CHAPTER 2 -
SUMMARY OF THE ANALYSIS OF THE MANAGEMENT SITUATION

A. INTRODUCTION

This chapter summarizes the management situation at the time these plan decisions were made. It focuses on the supply and expected future demand conditions for significant market and non-market goods and services, tied to the major issues and concerns. It also addresses the capability of the Forest to meet (or not meet) those demands. The benchmarks are revisited, to provide information about the the maximum and minimum biological and economic production opportunities of the Forest. Chapters II and III of the FEIS contain additional supply/demand data. The benchmarks are discussed in more detail in Chapter II, FEIS and Appendix B. Also, refer to the Mt. Baker-Snoqualmie National Forest, Analysis of the Management Situation, May
1985.

The last section of this chapter is a list of information and research needs, identified during this extensive planning process.

B. BENCHMARK ANALYSIS

The analysis of the current management situation includes, as part of the requirements of NFMA, a "benchmark" analysis. The benchmarks had several purposes: they helped define the maximum economic and biological resource production opportunities on the Mt. Baker-Snoqualmie; assisted in evaluating compatibilities and conflicts between market and nonmarket objectives; defined the range - or the "decision space" - within which integrated alternatives will be developed; and were used to analyze the implications and opportunity costs of legal and policy constraints.

Benchmarks, like alternatives, were a combination of land capability management practices, and schedules to achieve certain objectives. The benchmarks were "run" using FORPLAN, a linear' computer model ; the resource outputs or results were then reported and analyzed. Unlike alternatives, benchmarks are not designed to respond to all the ICO's. In addition, not all of the benchmarks were formulated to meet the management requirements (MR's) of 36 CFR 219.27. By comparing those benchmarks with and without 1411's, the opportunity costs of the MR's could be quantified.

Required Benchmarks

There are several benchmarks that were required by the regulations [36 CFR 219.12(e)] and National direction. They include:

Minimum Level. This benchmark specified the minimum level of management which would be needed to maintain the Mt. Baker-Snoqualmie National Forest as part of the National Forest System.

Maximum Present Net Value Based on Established Market Price. This benchmark specified the management of the Forest at a level which will maximize the present net value of those outputs that have an established market price.

Maximum Present Net Value Including Assigned Values. This benchmark specified the management which will maximize the present net value of those outputs that have either an established market price or assigned monetary value (such as dispersed recreation.)

Current Level. This benchmark specified the management of the Mt. Baker-Snoqualmie most likely to be implemented in the future if current direction is followed. This benchmark forms the basis for the "no action" alternative.

Maximum Resource Levels. Each of these benchmarks estimated the maximum capabilities of the Forest to provide a single resource emphasis level. On the Mt. Baker-Snoqualmie, the maximum resource benchmarks included Timber and Primitive and Semi-primitive Nonmotorized Recreation.

Summary of Benchmark Production Potentials

The production potentials determined by the benchmarks are compared with current management direction and Alternative A (No Action), as displayed in the accompanying FEIS, in Table 2-1. Outputs, effects, benefits and costs related to significant issues, concerns, and opportunities (ICO's - see Chapter 3, Forest Plan for more information on ICO's) are displayed for comparison. Benchmarks 1 and 3 did not include the MR's; therefore, they did not meet requirements of NFMA.

Present net value (PNV) is affected most by the discounted costs and benefits of timber activities. The discounted costs and benefits of recreation activities did not vary much between benchmarks. This reflects the rather narrow decision space for potential recreation use and capacity, especially in unroaded.

Table 2-1
Benchmark Outputs and Effects

	Minimum Level	Biological Tmbr Potent. without MR's (Run #1)	Max PNV w/out MR's (Run #3)	Max PNV with MR's (Run #7)	Max Timber with MR's	Max. Primitive Semi-Prim Rec. with MR's	Alt. A (No Act)
Discounted Benefits ($MM)							
Timber	Not	3057 6	2870.6	2189 5	2534.1	1191.1	1806.6
Recreation	Est	1792.9	1790.9	1787.6	1791.7	1761.7	1915.2
Other		not estimated					33.7
TOTAL		4850.5	4661.5	3977.1	4325.8	2953.5	3755 5
Discounted Costs ($MM)							
Timber	Not	1927.4	1719.1	1286.9	1689.9	684.9	1083 0
Roads	Est.	267 3	256 0	253 5	277.5	169.8	168.8
Recreation		33 7	33.7	33 7	33 7	33 5	34.8
Other		not estimated					
TOTAL		2228.3	2008.1	1574 1	2001.1	888.2	1444.2
PNV ($MM)	Not Est.	2599.7	2630.9	2254.0	2302 3	2050 5	2319.8
Budget ($MM)	3 0	25 1	23 4	28.2	33.4	19.0	22.0
Allowable Sale Quant. (MMCF)							
Decade 1	No Timber	68.4	63 9	37.5	57 2	26.7	31.0
Decade 2	Management	68.4	63 9	37 5	57 2	26.7	36.7
Decade 3	Activities	68.4	63.9	37.5	57.2	26.7	39.0
Decade 4		68.4	63.9	37.5	57.2	26.7	39.0
Decade 5		68.4	63.9	37.5	57.2	26.7	39.0
Long Term Sustained Yield Capacity (MMCF)	N/A	72 6	66 2	37 5	62.9	27.8	39.0
Acres Suitable for Timber Harvest Acres)	N/A	606.9	606 9	463.8	529 7	300.9	412.5
Recreation Use (MRVD/Year)							
Roaded	829	2177	2177	2177	2177	2099	2060
Unroaded	100	203	203	211	209	240	201
Wildlife Pop Levels 1/							
Bald Eagle (Pairs)	4	4	4	4	4	4	4
Elk (Summer Range Pop.)	Not Est	1080	1080	1080	1080	1080	1240
Deer (Summer Range Pop.)	Not Est	19660	19660	19660	19660	19660	19750

1/ Bald eagle numbers are derived from recovery plan population objectives for pairs in breeding territories. Deer and elk values are population estimates based on maximum habitat potential for each range type.

Discounted recreation benefits for Alternative A are higher than in any benchmark, but PNV is less than all the benchmarks except Max Recreation. The combination of MR constraints and allocation of tentatively suitable acres to other resource benefits in Alternative A (no such allocations were made in benchmarks), reduced the timber outputs in Alternative A and, thus, PNV.

The decision space for harvest levels that included MR's ranged from 57.2 MMCF (the Max Timber benchmark), to 26.7 MMCF (the Max Recreation benchmark). Alternative A harvest level falls in the lower portion of this benchmark decision space. Due to MR's and existing land use constraints (including Congressional designations), the practical upper limit for timber outputs was approximately 38 MMCF (Benchmark #7).

Long-term sustained yield capacity (LTSYC) was not reached until after Decade 5 in the benchmarks.

C. RESOURCE DEMAND PROJECTIONS

This section includes additional demand projections for selected resources. Some outputs and activities, while included in the RPA targets and reported in the output tables in the FEIS, do not have a true demand-supply relationship, and are not discussed here (such as precommercial thinning and road construction).

Demand is generally defined as the quantity of a good or service demanded at a certain price. A substantial change in price can result in a far different quantity demanded. This definition is appropriate for market commodities with a price (or user fee), such as timber and developed recreation.

Demand for non-market goods and services, such as wilderness and wildlife resources or facilities, do not fit the general definition. Although recreation costs are incurred by the visitor, the outdoor recreation resource or facility is generally available at zero or nominal charge. The thousands of days of outdoor recreation currently being consumed are those demanded at the prevailing zero or near zero-prices for these resources. If prices were raised substantially, a different quantity would be demanded or consumed.

As used in this section of the document, "demand" is used to identify a particular point or instant on a demand schedule. As such, it reflects an intersection at a particular point in time between a demand schedule (a list of willingness-to-pay values for various levels of offerings) and a supply schedule (a list of volumes the seller is willing to offer at various prices).

Recreation Demand

Recreation demand was projected using regression analysis. This form of analysis uses historical trends and expected population growth to predict future recreation use. Demand is expressed as a range (±10% from the absolute figures developed in the analysis process) due to the uncertainty of projecting recreation demand so far into the future.

Currently, the demand for developed recreation (which is primarily alpine skiing and developed campgrounds) is well below the Forest capacity. Alpine ski areas currently have more than enough capacity, and are now expanding to meet a market demand for a higher quality skiing experience. Developed campgrounds are operating well below capacity except for selected summer weekends, and in certain geographic areas.

Current capacity for roaded dispersed recreation far exceeds the current demand. Future capacity will be able to accommodate expected demands on the Forest until the fourth decade, when population growth begins to affect all recreation sectors.

Unroaded dispersed recreation use currently exceeds the capacity of the Forest. The result, at present, is a reduction in the quality of the local experience, or a displacement to another location to satisfy current demand. With future population growth, this situation will not improve.

Wilderness on this Forest is nearing its practical capacity, due in large part, to its proximity to the Puget Sound metropolitan area. By the second decade, projected demand will have exceeded capacity.

Table 2—2

Summary of Projected Supply and Anticipated Demand

1/ Anticipated recreation demand is based on historical use figures projected into the future and Puget Sound population projections

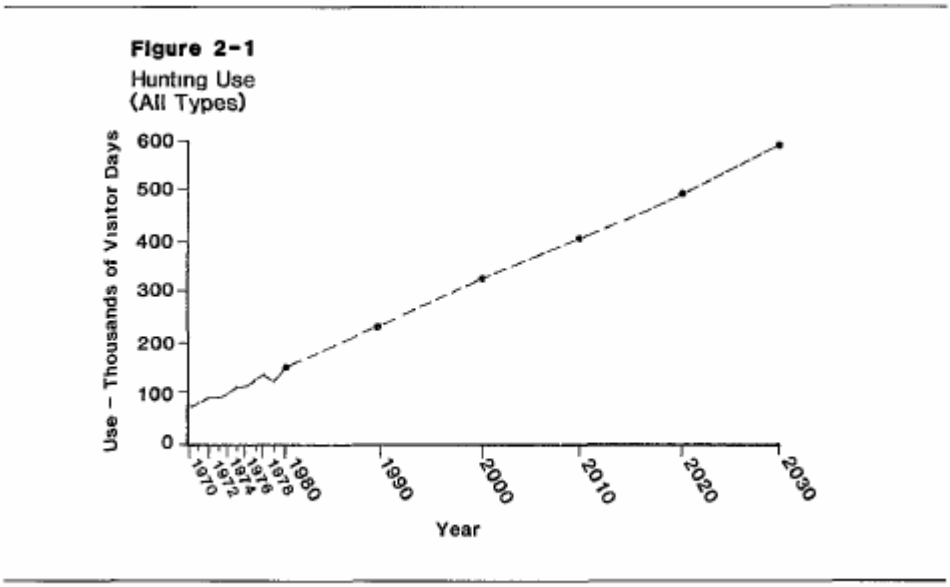
2/ FORPLAN Alternative rums (1989) have undergone changes in recreation modeling since the Benchmarks were rum (Mar 85) to better reflect the spatial characteristics of the recreation opportunity spectrum (ROS) from a per acre to a per area basis.

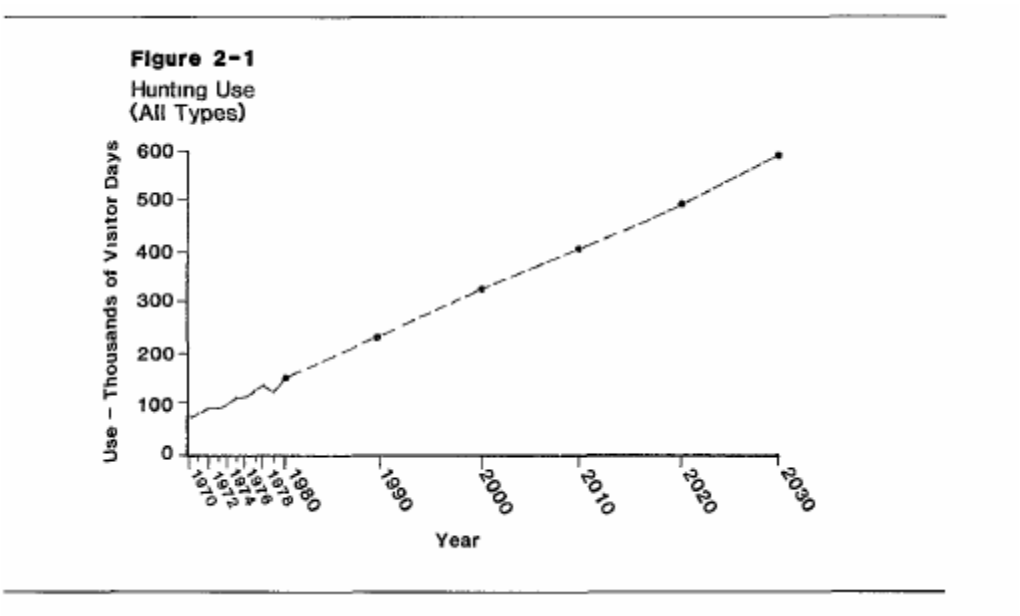
3/ Projections indiate that demand for timber from the 1483 will remain sufficiently high to allow the Forest to sell all the timber it can produce from lands allowing harvest, with no downward effect on prices

Wildlife Demand

The demand for wildlife takes the form of hunting, wildlife study, viewing, and photography. Figure 2-1 shows past and projected demand for all types of hunting on the Forest.

Hunting, especially for big game, has been a dominant demand on the wildlife resource for the past 20 years. During recent years, non-consumptive use has accounted for a larger percent of the total wildlife-related demand. Estimates indicate that non-consumptive use exceeds consumptive use by about 33 percent on all lands and is growing at a faster rate (USDA 1980). The projections shown below are based on land area to support a given density of hunters, rather than the availability of animals to hunt. Future demand may be lower than indicated below if hunter success decreases drastically as a result of reaching the carrying capacity for hunted animals. Because of the large population growth in the Puget Sound area, the demand for non-consumptive fish and wildlife use will continue to increase at a fast rate.





Demand for Fish

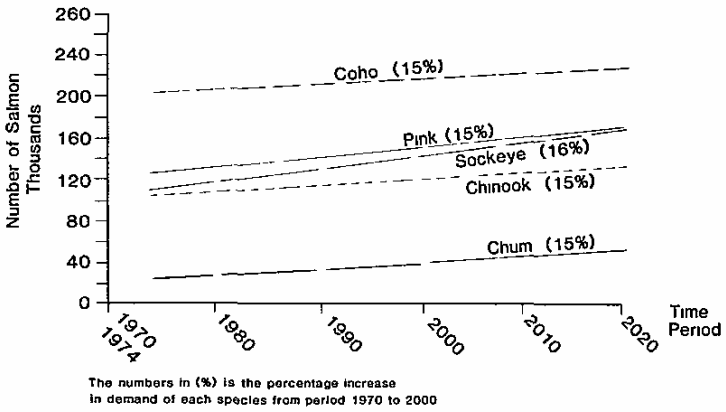
The demand for anadromous fish is twofold: commercial (non-treaty commercial ocean fishing and American Indian commercial harvest) and sport. The current demand for commercially caught fish is assumed to equal the current annual harvest (USDA and State of Washington 1981-85).

This estimate of demand is conservative. There are more commercial fishermen in the industry than there are fish. If more fish were produced, they could be harvested with little additional cost. Therefore, actual demand at current prices is probably higher than shown.

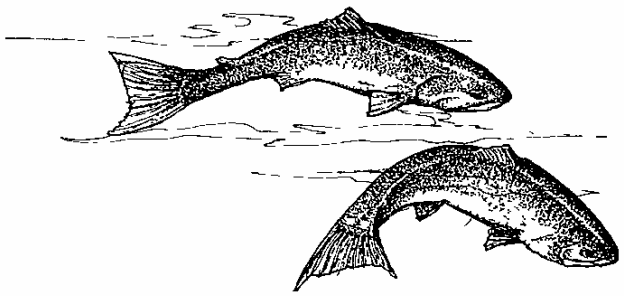
The National demand for edible fishery products increased 52 percent from 1967 to 1976. This increase was a result of a growing population and an increased per capita consumption rate. This increase is projected to continue nationally and worldwide (USDA 1980).
Figure 2-2 shows the estimated demand for salmon produced from all ownerships in the Statewide Comprehensive Plan's Area 1; this includes most of the western half of the state, north of the Cowlitz River and including all of the Olympic Peninsula. It is assumed that the projected increase in demand for fish produced on the Forest will be similar to that for Area 1, though the actual number of fish produced on the Forest is much smaller.

Figure 2-2

Demand For Salmon Produced in Area 1



The numbers in (%) is the percentage increase in demand of each species from period 1970 to 2000



Most of the salmon sport fishing in the Puget Sound area occurs in salt water. There is little salmon fishing on rivers and streams; exceptions include a small salmon sport fishery on the Nooksack and Skagit Rivers. There is also some incidental harvesting of salmon during the sea-run trout sport fishery.

Sea-run trout sport fishing occurs almost entirely in the stream and river systems. Steelhead, sea-run cutthroat, and Dolly Varden are caught almost exclusively in freshwater systems. The freshwater sport fishing demand for sea-run and resident fish produced on the Forest has steadily increased since the early 1970's. Projections indicate that this demand, measured in angler days, will increase by 25 percent by the year 2000. The demand for saltwater sport fishing for all anadromous fish produced on the Forest is likely to increase 25-50 percent over present demand.

Sport fishing demands are conservative. The Puget Sound region has more recreational sport fishermen than desirable fish. If more desirable sport fish were produced, they could be absorbed by the recreational sport fishery.

Timber Demand

The following is a brief summary of the timber demand discussion found in Chapter III of the FEIS.

Demand for lumber and wood products from the Puget Sound Economic Area followed the trends of the Pacific Northwest, with a drastic decline in the early 1980's compared to the highs during the 1970's. Production of wood products in the period 1980-84 was slightly less than 80 percent of that experienced during the 1970's. The structure of the wood products industry in the Puget Sound Area put it at a competitive disadvantage with imports from Canada and Southern U.S. production.

The pulp and paper industry avoided the deep declines in demand and production of the early 1980's. Strong demand for paper, domestically and abroad, helped pull that sector of the wood products industry through the recession in fairly good shape. Over the past decade, the number of pulp and paper mills in the Puget Sound area has dropped by almost 20%, but the installed capacity of the remaining mills has increased by about 10%. This is similar to the structural changes found in other sectors of the industry. As of 1986, about 5% of the Forest's annual harvest went to Puget Sound area pulp mills, which represented about 7% of the mills' roundwood consumption. Regionally, roundwood consumption represents only about 30% of the total fiber input for pulp production.

The restructuring of the timber industry in the Northwest during the early 1980's was a response to the declining market share and an attempt to regain market share. The projected future decline in production from Canada and a continuing growth in exports to the Pacific Rim Countries are likely to result in a shift in demand for Puget Sound Economic Area logs. The timing and magnitude of this shift in demand, however, are speculative. Increased production from Puget Sound Area mills during the past three years is an indication that the industry is improving the efficiency of its wood processing and thus improving its ability to compete for market share nationally and internationally.

The supply/demand situation in other economic areas around the state also influences the availability of timber in the Puget Sound area. The Puget Sound area mills (including export facilities) consume more logs than are harvested in the area. During the 1980's, approximately 66 percent of the logs consumed in Puget Sound originated from Puget Sound; approximately 26 percent came from the Olympic Peninsula; 5 percent from Central Washington; and 3 percent from other areas, including out of State. A similar pattern of imports into the area occurred during the 1970's.

While the Puget Sound area has historically imported approximately 35% of the logs needed for its mills, it has used about 95% of the wood harvested in the are within the region. Only about 5% of the harvest from the Puget Sound area is going to processing elsewhere. (Exporting logs overseas is considered part of the local processing industry.) So the Puget Sound area is a net importer of logs, which come from other parts of Western Washington, along with a minor amount from the east side of the Cascades.

Depending on markets, mill capacity, price and local harvest level fluctuations, one part of the State may have a greater demand for logs at any given time than another. The relative demand for logs among processing areas may change seasonally, or from year to year. Prices in the areas with a greater need for logs will tend to float upward, drawing more supply to that area. As that need is met and prices stabilize, a shift may occur to another region. Prices serve as the leveling agent to direct the log supply to the areas with greatest demand. In extreme cases, prices may not be able to go high enough to bring in the needed lumber and a structural shortage of logs may develop for an area. If that continues for any length of time, mills in that area will be faced with closure. Competitive mills will tend to survive such periods, but marginally efficient mills may drop out. The changing of prices to moderate log flows have to operate within limits, which are set primarily by the prices of finished wood products in the regional market.

Because of the local and regional interactions in the roundwood markets, it is difficult to make quantitative estimates of future demand for logs from the Puget Sound area. One can not really assume that the consumption by the Puget Sound mills is a measure of the demand for Puget Sound logs, when other regions may assert a need, as reflected through relative prices, for those logs as well. However, estimates of relative levels and trends in demand for timber can be made, given what is known about current consumption patterns, expected changes in regional, national and international demand for wood products, and projected physical/biological supply.

For the next 20 years, demand for wood products is expected to grow, but slowly. This is based on a continuing, though not rapidly expanding, need for wood for new construction and for remodeling and repair. Export markets will decline somewhat over that time period, but will still remain very active. Canadian wood imports will continue to decline from the high levels they held in the early 1980's because of decreased competitiveness and increasing restrictions on logging in Canada. In all, given no economic shocks, the demand for roundwood will stay at least at current, to somewhat higher, levels.

In the face of this demand, available inventory from private industrial forest lands will be declining, as will harvests from National Forest lands, particularly in Northwestern Washington. Other private land harvests may come up somewhat, but probably not enough to offset the declines in these two ownerships. And after the mid-1990's, almost all old growth timber that is still harvested will come from National Forest lands. Therefore, it appears the next 20 years will find fairly tight physical/biological supplies juxtaposed with demand that stays at least at current levels. The expected result will be fairly rapidly rising prices in the range of 1.5 to 4 percent per year (Adams, 1989), but no timber supply "crisis," as prices play a moderating effect - eliciting more supply from the private nonindustrial forest lands, and dampening final demand for wood products by consumers because of increased cost.

The declining inventory of sawtimber of harvestable age in the next two decades will have less effect on the pulp and paper sector than on the lumber and plywood sectors. Pulp mills can use much smaller material, chipped either in the woods or at the mill, than can sawmills. Thus, the age-class gap in the inventory will not be as limiting for pulpwood supply. Other economic factors, though, may combine to place an increasing squeeze on pulp prices. Better log utilization and on-site use of residues by the primary manufacturers leaves less low-cost residue available for pulp. Declining harvests region wide and in western Canada will also reduce residues available. If the export demand for chips remains strong, additional pressure will be placed on prices.

Over the next decade or two, these supply and demand factors may put the Northwest pulp producers at a greater cost disadvantage than East Coast or Southeast producers, who already produce the major portion of pulp and paper products in the country. Mitigating factors for the industry are likely to be continued technological changes, allowing more use of species little utilized to date, and greater use of recycled paper as feedstock. Supply changes from the Mt. Baker-Snoqualmie National Forest are expected to have little effect on the local area or regional pulp and paper sectors.

D. INFORMATION NEEDS

This section lists the information, inventory and research needs that have been identified during the planning process for the Mt. Baker-Snoqualmie National Forest. Information needs form the foundation for ongoing efforts by the research and planning communities (U.S. Forest Service Pacific Northwest Research Station, Pacific Northwest Region of the Forest Service, and the Mt. Baker-Snoqualmie National Forest) to identify management needs, and to build and implement the information and research programs necessary to support plan accomplishments. The concept used to organize and develop these needs recognizes that biological, physical and social ecosystems are the foundation for the planning process.

The remainder of this chapter is devoted to listing research, inventory and data needs identified during the planning process.

Recreation

1. Recreation *use* database to be brought *up to* date *and* should reflect accurate levels of use based on measurement rather than estimates. This should be tied to ROS.

2. A uniform method for determining and applying demand for various forms of recreation with ties to R0S needs to be developed.

3. Update Forest Existing Visual Condition mapping in the Forest Data Base every 5 years.

4. Review and update closure orders every 5 years.

5. Collect baseline vegetation and soil information using permanent transects in camps, trails, and other areas that currently appear to be well within acceptable standards but have potential for future degradation.

6. Complete Vegetation Management Plans for all developed recreation sites.

7. Develop Forest-wide inventory of sensitivity levels for trails, roads, and wild and scenic rivers.

Human Community

1. Prior to the update of the Forest Plan (in 10 to 15 years), complete an economic-base analysis (or the equivalent) for certain towns, including any or all of the following: Darrington, Granite Falls, Skykomish, and Enumclaw. Others may be studied if deemed necessary.

American Indian Religious and Cultural Uses

1. Work with Tribes and religious practitioners to update the inventory of religious use areas and predict future use trends.

2. Consult with Tribes and religious practitioners on specific projects and to develop more effective mitigation measures through consultation.

3. Examine integrated resource inventory to determine location and volume of old-growth cedar stands.

Archaeological and Historical Properties

1. Complete inventory of reported cultural resource sites. Use thematic or district approach. Conduct evaluations of National Register eligibility within this context.

2. Develop new techniques to identify prehistoric cultural resources. Take advantage of ground disturbance (road construction, timber harvest, trail use etc.) to discover new sites. Investigate new site discovery techniques (subsurface probing, soils testing, etc.) to identify previously unidentified sites. Use this new information to understand distribution of sites across the landscape and more effectively plan future surveys.

3. Develop cultural resource field sampling survey strategy based on Forest overview and land type analysis. Refine the strategy based on results of information needs of the above.

4. Identify how the Forest cultural resources can best contribute to general knowledge of prehistory and history. Coordinate with State and regional efforts to establish appropriate research goals.

5. Identify cultural resources best suited to interpretation. Consider accessibility and representation of major historic themes. As a start, improve interpretive information at the Public Service Centers, the Joint Information Center, and other public contact points.

6. Expand efforts to repair and rehabilitate historic resources listed on the National Register of Historic Places.

Wilderness

1. Verify and refine the limits of acceptable change through monitoring. Especially, need to refine data on social impacts in the wilderness, such as what are the ~realr implications of encounters and camps visible, to wilderness use levels and experiences.

2. Develop and maintain a database on wilderness use and impacts. Inventory wilderness campsites.

3. Further research is needed on what the appropriate level of outfitter-guide use should be in the wilderness.

4. Locate and define the wilderness boundary on the ground for both wilderness and other management activities outside of wilderness.

5. Collect vegetation, soil condition, and impact trend information in heavily-used camp areas near trails and other heavy-use areas (such as stock-hitching areas) that appear to be near the limit of acceptable change.

6. Identify air quality related values that would be potentially impacted by changes in air quality in Class I areas.

Air Quality

1. Complete inventories of baseline conditions for visibility, water chemistry, vegetation vigor, aquatic habitats and other identified air quality related values.

Wildlife

1. Complete bald eagle roosting, foraging and nesting habitat inventory and monitor these and other potential use sites. Validate the effectiveness of standards and guidelines for bald eagle habitat areas, and determine the need for changes or additional mitigation measures.

2. Delineate active and potential bald eagle nest sites in accordance with the recovery plan, and develop a management plan for these areas.

3. Determine the significance of recreational activities impacts on bald eagles feeding on salmon carcasses on the Skagit River, and any other area where both activities occur. Determine the best way to manage both resources.

4. Complete peregrine falcon *nesting habitat* survey and map potential *habitat* on the Forest. Determine whether there is any reproduction occurring on the Forest. Survey periodically for any nesting use.

5. Determine whether there are resident populations of gray wolves and whether breeding is occurring on the Forest. Develop inventory procedures which are reliable and cost-effective. While bald eagle inventory methods are currently reliable and relatively efficient, methods of inventorying for grizzly bear or gray wolf numbers are lacking. We do not currently have a good idea of how many individuals of these species are using the Forest, how they use the habitat, or whether they are successfully reproducing.

6. Determine whether there are resident grizzly bears on the Forest and whether they are breeding. Examine the effects of recreational uses, road traffic and other activities on any such bears. The U.S.D.I. Fish and Wildlife Service will be making a decision as to whether or not the North Cascades area will be a recovery zone. There is a need to develop information and educational means of teaching the public how to recreate and work safely in the presence of black bears, and potential presence of grizzly bears.

7. Determine baseline numbers for populations of bald eagles, gray wolves, peregrine falcons and grizzly bears.

8. Define potential habitat and habitat types on the Forest for grizzly bear and gray wolf. Determine what would constitute viable populations of these species.

9. Determine how to maintain and create usable dead and defective tree habitat (standing and down) in timber harvest units, while meeting State logging safety requirements. Determine whether created snags provide useful habitat, and how long it takes for them to do so.

10. Inventory current conditions for dead and defective, standing and down, tree habitat.

11. Inventory pileated woodpecker, pine marten and spotted owl populations.

12. Develop more accurate baseline inventories for deer, elk, goats, cavity excavators, and sensitive species.

13. Develop reliable and cost-effective techniques for inventorying indicator species and sensitive species.

14. Refine deer and elk winter, summer, and transition range habitat inventories, and identify critical wintering areas, fawning and calving areas, and migration and travel corridors.

15. The FSEIS and U.S.D.I. (1988) list a large number of information needs for the spotted owl. Refer to these documents. Needs described therein include defining habitat size, dispersal, reproductive, and feeding requirements, year-round habitat needs and information on mortality and survival of adults and young.

16. Validate wildlife ecological indicator species and identify the need for changes in species used. Validate MR habitat requirements for these species, and identify any need for changes in the MR habitat requirements.

17. Validate the critical nature of optimal thermal cover to maintain MR populations of mountain goats and desired levels of deer and elk.

18. Determine the effects of vehicular traffic on roads on species other than elk, which have been well-researched. Determine acceptable threshold levels of road densities for species sensitive to road disturbance. Validate road densities allowed in deer and elk winter range and goat MR areas, and determine whether there is a need to change the allowed density.

19. Determine habitat requirements of, and develop management guides for,sensitive animal species.

20. Determine the effects of forest fragmentation of habitat on wildlife species, particularly those which use mature and old growth habitats. Validate minimum block sizes for habitat pieces. Identify needs and requirements for connecting habitat between blocks of older forest habitats and develop methods for achieving these needs.

21. Revise and improve models for deer and elk habitat capability. Refine coefficients used for various habitat stages. Develop a nonlinear model which fully reflects needs for a balance of optimal cover and forage.

22. Complete and improve mountain goat inventory and goat habitat inventory. Identify critical habitats, and needs for revisions or additions to MR habitat areas. Identify kidding areas, and areas needing protection from human disturbance. Information is needed on the numbers of humans in critical goat habitat areas and the effects of their presence on goat--stress, avoidance, reproductive failure.

Continue to investigate, with the Washington Department of Wildlife, causes for the apparent decline in goat populations and current levels below calculated habitat capability. Areas to be further examined include the effects of parasites, genetic problems from small herd numbers, over-harvesting (legal and illegal hunting) and harassment from human recreational and other activities. Determine the need for additional mitigation measures for goat habitats.

23. Establish, with the State, population objectives for deer, elk and goats on the Forest. Currently, the Forest's shares of statewide species population objectives have not been established.

24. There is a need for a complete inventory of cave and cave-like habitats on the Forest. An extensive (rather than intensive) inventory of these sites was completed by Perkins (1988) under contract with the Forest Service. Inventories of use of these sites by sensitive bat species need to be continued.

25. Talus and cliff habitats on the Forest need to be inventoried and mapped.

26. There is a great need for information, and improved methods for measuring the use of, and demand for, appreciative and consumptive uses of wildlife. Current measures of WFUDS are probably inaccurate and underestimate appreciative (nonconsumptive) uses. There is the same need to improve the methods for, and accuracy of, valuing the economic benefits of wildlife uses on the Forest. In addition, other measures, such as what is called "existence value" of Forest wildlife resources needs to be measured. In short, there is a great need for accurate measures of the importance and values of the Forest's wildlife to the public.

Fish-Water-Riparian

1. Complete and update stream surveys for all fish bearing streams, to include an assessment for presence of fish migration barriers posed by natural and man-caused events.

2. Inventory all fish bearing streams for distribution and volume of large woody debris.

3. Determine the amount and composition of streamside vegetation required for bank and channel stability and its influence on fish habitat capability.

4. Determine what deviations, due to forest management activities, from the existing riparian vegetation types identified as critical riparian vegetation are acceptable for maintaining bank stability and fish habitat capability.

5. Determine what percentage of loss (of the previously established riparian area vegetation) within a project area has resulted in a reduction in the habitat capability to support wildlife dependant species (over a 5 year period).

6. Determine what deviations in baseline flow (high and low periods), resulting from forest management activities, impact fish populations, and/or fish habitat within, and downstream of the project areas.

7. Develop and maintain a data base on Forest lake surveys and fish stocking.

8. Validate the parameters that comprise the Anadromous Fish Habitat Capability Index. Correlate habitat capability parameters to fish use and abundance (numbers of smolts and pounds of fish).

9. Develop forest-wide values for estimating the number of fish that could be produced by implementing habitat improvements (structural and non-structural types). Use actual improvement sites and fish populations present to make these evaluations.

10. Inventory and map riparian areas (to include wetland areas) during project design; develop forest wide data base for this information/data.

11. Stream classification designations will require re-evaluation and possible reclassifications based on new information and additional data.

12. Validate the amounts of area identified in the forest plan's FORPLAN model as riparian acres (streamside class I, II, and III class streams). Also determine if the conceptual modeling of 25% non-harvest, 50% extended rotation yield, and 25% normal rotation is being accomplished and meeting other riparian resource objectives on the ground.

13. Determine what bird, mammal, reptile and amphibian species are dependant on riparian habitat, and what the necessary components of their habitat are.

14. Identify plant indicator species for riparian habitats.

15. Determine the effectiveness of all the stated mitigation measures addressing effects (direct, indirect and cumulative) on fish and water. If ineffective, determine what additional measures will be required.

16. Determine the extent of the transient snow zone and it probability of occurrence of rate of water delivery to soil during rain-on-snow conditions.

17. Determine the effects of different types of forest cover (new clearcut, mature forest, 15-year-old unthinned plantation, etc.) on rate of water delivery to soil during rain-on-snow conditions.

18. Determine under what site conditions forest roads collect and redirect subsurface water.

19. Determine the relative importance of sediment from valley glaciolacustrine deposits reworked by major streams and from Type 4 and 5 streams (as classified in Washington Forest Practices Rules and Regulations) in adversely affecting spawning gravels of anadromous fish.

20. Identify riparian wildlife indicator species.

21. Validate adequacy of riparian standards and guidelines for meeting riparian wildlife habitat needs. Determine effectiveness of riparian mitigation measures for wildlife, and whether additional measures will be required.

22. Determine appropriate widths of riparian travel corridors for wildlife. Determine needs for corridors connecting riparian habitats with upland habitats.

23. Develop improved understanding of seeps, bogs, wet meadows, forested wetlands, marshes, springs and other wetlands, and how they are impacted by project work. Validate the effectiveness of riparian standards and guidelines and mitigation measures in protecting these areas. Develop guidelines for addressing very small wetlands which occur interspersed with forested, suitable timberlands, where they are sometimes difficult to manage.

Sensitive Plants and Vegetative Diversity

1. Identify plant indicator species for riparian, special and unique communities.

2. Inventory entire Forest for threatened, endangered and sensitive plant species, with emphasis on all proposed project areas, RNA's, botanical Areas, wilderness and other areas where timber harvest is not emphasized. Determine management standards and guidelines needed for maintaining species viability, and develop management guides incorporating them. The new Sulphur Creek Botanical Area is a high priority for inventory.

3. Identify tree species whose gene pools are shrinking and develop plans to ensure that they continue to exist on the Forest in their natural range. Some of these species have special medicinal, religious or cultural uses. Identify potential cedar preserves.

4 Inventory the distribution, abundance and habitat requirements of forest plant products, other than trees, collected for commercial uses. These include mushrooms, salal, beargrass, mosses, ferns and other plants, and collection of seed. Determine the effects of harvesting these species, and need for, and means of regulating or restricting collection.

5. Information is needed on the role of the fungal flora in the ecosystems, and how to manage to preserve these elements--their viability, diversity and distributions. The role of fungi in maintaining forested ecosystems needs to be much better understood.

6. Identify future potential Botanical Areas and Research Natural Areas.

7. Determine the effects of using non-native, but already present, plant species for revegetating and stabilizing sites and for forage enhancement. Determine the appropriateness of using these species, and whether there is a need to restrict seeding to only native species.

8. Identify plant zones other than old growth which may need large, viable examples preserved in order to maintain species and community viability through time.

9. Determine prescriptions for reforesting timber harvest units, and subsequent timber management to maintain a diversity of tree species in these areas.

10. Identify effects of fragmentation on plant communities--their viability, diversity and composition.

11. Continue to inventory horizontal and vertical structural diversity of forest stands, to better understand structural differences among age classes, and to identify structural management goals for experimental silvicultural management, to produce desired stand structural components.

12. Complete a Forest inventory of mature and old growth forest communities which includes information on species composition, structure, and other ecological components. A new, more complete inventory of this type was begun in 1990.

Timber

1. Determine what portion of the Mountain Hemlock Area (Management Area 19) can be reclassified as tentatively suitab~1e for timber production.

2. Reinventory the timber resource. Stratify forest land by productive potential and other significant characteristics.

3. Inventory old growth forest land to determine area and location.

4. Develop managed yield tables to project timber growth and yield in forest stands that are predominately true fir, western hemlock, or mountain hemlock species.

5. Determine effects of logging damage on true firs and hemlock and whether or not to plan commercial thinning in these species.

6. Validate areas of J-8 and 5-8 suitability classification on the ground.

7. Complete inventory of riparian habitat on the Forest.

8. Conduct provenance testing of Pacific silver fir to determine the genetic variability of this species.