fiscal Year*

Cost Item	Units	Unit Costs Projected in Plan	Weighted Average FY 88-92	FY 93	FY 94	FY 95	FY 96	FY 97	Weighted Average FY 93-97
Timber Sales	$/MBF	30	42	111	126	139	62	92	98
Timber Roads	$/MBF	32	28	53	55	58	24	35	46
Reforestation	$/acre	355	390	397	417	421	552	518	463
Precommercial Thinning	$/acre	315	235	222	232	293	218	216	249

* All unit costs in this table have been updated to FY 97 dollars to account for inflation and to provide comparability

HUMAN & COMMUNITY DEVELOPMENT: Forest Plan Budget: Monitoring Item H-4

ACTION OR EFFECT TO BE MEASURED:	Assess Forest budget levels and their effects on Forest Plan implementation
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION	10 percent deviation by funding item from the predicted levels in the Forest Plan.

Purpose: This monitoring item was established to track the budget levels received from Congress. The Forest Plan requires that this item be reported annually. The expected accuracy and reliability of the information is high.

Background: The budget process is directly related to the Plan, but also influenced by other factors. Program targets vary from year to year to meet certain needs and such changes are reflected in the budget figures. As a result, budget levels for any single year should be interpreted with care. However, given major trends now seen since 1988, it is apparent that many programs and costs have changed substantially, and Plan predictions are no longer fully valid. The analysis presented below will be helpful in budget analysis for Forest Plan revision.

Results: Table H-4-1 (next page) shows the percentage difference between the planned and actual budgets for the first five years of the Plan, and FY's 93-97. Major increases have occurred in fire, law enforcement, timber salvage sales, KV Trust Funds, trail construction and tree improvement. For more detailed information on the specific dollar amounts for each budget item by fiscal year, see Appendix D at the end of this report.

Evaluation: In order to evaluate this information with its wide variations, the major Forest programs were grouped for easier comparison. For each major Forest program (such as timber, wildlife, recreation, etc.), all applicable budget items were grouped and added together. Data for all fiscal years were averaged to smooth out year-to-year variations. Output levels for each major resource area were obtained from Appendix A (at the end of this report) and are based on the Forest's Management Attainment Report for FY's 88-97. For each major program area, all applicable outputs were added together. To some extent, some misrepresentation was introduced by this addition (for instance, developed recreation and dispersed recreation) but overall results do show the major trends. Table H-4-2, on a following page, shows the results of this analysis. Below is a brief listing of each program area, the outputs contributing to it, and an evaluation of the trend.

Minerals (number of cases handled): The number of minerals cases arising is not a controllable item, because the Forest is required to respond to cases as they arise. Although a considerable number of cases have been completed, many of them have been less complicated than the expected long-term average.

Protection (natural fuels treatment, in acres): Continuing the trend which began in FYs 92 and 93, the acres of natural fuels treatments went up substantially over prior years (see Appendix A). As a result, the level of accomplishment is continuing very high, at 158 percent of the planned amount.

Range (permitted grazing use, in acres): Both range budgets and production amounts are below that shown in the Plan, but relatively less so for production. See Item D-1 for more information.

Recreation (Total of developed and dispersed use, in recreation visitor days): Compared to the Plan, recreation budgets are lower and outputs are higher. Continuing difficulty in obtaining full funding on a national basis affects this program area. Outputs, however, are steadily increasing as more people opt to volunteer and challenge grants help reduce this gap between planned and realized funding. Recreation experience quality could diminish if the current cooperation diminishes and the budget gap continues. The low reliability and accuracy of the dispersed recreation use data (using traffic counts to calculate driving for pleasure and viewing values, for example) may also be a contributing factor to the large overrun of outputs.

Table H-4-1 Actual Budgets as a Percent of Forest Plan Projected Amounts

Item	Budget Activity	Planned Amount base year FY78	FY 88-96 Percent of Planned	FY 97 Planned Amount	FY 97 Actual Amount	FY 97 % of Actual Amount
00	General Administration	1,465	63%	3,285	1,261	38%
01	Fire	530	675%	1,188	1,924	162%
02	Fuels	59	131%	132	226	171%
03-05	Timber	2,648	50%	5,937	2,593	44%
06-07	Range	59	97%	132	231	175%
08	Minerals	287	53%	644	469	73%
09	Recreation	561	70%	1,258	887	71%
10	Wildlife and Fish	648	60%	1,453	472	32%
11	Soil, Air, Water	269	87%	603	393	65%
12	Facility Maintenance	145	100%	325	300	92%
13-15	Lands/ Land Management	156	84%	350	367	105%
42-43	Lands-Status/ Acquisition	96	38%	215	37	17%
16	Landline Location	285	90%	639	213	33%
17	Road Maintenance	764	55%	1,713	1,111	65%
18	Trail Maintenance	115	81%	258	185	72%
19	Co-op Law Enforcement	12	104%	27	69	256%
20	Reforestation (appropriated)	871	53%	1,953	914	47%
21	TSI (appropriated)	562	58%	1,260	380	30%
23	Tree Improvement	20	260%	45	100	223%
26-28	KV (Trust Fund)	1,427	138%	3,200	3,405	106%
29	CFWS - Other (Trust Fund)	348	101%	780	971	124%
30	Timber Salv Sales Perm Fund	275	974%	617	8,162	1324%
31	Brush Disposal (Perm Fund)	694	72%	1,556	779	50%
32	Range Improvement	6	39%	13	5	37%
33	Recreation Construction	99	91%	222	128	58%
34	Facility Construction: FA&O	111	6%	249	1	0%
35	Engineering Const. Support	2,360	42%	5,292	1,596	30%
36	Const. Capital Invest Roads	1,801	10%	4,038	418	10%
37	Trail Const/ Reconstruction	32	204%	72	111	155%
24, 38	Timber Road Const.: PC/Elect.	2,399	43%	5,379	1,296	24%

Actual budgets are based on each Fiscal Year's budgets, and can be found in prior year's Monitoring Reports. FY 1997 Planned Dollars are FY 78 times 2.2422 to account for inflation. The Forest Plan projected amounts are detailed in Appendix D.

Reforestation (Acres reforested naturally and artificially, by Forest and cooperators): Reforestation budget and achievement levels are close to those projected in the Plan.

Timber (Total volume sold, MMBF): Both timber budgets and outputs are less than planned. See Monitoring Item H-2 for a discussion of timber unit costs and Monitoring Item E-1 for timber sell volume information.

Timber Stand Improvement (Acres precommercially thinned): Actual costs for precommercial thinning for the first nine years of the Plan have been less than those anticipated. Acreage thinned has not fully reached expected levels due to budget limits.

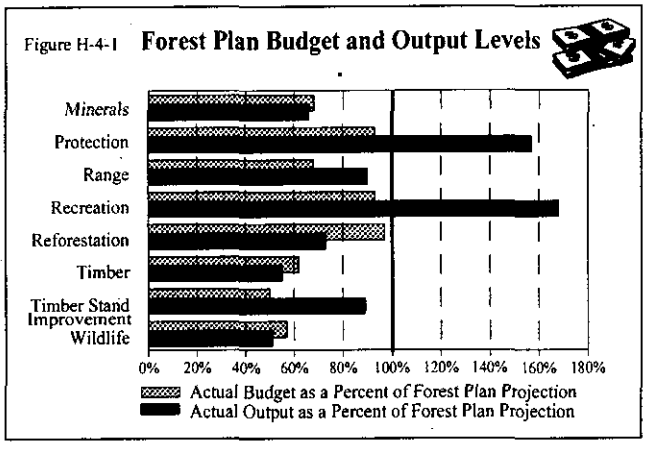
Wildlife and Fish (Total acres of wildlife, fish, and T & E habitat improvement): Budgets in this area average at around *57 percent of planned amounts considered over the last ten years.* Accomplishment also remains lower than expected at about 51 percent. Appendix D shows a decline in these budgets beginning in FY 93 and continuing through FY 97. This trend away from the levels of funding prior to FY 93 signals a change in the ability of the Forest to undertake habitat improvement work.

Table H-4-2 **Forest Plan Budget & Output Levels**

Activity or Output	Actual Budget as a Percent of Forest Plan	Actual Output as a Percent of Forest Plan Projection
Minerals	68%	66%
Protection, Natural Fuels Treatment	93%	158%
Range	93%	90%
Recreation	68%	168%
Reforestation	97%	73%
Timber	62%	55%
Timber Stand Improvement	50%	89%
Wildlife	57%	51%

* Factors contributing to the outputs are shown in the text.

Figure H-4-1 **Forest Plan Budget and Output Levels**



Conclusion: Based on the information stated above, this monitoring item is outside the range prescribed in the Plan.

Recommended Actions: Continue monitoring.

FACILITIES: Road Access Management; Monitoring Item L-1

ACTION OR EFFECT TO BE MEASURED: Determine if the road access management objectives are being met.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: +/- 20% of the proportion of open to closed roads, as described in the Forest Plan, by the end of the first decade

Purpose: This monitoring item was established to ensure that the road access restrictions required in the Forest Plan were being achieved. The Plan requires that this item be reported every five years. The expected accuracy and reliability of the information is high.

Background: Just prior to the time the Plan was approved in September, 1987, about 27 percent of the Forest system roads were being restricted either yearlong or seasonally (Forest Plan FEIS, pave IV-51). The Plan projected that in order to provide the issue resolution desired, about 57 percent of the roads would eventually need some form of restriction. This would be about double the amount of road restrictions at the time the Plan was approved. The assumption was that the number of new roads needed to timber harvest would increase significantly, and that they would all be restricted after the timber sales were completed -- the net result being a lot more road restriction but about the same level of original access for the public. The need for additional road restrictions was to protect dispersed recreation values, provide for wildlife security in big game winter and summer range, reduce road maintenance costs, and provide for grizzly bear recovery. Because of the significant increase in the amount of road restrictions needed (from 27 percent to 57 percent), it was assumed that it would take about 10 years to accomplish. This is about an 11 percent increase each year to reach the planned level.

Evaluation: By FY 97, enough roads have been restricted to meet the goal of having closures on approximately 57 percent of the Forest's roads. Table L-1-1 shows the progression of closures through time. The closed roads have been both yearlong and seasonal closures. Although the percentage of road closures have been achieved as expected, the total amount of road access is less than expected. This is because road construction has been less than anticipated due to reductions in the timber sale program (see Monitoring Item E-1 for details). The road closures have been placed not only on new logging roads, but also on older roads, which were not anticipated for a significant level of closures in the Forest Plan. The reasons for closures include wildlife habitat security, to save maintenance costs, to decrease erosion, and improve hydrological conditions. Access has been identified as an emerging issue (Monitoring Item H-2). Response to closures on existing roads includes an increasing number of signs and gates being vandalized or removed.

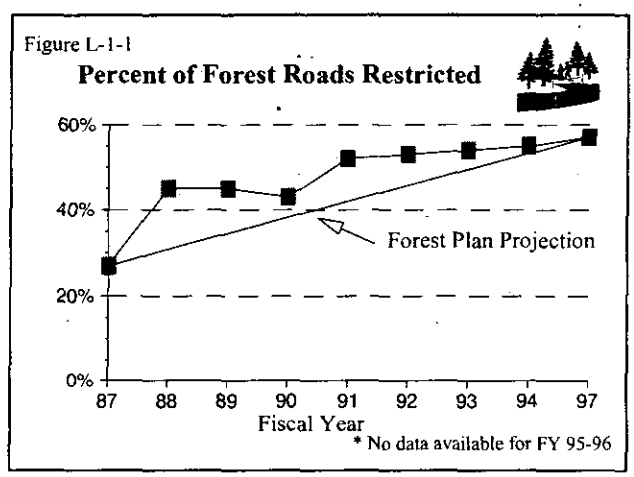
Recommended Actions: Continue to monitor the mileage of roads restricted and the reasons for the restrictions.

Table L-1-1 **Forest Roads Access Restrictions**

FY	Total Miles of Road	Total Miles of Restricted Access	% of Total Roads Restricted	Total Miles of Unrestricted Access	Difference in Miles of Unrestricted Access from FY 87
87*	6,200	1,669	27%	4,530	0
88	6,972	3,195	45%	3,777	(753)
89	7,112	3,260	45%	3,852	(678)
90	7,052	3,041	43%	4,011	(519)
91	7,131	3,734	52%	3,399	(1,131)
92	7,149	3,784	53%	3,365	(1,165)
93	7,377	3,990	54%	3,387	(1,143)
94	7,350	4,062	55%	3,280	(1,242)
97	6,460	4,275	57%	3,185	(1,345)

Forest system roads only, that are restricted to motor vehicles both yearlong and seasonally.
*1987 was the year before the Plan was approved.

Figure L-1-1



FACILITIES: Road Density; Monitoring Item L-2

ACTION OR EFFECT TO BE MEASURED: Determine if the road densities predicted in the Plan are still valid.

VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION: Any increase in road density over that predicted in the Forest Plan.

Purpose: This monitoring item was established because there was a strong public concern that the amount of existing and planned roads were too numerous and that the cost to other resources (soil, water, wildlife, roadless recreation and economics) was too high. The Forest Plan requires that this item be reported every five years. The expected accuracy and reliability of the information is high.

Background: The monitoring item was designed to test the assumption of road density used in the FORPLAN computer model. This model calculated the total road mileage needed to access all the suitable timberland. The maximum road densities projected in FORPLAN ranged from 4.4 to 5.8 miles per square mile depending on the steepness of the terrain and the logging system used. These road densities were calculated from previous experience on the Forest during the 1970s. Also, a Forest Goal was established to minimize the number of roads needed to manage the Forest (see Forest Plan, page II-1). As a result, it was anticipated that actual road densities would be less than or equal to the projected maximum.

Results: During the first 5 years of Forest Plan monitoring, the only way to measure road density was based on measurements made by Ranger Districts during project planning. This method is inherently incomplete, since only a small part of the Forest is sampled. In the FY 92 Monitoring Report, the road density for suitable lands was estimated to be 3.2 miles of road per square mile. During the second 5 years of Plan monitoring, the roads and management area information for the Forest's geographic information system was completed, and it became possible to obtain an actual measurement of road density rather than a sample. As of FY 97, this calculation showed that the road density for suitable lands is 3.53 miles per square mile.

Evaluation: The actual road density on suitable lands has been measured to be 3.53 miles per square mile, which is significantly less than the road density which would be necessary to fully access all the suitable lands on the Forest. Given the decreased harvest levels of the Forest's current program in comparison to its program of 10 years ago, it is unlikely that there will be any significant increase in road density in the near term. In addition, watershed restoration work is being done to obliterate unstable and unneeded roads, so road density may decrease in some areas.

Recommended Actions: The Forest Plan goal is to construct the minimum number of roads to permit efficient removal of timber and mineral resources. This is continuing to occur, therefore no change is needed at this time.

PROTECTION: Insect and Disease Status; Monitoring Item P-1

ACTION OR EFFECT TO BE MEASURED:	Determine the level of insect and disease organisms following management activities to insure the health of residual and surrounding stands.
VARIABILITY WHICH WOULD INITIATE FURTHER EVALUATION:	Insect and disease levels increase beyond normal levels.

Purpose: This monitoring item was established to ensure that insect and disease levels are not made worse by Forest management activities, particularly timber management. The Forest Plan requires that this item be reported every two years. The expected accuracy and reliability of the information is moderate.

Background: Insects and disease (I&D) levels in stands meeting the above criteria have remained at endemic (low) levels for the last two years. Management activities are normally designed using integrated pest management strategies to ensure insect and disease levels remain low from management activities. This includes treatments to physically reduce insect and disease damaged trees and subsequent fuel abatement to do the same.

Results: Densely growing trees, regardless of size, can come under stress, often predisposing them to insect and/or disease attack. Commercial (3,100 acres) and precommercial thinning (4,400 acres) treatments have occurred on the Forest over the last two fiscal years. Both treatments include reduction of stocking levels to reduce stress while improving species mixtures that are less susceptible to insect and disease problems. Insect and disease damaged trees are normally reduced during these operations. Mistletoe infected overstory trees on recently regenerated stands have been reduced on over 350 acres. Pruning of white pine blister rust infected western white pine occurred on 120 acres. Prescribed burning following harvest and for wildlife habitat improvement sometimes increases insect activity, but at a low level.

Evaluation: An insect and disease flight, activity reviews, service visits, stand exams, reforestation exams, permanent plot (growth plots) remeasurements, and benchmark exams indicate stands that have been regeneration harvested and those treated with some form of intermediate treatment are generally healthy, with only minor amounts of insect or disease that can cause significant problems.

The Forest surveyed about 31,000 acres for dwarf mistletoe infection in FY 96 and FY 97. We found few infections in the seedling and sapling size class but did find infection in mature trees of western larch, lodgepole pine, and Douglas fir in or adjacent to many plantations that pose a threat to spreading this disease. Follow-up treatments are proposed in stands that may cause subsequent problems in regenerated stands. About 355 acres of mistletoe-infected overstory trees were treated in FY 97, with an additional 450 acres proposed in FY 98.

Western gall rust continues to infect many lodgepole pine stands recently precommercial thinned. We have requested that the region prepare an evaluation ("white paper") on this disease and recommend possible management strategies. Root rot continues to infect tolerant species primarily in the western districts. The vast majority of stocking in these plantations is composed of intolerant species not highly susceptible to root rot.

White pine blister rust continues to infect natural white pine at a high rate. We rarely feature natural white pine as a crop tree, so this condition does not pose a threat to the forest timber resource productivity. However, in stands where natural white pine is intended to remain a part of the stand composition and infection levels are moderate, branch pruning is being tested to reduce infection levels.

Recommended Actions: Based on the information stated above, insect and disease levels are at low levels in managed stands. Continue monitoring using the above surveys.

APPENDIX A: Planned Outputs or Activities and Accomplishments

				Actual Accomplishments							
Target Item	**Output or Activity**	**Unit of Measure**	**Planned FY 1988-92**	**5-Year Ave. FY 1988-92**	**FY 93**	**FY 94**	**FY 95**	**FY 96**	**FY 97**	**10-Year Ave. % of Planned Units**	**10-Year Ave. % of Planned Units**
Recreation	Developed Use	M RVD	297	192	319	325	315	329	337	311	87%
	Dispersed Use: Wilderness	M RVD	18	26	23	23	28	28	99	29.1	184%
	Non-Wilderness	M RVD	559	981	1,223	1,244	1,275	1,284	1,303	912.4	201%
Wildlife and FIsh	Wildlife Habitat Improvement	Acres	5,600	3,700	4,400	1,900	1,200	538	960	3,699.8	49%
	T & E Habitat Improvement	Acres	150	110	52	319	275	0	16	141.2	81%
	Fish Habitat Improvement	Acres	120	121	146	97	400	80	97	142	119%
Range	Permitted Grazing Use	M AUM	12.6	11.4	12.1	11.6	11.7	10.6	9.4	11.84	89%
Soil	Soil Inventory	M Acres	15.7	9.8	0	11	0	0	0	8.95	38%
Lands	Land Exchange	Acres	1,700	2.2	100	80	380	0	22,680	3,174	137%
Minerals	Minerals Management	Cases	300	236	191	154	102	120	161	222.8	64%
Protection	Fuels Treatment, Natural	Acres	800	762	1,289	2,561	750	1,722	2,534	1,285.6	158%
Timber	Total Volume Offered 1	MMBF	233	161	75.5	73.6	66	122	90	159.21	53%
	Reforestation (appropriated)	M Acres	3	3.1	3.5	4.3	3.6	2.9	2.7	3.2	108%
	Reforestation (KV)	M Acres	7.1	7.2	10.1	7.8	5.7	4.9	4.4	6.84	97%
	Reforestation (Other - Co-op)	M Acres	4	2.8	2.9	2.5	0.2	0	0.4	2.6	50%
	Total Reforestation	M Acres	14.1	13.1	16.5	14.6	9.5	7.8	7.5	12.64	86%
	Timber Stand Improv (appropriated)	M Acres	4	3.3	4.7	3.7	4.7	3	1.5	3.76	85%
	Timber Stand Improv (KV)	M Acres	1	0.8	1.1	0.8	1.2	1	1.3	1.04	94%
	Total Timber Stand Improv	M Acres	5	4.1	5.8	4.5	5.9	4	2.8	4.8	87%
	Stand Examination	M Acres	139	177	202	139	105	107	104	135.2	111%
	Fuel Treatment (BD/ KV)	M Acres	11.7	11.8	8.06	6.34	6.4	3.5	5.6	8.84	76%
Facilities	Total Road Construction 2	Miles	237	77	80	36	8	30	6.4	134.54	23%
	Trail Construct/ Reconstruct	Miles	7.5	6.7	7.2	13.4	133	12	25.5	22.86	299%

[1] Timber offered but not necessarily sold as of Oct 31 of the Fiscal Year. Planned amounts include 25 MMBF/year of non-interchangeable volume (primarily dead lodgepole) plus 202 MMBF of live green timber for an ASQ of 227 MMBF/year. In addition to the ASQ, 6 MMBF/year of unregulated volume is expected to be offered.

* Acres of site preparation for natural regeneration as part of the timber sale contract (purchaser's requirement) and other contributed funds.

** Includes precommercial thinning and release.

[2] Includes arterial, collector, and local roads.

APPENDIX B: Timber Sell Volume

The following Table show actual accomplishments compared to Forest Plan projections. All values are shown in million board feet (MMBF). Please see Monitoring Item E-1 for details.

	Forest Plan ASQ	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	Total FY 88-97	Average Per Year	10-Year Vol. Diff.	Percent of FP Sold
Suitable Lands															
Regulated:	202	152.4	152.8	115.4	74.5	150.4	58	35.3	34.1	61.9	41.1	875.9	159.94	(1,144.1)	43.4%
Non-interchangeable:															
Dead LPP	20	19.2	25.9	26.4	14.7	26.2	11.4	6.7	3.3	4.3	34.5	172.6	32.6	(27.4)	86.3%
Other Dead	5	1.7	2.3	4.5	4.6	22	12.2	13.7	17.7	56.6	11.5	146.8	29.19	96.8	293.6%
Total Non-interchangeable	25	20.9	28.2	30.9	19.3	48.2	23.6	20.4	21	61	46	319.5	61.81	69.5	127.8%
Total Sell Volume	227	173.3	181	146.3	93.8	198.6	81.6	55.7	55.1	122.9	87.1	1195.4	221.75	(1,074.6)	52.7%
Non-chargeable*															
Roundwood	0	0.9	0.7	0.8	2.3	0.3	0.5	0.9	0.4	0.4	0.3	7.5	1.41		
Fuelwood	0	2.4	3.2	2.1	2.4	2.1	2.3	2.6	3	2.7	2.4	25.2	4.8		
Total Non-chargable	0	3.3	3.9	2.9	4.7	2.4	2.8	3.5	3.4	3.2	2.7	32.8	6.23		
Unsuitable Lands															
All Unregulated	6	2.4	3.4	2.2	1.4	2.4	0.5	0.2	0.3	0.6	0.2	13.6	2.48	(46.4)	22.7%
GRAND TOTAL	233	241	224	237	165	167	120	124	122	111	90	1601	296.1	(729)	68.7%

* Woody material that is sold, but not accounted for in Appendix 11 of the Forest Plan. Roundwood is small material not meeting Region 1 forest planning sawlog specifications and usually removed as post, pole, or rail products.

NOTE: Totals may not be exact because of rounding.

APPENDIX C: Openings Greater than 40 Acres

The National Forest Management Act (NFMA) provides direction for development and implementation of land and resource management plans. Secretary of Agriculture regulations of 36 CFR 219 provide guidance for implementing NFMA provisions. Section 219.27 (d)(2)(iii) states that "...the established limit shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm."

Furthermore, the Northern Regional Guide, 36 CFR 219.8, states, "Where natural catastrophic events such as fire, windstorm, or insect and disease attacks have occurred, 40 acres may be exceeded without 60-day public review and Regional Forester approval, provided that the public is notified in advance and the environmental analysis supports the decision" (Regional Guide, page 2-6). This same direction is repeated in the Regional Supplement to Forest Service Manual 2471.1.

The Forest Plan also provides direction regarding opening sizes and states, "...maintain a variety of unit sizes of generally 40 acres or less. Where catastrophic conditions such as insects, disease, or fire create a condition whereby larger unit sizes will have no additional effect on wildlife habitat, larger cutting units may be used" (Forest Plan, page II-23). The intent of this statement is to ensure that any activity hastens recovery for wildlife and that there are no long-term detrimental effects through exceeding 40 acres.

The following projects were approved by the Forest Supervisor to exceed opening sizes and, therefore, are consistent with Forest Plan direction.

Fiscal Year	Project Name	Total Acres of Openings	MA	Years to Recovery	Comments
1997	Basin Creek	249	12	3-17	Harvest of beetle-killed lodgepole in 1 unit (16 acres) adjacent to 233 acres of previous harvest
		48	12	3-17	Harvest of beetle-killed lodgepole in 1 unit (15 acres) adjacent to 33 acres of previous harvest
		134	12	3-17	Harvest of beetle-killed lodgepole in 4 units (72 acres) adjacent to 72 acres of previous harvest
		161	12	3-17	Harvest of beetle-killed lodgepole in 4 units (101 acres) adjacent to 60 acres of previous harvest
1997	Burro Face	114	12	15	Harvest of beetle-killed lodgepole in 3 units (62 acres) adjacent to 52 acres of previous harvest
		85	12	15	Harvest of beetle-killed lodgepole in 1 unit (25 acres) adjacent to 60 acres of previous harvest
		192	12	15	Harvest of beetle-killed lodgepole in 2 units (62 acres) adjacent to 130 acres of previous harvest
		79	12	15	Harvest of beetle-killed lodgepole in 1 unit (27 acres) adjacent to 52 acres of previous harvest
1997	Warland Creek	133	12	3-15	Harvest of beetle-killed lodgepole in 3 units (59 acres) adjacent to 74 acres of previous harvest
		65	12	3-15	Harvest of beetle-killed lodgepole in 1 unit (29 acres) adjacent to 36 acres of previous harvest
		99	12	3-15	Harvest of beetle-killed lodgepole in 1 unit (38 acres) adjacent to 61 acres of previous harvest
		55	12	3-15	Harvest of beetle-killed lodgepole in 2 units (28 acres) adjacent to 27 acres of previous harvest
		79	12	3-15	Harvest of beetle-killed lodgepole in 4 units (12 acres) adjacent to 67 acres of previous harvest

Fiscal Year	Project Name	Total Acres of Openings	MA	Years to Recovery	Comments
1997	Bristow Salvage	119	12	15	Harvest of beetle-killed lodgepole in 2 units (119 acres) adjacent to 138 acres of previous harvest
		134	12	15	Harvest of beetle-killed lodgepole in 2 units (92 acres) adjacent to 42 acres of previous harvest
		46	12	15	Harvest of beetle-killed lodgepole in 1 unit (5 acres) adjacent to 41 acres of previous harvest
		378	12	15	Harvest of beetle-killed lodgepole in 5 units (174 acres) adjacent to 204 acres of previous harvest
		82	12	15	Harvest of beetle-killed lodgepole in 1 unit (82 acres)
		42	11	15	Harvest of beetle-killed lodgepole in 1 units (10 acres) adjacent to 32 acres of previous harvest
1997	Advent Down	4	12	15	Harvest of dead (windstorm) lodgepole in 1 unit (4 acres) adjacent to 385 acres of previous harvest
1997	Fry-Zim	813	12	5-15	Harvest of fire killed lodgepole (298 acres) adjacent to 688 acres of burn intensity 1 and 2 and 125 acres of previous harvest
		1602	12	5-15	Harvest of fire killed lodgepole (11 acres) adjacent to 1312 acres of burn intensity 1 and 2 and 290 acres of previous harvest
1997	McSutton Salvage	309	12	5-15	Harvest of beetle-killed lodgepole in 4 regeneration units (116 acres) adjacent to 193 acres of previous harvest
		99	12	5-15	Harvest of beetle-killed lodgepole in 1 regeneration unit (26 acres) adjacent to 73 acres of previous harvest
		69	12	5-15	Harvest of beetle-killed lodgepole in 1 regeneration unit (20 acres) adjacent to 49 acres of previous harvest
		344	12	5-15	Harvest of beetle-killed lodgepole in 4 regeneration units (138 acres) adjacent to 206 acres of previous harvest
		114	15	5-15	Harvest of beetle-killed lodgepole in 1 regeneration unit (41 acres) adjacent to 73 acres of previous harvest
		62	15	5-15	Harvest of beetle-killed lodgepole in 1 regeneration unit (26 acres) adjacent to 36 acres of previous harvest
		78	12	5-15	Harvest of beetle-killed lodgepole in 2 regeneration units (44 acres) adjacent to 34 acres of previous harvest
		48	24	5-15	Harvest of beetle-killed lodgepole in 1 regeneration unit (9 acres) adjacent to 39 acres of previous harvest
		130	12	5-15	Harvest of beetle-killed lodgepole in 1 regeneration unit (104 acres) adjacent to 26 acres of previous harvest
		83	12	5-15	Harvest of beetle-killed lodgepole in 1 regeneration unit (20 acres) adjacent to 63 acres of previous harvest
		541	12	5-15	Harvest of beetle-killed lodgepole in 6 regeneration units (265 acres) adjacent to 276 acres of previous harvest
		158	12	5-15	Harvest of beetle-killed lodgepole in 2 regeneration units (21 acres) adjacent to 137 acres of previous harvest
		204	15	5-15	Harvest of beetle-killed lodgepole in 1 regeneration unit (9 acres) adjacent to 195 acres of previous harvest
		132	15	5-15	Harvest of beetle-killed lodgepole in 1 regeneration unit (43 acres) adjacent to 89 acres of previous harvest
		49	24	5-15	Harvest of beetle-killed lodgepole in 1 regeneration units (5 acres) adjacent to 44 acres of previous harvest
		199	24	5-15	Harvest of beetle-killed lodgepole in 1 regeneration unit (120 acres) adjacent to 79 acres of previous harvest

Appendix D: Actual Budgets as a Percent of Forest Plan Projected Amounts

Item	Budget Activity	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	10-Yr Average
00	General Administration	84%	77%	62%	79%	127%	65%	60%	41%	36%	38%	61%
01	Fire	78%	74%	74%	79%	107%	85%	1252%	835%	270%	162%	297%
02	Fuels	47%	25%	27%	38%	141%	113%	113%	197%	134%	171%	90%
03-05	Timber	75%	66%	65%	72%	111%	50%	50%	38%	41%	44%	56%
06-07	Range	68%	57%	54%	43%	80%	111%	84%	117%	153%	175%	93%
08	Minerals	59%	51%	55%	60%	109%	54%	53%	77%	75%	73%	61%
09	Recreation	66%	53%	57%	75%	132%	68%	73%	69%	66%	71%	68%
10	Wildlife and Fish	36%	49%	54%	70%	130%	60%	59%	49%	39%	32%	52%
11	Soil, Air, Water	56%	53%	91%	94%	103%	91%	83%	89%	68%	65%	77%
12	Facility Maintenance	72%	64%	114%	114%	100%	107%	93%	113%	79%	92%	89%
13-15	Lands/ Land Management	41%	38%	50%	82%	164%	94%	75%	92%	86%	105%	73%
42-43	Lands-Status/ Acquisition	20%	18%	11%	3%	27%	51%	25%	40%	23%	17%	72%
16	Landline Location	69%	75%	65%	85%	131%	91%	89%	40%	32%	33%	67%
17	Road Maintenance	78%	72%	74%	90%	122%	52%	59%	63%	58%	65%	67%
18	Trail Maintenance	76%	42%	81%	101%	125%	87%	75%	69%	66%	72%	75%
19	Co-op Law Enforcement	227%	167%	154%	113%	62%	120%	89%	92%	44%	256%	157%
20	Reforestation (appropriated)	58%	67%	60%	95%	72%	51%	55%	63%	55%	47%	61%
21	TSI (appropriated)	62%	77%	52%	43%	196%	62%	55%	88%	56%	30%	59%
23	Tree Improvement	94%	135%	122%	102%	127%	304%	217%	280%	273%	223%	180%
26-28	KV (Trust Fund)	98%	109%	150%	155%	103%	153%	124%	117%	99%	106%	125%
29	CFWS - Other (Trust Fund)	102%	128%	100%	113%	511%	107%	95%	86%	147%	124%	109%
30	Timber Salv Sales Perm Fund	119%	205%	266%	511%	41%	1125%	828%	1327%	1393%	1324%	772%
31	Brush Disposal (Perm Fund)	93%	101%	105%	110%	58%	86%	58%	51%	83%	50%	83%
32	Range Improvement	81%	48%	73%	61%	144%	40%	39%	77%	64%	37%	59%
33	Recreation Construction	77%	82%	14%	105%	750%	48%	132%	49%	26%	58%	68%
34	Facility Construction: FA&O	10%	0%	3%	0%	1900%	4%	8%	109%	0%	0%	14%
35	Engineering Const. Support	70%	56%	57%	57%	21%	49%	35%	36%	35%	30%	47%
36	Const. Capital Invest Roads	4%	11%	36%	12%	344%	18%	2%	14%	15%	10%	14%
37	Trail Const/ Reconstruction	49%	57%	53%	124%	83%	91%	217%	251%	159%	155%	129%
24, 38	Timber Road Const.: PC/Elect.	63%	46%	35%	44%	126%	53%	33%	22%	24%	24%	41%

Actual budgets are based on each Fiscal Year's budgets, and can be found in prior year's Monitoring Reports.

APPENDIX E: Project-specific Amendments

The Forest Plan identified overarching standards for all Forest lands. One of these standards (Forest Plan, page II-20) states, "If it is determined during project design that the best way to meet the goals of the Plan conflicts with a Forest Plan standard, the Forest Supervisor may approve an exception to that standard for the project." Project-specific amendments change the standard only for the period covered by that project.

The Kootenai Forest Supervisor determined that the following projects are designed to meet the goals of the Forest Plan and, therefore, approved these project-specific amendments.

District	Date Approved	Decision Name	MA Standard	Description	Years in Effect
Rexford	11/18/96	Burro Salvage	MA 12 WS #7; MA 12 TS #2;	Harvest within movement corridors	15 years
			MA 12 FS #3	Existing ORD 1.01, during sale 1.49, after sale of .75 in Comp 6	3 years
Rexford	6/6/97	McSutton LPP Salvage	MA 12 WS #7; MA 12 TS #2;	Harvest within movement corridors	15 years
			MA 12 FS #3;	Existing ORD is .8, during project 1.53, after sale .75	4 years
			MA 15 TS #5	Openings adjacent to uncertified units	2-4 years
Libby	10/21/96	Bristow Salvage	MA 12 TS #2 MA 12 WS #7	Harvest within movement corridors	10-15 years
			MA 12 FS #3	Existing ORD 1.27, during project 2.18, after project .74	3 years
Libby	10/21/96	Warland Salvage	MA 12 TS #2 MA 12 WS #7	Harvest within movement corridors	15 years
			MA 12 FS #3	Existing ORD 2.59, during project 2.05, after project .66	2 years
Libby	6/19/97	Cripplehorse TS	MA 12 TS # 2 MA 12 WS #7	Harvest within movement corridors	10-15 years
			MA 12, FS #3	Comp 609 Existing ORD 1.4 , during sale 2.2 , after sale 1.4 (this is allowed for under amendment #8) Comp 610 existing ORD .9, during sale 2.2, after sale 0	2 years

MA 12 - Big Game Summer Range Timber
MA 15 - Timber Production

APPENDIX F: Programmatic Amendments, FY 97

The Forest Plan provides a process for amending the Plan. Amendments are effective until Forest Plan revision or until they are changed. The following amendments approved in FY 97.

No 10	**1/15/97**	Modify Forest Plan, Management Area 24, Range Standard #1, to state that domestic livestock grazing is permitted.
No. 12	**7/29/97**	Forest Plan, management area 21, page III-90 through III-95, Research Natural Area Candidates is modified to read that the Norman-Parmenter, Lower Ross Creek and LeBeau are formally established as Research Natural Areas. Section C, Standards, is modified to read "The Forest-wide management direction included in Chapter II of this Plan applies to this MA. Specific management direction as outlined in the pertinent Establishment Records (ERs) will be followed." In addition, Forest Plan Management Area 21, page III-107 through III-109, Botanical Areas is modified to read that Hidden Lake Areas is established as a Special Interest Area. This area will be management with he same goals and standards as outlined in the Plan page III-107 and as outlined in the pertinent ERs. Norman Mountain and Parmenter proposed RNAs in the Forest Plan have been combined and are now referred to as the Norman-Parmenter RNA. In addition, the Ross Creek RNA is now referred to as the Lower Ross Creek RNA and is adjacent to, but does not include, the Ross Creek Scenic Area. *The Lower Ross Creek Map*, Forest Plan Appendix 21, has been updated to include the modified boundary. Several Management Area designations were also modified.

APPENDIX G: Roadless Area Changes

FY	Inventoried Roadless Area	IRA No	Name of Project	District	Road Construction w/in roadless (miles)	Harvest w/in Roadless (acres)	FP Roadless Area Size	New Roadless Area Size	Remarks
* 1986	Gold Hill West	176	Purcell Timber Sale	Libby	2.5	400	10,200	11,142	New roadless size is based on review in 1996 of all activities that have occurred in this area. Increase in acres is due to finer resolution mapping.
* 1987	Buckhorn Ridge	661	Red Top Cyclone Timber Sale	Three Rivers	0	75	22,000	18,820	New roadless area size is based on review in 1997 of all activities that have occurred in this area. Decrease in acres is due to finer resolution mapping.
* 1987	Gold Hill	668	North Parsnip Timber Sale (from Parsnip & Compartment 14 EA)	Rexford	8.5	5,100	10,700	6,451	New roadless area size is based on review in 1996 of all activities that have occurred in this area. Decrease in acres is due to harvest of North Parsnip, Lawrence Mtn, and South Parsnip, and finer resolution mapping
1988	Gold Hill West	176	Lost Soul Timber Sale	Rexford	0	700	10,200	11,142	New roadless size is based on review in 1996 of all activities that have occurred in this area. Increase in acres is due to finer resolution mapping
1988	LeBeau	507	Ketowke Mtn Timber Sale	Fortine	0	300			
1989	none				0	0			
1990	McNeeley	675	McNeeley Timber Sale	Cabinet	11.4	2,680	7,700	6,708	New roadless area size is based on review in 1997 of all activities that have occurred in this area. Decrease in acres is due to finer resolution mapping.
1990	Trout Creek	664	Dry Gulch Dixie Timber Sale	Cabinet	0	50	31,400	30,869	Decrease in acres is from Lost Copter and Dry Gulch Sales, and finer resolution mapping
1991	Gold Hill	668	Lawrence Mtn Timber Sale	Rexford	1	80	10,700	6,451	New roadless area size is based on review in 1996 of all activities that have occurred in this area. Decrease in acres is due to harvest of North Parsnip, Lawrence Mtn, and South Parsnip, and finer resolution mapping
1991	Gold Hill	668	South Parsnip Timber Sale	Rexford	1	182	10,700	6,451	New roadless area size is based on review in 1996 of all activities that have occurred in this area. Decrease in acres is due to harvest of North Parsnip, Lawrence Mtn, and South Parsnip, and finer resolution mapping

FY	Inventoried Roadless Area	IRA No	Name of Project	District	Road Construction w/in roadless (miles)	Harvest w/in Roadless (acres)	FP Roadless Area Size	New Roadless Area Size	Remarks
1991	Trout Creek	664	Lost Copter Timber Sale	Cabinet	0	57	31,400	30,869	Decrease in acres is from Lost Copter and Dry Gulch Sales, and finer resolution mapping
1992	none								
1993	none								
1994	Gold Hill West	176	Bald Bear Timber Sale	Rexford	0	46	10,200	11,142	New roadless size is based on review in 1996 of all activities that have occurred in this area. Increase in acres is due to finer resolution mapping
1995	Lone Cliff Smeads	674	Smeads Rice Timber Sale	Cabinet	6.4	557	9,000	5,035	Decrease in acres is from harvest, and finer resolution mapping
1996	Big Creek	701	North Fork Fire Recovery	Rexford	1.4	369		7,100	This area was added to the roadless inventory because sales scheduled in this area in the early 1980s did not occur. This area was evaluated for harvest in the North Fork EA. The original roadless acres were 8098 acres. Decrease in acres is from harvest
1996	Mt Henry	666	North Fork Fire Recovery	Rexford	0	41		13,123	This roadless area was not included in the Forest Plan Appendix C because it was released from wilderness consideration by Congress. The original roadless area acres (based on 1996 reassessment was 13,167.
1996	Flagstaff	690	China Basin, Smokey Quartz	Libby	0	34	9,500	11,702	No change in the roadless boundary due to type of harvest (roadless character would be maintained) and no roads
1996	Marston Face	172	Murphy Lake Timber Sale	Fortine	0	174	6,000	9,012	No change in the roadless boundary due to type of harvest (roadless character would be maintained) and no roads
1997	none								

* 1986-1987 were entries prior to approval of the Forest Plan

APPENDIX H: Bibliography

Literature Cited:

USFS. 1987. Kootenai Forest Plan. Final Environmental Impact Statement. Vol 1. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 201 pp.

USFS. 1987. Kootenai Forest Plan. Final Environmental Impact Statement. Vol 2. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 405 pp.

USFS. 1987. Kootenai Forest Plan. Vol 1. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 218 pp.

USFS. 1987. Kootenai Forest Plan. Vol 2. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 272 pp.

USFS. 1987. Kootenai Forest Plan Record of Decision. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 44 pp.

USFS. 1990. Kootenai Forest Plan Monitoring Report for FY's 1988-89. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 53 pp.

USFS. 1991. Kootenai Forest Plan Monitoring Report for FY 1990. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 55 pp.

USFS. 1992. Kootenai Forest Plan Monitoring Report for FY 1991. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 56 pp.

USFS. 1993. Kootenai Forest Plan Monitoring Report for FY 1992, Including a Summary Of The Last Five Years. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 107 pp.

USFS. 1995. Kootenai Forest Plan Monitoring Report for FY's 1993-94. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 55 pp.

USFS. 1996. Kootenai Forest Plan Monitoring Report for FY 1995. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 47 pp.

USFS. 1997. Kootenai Forest Plan Monitoring Report for FY 1996. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 100 pp.

A-6
MFWP. 1992. Statewide Elk Management Plan for Montana. Montana Fish, Wildlife and Parks, Helena. 170 pp.

C-1
USFS. 1985. Elk Habitat - Timber Management Relations, Central Zone, Northern Region. USDA Forest Service, Missoula. 20pp.

Hillis, Michael; M. Thompson; J. Canfield; L. J. Lyon; L Marcum; P. Dolan; and D. McCleerey. 1991. Defining Elk Security: The Hillis Paradigm. pgs 38-43 *in* Christensen, Alan; L.J. Lyon; T. Lonner 1991. Proceeding of Elk Vulnerability - A symposium. Mont. Wildlife Society. Bozeman, MT. 330 pp.

C-2
MFWP. 1992. Statewide Elk Management Plan for Montana. Montana Fish, Wildlife and Parks, Helena. 170 pp.

C3b

Kasworm, W.F. and T.J. Thier. 1994. Adult black bear reproduction, survival, and mortality sources in northwest Montana. Int. Conf. Bear Res. and Manage. 9(1):223-230.

MFWP. 1994. Management of Black Bears in Montana, final environmental impact statement. Montana Fish, Wildlife and Parks, Helena. 184 pp.

Stansberry, B. 1996. Evaluation of bighorn sheep and mule deer habitat enhancements along Koocanusa Reservoir. Montana Fish, Wildlife and Parks, Helena. 76 pp.

USFS. 1993. Forest Plan Monitoring Report for Fiscal Year 1992 Including a Summary of the Last Five Years. USDA Forest Service, Kootenai National Forest, Libby, MT. 107 pp.

C-4

Hutto, R.L. 1995. Northern Region Landbird Monitoring Program, second report, USFS Region 1 contract #R1-95-05. Div. of Biological Sciences, Univ. of Montana, Missoula.

Samson, F.B. et. al. 1997. Population viability protocol *in* Northern Region 1996 Terrestrial Protocols. USDA Forest Service, Northern Region, Missoula, MT. 30 pp.

C-6

Bull, Evelyn L., C. Parks, and T. Torgersen. 1997. Trees and Logs Important to Wildlife in the Interior Columbia River Basin. USDA FS PNW Res. Sta. PNW-GTR-391. Portland OR. 55 p.

Harris, Richard B. unpub. Abundance and Characteristics of Snags in Western Montana Forests 2nd Draft. May 1997. Forest Mgmt. Bureau Trust Lands Mgmt. Div. MDNRC Missoula, MT. 17 p.

Thomas, Jack Ward (Tech. Ed.) 1979. Wildlife Habitats in Managed Forests the Blue Mountains of Oregon and Washington. USDA FS Agr. Hdbk No. 553. 512 p.

C-7

MBEWG. 1994. Montana Bald Eagle Management Plan. Montana Bald Eagle Working Group. Bureau of Reclamation, Billings, MT. 104 pp.

USFWS. 1987. Northern Rocky Mountain Wolf Recovery Plan. U.S. Fish and Wildlife service, Denver, CO. 67 pp.

USFWS. 1984. American peregrine falcon Rocky Mountain/Southwest Population Recovery Plan. U.S. Fish and Widlife Service, Denver, CO. 105 pp.

USFWS. 1986. Recovery Plan For the Pacific Bald Eagle. U.S. Fish and Wildlife Service, Portland, OR. 160 pp.

USFWS. 1993. Grizzly Bear Recovery Plan. U.S. Fish and Wildlife Service, Missoula, MT. 181 pp.

USFWS. 1997. Draft Recovery Plan for White Sturgeon: Kootenai River Population. US Fish and Wildlife Service, Portland, OR. 143 pp.

D-2

Hirsch, S.A. and J.A. Lietch. 1996. The Impact of Knapweed on Montana's Economy. Agriculutural Economics Report No. 355. Dept of Agriculuture Economics, Agriculture Experiment Station, North Dakota State University. Fargo, ND

Hitchcok, C.L. and A. Cronquist. 1973. Flora of the Pacific North west. 8th printing 1991. University of Washington. Press, Seattle and London. 730 pp. Illustrations by Jeanne R. Janish.

USDA Agricultural Research and Montana State University. 1996. Biological Control of Weeds in the West. Ed. by Norman Rees et al. Weshtern Socieity of Weed Science.

USFS. 1986. Noxious Weed Treatment Program, Final Environmental Impact Statement. USDA Forest Service, Kootenai National Forest. Libby, MT 72 pp.

USFS. 1997. Herbicide Weed Control Environmental Assessment. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 55pp.

E-1

USFS. 1995. Inland Native Fish Strategy Environmental Assessment. USDA Forest Service, Intermountain, Northern and Pacific Regions, Coeur d'Alene ID. 179 pp.

E-4

USFS. 1993. Habitat Type Groups and Target Stands. USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 84 pp.

C-9, C-10

USFS. 1994. Riparian Area Guidelines, Timber Harvest Guidelines Within Streamside Management Zones Including Requirements of MT HB-731 (Streamside Protection Law): Kootenai Forest Plan Appendix 26. USDA Forest Service, Kootenai National Forest. Libby, MT 35 pp.

USFS. 1995. Inland Native Fish Strategy Environmental Assessment. USDA Forest Service, Intermountain, Northern and Pacific Regions, Coeur d'Alene ID. 179 pp.

F-2

MacDonald, Lee, Ellen Wold and Susan Madsen. 1997. Validation of Water Yield Thresholds on the Kootenai National Forest. Department of Earth Sciences, Colorado State University, Ft. Collins, CO. 260 pp.

H-1

USFS. 1998. Timber Sale Program Information Reporting System ("TSPIRS"). USDA Forest Service, Northern Region, Kootenai National Forest, Libby, MT. 64 pp.

APPENDIX I: List of Preparers

Joan Dickerson, Forest Planner
Dan Thompson, Operations Resource Analyst

Bill Fansler, Recreation Forester
Margaret Lincoln, Landscape Architect
Becky Timmons, Archaeologist
Bob Summerfield, Biologist
Wayne Johnson, Biologist
Steve Johnson, Hydrologist
Hilaire Bojonell, Hydrologist
Doug Perkinson, Fish Biologist
Lou Kuennen, Soil Scientist
Gary Dickerson, Silviculturist
Russ Gautreaux, Silviculturist

Other Assistance:
Leslie Ferguson, Botanist
Gerald Jimeno, Logging Engr Forester
Piper Desy, Budget & Accounting Analyst
Frank Lamb, Computer Specialist
Bob Krepps, Planning Staff Officer

Lewis Young, Rexford Ranger District
Bryce Bohn, Fortine Ranger District
Rob Carlin, Fortine Ranger District
Jeanne Higgins, Three Rivers Ranger District
Jeff Scussel, Libby Ranger District
Lee Brundin, Libby Ranger District
Kurt Werst, Cabinet Ranger District

SOURCES OF INFORMATION

For information about the Forest Plan and this monitoring report, contact the following offices:

Kootenai National Forest
Supervisors Office
506 US Hwy 2 West
Libby, MT 59923
406-293-6211

Kootenai National Forest
Rexford Ranger District
1299 Hwy 93 N
Eureka, MT 59917
406-296-2536

Kootenai National Forest
Fortine Ranger District
PO Box 116
Fortine, MT 59918
406-822-4451

Kootenai National Forest
Three Rivers Ranger District
1437 North Highway 2
Troy, MT 59935
406-295-4693

Kootenai National Forest
Libby Ranger District
1263 Highway 37
Libby, MT 49923
4060293-8861

Kootenai National Forest
Cabinet Ranger District
2693 Highway 200
Trout Creek, MT 59874
406-827-3533