encourage the removal and utilization of greater amounts of biomass material

Special management considerations may be necessary to mitigate conflicts between personal firewood use and biomass use for wood burning power plants This could include special management zones, especially near forest communities, where firewood use would have priority over biomass use

The removal and use of biomass can produce related benefits (1) potential loss from destructive wildfires can be reduced, (2) new employment can be provided, (3) air quality can be improved because of less acreage and material needing prescribed burning, (4) land productivity can be enhanced, and (5) wildlife browse and range opportunities can be increased

Biomass plays a major role in forest ecology. Its ecological functions include recycling nutrients to the soil, increasing the soil's moisture holding capacity, maintaining and enhancing forest health and vigor, and providing habitat for plants and animals

4. Botany

Public Issue

One public issue relates to threatened, endangered, and senstive (TE&S) plants

How should the Forests' vegetative resources be managed for ecosystem diversity? Special consideration would be given to providing habitats that maintain or enhance populations of threatened and endangered (T&E) species and viable populations of sensitive species and/or management indicators. (Public Issue #2)

There is public concem that a wide variety of ecosystems should be maintained on the Forests to specifically provide for the.

a maintenance and/or enhancement of habitats for Federally listed T&E species (plants and animals),

b maintenance and/or enhancement of habitats sufficient to provide for viable populations of all other existing species (plants and animals)

Discussion of Public Issue

Species richness is one component of biological diversity Identifying and conserving habitat for the rarest plant species on the Forests is one aspect of maintaining botanical diventy The Shasta-Trinty National Forests' TE&S program focuses on three categories of rare plants

a Plants listed by the US Fish and Wildlife Service (USFWS) as Threatened or Endangered under the auspices of the Endangered Species Act Management and recovery of these species is governed by the provisions of that Act Consultation with the USFWS is required if there is a potential for adverse impacts to listed species or their habtats on National Forest lands

b Plants listed as Sensitive by the Regional Forester This list includes Federal candidates for listing under the Endangered Species Act, State-listed species, plants on lists I and 2 of the California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California, and plants tracked by the Callfomia Natural Diversity Data Base These species are managed in accordance with Pacific Southwest Region (Region 5) policy

c Plants endemic to the Shasta-Tnnty National Forests that are not listed as TE&S These are species for which all or nearly all populations lie within the boundaries of the Forests Management policy is developed at the Forest level Most of these plants are on list 4 of the California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of Calfornia

Because of restricted natural ranges or low population numbers, rare species are vulnerable to habitat changes brought on by human activties This is particularly true of endemics and outlying populations at the edges of a species' range

Threats to rare plants on National Forest lands can include road building and maintenance, excavation of rock sources, grazing, logging, changes in hydrology, herbicide use, fire suppression activities, and plant collecting Not all plants respond in the same way to these impacts. In fact, about 20 percent of the senstive plants on the Forests rely on wildfire or other disturbances for maintenance of their habtat

Wth the suppression of wildfires for the last 80-100 years, these plants now rely on other natural and human-caused disturbances to create or enhance their habltat Management of these disturbance followers requires identification of the degree and interval of disturbance needed to promote species survival Species management guides must be tailored to address the particular factors affecting the success of each species

The sensitive and endemic plants of the Shasta-Trinity National Forests are disproportionately concentrated in a relatively small number of special habtats such as serpentine barrens, montane meadows, and limestone outcrops Management for maintenance of sensitive and endemic plants, therefore, conserves these special habitats

Current Management Situation

Threatened/Endangered

At present, no plants on the Shasta-Tnnty National Forests are Federally listed as threatened or endangered

Sensitive

Forty-two species, or approximately 2 percent of the native flora of the Forests, are on Region's senstive species list One third of these *are* endemic to the Shasta-Trinity

National Forests, that is, they do not occur anywhere else The majority of these endemics are restricted to serpentine soils

Management and protection of sensitive plants is accomplished through identification and inventory of suitable habitat, surveys of project areas for potentially affected populations, protection of habitat, and population monitoring It may also include manipulation of habitat to increase or stabilize populations Information on the locations, numbers, and habitats of sensitive plants is shared regularly with the Califomia Natural Diversity Data Base

The Forests' sensitive plants include two State-listed species Brandegee's eriastrum (*Eriastrum brandegeae*), listed as rare, and Trinity buckwheat (*Eriogonum alpinum*), listed as endangered

Eriastrum brandegeae has been observed on the Trinity National Forest in open xeric chaparral on the alluvial bottom of Hayfork Valley One population occurs on a portion of the isolated Forest Service compound on the northeast end of town Apparently there is no additional suitable habitat for this species on the Forests Unless further study reveals otherwise, efforts to sustain viable populations may be limited to protection of this existing population This species is more widespread to the south, on and adjacent to the Mendocino National Forest

Eriogonum alpinum is found above 6,400 feet on soils denved from serpentine in the Eddy Mountains This species is endemic to the Shasta National Forest

Refer to Appendix G for a listing of sensitive plants found on the Forests

Endemics

As noted above, about a third of the sensitive plants on the Forests are endemics. In addition to these, two plants are endemic to the Trinity National Forest, and two are endemic to the Shasta National Forest The Trinity endemics are Dubakella Mountain buckwheat (*Eriogonum libertini*) and serpentine haplopappus (*Haplopappus ophitidis*) Both are restricted to serpentine soils The Shasta endemics are Shasta eupatory (*Eupatorium shastense*), a limestone endemic, and veiny arnica (*Arnica venosa*).

All four of these endemics were listed as sensitive at one time, and they were managed as such Since their removal from the Regional sensitive plant list, they have not been systematically surveyed for, nor have they been protected In the future, endemics will be surveyed for, mapped, and avoided where possible In addition, habrtat management plans will be developed for endemics according to the schedule set forth in Appendix A of the Forest Pian

Management Opportunities

Opportunities exist for acquiring more and better information about rare plants on the Forests Forest personnel will continue to share rare plant locality and population information with the Califomia Natural Diversity Data Base, the California Native Plant Society, adjacent Forests, the Bureau of Land Management, and other interested agencies and individuals Further survey work is needed for most sensitive species Comprehensive surveys, in conjunction with the development of Species Management Guides, are planned according to the schedule set forth in Appendix A of the Forest Plan

While all sensitive plant populations are protected under Prescription VII (Threatened, Endangered, and Selected Sensitive Species), areas with concentrations of rare plants may benefit from designation as Special Interest Areas (SIAs) Several botanical SIAs have been recommended for establishment in the Forest Plan For a few species whose populations are largely in private ownership, land acquisition may be appropriate as a protection tool Acquisition of specific parcels for protection of sensitive plants s recommended in the Supplemental Management Direction sections for several Management Areas (see Zhapter 4 of the Forest Plan) Habitat manipulation may oe needed to maintain or create habitat for disturbance-dependent plants This approach is being used with Zooke's phacelia, a sensitive plant It may also be used for other species once their disturbance requirements are known

n addition to information sharing among agencies and orivate groups, opportunities also exist for cooperation n species management For instance, two Species Yanagement Guides were developed in 1990 under cooperative agreements with The Nature Conservancy The Shasta Chapter of the Native Plant Society has assisted with sensitive plant monitoring Boundaries of the four recommended Botanical Interest Areas along the Scott Yountain crest, dividing the Shasta-Trinity and Klamath National Forests, were coordinated with the Klamath. These partnerships will be expanded in the future

5. Facilities

The Forests' facilties support a variety of management activties Includedwithin the context offacilities are roads, trails, bridges, major stream crossings, sewage systems, water systems. buildings, and dams

Public Issue

One public issue relates to facilities That issue is

How many miles of additional roads are needed and to what standard should they be constructed and maintained in order to meet future needs?(Public Issue #4)

Discussion of Public Issue

Management of the Forests' road system is important to accommodateforest users and to faciltate in the management of the resources Most Forest use and enjoyment could not or would not occur without a transportation system

The Forests' road system is not self-serving Its existence and changes to it are to better serve the various uses of the forests As use patterns and modes of transportation change, corresponding changes *may* need to be made in the transportation system A typical example is the larger recreation vehicles (RVs) in use today, they require different standards of roads within Forest Service campgrounds

Maintenance of the Forests' transportation system is a never ending job Maintenance relating to use is easy to understand (i e , surface blading to eliminate ruts) Non-use maintenance may involve such things as cleaning out drainage features (culverts or dtches). painting signs, or clearing roadside brush

Confusion still exists concerning terminology with regard to trails and roads as conveyors of vehicles Wtthin this document any reference to "trails" is for a single track facility used primarily for foot, horse, and in some cases, *two* wheeled cycles Two track roads, jeep roads, jeep trails (common usage), and 4 X 4 trails are all considered "roads" on the Shasta-Trinity National Forests

Current Management Situation

Transportation System - Roads. The Forests are traversed by a well-developed system of State, County, private, and Forest Service roads The primary roads are Interstate 5 and State Highway 3 in the north-south direction, and State Highways 299, 44, and 36 in the east-west direction

There are over 6,800 miles of inventoried system roads and an estimated 500 miles of uninventoried roads under Forest Service jurisdiction The uninventoried roads consist of a mix of old, unobliterated logging roads, roadways created by vehicle use, and others, such as old mining roads The uninventoried roads will be evaluated and added to the transportationsystem inventory fneeded for future management activities All others will be closed to use or oblitterated

About 15 percent ofthe Forests' inventoried road system is closed seasonally by gates, and as much as 30 percent more is closed by snow during normal winters An additional 10-12 percent ofthe road system is closed following completion of management activities, such as timber harvesting These roads are kept closed, providing there is adequate public access into the area, until future management activrties necessitate reopening

The Forests' transportation system or Forest Development Roads (FDR) are classfied as follows

Functional Classification	FDR System (Miles)	County Systems (Miles)	Total (Miles)
Arterial	685	202	887
Collector	1,515	111	1,626
Local	4.619	72	4.691

This transportation system represents an investment of approximately $300 million **Table 111-9** provides further information (See the Glossary [Chapter VIII] for a definition of transportationterms)

About 1,500 miles of the road system are jointly owned or cost-shared with neighboring private landowners The exchanged easements and rights-of-use in a joint-ownership road provide that each party cooperatively maintain the facility and preserveit to standards oforiginalconstruction or reconstruction To ensure that the proper road maintenance is camed out, the Forest Service and the cooperating joint owner enter into a maintenance agreement

Table 1119
Inventory of Facilities by Type

Facility Type	Units	'Facility Type	Units
Roads	Miles	Trails	Miles
Arterial	685	Pacific Crest Trail	154
Collector	1,515	National Recreation Trail	26
Local	4,619	Other Trails	1,139
Uninventoried (estimate)	500	Total	1,319
Total	7,319		
Bridges	Number	Buildings*	Number
Roads	84	*Residential*	
Trails	26	Permanent	90
Total	110	Trailers	22
Dams		Total	112
Other Government	4	*Nonresidential*	
Other Pnvate	10	Permanent	202
Forest Service	2	Trailers	0
Total	16	Total Number of Buildings	314
Water Systems	Number	Sewage Systems	Number
Surface	6	Municipal	4
Ground	80	Septic/Leach	64
Total	86	Vault	60
		Lagoon	1
		Total	129
Administrative Sites	26		

* Nonrecreabonal buildings only

Forest penonnel also work closely wtth State and County authorities, through Memorandums of Understanding or Cooperative Agreements, concerning changes in standards or jurisdiction of transportation facilities

Most new road construction is done as part of the contractual requirements of the timber sale contracts Lesser amounts of construction are done by appropnated fund public works contracts, such as campground road construction or upgrading existing roads to standards higher than are needed for timber sales Some new road construction is done by cost share cooperaton and special use permit such as within a permitted ski area or lake resort area New road construction requires that an environmental analysis be completed and approved New construction done by State or County jurisdictions is done under their respective environmental analyses

The Forest Service is responsible for road maintenance work that is generated by the Forests' administrative traffic, by the use of the Forests' resources, and by persons visiting the National Forests to use and enjoy their recreation, wildlife, and scenic resources Such maintenance will normally accommodate traffic associated with (1) special use areas not operated as a commercial enterprise, (2) incidental non-commercial use usually related to ownership or occupancy or land served by Forest development roads, and (3) incidental use generated by commercial recreation enterprises

Based on traffic management and use objectives, each road or road segment is assigned one of five maintenance levels All inventoried system roads are maintained to at least maintenance Level 1 (Definitions of road maintenance levels are found in the Glossary) Projects which will reduce the watershed impacts of existing roads and

contribute to a better road infrastructure have been and will continue to be identified Needed work includes increasing the size and number of culverts, surfacing roads close to streams, installing energy dissipaters, and oblterating some roads

Management and maintenance of the Forests' transportation system emerged as a public issue because it encompasses many acres of National Forest land and creates a visible, physical impact on the land Since Forest users traverse the road system for access, the maintenance condtion and closure status of the roads are readily apparent.

The Forests' commercial users (traffic generated by commercial operations under permit, license, or contract for the use of National Forest lands and resources) and non-Forest commercial users (traffic generated by movement of commercial commodities from private lands and using forest development roads) are required to maintain the roads in a satisfactory condtion commensurate with their use

Transportation System - Trails. Trails are separate from roads but are still commonly considered part of the Forests' transportation system Much of the unroaded portion of the Forests is traversed by about 1,319 miles of trails These trails, less than 50 inches wide, are for use by foot, animal, or mechanized vehicles, where permitted Any facility (road or trail) which will accommodate vehicles wider than 50 inches is considered a road (not a trail) and is referred to as such in this EIS

There are several categories or classifications of trails on the Shasta-Tnnty National Forests the Pacific Crest National Scenic Trail (PCT) (154 miles), National Recreation Trails (NRTs) - Sisson-Callahan and South Fork Trinity NRTs totaling 26 miles, and other Forest trails (1,139 miles) Addtional trails may be considered for designation as NRTs in the future

Along the route of the PCT no buffer is planned to separate trail users from management activrties This decision is specifically addressed in the standards and guidelines in the Forest Plan

The Forests' trail system is essentially complete wth the exception of the Mt Shasta area and a few isolated areas in and around developed recreation sites New trails are planned for Mt Shasta and Castle Crags because of their unique geologic and scenic appeal

Trail use throughout the Forests varies from very heavy to very light The majority of the users are backpackers. equestrian groups, hunters, and anglers Many of the trails have been surveyed and constructed in locations which best serve user needs and which cause few adverse environmental impacts However, many trails have deteriorated from overuse If these trails are needed, maintenance and reconstruction work will be accomplished to perpetuate their continued use The overall objective of the Forests' trail maintenance program is to maintain and upgrade all needed trails or portions thereof which are causing resource damage or inadequately sewing the public

Cooperative partnerships with organized groups can be used to accomplish a variety of trail maintenance needs

Other Facilities. In addtion to roads and trails, a number of other facilties under the Forests' jurisdiction must be managed and/or maintained **Table 111-9** lists these facilities

Many of the buildings are very old and in need of major repair or replacement A major capital investment program is needed to improve or replace these facilties A Facility Master Plan, which will prioritize the stes and the work that needs to be done, is being updated and will be kept current Managing the historical values of many buildings on the Forests is also very important

Many buildings are leased from the private sector Although leasing requires less capital investment, it significantly increases the annual cost of providing buildings

High priority has been given to upgrading the Forests' water systems consistent with laws and regulations Providing handicapped access and use, providing adequate storage for hazardous materials, providing adequate accommodations for mixed or both genders, where needed, eliminating asbestos risks. and montoring for radon are some of the high priority items actively being pursued

Management Opportunities

The number of miles of new road construction is diminishing annually This decrease will continue as remaining unroaded areas are accessed or management decisions are made to leave them roadless Reconstruction of existing roads will continue in order to meet the demands of increased use and new equipment Normal deterioration will also cause a continued need for reconstruction

Products for dust abatement and surfacing, which use less oil and oil-dependent products, need to be developed Maintenance of the Forests' roads should continue to emphasize the prevention of resource damage Cooperative maintenance of a jointly-owned road system will receive more emphasis as the lands served are more heavily used. Increased subdivision of private lands within the Forests' boundary will create a need for privately funded road districts

Restrictions on trail use will be evaluated to eliminate use conflicts and resource damage and to improve the user's experience Some changes may occur in the seven Ranger District administrative units: this may cause possible changes in some of the existing administrative sites. Increased maintenance costs could be experienced due to the age of these facilities Cost-efficient energy retrofitting, already identified, may be needed In the interest of annual operating cost savings, all administrative site leases will be eliminated in favor of agency-owned facilities Public information contact sites may be exempt.

6. Fire and Fuels

Public Issue

One public issue emerged concerning fire and fuels

To what extent should prescribed burning be used as a way to reduce fuel hazards, prepare sites for reforestation, and improve wildlife habitat? (Public Issue #5)

Air quality and particulate matter was another concern relating to prescribed fire

Discussion of Public Issue

The primary issue relating to prescribed fire is that firewood and alternate energy resources are being destroyed Historically, between 9,000 and 12,000 acres of timber sale slash and debris and wildlife habitat have been treated annually using prescribed fire Emphasis has changed since 1986, however, and the number of acres being burned has been reduced Between 6,000 and 8,000 acres are treated annually using prescribed fire, and the acreage continues to decrease as timber harvest decreases As the population increases and town encroachments approach National Forest land, there is concern that the supply of firewood and alternative energy materials will be in short supply

Current Management Situation

During the period of time between 1972 - 1989, 1,836 person-caused fires and 2,110 lightning-caused fires burned on the Shasta-Trinity National Forests, for a total of 3,946 fires These fires burned an average area of 4,952 acres per year for person-caused fires, and 5,040 acres per year for lightning caused fires, for a total of 9,992 acres burned per year Nearly 90,000 acres burned on the Forests during 1987, an extremely bad fire year

The fire management program consists of two basic elements (1) wildland fire protection and (2) wildland fuels management Activities relating to fire protection are detection, prevention, presuppression. and suppression Activities relating to fuels management are removing or rearranging them to meet protection requirements

Prior to 1992 the Shasta-Trinity National Forests had been providing wildland fire protection for approximately 2 7 million acres In 1992 this figure was reduced to 2 4 million acres This decrease is the result of a balance of acreage program that was coordinated with the State of California Prior to 1992 the Forest Service protected 724,000 acres of private or State-owned land In 1992 this figure was reduced to 364,081 acres Starting in 1992, the State has wildfire protection responsibilities on 200,000 acres of National Forest land within the boundaries of the Shasta-Trinity National Forests This is an increase of about 60,000 acres over its previous protection responsibilities

The size and mix of the fire organization allows Forest personnel to handle singular incidents but places limits on their ability to respond to multiple situations or incidents This shortfall occurs when forces and equipment are depleted because of assignments to other forests or agencies or when numerous lightning fires are burning at one time

There is a cooperative agreement between the Shasta-Trinity National Forests and the California Department of Forestry and Fire Protection (CDF) This agreement provides for the sharing of fire protection resources, thus augmenting the fire suppression capabilities of each agency Fires that threaten lands of more than one jurisdiction are managed jointly Initial attack planning is based on using the closest suppression forces or resources Training is coordinated and often conducted jointly In addition. the Incident Command System is used by all agencies for managing fire suppression actions

The wildland fire protection problems are dynamic and ever changing as the values-at-risk increase Increasing values-at-risk are a result of large numbers of acres having been planted with high investment timber plantations and changing environmental influences These factors, when coupled with changing public use patterns and prolific urban interface development on intermingled or adjacent private lands, influence fire protection priorities They also increase the dollar value loss

Wildland fire suppression strategies and tactics have been to control all fires at the smallest size and with the least resource damage possible These control practices have modified the environment, allowing large accumulations of natural and unused material. along with undesirable vegetation, to accumulate throughout the Forests Within wildernesses, control strategies have produced areas of unnatural vegetation mosaics Some resource management practices have also contributed to the increased amount of fuel by not requiring adequate hazard abatement

Fuels management activities have included the construction and maintenance of fuelbreaks and road hazard reduction to break up the contiguous fuels or vegetation. Prescribed burning of timber sale slash, by broadcast and pile burning, has been done as part of the reforestation and fuels reduction program

The use of prescribed fire has been the most economical treatment method available for managing forest fuels Intensive utilization of forest residue can reduce the amount of prescribed fire necessary to meet protection and site preparation objectives for timber management

Historically, 80 to 90 percent of the annual prescribed burning conducted on the Shasta-Trinty National Forests was done to remove logging residues and prepare brush fields for reforestation The remainder of the burning was done to benefit wildlife and reduce fuels With decreased acres of timber being harvested on the Forests the percentage of logging residue created and treated would also decrease. The need to treat natural fuels occurring in the ecosystem would increase due to insect infestations, drought, and blow down due to natural causes Methods of treatment of natural fuels include prescribed burning, as well as mechanical fuel manipulation to achieve the desired effect The effects of smoke, resulting from prescribed fires, are considered in all prescribed burn plans to insure that State and local air quality requirements are met

Management Opportunities

In areas of increasing value-at-risk, wildland fuels will be managed for long-range mitigation of the increasing demand for and escalating costs of fire protection

Within wildernesses, the use of unplanned natural ignition may reduce the unnatural build up of down and dead materials. Natural barriers, vastness of continuous vegetation, topography, and weather are contributing factors

Prescribed fires, burning under specific conditions with defined results, can be conducted using planned ignition both inside wilderness boundaries and throughout the Forests Mosaic patterns can be achieved to meet resource constraints and concern on site specific projects In chaparral areas, where wildlife habitat or range forage can be improved while reducing the fire hazard, this option may be employed

Fires will always be part of the natural ecosystem, but controlling the timing and intensity of them will be necessary to minimize the impacts to human health and forest resources

7. Fisheries

Public Issues

One public issue focuses on fisheries

How should watersheds be managed to maintain or enhance water quality and fisheries? (Public Issue #6)

Other related issues having an affect on fishenes include

a There is public concern that a wide variety of ecosystems should be maintained on the Forests to specifically provide for the maintenance and/or enhancement of habrtats for Federally listed T&E species (plants and animals) (Public Issue #2a)

b How should livestock grazing be managed to minimize degradation of riparian areas? (Public Issue # 10)

c How wide should ripanan management zones (RMZs) be and what management activrties should be allowed within them? (Public Issue # 13)

Discussion of Public Issues

Watershed Management. The Forest Service's attempt to protect and maintain fish habrtat quality, using Best Management Practices (BMPs) during timber harvesting operations, is being questioned Some of the perceived problems identified are lack of erosion control, degradation of riparian habrtats, and slope cutting on steep grades

Specific questions raised by the public include

1 What are the potential effects of cumulative watershed impacts on spring-run chinook and summer steelhead within the South Fork Trinty River?

2 Do Forest Service management practices adversely affect anadromous fish habitat in the South Fork Trinity River?

3. How can fish populations increase. especially anadromous fish, wrth an increase in clearcuts, road building and degraded watershed conditions?

4. What should be done to insure on-the-ground compliance with BMPs?

5. How should fisheries monitoring be done dunng timber sale harvesting?

5 What magnrtude of streambank protection should be provided?

Other watershed management concerns include

1 The Forest Service should have a clear, concise fisheries management plan, and

2 The agency needs its own fishenes protection plans, it is not enough to rely on other agency plans.

Livestock Grazing. Public concerns have to do with

1 grazing in and near riparian areas,

2 the effect of grazing on water temperatures and fish habrtat production potential,

3 grazing in wildernesses, and

4 making important redband trout stream corridors, such as Sheepheaven and Trout Creeks, off limits to grazing to prevent streambank degradation, shade loss, and eutrophication

Streamcourse Protection. Public concerns reaffirmed that ripanan areas should be maintained to provide a sediment barrier and a shade canopy for the water and to protect stream channel integrity RMZs should be designated for all perennial streams and for intermittent streams that are used as fish spawning and/or nursery areas

Habitats. There is concern that habitats of sensrtive fish species such as the bulltrout, redband trout, rough sculpin, spnng-run chinook, and summer steelhead be protected and maintained Furthermore, can anadromous fish populations be increased by improving anadromous fish habitat capabilrty through structural habrtat improvement?

Current Management Situation

Available Resources. There are about 5,500 miles of rivers and streams on the Forests, 1,900 miles of which are fishable In addrtion, there are over 50,000 acres of lakes and reservoirs

Outstanding coldwater fisheries are found in the McCloud and Pit Rivers Eight miles of the McCloud River (below McCloud Reservoir) are classified as a Wild Trout Stream and offer a blue-ribbon fishing experience of National acclaim At one time, the upper Sacramento hver provided an outstanding wild trout fishery Unfortunately, a chemical spill near the community of Dunsmuir in July, 1991 impacted this fishery along 45 miles of its course down to the backwaters of Shasta Lake

The headwater areas of the Trinity River (above Clair Engle [Trinity] Lake), the North and South Forks of the Trinity River and their tributaries, Squaw Creek, and Squaw Valley Creek also support fisheries of regional interest

The fish in Shasta, Trinity, Lewiston, McCloud, and Iron Canyon Reservoirs, as well as in over 80 alpine lakes, are also of major recreational interest

The Sacramento and Trinity River Basins once sustained several of the largest populations of important anadromous fish (salmon and steelhead) in California In recent years there has been a decrease in the anadromous fish numben Typical of the situation is the winter-run chinook salmon of the Sacramento River which has been listed as a threatened species.

Some of the factors contributing to reduced habitat availability and fish population may be one or more of the following dam construction and other diversions, catastrophic *floods,* natural landslides, over harvest of fish, human activities on the landscape, and domestic livestock grazing Continued drought conditions have impacted salmon and steelhead streams causing signrficant reductions in waterflow regimes This has lead to a cumulative loss of spawning and rearing habitat and increased water temperatures These factors, coupled with poor ocean survival, have accelerated the decline of anadromous fish populations in the Sacramento and Tnnity Basins.

Current Use of Available Resources. Sixty million people enjoy fishing, the Nation's second most popular outdoor sport after swimming Sport anglers generate a $28 million contribution to the nation's economy annually Current fishing use throughout the National Forest System is estimated at 46 5 million angler days each year with a net economic value of over $1 2 billion

The State of California has experienced a shift downward in the number of fishing licenses sold over the past decade In 1989, the State reportedly sold 29 percent fewer angling licenses than in 1980, although the state's population increased by more than 7 million dunng the decade

In 1980 about one in 10 Californians bought a fishing license, for a total of 2 3 million. In 1989, about 1.6 million fishing licenses were sold, or one for every 20 Californians

On the Shasta-Trinity National Forests the Recreation Resource Information System (RRIS) has provided information about the current level (FY 1988) of fish user days (FUDs) on the Forests Warmwater fishing accounts for 267,000 FUDs (67 percent): resident coldwater fishing (streams, lakes, reservoirs) 91,000 FUDs (23 percent), and anadromous sportfishing 38,000 FUDs (10 percent).

Fish Population Concerns

General. In the Trinity hver Basin, Forest Service personnel are concerned about the reduced populations of spring-run chinook and summer steelhead over the last five years. The summer steelhead is listed as a Forest Service sensitive fish species

Inland coldwater streams, lakes, and reservoirs have also been impacted by the continued drought conditions In Siskiyou County, offspring from Oregon bull trout, introduced by the Department of Fish and Game (DFG) into two private streams, have been reported as demised after once dependable year-round flowing natural springs dried-up Reservoir levels at Shasta and Trinity Lakes are significantly below maximum pool because once abundant annual snow accumulations have not been sufficient to sustain, much less replenish, diminished water storages

The DFG continues to supplement recreational sportfishing through hatchery releases However, the reduced capability of the natural water environments in sustaining the wild salmon, steelhead and trout populations of the Forests is of paramount concern

Anadromous Fish. In 1991, the American Fisheries Society identified 159 stocks of anadromous fish in the Pacific Northwest as being at moderate to high nsk of extinction Another 54 stocks were listed as being of special concern A total of 39 stocks was listed in California The primary reason for the decline of these stocks varies by species and locality The continued existence of these stocks is threatened by an *unquantifiable* combination of hydroelectric development, over-harvest of fish, hatchery influences on susceptibility to disease and genetic *fitness* and habitat conditrons High quality habitat conditions on National Forest lands are important to conserving many of the "at-risk" stocks. Enlightened management of the anadromous fish habltat is important to the recovery of these stocks, even though the pnmary reasons for the decline may not be habitat related

Potential conflicts within aquatic/riparian zones and upslope of streamcourses can include human-caused disturbances such as vegetation removal and manipulation. construction and use of road; and trails, use of heavy equipment, domestic livestock grazing, and mineral extraction operations and non-human-caused disturbances such as wildfire, insects and disease. and climatic extremes such as drought Unmanaged, these activrties could cause signficant long-term damage to fish populations and their habitats Simply put, fish production could become limited if aquatic habttat condttions in a stream are of poor qualtty for fish A prime example of a stream under stress is the South Fork Tnntty hver Even though this nver is gradually recovenng from the catastrophic impacts of the 1964 flood event, populations of fall and spring-runs of chinook salmon, like the summer steelhead, have not responded Their numbers remain relatively low

Because of its geological nature, the South Fork Tnntty River Basin is at risk of further sedimentation If not managed, activities such as, vegetation removal and manipulation, road construction and minerals extraction could produce unacceptable levels of sediment Management activtties must be sensrtive to watershed and fisheries needs in order to maintain populations of fall and spring-runs of chinook salmon in this drainage

Seven of 61 watersheds inventoried on the Forests have relatively high disturbance levels Therefore, there is a significant risk of inrtiating cumulative effects within the main channels which drain into these watersheds All seven of these watersheds are wtthin the South Fork Tnnity River basin Butter Creek, the East Fork of the South Fork Trinity River, Gulch Watershed, Hyampom, Plummer Creek, Rattlesnake Creek, and Upper Hayfork Creek Four of these watersheds (Butter Creek, the East Fork of the South Fork Trinity River, Plummer Creek, and Rattlesnake Creek) have the potential, if cumulative impacts do occur, to directly impact spring-run chinook and summer steelhead habitat

Within Canyon Creek, New hver, and the North Fork Trintty River spring-run chinook adults, like summer steelhead, are vulnerable to poaching during the summer since they are extremely visible in clear canyon pools The DFG recognizes poaching as one of the most immediate threats to these fish These latter tributaries to the mainstem Trinity River have not been identified as major sediment producers accelerated by human-induced activrties, although areas of natural instability do exist within their systems

Inland Coldwater Fish. Forest Service fisheries management efforts have concentrated very little on the wild trout populations of the Forests Stream and high mountain lake habrtat surveys have not been conducted on most inland coldwaters since the mid-1970's because of budget constraints

The greatest concerns for the redband trout streams center on cattle grazing/disturbance, high point source recreational use, and water drafting for dust abatement

The DFG has recommended that special management protection be developed for all redband trout waters on the Shasta-Tnnity National Forests This worthy goal is complicated by the intermingled land ownership on or adjacent to most of the redband trout streams Implementation of special management protection measures could be compromised by private landowner investments

Inland coldwater fisheries management has been strongly emphasized at the McCloud and Weaverville Ranger Districts On the McCloud District, habitat typing surveys have been conducted on redband trout streams, the McCloud River and Squaw Valley Creek At Trout Creek, a redband trout stream, the District has developed a comprehensive educational work program for students ***of*** the McCloud School District under the auspices of the Adopt-A-Watershed and Bring Back the Natives program Other partners in this program include the DFG, PG&E, National Fish & Wildltfe Foundation and Trout Unlimited

The Weaverville District has begun development of a fisheries/watershed inventory and restoration program for Baker Gulch, Eastman Gulch, and the upper Trinity River (above Trinity Lake) Squaw Creek, on the Shasta Lake District, has been habttat typed, but no formal work agreement has been developed with the Shasta Flycasters for a habrtat improvement partnership

Inland Warmwater Fish. Shasta Lake supports a heavily fished largemouth and smallmouth bass fishery Panfish, catfish, and bullheads provide additional sport angling opportunities Trinity Lake supports a trophy smallmouth bass fishery and a limited largemouth bass fishery

Shasta Lake's production of largemouth bass is below potential Concerns exist over the largemouth and smallmouth bass populations which are especially sensrtive to angling pressure and water fluctuations The major contributing factor toward effective and successful management of Shasta Lake bass is a well-coordinated endeavor among governmental agencies, special interest groups, and local bass clubs A working partnenhip composed of DFG, the Forest Service, and the Golden State Adopt-A-Lake Conservancy Program has helped to high-

light the Forests' warmwater fish habttat improvement program.

Heightened efforts have been undertaken by personnel on the Weaverville District to develop a more sophisticated approach to warmwater fisheries management at Trinlty Lake A research and development program was added to the District's implementation program in 1989 Partners include DFG, the California Conservation Corps, and the Trinlty County Fish & Game Advisory Commission

Habitat Improvement

General. Stream improvement for fish habitat applies to the installation of instream devices or the application of streamside procedures for correcting natural damage or problems caused by humans (USFS, 1988) More specifically, habitat rehabilltation means repair of abused or deteriorated habitat by augmenting and speeding up natural recovery Enhancement means to create more suitable habitat than that which would occur naturally in a stream This includes increasing access as well as directly improving or developing spawning and reanng habltat (Reeves, 1982)

The purpose of installing log structures, sometimes accompanied by the addition of boulder clusters, is to create instream structural complexity Structural design and installation provide for improved spawning and pool rearing conditions

Indigenous riparian plant species are planted to accelerate the growth of shading vegetation thereby reducing the harm caused by long-term solar heating This is especially true during the summer when low flow conditions and radiant exposure can stress anadromous fish and/or trout In addition, replanting of the riparian habitat helps anchor unstable streambanks

The effectiveness of habitat improvement structures may not be readily apparent due to other short term influences These influences may include annual and seasonal natural watershed variations, complications within the lifecycle of an anadromous fish species, or human-induced fisheries which may constrain the returns of fish to a stream which cannot be effectively qualified or quantified For example, the Klamath-Trinity River basin, after several years of drought, is experiencing its lowest recorded anadromous fish returns Therefore, someone could conclude, erroneously, that installed structures are ineffective in increasing fish numbers because of the low numbers of adults or juveniles using the structures. To determine structural effectiveness considerable long-term monltoring and extensive documenting is necessary.

Anadromous Fish. The signing of the Trinity River Basin Fish and Wildlife Restoration Act (H.R 1438 into law [Public Law 98-541]) provides a major step in needed restoration and rehabilitation addressed in the Trinity River Basin Fish and Wildlife Management Program This program is designed to provide an increase in fishing opportunities as a result of increased populations of anadromous fish The Model Steelhead Stream Demonstration Project Plan is another document which complements the purpose and intent of the Trinlty River Basin Fish and Wildlife Management Program

The Model Steelhead Stream Demonstration Project Plan, released in December, 1985, stipulates the need to undertake anadromous fish habitat improvement work after stream and/or watershed inventories are completed This work is to be accomplished in a pnortized manner within tributaries of the South Fork Trinity River basin. The DFG and California Trout, Inc were instrumental in developing this plan Between 1986 and 1990, the Forest Service installed over 500 fish habitat improvement structures within tributaries of the South Fork Trinity Rver basin

Inland Warmwater Fish. State Fish and Game Code 1743 states that, "The department (DFG) shall improve shoreline habtat for black bass in waters where insufficient habtat exists and shall encourage reservoir operating agencies to carry out shoreline habltat improvement projects" This has been the emphasis at Shasta Lake since 1982 and at Tnnity Lake since 1989 DFG was an active participant in the development of the warmwater fish habitat management plan for both lakes and continues to implement project-level work Over 1,000 manzanita brushrows have been built along Shasta Lake's shoreline to benefit black bass juveniles

Program Planning

General. National and Regional attention has focused on the need to provide direction to the National Forests to develop and implement viable fisheries programs

National emphasis has focused on the "Rise to the Future" program (March, 1987) The underlying pnnciple of Rise to the Future is to emphasize fisheries management through improvement of fish habitats and to increase opportunlties for the public to enjoy the fishery resource on the National Forests The program ensures that necessary protection measures are provided during the course of other land management activlties It also iden-

trfies projects designed to restore degraded habrtats, enhance existing habitats, and create new habtats In addition, the program emphasizes accomplishments through partnenhips with the states, Native Amencan tribes, and environmental, industry and fishenes interest groups, as well as the fishing public

The Pacrfic Southwest Region's (Region 5) "Rise to the Future" program reterates integration of the fishenes program with all other resource programs This document incorporates the state approved "Partners in Fish" program (May, 1987) which asks the Forest Service to take a strong leadership role in protecting, restoring, and improving fish habitats wthin the National Forest-

"Bring Back The Natives" is a new national approach by the Forest Service, the Bureau of Land Management (BLM), and the National Fish and Wildlife Foundation to restore the health of entire riverine systems and their native species on public lands This is not a separate program of any Federal agency, but rather a series of projects that use a watershed approach to restonng stream health The program serves as the pnmary instrument for implementing national strategies for ripanan habitat restoration and native fish habitat conservation

On the Shasta-Trinity National Forests three watersheds have been selected to promote the "Bring Back the Natives" program

(1) Big Creek - Hayfork Ranger District,

(2) Trout Creek - McCloud Ranger District, and

(3) Upper Tnnrty River (above Trinity Lake) - Weaverville Ranger District

Forest penonnel have also assisted in the preparation of fishenes plans wth other agencies, including the DFG Each of these plans sets goals for accomplishing the long-term recovery of selected fish species or bodies of water

Forest involvement with plans to initiate recovery of anadromous fish in the Sacramento hver Basin has been limted because of the small amount of National Forest land involved (Beegum Creek)

Overall, two types of habtat problems can impose long-term impacts to the anadromous or inland coldwater fish stocks, those that are human-induced and those that are naturally inherent to a system, (i e , unstable soils or geological formations) Human-induced activities are further delineated into those that are under Forest Service administrative control and those outside the purview of Forest Service authority This document will track only those Forest Service activities that have a potential to impact anadromous or inland coldwater fish habtat An increased demand for recreational sportfishingon National Forest lands will accelerate the need to manage lake habitat for inland warmwater fish

Selection of Fish Assemblages. Fish species have been grouped into three specific assemblages or groups to simplify tracking the effects of management activties on fish habtats wthin the Forests These are

(1) Anadromous Fish Assemblage,

(2) Inland Coldwater Fish Assemblage, and

(3) Inland Warmwater Fish Assemblage The species associated with each of these assemblages are listed in Appendix G

Selection of Management Indicators. To ensure that viable populations of wild, native fish are maintained. management indicators are selected to act as "barometers" for aquatic communlties Management indicaton are selected from species with similar habitat requirements These indicators can then be used in determining the needs of a species and for predicting habitat capability responses to management activties Simply put, these management indicators are used to guide and montor forest management activties in a manner that will maintain biological diversrty and produce enough fish to meet recreational and commercial needs

Winter-run steelhead, spring-run chinook and summer steelhead were selected as management indicators for the anadromous fish assemblage, rainbow trout were selected for the inland coldwater fish assemblage, and largemouth bass were selected for the inland warmwater fish assemblage

Anadromous Fish Assemblage

Management Indicators. All anadromous fish in Calfomia are in a state of decline The Trinity River Basin sustains important anadromous fish populations However, natural catastrophes and other causes have contributed to a population decline of 60-70 percent in the last few decades Over fishing of major basin fish stocks, inundation of limted critical spawning and reanng habtats, poor water release schedules at dam **stes,** and terrestnal habitat

alteration in sensitive watersheds are contributing factors to this decline.

Winter-Run Steelhead Trout. The winter-run steelhead was selected as a management indicator for the anadromous fish program throughout the Trinity River basin because of its presence and wide distribution throughout most of the free-flowing streams within the basin It can be impacted by management activities, such as logging and road construction Steelhead trout habitat readily responds to instream, nparian, and upslope terrestrial improvement and stabilization efforts.

Impetus for the protection, maintenance, and enhancement of steelhead trout habitat comes from the population declines throughout California Concerns exist because of the low numbers of winter-run steelhead in the South Fork Tnnity River Basin Over time, natural catastrophes and human-induced activities have lead to a decline in population levels

forest Service personnel place great emphasis on watershed rehabilitation and fish habitat restoration for winter-run steelhead, particularly in the South Fork Trinity River basin

The Model Steelhead Stream Demonstration Project Plan is intended to guide the recovery of steelhead and their habitat in the South Fork Trinity River

The wildfires of 1987 and 1988, coupled with previously identrfied projects, have allowed the Shasta-Tnnity National Forests to apply about $900,000 to the rehabilitation of fish habitat and watersheds within the South Fork Trinity River Basin A major contributor to this rehabilitation effort was the California Conservation Corps

The most signrficant commitment to andromous fish restoration came in October, 1984 with the signing of the Trinity River Basin fish and Wildlife Restoration Act (PL 98-541) This law authorized the creation of the Trinity River Restoration Program (TRRP) with $57 million set aside for 10 years to allow for numerous restoration and rehabilitation activities on National forest land

Spring-Run Chinook Salmon. The chinook were once the most abundant salmon in California. Today annual runs of wild spring-run chinook are less than 1,000 fish, divided between the Sacramento and Klamath River drainages Their numbers are declining each year (Moyle, 1991).

This species was selected as a management indicator for the anadromous fish program within the South Fork Trinity River for a number of reasons. The chinook has low reproductive numbers which appear highly sensitive to changes in biological and physical parameten, it has limited instream system distribution, and it is vulnerable to poaching Because of the chinook's low numbers in the South fork Trinity River, it is difficult to measure direct impacts from land management activities.

In conjunction with DFG, the forest Service not only recognizes valuable spring-run chinook streams, but looks to further management actions to benefit their habitats Both agencies want to play a major role in restonng damaged watersheds and streams in order to increase fish runs

California's major spnng chinook salmon runs have been lost to barrier dams. Other, much smaller runs, have been lost to other causes such as degraded habitat Loss of the wild spnng chinook runs to barriers have been partially mitigated by the Trinlty River Hatchery Self-sustaining runs of spnng-run chinook are at a fraction of their historic levels Those runs that are stable or increasing are generally those that are affected by artificial propagation (DFG, 1990).

Prior to the 1964 flood and after the demise of the San Joaquin run, the South Fork Trinity River was probably the most productive spring-run chinook stream in the State The river was the largest single producer of spring-run chinook in the Klamath system until landslides, triggered by the 1964 storm, filled in the holding pools and buried the spawning areas This situation improved only slightly during the next 15 years At that time, a few of the holding areas became usable again and spnng-run chinook were once again observed in isolated pools (DFG. 1990).

Since 1988, spring-run chinook adults have been counted annually within their summer holding habltat in the South Fork Trinity River The DFG estimated that there were 11,604 spring-run chinook in the South Fork Trinity River n 1964 The forest Service counted 59 in 1988; 6 in 1989, and 82 in 1990 between Hyampom Valley and the confluence of the East Fork of the South Fork

Spring-run chinook are impacted as adult (or near adult) ish in ocean and in-river fisheries The ocean commercial ishety has a major impact on the adult returns Spring-run chinook are less impacted by the ocean fisheries than 'all-run stocks because they are legal-size fish to the commercial fishery for a shorter period of time

Native Americans are permitted to harvest returning spring-run chinook adults in the lower Klamath and Tnnity Riven using gill-nets, sport anglers use hook-and-line gear Estimates by the US Fish and Wildlife Service (USFWS) indicate that a combination of the commercial and in-river fisheries has reduced the runs of adult spring-run chinook of hatchery origin by about half (DFG, 1990)

Low flows, coupled with high water temperatures, are a primary impact to spring-run chinook within their holding areas in the South Fork Tnnty River High water temperatures can lead to high adult mortalities and low spawning success

Spring Run (Summer) Steelhead. Two races of steelhead trout are indigenous to the Trinty River Basin the spring-run (summer) steelhead and the winter-run steelhead

The summer steelhead is designated as a sensitive fish species by the Forest Service because of its limited habitat preferences and low population numbers This species was selected as a management indicator for the anadromous fish program within the South Fork Trinity River for a number of reasons It has low reproductive numben which appear highly sensitive to changes in biological and physical parameters. it has limited instream system distribution, and it is vulnerable to poaching Because of the steelhead's low numbers in the South Fork Trinity River, it is difficult to measure direct impacts from land management activities

Summer steelhead are found only in streams from the Eel River drainage to the Oregon border The total number of summer steelhead in California varies between 1,500 and 4,000 fish This figure is divided among 25 isolated populations Most of these populations contain less than 100 fish, so they are unlikely to persist in the long-term unless an aggressive protection program is initiated (Moyle, 1991)

Studies indicate that summer steelhead spawn in small headwater streams wrth relatively low (50 cubic feet per second [cfs]) winter flows Most of these streams are intermrttent and dry up in the summer

Summer steelhead habitat is very sensitive to disturbance Both natural and human-caused landslides have been the major cause of habitat alteration, especially in the South Fork Trinity River Adverse impacts to spawning srtes. stream shade canopy, water temperature, bank stability, pool frequency, and volume have been documented

The numbers of summer steelhead in Northern California were greatly reduced by the floods of 1964 These floods destroyed much of their holding habrtat Although the habitat has been improving slowly, the summer steelhead populations seem to be, at best, static (Moyle, 1991)

Since 1988, summer steelhead adults have been counted annually within their summer holding habitat in the South Fork Trinity River DFG estimated that there were 3,500 summer steelhead in the South Fork Trinity River in 1964 The Forest Service counted 30 in 1988, 37 in 1989, and 66 in 1990 between Hyampom Valley and the confluence of the East Fork of the South Fork

Habitat. A cursory inventory of the anadromous fish habrtat on National Forest streams indicates that 296 miles are or have been used by steelhead trout and 127 miles by chinook salmon

Historical information is unavailable to compare present-day anadromous fish habitat qualrty and quantity with that of the past or to project accurate trend information A 1988 update on anadromous fish habitat capability, compiled from existing stream survey data, indicates that 33 5 percent of the habitat was rated as high quality, 44 2 percent moderate quality, and 22 3 percent (mostly the mainstem Trinrty River) as low quality None of this habrtat is filled to spawner capacty

The Forest Service's role is to protect and maintain habrtat quality and quantrty and, where possible, to improve habrtat on National Forest lands These are only two of the many variables influencing anadromous fish production Working with other agencies the Forest Service is assisting in the design and implementation of anadromous fish habrtat improvement projects within the Trinity River Basin

The South Fork Trinity River is slowly recovering from the catastrophic flood event of 1964 which released millions of cubic yards of sediment into the mainstem Summer steelhead and chinook salmon habitat were affected by this event The South Fork Trinity River may no longer have the capability to produce the large numbers of wild spring-run chinook or summer steelhead it once did The river is now being managed as a wild free-flowing system without any hatchery mitigation efforts The mainstem Trinity River, on the other hand, is heavily subsidized by releases from the Trinity River hatchery

The Tnnity Alps Wilderness and Wild and Scenic River classifications on segments of New River and North Fork Trinty River are assisting in maintaining salmon and steelhead habitat in their natural pristine state

Habtat typing is a procedure which allows the Forest Service to identify some factors limting fish production This process has been completed on Canyon Creek, the North Fork Tnnity fiver, and wlthin most of the critical spring-run chinook and summer steelhead adult holding areas in the South Fork Trinity River The USFWS is in the process of completing its analysis of the New River Nearly all major anadromous fish streams tributary to the South Fork Trinity River have been habitat typed within the last *two* years No habitat typing is being planned for the mainstem Trinity fiver because of its size and complexity and the large amount of private land involved

Additionally, the Forest Service has conducted or coordinated an inventory of major anadromous fish watersheds wrthin the Trinity River basin These watersheds were inventoried to identrfy existing and potential problem areas

Enhancement. The anadromous fish habitat improvement program in the South Fork Trinity River is designed to assist in the recovery of the winter-run steelhead However, improved spawning and rearing condrtions in restored nursery streams would also be of benefit to summer steelhead

Stream habrtat improvement projects for salmon and steelhead have been implemented in the mainstem Trinity River, Rush Creek, Browns Creek, and within the South Fork Trinity River and several of its tributaries

The spectrum of habitat improvement projects for the anadromous fish population includes watershed rehabilitation, barrier removal, installing instream structures to modify channel morphology and increase suitable fish habitat, planting riparian vegetation to increase streambank cover and canopy over a stream, and stabilizing landslide toes to reduce fine sediment delivery to stream channels

Economics. The demand for anadromous fish, from commercial and sport fisheries, is greater than the supply

In the 1950s, the following spawning escapement to the Trinity River Basin was estimated chinook salmon (90,000) and steelhead (50,000) In 1983, the USFWS estimated the natural spawning escapement at 4,200 spring chinook and 19,400 steelhead

Escapement goals for the mqor anadromous species in the Trinity River basin have been developed by the DFG They are based on gains anticipated to be achieved with a management program The production goals, as stated in terms of natural adult spawning escapement, are 6,000 spring chinook and 40,000 steelhead

In 1984, a Forest Service evaluation, in cooperation wrth the DFG, identified the potential *of* anadromous fish spawner escapement from the Shasta-Tnnity National Forests as 14,700 spring chinook and 42,300 steelhead. Attainment of Forest Service fishenes management objectives can assist DFG in meeting its production goals

inland Coldwater Fish Assemblage

Management indicators. The rainbow trout was selected as a management indicator for the inland coldwater fish assemblage It was selected because it has the greatest distribution of any of the salmonid fish species on the Forests As such, it can be the species most directly impacted by hydroelectncal developments, logging, road construction, grazing, or mining activities

Concern for protection, maintenance, and enhancement of rainbow trout habrtat comes from land management activities centered near perennial and intermittent streams The rainbow trout is being used to monitor activities which could cause increased sediment loading and water temperatures, reduced water quality and waterflows, blockage to spawning or rearing areas, etc These factors could lead to the demise of important wild :rout populations

Dther Species

Bull Trout. DFG reports that, "In California, the bull trout was native only to the lower McCloud River in northern Shasta and southern Siskiyou counties This population was the southernmost wthin the range of the species and represented California's only native char In the McCloud River, bull trout were limited to the area below Lower Falls [however] it seems likely that major concentrations were located in the area below the present McCloud Reservoir downstream to Baird Hatchery (the latter now nundated by Shasta Lake)"

As authorized under the Calrfornia Endangered Species Act, Section 2050 to 2055, the State of California Fish and Game Commission has listed the bull trout (*Salvelinus confluentus*) as an "endangered" species

The bull trout was designated as an endangered species by the State of California because by the mid 1970's its numbers had declined drastically to the point where none had been reported since 1968. Two bull trout, captured

in 1975. gave hope that the species could effect a recovery However, extensive investigations conducted by the DFG between 1976 and 1987 were unsuccessful in capturing any additional bull trout As such, it appears the bull trout is extirpated from the McCloud River system (Rode, 1988)

There is no precise reason for the demise of the bull trout, but speculation suggests that several cumulative effects, acting in concert, may be responsible Factors leading to the bull trout's decline include inundation of habitat by Shasta Lake backwaters, potential competitors, such as squawfish: elimination of the runs of chinook salmon, which may have deprived the bull trout of enough protein to maintain the population, and the blocking of upstream spawning migrations In addition, the introduction of ecologically similar brown trout may have contributed to the decline (Moyle, 1976)

The DFG has recently introduced a non-native bull trout from Oregon into the McCloud River Basin However, it will take time and a greater distribution before the bull trout can be used as a management indicator of Forest Service activities Since the Oregon bull trout is a newly introduced species on private lands, population monitoring is at the discretion of DFG

Redband Trout. Redband trout consttutes a subspecies *of* rainbow trout native to western North America Originally native to much of the Pacific Northwest, redband trout distnbution has shown a dramatic reduction due to crossbreeding and competition with non-native trout Redband trout now appear as small, isolated, relict populations in a few stream drainages

The redband trout exists on and adjacent to the Shasta-Trinty National Forests in the mainstem McCloud River above the Upper Falls, and in Edson Creek, Moosehead Creek, Sheepheaven Creek, Swamp Creek, Tate Creek, and Trout Creek (Bacon, 1980)

The redband trout is recognized as an "emphasis" fish species by the Shasta-Trinity National Forests An "emphasis" species is one of high public interest and demand The management goal for an "emphasis" species is to maintain or improve habtat capabilty where economically and biologically feasible

The greatest concerns for redband trout streams center on cattle grazing/disturbance, high point source recreational use, and water drafting from streams

A Comprehensive Habitat Management Plan was developed for redband trout cooperatively between the Forest Service and DFG (Bacon, 1980) Management pnorties were established for each of the above-mentioned tnbutary streams to the McCloud River In the action plan, top priority was placed on acquiring private land at Trout Creek, especially land adjacent to the redband trout's essential habitat

The redband trout was not selected as a management indicator because of its low reproductive numbers, its limited instream system distnbution, and the large contingency of pnvate ownership adjacent to known redband trout streams

Rough Sculpin. As authorized under the Calfomia Endangered Species Ad, Section 2050 to 2055, the State of California Fish and Game Commission has listed the rough sculpin (*Cottus aspernmus*) as a "threatened" species

The rough sculpin is biologically rare due to its extremely limited distnbution and low population density within its range It is potentially threatened by habitat degradation in the form of increased shoreline development, changes in land and water use, and the introduction of exotic organisms A major potential threat is the introduction of non-native fishes which could either compete with or prey on this native species The low abundance of rough sculpin wthin some habitats is another source of concern since extirpation from a portion of its range would require a long time for recovery (Ellis, 1988)

Fishenes investigations by BioSystems Analysis, Inc , located rough sculpin in aquatic habtats on pnvate lands and Lassen National Forest administered lands in 1983 and 1984 in the Pit River system These investigations indicated the presence *of* Pit and marbled sculpin, but not the rough sculpin No habitat enhancement or species management plan is being developed for the rough sculpin

Other Trout. Trout species are widely distributed throughout the Shasta-Trinty National Forests Trout waters include low to high gradient streams, low to moderate level reservoirs, and high alpine lakes Self-perpetuating wild trout populations are found within many of these bodies *of* water Existing and suitable trout waters, containing brook and brown trout populations, are maintained and/or supplemented as necessary (i e , high alpine lakes) at the discretion of DFG

Until 1990, little effort had been devoted toward inland coldwater fish in the way of new high tech surveys, studies, research, habtat improvement, or monitoring A more

indepth analysis of the inland trout waters began at that time. However, this effort remains constrained because budgetary monies are predominantly allocated to the anadromous fisheries program in Region 5

The inland coldwater fishery is characterized by three majorgamefishtroutspecies(rainbow, eastern brook, and brown). Kokanee salmon are present in Clair Engle (Trinity) Lake, but they have not been significant contributors to the angler's creel in recent years

Native (or wild) and hatchery trout populations can be found in many streams wlthin the Forests. Hatchery trout are planted to supplement the wild populations in heavily fished waters Shasta and Trinrty Lakes, in particular, receive considerable angler pressure

Outstanding coldwater fisheries are found in the Sacramento, McCloud, and Pit Rivers Eight miles of the McCloud River (below McCloud Reservoir) are classified as a Wild Trout Stream and offer a blue-ribbon fishing experience of National acclaim

The headwater areas of the Trinrty River (above Trinity Lake), the North and South Forks of the Trinrty River and their tributaries, Squaw Creek, and Squaw Valley Creek also support fisheries of regional interest

Habitat. Within the Shasta-Trinrty National Forests there is rainbow trout habitat in 1,900 miles of fishing streams, 38,159 acres of lakes and reservoirs, and in numerous recreational important alpine lakes

Historical information is unavailable to compare present-day inland fish habitat quality and quantity with that of the past or to project accurate trend information A 1988 update on inland fish habitat capabilrty, compiled from stream survey data, indicates that 7 9 percent of the habitat was rated as high qualrty, 63 7 percent moderate quality, and 28 4 percent as low quality

It is illogical to conclude that all streams were once of high quality and that over time they have been degraded to their current levels of production strictly as a result of human-induced impacts It is difficult to judge whether inland coldwater fish habitat is stable or improving. In certain drainages, geological processes limit fish productivrty Unfortunately, these natural processes may have been accelerated or aggravated by people's presence in the drainage Impacts to inland fish habitat have occurred in streams on National Forest lands in the past, but increased public concem and more restrictive protective measures have decreased these impacts in recent years.

On National Forest lands, the long-term trend favors maintaining good quality inland coldwater fish habitat through reduced road construction and timber harvesting activities Management practices are not intended to compromise inland coldwater fish levels but rather to maintain and improve them where necessary and feasible

Undoubtedly, the best protection for wild trout populations exists in waters located wlthin wild and scenic rivers, wildernesses, and late-successional reserves. No mqor land disturbing activities, except for naturally occurring catastrophic events, such as wildfire, will signficantly affect habitat condrtions wlthin a wilderness and wild and scenic river With respect to the inland coldwater fish program, particularly rainbow trout in streams. the protection and maintenance of fish habltat has received greater emphasis than habitat improvement.

The Forest Service is working cooperatively wlth the DFG to achieve its general fisheries management objectives of the Wild Trout Program These objectives are to

1 maintain wild trout populations at levels necessary to provide satisfactory recreational angling opportunrties,

2 maintain and enhance, where possible, the habitat required for optimum wild trout production; and

3 preserve the natural character of the streamside environment

Enhancement. Rainbow trout habitat, like that of the steelhead trout, can respond readily to instream, riparian, and upslope terrestrial improvement and stabilization efforts

The spectrum of habitat improvement opportunrties for inland coldwater fish includes installing instream structures to modify channel morphology and increase suitable fish habitat, fencing streamside areas and planting riparian vegetation to increase streambank cover and canopy over the stream, and stabilizing landslide toes to reduce fine sediment delivery to stream channels

The most recent notable efforts for inland coldwater fish habitat improvement were undertaken on the Mt. Shasta Ranger Distnct to improve inlet spawning streams at high alpine lakes On the McCloud Ranger District efforts have been made to maintain and/or improve redband trout habitat at Trout Creek.

In July, 1986, the Forest Service conducted a stream habitat condition survey in Trout Creek and recom-

mended nparian and instream protection measures to enhance the redband trout population

In July, 1987 fishenes surveyon observed 267 redband trout in Trout Creek and judged the redband trout habrtat for older age fish to be a limiting factor on the stream The surveyors recommended the implementation of a fish habitat improvement program

In May, 1988, McCloud Ranger District personnel prepared a Trout Creek Management Plan for public recreation opportunrties and fish rehabilrtation projects This plan allows for the following actions (I) dispened public camping outside of a 50-foot ripanan management zone with a 14-day stay limit, (2) closes roads causing damage to the riparian habitat, (3) controls livestock grazing, (4) prohibits off-highway vehicle use within meadows and riparian areas, (5) permits water drafting in designated areas only, and (6) calls for the implementation of fish habitat restoration projects to protect the redband trout

In July, 1988, and again in September, 1988, Forest Service personnel completed fish habrtat improvement projects in upper Trout Creek In October 1988, fisheries personnel surveyed Edson, Moosehead, and Trout Creeks for potential habitat improvement and rehabilitation opportunities They identlfied a total of 48 fish habitat improvement projects on these streams In 1989, 40 acres within Trout Creek meadows were fenced off for added protection from random cattle grazing

Economics. AS recreational sportfishing increases in California, high quality stream and lake fishing for trout will be in greater demand Wild trout populations cannot withstand a high degree of angling pressure For inland coldwater fish, where access has been developed, the demand for high quality stream and lake fishing exceeds the supply Where access is restricted, the supply may exceed the demand In selected areas (i e , reservoirs, where angler demand exceeds the natural supply) hatchery reared rainbow trout are stocked at the discretion of DFG

However, current hatchery production will not be able to sustain the consumptive angler needs of the next century DFG personnel predict that State hatcheries. which now produce 6 million pounds of fish annually, will need to supply 9 million pounds of fish annually by the year 2000 and 13 5 million pounds annually by the year 2020 to meet sportkhing demands AS such, wild trout management on National Forest lands needs to be innovative. regulated, and monrtored to ensure a high quality recreational sportfishing experience

Inland Warmwater Fish Assemblage

Management Indicators and Other Species. The largemouth bass was selected as a management indicator for the inland warmwater fish assemblage This will help to evaluate the success of increasing warmwater fish in lakes and reservoin through a shoreline habtat improvement program Other species that can benefrt from this effort include smallmouth bass, bluegill. crappie, and catfish

Habitat. Habrtat capability for warmwater fish in lakes and reservoin on the Shasta-Trinty National Forests totals 11,518 acres

Since 1984, DFG personnel have maintained manzanita brushrows at Shasta Lake wrth the assistance of California Conservation Corps (CCC) crews Two new, large work forces have provided additional depth to the warmwater fish habitat program the Sugar Pine Conservation Camp at Shasta Lake and the Tnnity River Conservation Camp at Trinity Lake

In 1989 and 1990 the Trinity Lake shoreline was habrtat typed as outlined in the "Trinty Reservoir Fisheries Habitat Management Plan" [Phase I/Task 2] The implementation of habitat improvement projects at Tnnity Lake began in 1990 Using the same methodology. habrtat typing was done on Shasta Lake in 1991 Habitat typing was undertaken as a prelude to selecting shoreline srtes for appropriate treatment (habtat improvement)

The Shasta-Trinty National Forests, in cooperation with the DFG. have produced two Warmwater Fish Habtat Management Plans aimed at increasing the largemouth bass production at Shasta and Tnnity Lakes

No long-term monitoring and analysis plans have been developed for Shasta Lake In 1990 DFG personnel began population monitoring at Trinity Lake to estimate relative abundance of target fish species between treated (habitat improved) and untreated (control coves)

The warmwater fish habrtat improvement program at Shasta Lake has involved constructing manzanta brushrows and artificial cover reefs, hydroseeding barley and rye grasses along the shoreline, planting button bush and willow shoots, and limiting oak tree felling The habrtat improvement work at Trinity Lake has included the development of brush cover, log cribs, and the planting of willows

Economics. For inland warmwater fish the demand for large and smallmouth bass exceeds the supply Substantial

habitat modifications are necessary to increase yields so supply can be in balance with demands Other warmwater species are available in greater quantity than present demand.

Management Opportunities

General. Two conservation strategies have emerged as critically essential to the management of salmon and trout resources on National Forest lands These strategies are to conserve whole river systems (holistic watershed management) as well as to protect the most precious segments of these river systems Both strategies are essential to achieve the general goals of conserving biodiversrty and implementing the precepts of the Wild Trout Program Scientists and the Oregon Rivers Council have developed a watershed strategy for meeting these needs They appear in the following order

- protect what remains of the intact headwaters areas,
- protect and ultimately restore the ripanan zones along every river and stream,
- protect and restore flow regimes that will sustain the life of rivers over the long-term

A multi-year schedule of ecosystem management projects, consistent with the land management plan, should take into account the following recommendations

Anadromous Fish Assemblage

- Rebuild the spring-run chinook and summer steelhead populations to levels where special protection is no longer needed
- Further protection could be afforded to summer steelhead populations in Canyon Creek and the North Fork Trinity River by designating these streams as Wild and Scenic Rivers
- Intensify law enforcement efforts, in cooperation with DFG, to assist in curtailing poaching activities on spring-run chinook within the South Fork Tnnity River
- In cooperation with DFG, identify summer steelhead streams that are tributary to the mainstem South Fork Trinity River
- Work cooperatively with DFG and the Tnnity Rver Restoration Program to attain production goals for spring-run chinook and summer steelhead in the South Fork Trinrty River. This can be done by identifying and evaluating opportunities for Interim Artificial Propagation (IAP) within the South Fork Trinity River
- Catalogue structural improvements by stream reach and institute an annual instream structure maintenance program

Inland Coldwater Fish Assemblage

- Develop a lake and stream atlas, with DFG, distinguishing major wild trout waters from hatchery-planted trout waters
- Conduct frequent interagency recreation/fisheries discussions to outline a pattern for growth and development to meet future demands
- Catalogue potential public access areas that can be developed to help meet future recreational sportfishing demands
- Cooperative opportunities need to be identfied and developed with the DFG to improve trout populations in lakes, reservoirs, and streams. Improvement for inland trout in streams would focus predominantly on the Upper Trinity River watershed followed by those in the Upper Sacramento River Opportunities for increased inland trout production, other than the addition of structures, in lakes and reservoirs should be investigated at Shasta Lake, Lewiston Lake, Trinity Lake, and Iron Canyon Reservoir.
- Evaluate dams at the outlets of high alpine lakes (outside of wildernesses) to determine their condition and the need to replace or modify them Many of these dams are flow maintenance dams which release water during periods of low streamflow Each may be important in maintaining a wild trout population below the lake
- Future habitat improvement opportunrties in the major lakes include planting or protecting ripanan vegetation to minimize sedimentation, improving access for management, and regulating water levels or dredging to increase suitability

In cooperation with DFG, designate three watersheds with viable trout populations for long-term fish population and watershed condrtion monitoring

Personnel from the Shasta-Tnnty National Forests are in the process of developing a fisheries/watershed partnership program, with the McCloud School District, for Trout Creek under the auspices of the Adopt-A-Watershed program. This program will provide the opportunity for annual monitoring and restoration activities to stimulate the recovery and promote the health of redband trout and their habitat in Trout Creek.

Acquire specific parcels of private land that contain redband trout populations, especially adjacent to Sheepheaven Creek

Inland Warmwater Fish Assemblage

In conjunction with DFG and other appropriate agencies, evaluate opportunities to increase fish populations through nutrient enrichment, development of sub-impoundments, intensifying pen culture, and manipulating lake drawdown levels

Develop additional sportfishing access areas at Shasta and Tnnty Lakes for use by the full spectrum of recreational anglers

8. Forest Pests

Public Issue

No public issue *specifically* mentions forest pests How-ever, a related issue addresses the use of herbicides That issue is

Should herbicides be **used** to c v t in order to t b t ti ? (Public **Issue #15)**

Vegetation can be considered a forest pest f i t prevents the Forests' land management goals or objectives from being attained The issue of herbicide use to control vegetation is discussed in the Timber Section

Current Management Situation

Forest organisms sometimes interfere with the attainment of the Forests' goals and objectives When these organisms affect planned objectives, they are referred to as forest pests A certain vegetation type may be a pest in one area or situation but may not be a pest where different objectives are being pursued Native organisms that function as pests are established elements of the forest and range ecosystem, and they co-evolve with their habitat These forest pests affect the natural ecological processes and *are* affected by the same processes themselves Non-native organisms can cause substantial changes in ecosystems because native vegetation may have little resistance, and natural biological controls are usually lacking

Pests can affect forest resources in a variety of ways The loss of timber through mortality and growth loss is obvious Pests can also adversely affect wildlife by altering the habtat required for certain groups of organisms Dead trees on a hillside may alter the visual landscape The loss of tree cover and creation of openings in the forest canopy in developed recreation areas can interfere with recreation objectives The actual effect of pest organisms on the Forests' resources is dependent on the management objectives for an area

Populations of some organisms increase to levels at which they are considered pests only on rare occasions For other organisms, the sequence of events leading to their population increase is so unusual that it is difficult to anticipate in advance These events are dealt w t h on a case-by-case basis using the principles of integrated pest management An example of a unique population increase was the western budworm infestation in the vicinity of Trinity Lake This infestation began in 1981 and lasted about six years, it eventually covered over 100,000 acres of timber land in mixed ownership Moderate growth losses and some mortality in smaller trees took place in the Douglas-fir host species. Control of this infestation was initiated in May, 1985 by aerial spraying *Bacillus thuringiensis* on about *90,000* acres, about half of which were on National Forest lands

Certain organisms grow in portions of the Forests at levels which are likely to interfere with some management objectives Preventive measures for these stuations can be included in management prescriptions Several non-native organisms have a high potential to disrupt management activties if they become established. Established methods to exclude these organisms can be incorporated into plans for activities, or areas, which pose a high risk of introduction

Dwarf mistletoes, *Arceuthobium* spp , are a group of parasitic plants that attack most of the confer species on the Forests Individual species are usually specific to a certain host They are widespread in distribution They reduce the vigor of their host which results in reduced growth and ncreased risk of mortality Because of the way they spread, mistletoes can become particularly damaging in stands that are comprised of predominantly one tree species and where both overstory and understory are present They can easily be managed silviculturally, however, it is most advantageous to avoid their establishment or the situations where they can increase

White pine blister rust, caused by *Cronartium ribicola*, is a disease of sugar pine and other five-needled pines It can kill small trees before they reach commercial size or reproduce Blister rust can also result in the top-kill of larger trees and increase their susceptibility to successful bark beetle attack Genetic resistance to this disease has been identified and an active program is ongoing on the Forests to screen and locate resistant individuals As of *1992,* there were two resistant sugar pines identfied on he Forests Once resistance is identified, seed can be collected and propagated during regeneration efforts Other more specialized treatments, such as pruning, may also be used in certain stuations

Black stain root disease, caused by *Leptographium wageneri,* is common in ponderosa pine stands on the McCloud Flats The disease pnmarily attacks trees at least 40 years old Silvicultural systems, which reduce the proportion of ponderosa pine in a stand and favor other tree species, have shown some promise in reducing the local impact of he disease

Annosum root disease is widespread in the eastside pine stands on the Forests All species of conifers are susceptible to the disease, but white and red fir are especially prone to substantial root decay Disease centers are initiated when a spore of the fungus *Heterobasidion annosum* infects the stump of a freshly cut pine Once established. the fungus grows through root systems and mortality centers develop Centers may persist for decades and eventually occupy up to one tenth acre or more Intiation of disease centers can be prevented by treating pine stumps when trees are cut Annosum root disease also causes concern in developed recreation areas because of tree mortality and hazard to recreationists from the failure of root-decayed trees Treating conifer stumps can prevent infection in recreation areas

High stocking levels are a contributing factor to confer mortality When the stress from heavy stocking and competing vegetation is combined with an addtional stress such as the drought of 1975-77, or the dry period from 1989-91, the amount of annual mortality can increase several times In areas where it is consistent with other management objectives, thinning or releasing stands can reduce mortality

Pines are a signficant component of the mixed conifer and eastside pine types and are important in other areas of the Forests as well Pine slash created during management activties can be used by pine engravers. *Ips* spp for breeding This can resutt in some mortality or top-killing of residual trees In areas where the loss of residual trees would conflict with management objectives, the timing of activties and subsequent treatment of slash can reduce the probability of mortality

The gypsy moth is a non-native insect which has not been permanently established in California It has been eradicated several times from Calfornia, and there have been infestations in Oregon, Idaho and Utah The primary means of spread is by egg masses or pupae transported on outdoor furnture or recreational vehicles Feeding by the gypsy moth causes defoliation, and in some cases mortality, of a wide vanety of host trees and shrubs Most resources would be impacted by an infestation Early detection by pheromone trapping makes it possible to attempt eradication when the infestation is still small enough for treatment to be effective

Port-Orford-cedar root disease, caused by *Phytophthora lateralis*, is a non-native disease first observed in natural stands of Port-Orford-cedar in southwestern Oregon dunng the 1950s In Calfornia, the disease is currently present only in the Smth River drainage on the Six Rivers National Forest There is no evidence that the fungus, which is soil-borne and spread by water or soil movement, has spread to the Shasta-Trinrty National Forests Port-Orford-cedar trees of all sizes and ages are susceptible to the disease Management strategies focus on preventing introduction of the fungus into uninfested areas The Interregional Port-Orford-cedar Action Plan, approved in June 1988 by the Regional Forester, will continue to be followed This includes inventory and mapping, research, public education and management

Pocket gophers, *Thomomys* spp , can adversely affect regeneration efforts on many parts of the Forests They are most common in the eastside pine type on the McCloud District and in the higher elevation white and red fir types Avariety of measures have been taken to reduce their population, including habitat manipulation, trapping, and poisoning

Management Opportunities

The Forest Service has been directed to implement an integrated pest management (IPM) approach when dealing with forest pests IPM is a process that integrates pest information with resource management considerations to achieve goals and objectives as part of the NEPA decision-making requirements This process has been broken down into a series of steps (1) prevention, (2) detection, (3) evaluation, (4) suppression, and (5) monitoring Coordination with other agencies, such as the California Department of Forestry and Fire Protection (CDF), is part of an IPM effort in some stuations

Prevention is a major element of IPM This involves avoiding the impact of pests before they occur Prevention includes regulatory measures, cultural measures, and the use of genetically resistant stock

Detection. or the early discovery of potential pests. is critical to successfully preventing damage The adverse *effects* of many pest organisms can be reduced quickly and easily if detected in their incipient stages Also, more options are often available for reducing their damage when discoveries are made early

The evaluation process involves the gathering and interpretation of information about the pest stuation in order to develop possible alternatives to meet management goals and objectives This includes biological, environmental, and economic information

Suppression activities are directed at reducing pest-related damage to acceptable levels The techniques to achieve

this can include, either singly or in combination, silvicultural, mechanical, chemical, and biological methods. A full range of methods, as well as "no action," is considered for each situation. The preferred course of action is selected on the basis of the ability to attain management objectives, biological effectiveness, cost efficiency, and human health and environmental safety The activities and techniques used are determined during the decision-making process and are tailored to the specific situation, including pest, host, and management objectives

Monitoring has two phases in IPM First is the need to determine if any suppression activity met the intended objective. In the broader context, monitoring also needs to be done to determine if the IPM process is adequate and if management goals and objectives are being met regardless of what activity, if any, was undertaken

Forest pest management goals should be directed toward reducing pest-related losses to levels commensurate with management goals and objectives Climatic conditions favorable to pest outbreaks will likely occur in the future However, the magnitude of the losses due to these outbreaks will depend, in part, on the effectiveness of mitigating actions to maintain tree vigor and health so that these destructive impacts are reduced

9. Geology

Public Issue

No public issue was raised which specifically focuses on geology

Current Management Situation

Personnel on the Shasta-Tnnty National Forests have nearly completed athird-order Geologic Resource Inventory (GRI) which contains maps at a scale of I 24,000 These maps detail the seismic hazards, volcanic hazards, avalanche hazards, groundwater resources, geomorphic features, and bedrock geology elements on the Forests Current emphasis is on performingsecond-order geologic inventories while participating in Ecological Unt Inventories

No slope stabilty hazard element has been completed for the entire Forests, however, ageneral one was completed for areas which have the greatest slope stability hazards This inventory was incorporated into the Planning Data Base for Land Management Planning Documentation of the GRI is in progress In addtion. the US Geological Survey (USGS) has compiled an inventory of Known Geothermal Resource Areas (KGRAs)

The Shasta-Trinty National Forests cover a broad expanse of land with a widely diverse and complicated geology The majority of the Tnnty Forest is underlain by a portion of the Klamath Mountain physiographic province. This province has been divided into four belts which are separated by northwesttrendingfaults The Trinty Forest covers portions ofthe eastern, central, and both western belts The west and southwestern portions of the Shasta National Forest are underlain by the eastern belt of the Klamath Mountains province

Rocks of the Klamath Mountains province range in age from the Ordovician Period through the Jurassic Period, or 500 million years to 135 million years ago Rock types within this province include sedimentary and volcanic, both ofwhich are highly metamorphosed locally Intrusive rocks range from ultra-mafic to grantic

The western and southwestern side of the Trinrty Forest is underlain by the Franciscan Complex of the Coast Ranges which is Cretaceous in age (65 to I35 million yean ago) and isgenerallycomposed ofmetasedimentary rocks The southeastern edge ofthe Trinity Forest is underlain by the Great Valley Sequence which is a thick sequence of sedimentary rocks of Late Jurassic to Cretaceous age (I45 to 65 million years ago) (See **Figure 111-3)**

The northeast portion of the Shasta National Forest is underlaid by volcanic rocks of the Cascade Range and Modoc Plateau These volcanic rocks are generally younger than **4** million years old The Medicine Lake volcano and Mt Shasta are located wthin the northeastern portion of the Shasta National Forest Both volcanoes are considered active

Geologic Hazards

Four types of geologic hazards exist on the Forests volcanic, seismic, snow avalanche, and slope stabilty The identfication of geologically hazardous areas is important so that appropriate management direction can be formulated for land use in these areas

Volcanic Hazards

Volcanic hazards are quite widespread on the Shasta National Forest Three major active areas have been identified, however, many addtional recent cinder cones and lava flows are dispersed about the Forest Mt Shasta and the Medicine Lake Highlands lie in the north central and northeastern portions, respectively, of the Shasta National Forest Mt Lassen, the third major volcanic center, lies 50 miles south ofthe Forest

a Mt Shasta is a stratovolcano which was formed wthin the last 100,000 years during four cone building periods Extensive lava flows and pyroclastic flows originated predominantly at the central vents The lower flanks of the volcano consist mostly of a broad apron of coalescent fans of pyroclastic, mudflow, ash, and fluvial deposits It is believed to have last erupted in 1786

The volcanic hazards of Mt Shasta have been well documented (C Dan Miller, 1980) with areas subject to volcanic hazards zoned according to hazard level Three types of hazards were recognized (I) lava flows, (2) pyroclastic flows and mudflows, and (3) air fall tephra In addtion, recent studies have identded a large depost of volcanic rocks which extend 30 miles north ofthe summit These were deposrted by a large lateral blast or landslide from an ancestoral volcano The communities of Mt Shasta, Weed, and McCloud all lie directly on the flanks of the volcano and are likely to be affected infrequently by lavaflows However, all

SHASTA-TRINITY NATIONAL FORESTS

GEOLOGIC PROVINCES

LEGEND

PROVINCE		PROVINCE	SUBPROVINCE	
CR	Coastal Range	KL	Klamath	
GV	Great Valley		wj	Western Jurassic
C	Cascade		wp	Western Paleozoic
MP	Modoc Plateau		cm	Central Metamorphic
			e	Eastern Belt
			im	Ironside Mountain

Figure III-3

of these communities lie within an area likely to be affected by pyroclastic flows and mudflows Historically, wind currents tend to be from the southwest, so that in the event of a tephra eruption, ash would likely be carried northeastward, away from local population centers

b The Medicine Lake Highland is a broad shield volcano which has a large caldera at its summit and over 100 smaller lava cones and cinder cones on its flanks The volcano developed over a penod of 1,000,000 years, mainly through lava flows. The most recent activity was approximately 500 years ago when a large tephra eruption was followed by an extrusion of obsidian Volcanic activity will persist in the future Local lava flows can be expected, and there is a potential for great tephra eruptions Fortunately, the Highlands are somewhat remote, so activities of a volcanic nature would not directly impact any communities.

c Mt Lassen is a cluster of dacitic domes and vents which have evolved over the past 250,000 years The most recent eruption, in 1914, began as a tephra eruption, with steam blasts, and climaxed with a lateral blast, hot avalanches, and mudflows Some ash was carried to the east Future eruptions could result in wind-carried tephra to the north, toward the Forest, but it is more likely that it would be carried to the east

These three main centers of volcanic activity have been shown to be recently active Of equal concern, however, are all the smaller cinder cones that dot the landscape in the north and eastern portions of the Shasta National Forest. These are considered dormant However, if re-activated, their hazards, although less widespread. could be devastating

Seismic Hazards

Seismic hazards consist of the effects of ground shaking and surface rupture along and around the trace of an active fault. Seismic hazard areas appear to be very limited within the Forests Earthquakes of Richter magnitude 4 5 and 3 7 occurred in 1978 and 1981, respectively. in the Stephens Pass area in the northern portion of the McCloud District. Both resulted in surface rupture along the fault trace and moderate shaking in the town of Tennant

Minor tremors have been recorded all across the Shasta National Forest, and many surface traces of faults are evident, especially in the northeastern portion Some of these faults are believed to be active Many areas of the Tnnity Forest are prone to seismically-induced landsliding due to rapid ground acceleration from local and coastal seismic activity Surface traces of relatively recent faulting are minor on the Trinity Forest, with most seismic shaking induced by relatively deep seismic events No Alquist-Priolo Special Fault Study Zones are recognized within the Forests

Avalanche Hazards

Avalanche hazards are extensive in steep, high elevation, alpine areas within the Forests These areas are generally above treeline or in sparsely vegetated areas. Key avalanche areas on the Forests include the Tnnity Alps, the Tnnity Divide, and Mt Shasta Other than Mt Shasta, these areas are not highly used by winter recreationists due to poor access

Slope Stability Hazards

Slope stability hazards consist of active landslides and dormant landslides which have the potential for activation Slope stability hazards are found on every Ranger Distnct but are more common within the western portion of the Klamath Mountains and Coast Ranges on the Trinity Forest Major unstable areas include the South Fork Tnnity watershed, the steep canyon lands along the main fork of the Tnnity River, lands on the west side of Clair Engle (Trinity) Lake and canyon lands along the upper Sacramento and Pit Rivers In addition. valley inner gorges, which are those over steepened slopes adjacent to stream courses, are highly unstable. These inner gorges, formed through mass wasting in response to channel downcutting and streambank undercutting. occur commonly throughout the Forests

Valley inner gorges, active landslides, and other highly unstable lands have been removed from the suitable timber base These areas are unsuitable for regeneration timber harvest activtties This is because management activities contribute to the nsk of landslide activation and resultant water quality degradation

Groundwater Resources

Groundwater resources are relatively plentrful on the Forests although the geologic systems which control their occurrences, quantity, and quality are quite vaned and not well defined Economics or land ownership often interfere with the development of the resource, especially in areas of isolated National Forest lands or steep topography Based on numerous groundwater siting investigations, no regional aquifers are present in the Forests

Groundwater infiltrates through local bedrock fracture systems and concentrates along large fractures and faults. These fracture aquifers extend up to several miles across the landscape but do not appear to link to "regional" aquifer systems. There are over 80 developed system wells on the Forests having an output of about 1.8 acre-feet/day (657 acre-feet/year).

10. Heritage Resources

Public Issue

One public issue relates to heritage resources

How should the Forests effectively provide identification, protection, and interpretation of archaeological, historical, and religious sites? (Public Issue #1)

Discussion of Public Issue

How the Forest Service manages heritage resources is a concern with several publics, including the Native American community, the State Historic Preservation office (SHPO), and professional archaeologists and anthropologists Native American communities have raised several questions including (1) how is the Forest Service protecting its religious places? (2) should archaeologists be allowed to disturb burials in prehistoric Indian sites? and (3) will sacred objects and skeletons, excavated from Federal lands, be returned to them?

The SHPO has expressed concerns that the Forest Service does not fully comply with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR 800 The SHPOs concerns include such things as failing to adequately inventory undertakings such as timber sales, failing to evaluate heritage resources for the National Register of Historic Places, and failing to include Native Americans as "interested parties" in the formal consultation process

The professional community, including archaeologists, anthropologists, and historians, has an interest in how heritage resources are conserved on the National Forests in California They have expressed the following concerns not enough historic properties are being nominated to the National Register of Historic Places, historic buildings, such as lookouts, need to be preserved, archaeological sites are being looted at an alarming rate: and archaeological sites continue to be disturbed by project activities regardless of the protection methods used

Current Management Situation

In assessing the present management situation for the Forest Plan, Shasta-Trinity National Forests' personnel awarded contracts to several professional anthropologists and archaeologists (Bauman, 1981, Martin and Hodder, 1981, Theodoratus Cultural Research, 1981, and Theodoratus Cultural Research, 1984) These individuals prepared overviews concerning history, Native American religious places and uses, prehistoric archaeology, ethnography, and Native American languages The completed documents present a comprehensive picture of culture history, land use, and current ethnic and professional concerns

Information has also been solicited from people associated with local historical societies (Shasta, Siskiyou, and Trinity Counties). academic institutions (Shasta College and California State University at Chico), the SHPO, and the Native American community

As of 1990, several hundred thousand acres of the Forests had been surveyed for heritage resources, and about 2,650 historic and prehistoric heritage resources had been recorded Most of those inventories have been conducted for timber sales, other areas (e g , wildernesses) have been inventoried to a much lesser extent Less than half of the recorded heritage resources have been formally evaluated for the National Register of Historic Places, and about 500 have formally been determined to be eligible. in consultation with the SHPO In addition to the recorded historic and archaeological sites, several ethnographic studies have identified thousands of Indian "placenames" within the Shasta-Trinity National Forests However, many of these cannot be physically located with any degree of precision

The inventory and evaluation of heritage resources has been guided by two research orientations that have been termed "cultural ecology" and 'the direct historical approach" The former is concerned with how societies. through time and space, have used culture to adapt to changing or static environments The latter involves studying the history of a particular ethnographic group, such as the Wintu of the Redding area, by using the written historical record to interpret archaeological remains Both approaches seem particularly appropriate to the Shasta-Trinity National Forests, since there is a diverse and well documented ethnographic record and multiplicity of environments that must have fostered variable adaptive responses The two-fold research orientation revolves around the subject of land-uses and requires detailed chronological and environmental data, as well as a thorough understanding of prehistoric technologies

The California Inventory of Historic Resources (State Plan), 1976, listed nine themes for the State The various sites recorded in the Forests so far are representative of

all these themes (e.g , Aboriginal, Architecture, Government, etc) The Califomia inventory lists several places in or immediately adjacent to the Forests: Bass Hill, Battle Rock, Lake Britton Archaeological District, Southerns Stage Station (Shasta County); Strawberry Valley Stage Station (Siskiyou County), International Organization of Odd Fellows (IOOF) Hall, Comet Lodge No 84 (Trinity Center), La Grange Mine (Trinity County), and Weaverville Historic District (Trinity County)

The historic overview prepared for the Forests identified a number of the themes which highlight seven of the last 150 years The earliest theme identded was exploration, beginning in the 1830s The first explorers were fur trappers During the 1840s, several military expedrtions, such as that of John C Fremont, passed through the Forests Beginning in 1848, wrth the discovery of gold by PB Reading, Shasta and Trinity Counties witnessed the first signficant population influx As gold mining expanded, other historic themes became important, such as commerce, transportation, and homesteading

By the 1870s, trails, stage routes, and wagon roads were established throughout much of the Forests. These early endeavors culminated in 1887 with the completion of the Central Pacific Railroad linking Oregon with Calfornia The completion of the railroad and other transportation routes set the stage for several other historic themes that characterized the next few decades lumbering, recreation, and mining The construction of the railroad created a demand for wood products, as well as a haul route to larger markets, thus stimulating production even more

Early recreational use in the Forests was associated predominately with resorts, typified by those along the Upper Sacramento River Mining activities continued off and on dunng the last decade of the 19th century They reached a peak between 1895 and 1920 with the development of copper mines and smelters in the vicinity of present-day Shasta Lake When the Shasta and Trinity National Forests were created (in 1905 and 1907, respectively). the present era of Forest Service multiple-use management began

Within the general area of the Forests there are several California Indian groups including the Wintu, Chimariko, Achumawi, Yana, Hoopa, and several Shastan peoples At the time of initial contact, each group spoke a different language, while at the same time sharing certain cultural features For instance, all were hunters-gatherers, lacking agriculture, and all practiced some form of seasonal movement

Principal winter villages were situated adjacent to mqor watercourses, such as the McCloud and Trinity kvers Several cultural practices that were important historically affect Forest Service management concerns today, Of particular concern are places or activities associated wrth religious practices As mentioned previously, a contract report prepared by Theodoratus Cultural Research deals with this issue in detail.

Interest in local Native Amencan culture has continued unabated for over a century The various overviews previously cited discuss the histoty of ethnographic research Archaeological research began more recently, with studies of caves around Shasta Lake (i.e , Samwel and Potter Caves). Reservoir projects were the pnmary impetus for archaeological work between the 1940s and 1960s

In the 1970s, several programs were established that significantly increased the scope of archaeological work within the Forests' zone of influence. Projects begun by the Forest Service and the US Bureau of Land Management (BLM) included inventory, evaluation, research, and enhancement of heritage resources These activities, started because of new legal mandates for Federal agencies, had the effect of dramatically increasing the number of known archaeological sites Also in the 1970s, Shasta College, under the direction of Ed Clewett, conducted archaeological investigations at a number of sites in Shasta County, most notably the Squaw Creek srte near Shasta Lake

While knowledge of prehistory in this area is still limited, enough is known to suggest a broad outline of developments It appears that the local area was initially populated some 7,000 or 8,000 years ago by people with a fairly sophisticated stone technology and a hunter-gatherer economy Evidence of these early cultures is rather scarce, but over the next several thousand years most areas throughout the Forests appear to have been inhabited, at least seasonally During the last 2,000 years, there is reason to believe that important changes took place in hunting and food processing technologies, in patterns of settlement, and in ethnic distributions

During the past several years, there has been an increased use of herrtage resources and associated records by outside parties Archaeological excavations have been carried out on National Forest lands by various organizations including academic institutions and private consulting firms This work has been sponsored by the Forest Service, as well as the California Department of Transportation CALTRANS) and Santa Fe Pacific Timber Company. Other agencies, such as the US Bureau of Reclamation,

Pacific Gas and Electric Company, and various private consulting firms have sponsored inventories of National Forest lands These types of activities and passage of the Archaeological Resource Protection Act of *1979* (Public Law *96-95)* require increased consultation with local Native American groups to insure that their heritage concerns are adequately considered Publication of the Uniform Regulations (36 CFR *296)* for Public Law 96-95 also requires determination of which heritage resources are or are not of "archaeological interest"

Management Opportunities

Probably the most pressing and recurring problem with heritage resource management has been assessing the value of such properties. Future management strategies should include having this information available for decision makers It is expected that actions being taken by the State of California (Office of Historic Preservation) and the Pacific Southwest Regional Office of the Forest Service. to prepare schematic designs and update the State Historic Preservation Plan, will provide some useful guidance for assessing values Additionally, the conscientious use and updating of the overviews mentioned above will provide a useful reference

The management of historic sites, particularly standing structures, will require special attention. Direction for those sites should comply with the Secretary of the Interior's "Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings" (revised 1983) A recently signed Programmatic Memorandum of Agreement (State Historic Preservation Office, Forest Service. and Advisory Council of Historic Preservation) for fire lookouts and other historic properties also provides direction

Opportunities also exist to increase the Forests' involvement with Native American tribes and spiritual leaders Recent legislation and other actions by the Federal Government will require agencies. such as the Forest Service, to more directly involve Native Americans in their decision-making process The Native American communities in California and elsewhere are also becoming increasingly active in seeing to it that Federal agencies protect areas of religious significance and return items that were excavated without their knowledge

The archaeological and Native American resources of the Shasta-Trinity National Forests have long been of interest to the scientific community In recognition of that interest the Forest signed Participating Agreements with Shasta College and California State University, Chico, in 1988, to cooperate in a long-term program of archaeological exploration Additionally, Forest personnel have signed an agreement with Local Indians for Education, Inc , to develop projects concerning Native American history and culture

II. lands

Public Issues

No public issue specifically addresses lands

Current Management Situation

Landownership. There are a variety of complex landownership patterns within the boundaries of the Shasta-Trinity National Forests This diversity of ownenhip results from disposals of land under a variety of public land and mining laws enacted before and after the Forests' establishment The Timber and Stone Act, Homestead laws, General Mining Laws, grants to schools, and railroad land grants are examples. A large portion *of* the Shasta-Trinity National Forests has a "checkerboard" ownership pattern which is a result of the railroad grants

The complex landownership pattern can diminish the effectiveness and benefits that can be derived from the Forests The intermingled ownership results in increased costs for boundary line establishment and maintenance, the need for right-of-way acquisition, complexity *of* fire protection and general administration, occupancy trespass, a demand for special uses, and increases in complexity of other basic realty management and protection responsibilties.

Conversely, the need to consolidate in areas where the intermingled lands are large tracts of single private owners may not be needed when there are advantages of retaining the mixed ownership pattern, and there is an opportunity to promote better land use ofthe total area through coordinated efforts with the private landowner Simplification ofownership may be ofsecondary importance when considered wth respect to achieving an ownership mix that will maximize overall benefits to the public

There are approximately 631,000 acres of non-Federal ownership within the boundaries of the Shasta-Trinity National Forests This represents about22 percentofthe gross acreage Approximately 20 percent is in large ownerships and 2 percent in small ownerships Management problems include

Large Ownerships:

a. Require a large and expensive landline location program and rights-of-way program, and

b. There have been disagreements over road maintenance responsibilties and standards in using joint road systems

Small Ownerships:

a Preference for privacy substantially increases the difficulty in acquiring needed rights-of-way,

b There may be attempts by residential occupants to eliminate logging trucks from roads crossing their property,

c There may be attempts by landowners to restrict/control forest management practices on adjacent National Forest land,

d Landowners may expect high quality maintenance on National Forest access roads,

e Landowners may desire or need to use adjacent National Forest land for private uses, and

f Inadequate surveys improperly locate private landlines

Land exchange is the principal method for accomplishing landownership adjustments The Forests' land adjustment program is the vehicle used to develop and implement a coordinated program of adjusting ownership patterns to optimize the public benefits and administrative effectiveness of the Forests, consistent with private landowner's needs Land exchange proposals must be mutually agreeable to the Forest Service and the private landowner, neither can force an exchange on the other The land adjustment program has varied from a low *of* 700 acres acquired in 1989 to a high of about 30,000 acres in 1982

The major portion of the Forests' large landownership adjustment program, dunng the past 12 years, has been with Santa Fe Pacific Timber Company (formerly Southern Pacific Land Company) In addition, exchanges with Roseburg Resources Co , John Hancock Mutual Life Insurance Company (successorto Champion International), and Sierra Pacific Industries (successors to Santa Fe Pacific Timber Company) have been completed as well **as** iumerous small exchanges with individual owners

During the Carter Administration, there was a proposalto do an interchange with the Bureau of Land Management (BLM) However, most ofthe lands managed by the BLM are outside of the National Forest boundary, and there is

no authority to acquire these lands At present, there is a land exchange going on with the State of Calrfomia for lands in and around Castle Crags Wilderness and various isolated parcels in the Shasta and Tnnrty National Forests

Non-Recreational Special Uses. The Forests' ownership pattern necessitates that some occupancy and use of National Forest lands be permrtted so that private *or* other public lands can be appropriately developed or used Special use permits are issued, when proper, upon compliance with reasonable conditions for the protection and administration of the National Forests

The issuance of special use permits can affect some management activities on the Forests For example, there may be restrictions on logging or aerial spraying of herbicides near domestic water developments Some problems related to special uses are loss *of* land for other forest uses, erosion or other resource damage from inadequate maintenance. and inadequate funding for proper on-the-ground administration Currently there are about 800 non-recreation permits, half of which are for roads These permits occupy about 3,000 acres of National Forest lands

Withdrawals. Forest lands are withdrawn from mineral entry when they are near roadside zones or administrative. recreation, and power sites Some lands are also withdrawn by Congress or at the US Department of Agriculture level for wildernesses, research natural areas (RNAs), and wild and scenic riven In compliance with Public Law 94-579 (Section 204), each agency level withdrawal is reviewed in conjunction with the Secretary of the US Department of the Interior to determine whether the withdrawal should continue and for how long The law required that the reviews be completed by October 21, 1991 The review has been completed for the Shasta-Trinity National Forests, and recommendations have been submrtted to the BLM Final action by that agency has not yet been taken Currently there are 276 withdrawals that encompass 927,000 acres Of these acres, 920,290 are for wilderness, power, wild and scenic rivers or the Whiskeytown-Shasta-Tnnity National Recreation Area (NRA)

The only significant management problem related to withdrawals concerns power-sites They must be revoked or vacated by the Secretary of the Interior on those lands transferring to pnvate ownenhip through an exchange This has delayed some exchanges because the process usually takes at least two years

Rights-of-way. There is a continuing need to acquire nghts-of-way for all improvements, such as roads and trails, over private or other lands not administered by the Forest Service The acquisition document is usually an easement deed The objective is to acquire rights-of-way adequate for the protection, administration, and utilization of the National Forests or, where necessary, for the use and development of the resources upon which communities within or adjacent to the Forests are dependent Right-of-way acquisition varies from 4 to 30 cases per year, the average is about 15 cases per year

Occupancy Encroachment. A signficant number of occupancy encroachment cases is being discovered in conjunction with the landline program The encroachments vary from minor uses to signficant improvements and/or structures Some encroachments will qualify and can be resolved under the Small Track Act (Public Law 97-465) This Act was passed by Congress on January 12, 1983

Land Line location. There are about 3,100 miles of property line boundary between National Forest administered land and private property Nearly 40 percent of the mileage is surveyed and posted to standard The remaining property lines will be surveyed and posted as funding allows Approximately 150 miles *of* landline have been surveyed annually during the last five years

Transportation and Utility Corridors. Three major corridors have been identified on the Shasta-Tnnrty National Forests

a Interstate 5-Sacramento River Corridor.

b Oregon-California Gas/Power Transmission Intertie Corridor, and the

c Trinity Highway-State Route 299 Comdor

These corridon contain many land uses including pipeline transmission. electrical transmission, railroads, State and Federal highways, and water-oriented recreation No single-purpose use can be identfied within any one corridor

Electronic Sites. Eleven designated multi-user electronic sites make up the existing network on the Forests Each of these sites has the potential for expansion A management requirement for electronic sites is to maintain separation of uses to avoid interference

Illegal Occupancy. There are many illegal occupancies associated with mining claims on the Shasta-Trinrty National Forests Most of these occupancies occur on the Tnnrty side Persons are considered in trespass when they con-

struct and/or use residences or other facilities on mining claims when such facilities are not essential for exploration and development of those claims. They are clearly in trespass when there is no evidence of valuable mineral deposit within the intent of mining laws To be authorized, occupancies must be covered by an approved plan of operations according to the regulations found in 36 CFR 228

Hydroelectric Power. Hydroelectric power is the major energy resource associated with the Forests The Pit River contains five power houses operated by PG&E with a combined maximum capacity of 627 megawatts of power The Bureau of Reclamation operates the Shasta Dam with a maximum capacity of 625 megawatts and Trinity Dam with a maximum capacity of 100 megawatts of power Water from the McCloud Reservoir is diverted to the Pit River operation via Iron Canyon Reservoir Water is also diverted from Trinity Lake to Whiskeytown Lake via the Judge Francis Carr Powerhouse In addition to these large developments, there are four exempted (from FERC licensing) small hydro projects and one licensed small hydro project on the Forests, all west of the I-5 corridor There are four small hydro projects on private land in the Big Bend area east of the 1-5 corridor and south of the Pit River Only three small projects are being considered for development: all of them are on the Trinity side.

Management Opportunities

Large landowners, such as timber companies, are aware of the management and economic benefits resulting from mutually agreeable land exchanges Consequently, there are more opportunities for large exchanges than can be handled in the future There are also many opportunrties for small exchanges with individual landowners

Long-range landownership adjustment planning is needed to supplement management direction in the Forest Plan and to make visible the role of land adjustment actions in support of resource management

The anticipated future outlook is for an increasing number of special use permits as private lands within the Forests' boundary are more intensively developed

About 100 miles of road and 45 miles of trail rights-of-way are still needed for the existing transportation system The mileage will increase slightly until the transportation system is basically completed in about 20 years The existing right-of-way acquisrtion program should be completed in 10 years

Numerous peaks and ridges in the Forests could be used as electronic sites. Seven of these have been identified for expansion of the electronics site network, should the need arise

Opportunities for small hydro development are numerous, especially west of the 1-5 corridor The natural features of the area, such as high gradient streams draining large watersheds, make the Trinity side attractive Other factors such as local environmental concerns, reduced tax breaks, lack of capacity on existing transmission lines, and high construction costs reduce the viability of many opportunities

12. Law Enforcement

Public Issue

No public issue was raised dealing wrth law enforcement

Current Management Situation

Shasta-Trinity National Forests penonnel administer their responsibilities for regulating and protecting National Forest lands under Title 36 of the Code of Federal Regulations (CFRs) and appropriate sections of Titles 16, 18, and 21 of the United States Code

According to the US Constitution the authority and responsibility to protect citizens and their property and the general police power is reserved to the States Except in specific areas, the States have delegated their general police powers to city police departments or local county sheriffs

While the Forest Service does not assume the sheriffs responsibilrties in such matters, it is essential that the Agency continues to provide and enforce 36 CFRs which govern public behavior Specific examples relate to the rights, safety, and enjoyment of other users in full partnership wrth local law enforcement agencies

Although only a small percentage of visitors and users on the Shasta-Trinty National Forests commrt violations, the number of law enforcement incidents is rising steadily due to an increase in the following

a visitors and users,

b conflicts between users

c enclaves of lawlessness on National Forest and adjacent lands,

d users involved in illegal activities: and

e the trend toward increased criminal activity in areas suffering from economic depression or uncertainty

The Shasta-Trinity National Forests have cooperative law enforcement agreements with Shasta, Siskiyou, Tehama, and Trinity Counties The services provided by the Sheriffs of these counties protect recreation users and their property These services are reimbursable under the unsdiction Act of August 10, 1971, (Public Law *92-82)* from National Forest appropriations. The Forests have good working relationships with all four County law enforcement agencies

Shasta-Trinity National Forests' personnel also cooperate routinely with other State and Federal agencies such as the California Department of Fish and Game, Callfornia Highway Patrol, Federal Bureau of Investigation, U.S Marshal's Office, and various drug enforcement agencies

Local law enforcement agencies are small and operate with constrained budgets Incidents and crimes normally associated with urban areas, such as robberies, assaults, burglaries, narcotics trafficking, and cannabis cultivation, occur on the Forests and are increasing This situation leads to limited resources and delayed responses by responsible agencies, which in turn can expose Forest officers and visitors to potential personal risk

Management Opportunities

The time-tested success of the philosophy that all Forest Service employees have law enforcement responsibilities will continue and will be strengthened

The increase in volume and seriousness of law violations and the complexty and diversity of law enforcement situations occurring on the Forests today requires professional law enforcement support This support requires that additional employees be trained and equipped to function in a full law enforcement capacty

13. Minerals

Public Issue

One public issue relates to minerals That issue is

How can mineral development and exploration be encouraged while minimizing adverse impacts to non-mineral surface resources? (Public Issue #8)

Discussion of Public Issue

Mineral development is permitted on all lands not withdrawn from mineral entry These rights are subject to pnor existing rights in wildernesses The United States Mining Laws (30 U.S.C. 21-54) confer a statutory right to enter upon public lands to search for minerals Regulations found at 36 CFR 228 Subpart A set forth the rules and procedures so as to minimize adverse environmental impacts on National Forest resources In particular, part 228 8 sets forth requirements for environmental protection. including reclamation A combination of regulations and standards and guidelines define the bounds for developing the mineral resource They call for operating in an orderly and environmentally sound manner

Current Management Situation

Forest Service policy is to encourage mineral exploration and development The Forest Service integrates the development and use of mineral resources to the fullest extent possible under the laws governing mineral disposal

The prospecting, locating, and development of mineral resources within National Forests is authorized by the Organic Act of June 4, 1897 The Act also allows the Secretary of Agriculture to set rules and regulations in connection with operations authorized by mining laws These regulations, which minimize adverse impacts on the resources or define procedures, can be found in 36 Code of Federal Regulations (CFR) 228 - Subpart A - Locatable Minerals, 36 CFR 228 - Subpart C - Disposal of Mineral Materials, 36 CFR 228-Subpart E-Oil and Gas Resources, and 36 CFR 293.14, Mineral Leases and Mineral Permits (in wildemess).

The delegated authority to manage locatable and leasable mineral resources is retained by the Secretary of the Intenor. More specfically, the Department of the Interior, Bureau of Land Management (BLM), has the major role in issuing and supervising operations on mineral licenses, permits, and leases The principal authorities which relate to the exploration and development of the leasable minerals (i e , oil and gas and geothermal) are (1) The Mineral Lands Leasing Act of 1920, (2) The Mineral Leasing Act for Acquired Lands of 1947, and (3) The Geothermal Steam Act of 1970, as amended Oil and Gas and Geothermal leasing is administered by the BLM through a competitive and non-competitive leasing system

The Federal Onshore Oil and Gas Leasing Reform Act of 1987 authorized the Secretary of Agriculture to develop regulations (36 CFR 228-Subpart E) governing leasing for oil and gas resources, including bonding and reclamation requirements, wthin the National Forest System. This activity was formerly exercised by the BLM These regulations ensure effective compliance wlth applicable environmental protection statutes, as well as meeting the intent of the Leasing Reform Act

Agreements embodied in Memorandums of Understanding between the Secretaries of Agriculture and Interior that share various work processes are found in Forest Service Manual (FSM) 1500, External Relations The authority for the management and disposal of mineral materials including, but not limited to, common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay lies with the Forest Service The detailed authorties and direction for locatable minerals, mineral leasing, and mineral sales are in FSM 2800, Minerals and Geology

Access for mineral exploration and development is generally unrestricted, subject to the mitigation of advene impacts to surface resources Exceptions to unrestricted access are wildernesses, Wild portions of Wild and Scenic Rivers, botanical areas, Research Natural Areas (RNAs), the National Recreation Area (NRA), and areas which are withdrawn from mineral entry Minerals in the NRA are not locatable but they are leasable

Access to wilderness, the NRA, and other lands withdrawn from mineral entry, for mineral related activities, is subject to valid existing rights The type of access xuthorized must be consistent w th proposed use and of a type that will maintain the special character of the area to the extent possible.

Voteworthy minerals in the Forests, based on past and present mining or exploration interest, are gold, limestone, copper, zinc, iron, manganese, chromite, barite, oil and gas, geothermal energy, sodium, and rock aggregate.

Locatable Minerals

Gold. Gold is the primary mineral of interest involved with prospecting and mining on the Forests Average gold prices for the last seven years have ranged between $350 and $450 per troy ounce. Thus, the number of exploration and mining operations has remained relatively stable Since gold deposts on the Forests are not the high volume/low grade deposits amenable to cyanide heap leaching, there has not been the large increase in gold production that has occurred elsewhere in the westem Untted States

There are a large number of small, active placer gold mining operations in the streams flowing through the allwial gold-bearing areas of Shasta and Trinity Counties Many operations use suction dredges to recover the gold from the placer deposts Dredge size varies from 2 to 12 inches in intake diameter, with 3 to 6 inches being the most common Some placer deposts are mined using heavy equipment High investment needs and operating costs are major deterrents to these larger operations

Lode deposts, by contrast, are those containing veins or mineralized zones in consolidated bedrock and not alluvial placer deposts These deposits were historically mined in the Hayfork, Upper Canyon Creek and east and west Shasta massive sulfide Distncts Prospecting, exploration or mining activities continue to occur in these areas as well as the area southwest at Mt Shasta

Desptte inadequate statistics on the subject, it is obvious that gold mining is economically significant in areas of the Shasta-Trinity National Forests The gross retail sales of mining equipment and supporting vehicles amount to many thousands of dollars annually To this may be added the sales of gasoline, spare parts, tires, supplies, and accessories, as well as the repair and maintenance services required

The relatively stable price range of gold should continue to support ongoing mining operations The small dredging operations on the Forests will probably continue at about the same pace

limestone. A 50 to 100 million-ton limestone deposit has been identified southeast of Hayfork There are several other good limestone deposts around Shasta Lake Past interest in the limestone depost near Hayfork indicates that it could be mined for use in sugar processing when market condtions improve The deposit is too far from sugar refineries to be economically competitive wth other limestone sources at this time

Iron. A 30-million-ton iron deposit (34 percent iron) has been identified in the Shasta Unit of the NRA The depostt is on a highly visible point which is seen from Interstate 5, this portion of the lake is heavily used by recreationists No plans have been made to allow for the development of the iron deposit at Shasta Lake

Copper/Zinc/Barite. The east and west Shasta copper/zinc districts extend onto National Forest lands west and south of Shasta Lake A copper deposit has been identified at Bully Hill Barite deposts have been mined near Girard Ridge where the potential for new discoveries still exists No mining activity is anticipated for the known deposts of copper, zinc, and barite because of the current market and economic situation

Manganese/Chromite. Both manganese and chromite ore were mined from the Forests during the two World Wan and the Korean Conflict for the purpose of increasing Federal stockpiles Development of these minerals was heavily subsidized by the Govemment for war purposes, but the deposts are probably subeconomic at the present time The minerals are considered strategic because the United States imports more than 50 per cent of its needs from foreign sources The local deposits could become valuable during National emergencies

Leasable Minerals

Oil and Gas No oil or gas deposits are known to exist in the Forests Young, sedimentary sections, particularly the Hornbrook formation, are prospective source rock for the origination of hydrocarbons Not until one or more exploratory wells are drilled through the thick layer of volcanic and sedimentary rock on the east side of the Shasta Forest will it be known whether the area is a hydrocarbon source

The Federal Onshore Oil and Gas Leasing Reform Act was passed in 1987 Subsequent to this Act, the United States Department of Agriculture, Forest Service, promulgated regulations 36 CFR 228 Subpart E on January 9, 1990 Part 228 102(b), Scheduling Analysis of Available Lands, requires that Forest Supervisors shall develop, in cooperation with the BLM and public input, a schedule for analyzing lands under their jurisdiction that have not been already analyzed for leasing The Forest Supervisors shall revise or make addttions to the schedule at least annually Part 228 102 (c), Leasing Analyses, defines the procedure in detail and states that the analysis shall be conducted in accordance with the requirements of 36 CFR 219 (Forest Land and Resource Management Planning) and/or, as appropriate, through preparation of NEPA documents

Analysis for the development of potential oil and gar deposits on the Forests will be done upon receipt of an application for development and/or as funding is available In either case, the analysis will comply with NEPA requirements

Geothermal Energy. Geothermal energy is the natural heat of the earth captured by means of superheated steam, hot liquid, or hot dry rocks in reservoirs at depths ranging from a few hundred feet to over ten thousand feet This energy is legally specified as a mineral resource The eastern portion of the Forests (Shasta side) is of recent volcanic origin with lava flows, cones, volcanic vents, and hot springs As such, there may be potential for the presence of geothermal resources

The Geothermal Steam Act of 1970 (Public Law 91-581), as amended, authorizes the Secretary of the Interior to issue leases for the exploration, development, and utilization of geothermal resources on National Forest lands

The Shasta-Trinity National Forests have existing geothermal leases in or adjacent to the Glass Mountain Known Geothermal Resource Area (KGRA) located near Medicine Lake *Most* of the KGRA is on the Modoc National Forest All leases in a designated KGRA are issued through a competitive bidding process This designation in itself suggests a high potential for the presence of geothermal resources

Fifty percent of the rental fees, bonus bids, and royalties derived from oil and gas or geothermal leases is placed in the Federal Treasury The other 50 percent is returned to the State Forty percent of the State's share is then dispensed to the County of origin

Sodium. There is an inactive sodium lease on the Trinity Forest The deposit may eventually be mined

In contrast to mineral activities, authorized by the Mining Law of 1872, the leasing of leasable minerals (oil, gas, geothermal, sodium, and hard rock minerals existing on acquired lands or within an NRA), is a discretionary action of the Secretary of Interior The removal of leasable minerals is authorized only by a lease If an application for lease is received, the Forest Service makes a recommendation to the Department of the Interior as to whether a lease should be issued and whether special stipulations should be required Post-lease activities are managed by the BLM through a permit process

Future oil, gas, and geothermal activities are unknown

Common Variety Minerals

Forest personnel have complete . rock aggregate inventory This inventory is a compilation of the location of past and present rock pits, pertinent test information, and estimates on the quantity and qualrty of material available This inventory can be used to assess the availabilrty of rock aggregate throughout the Forests Removal of common variety minerals materials is regulated by 36 CFR *228,* Subpart C by issuance of a mineral materials permit

Based upon historical data in the use of aggregate for various types of surfacing, the Shasta-Trinity National Forests use 60,000 to 75,000 tons of aggregate each year Much of this aggregate comes from sources on land administered by the Forests

Meaningful estimates on the quantrty of earth borrow used on the Forests are impossible to determine. Most earth borrow is used in roadway construction and is balanced to minimize waste between excavation and embankment for each project

The mineral materials involve discretionary actions on the part of the Forest line officers and may be disposed of by free use permit, negotiated sale, or competitive sale These activities are managed by the Forest Service through a permit process

Based on past use and trends, it appears that the Forests will use between 50,000 and 65,000 tons of aggregate per year for the next 10 to 20 years It is anticipated that much of this material will continue to come from sources on National Forest lands

Withdrawals, Mineral Reservations, and Outstanding Rights

Withdrawals from mineral entry are restricted to Wildernesses, developed recreation sites, *RNAs,* Wild portions of the Wild and Scenic Rivers System, the NRA, and administrative sites such as offices and work centers There are 927,000 acres currently withdrawn in all categories Restoration of a withdrawal to mineral entry will be requested when the need for it ceases to exist Mineral activities within withdrawals are subject to valid existing rights obtained prior to date of withdrawal

There is a small amount of acreage of outstanding mineral rights on the Forests with considerable variation in the type of reservation These reservations are considered in the

management of the surface resources on a case-by-case basis

Management Opportunities

Mineral development will be a permitted activty on all prescnptions except Prescription X, Special Area Management, and Prescription XI, Heritage Resource Management The right to develop minerals will continue to be subject to pnor existing nghts in wrthdrawn areas, pnmarily Prescription V, Wilderness Management

Future mineral development depends on having reasonable access to deposits covered by mining claims or leases The Forests' can accommodate this need through approved plans of operation when such plans are required under 36 CFR 228 Miners can use Forest roads the same as other members of the public, subject to the Secretary's rules and regulations

If there are changes in the demand for traditional forest uses, there may be a corresponding increased future need to withdraw certain areas from mineral entry These areas would be withdrawn in order to maintain other public values or to reserve an area for a particular public purpose or program (e g , campgrounds, administrative sites, and RNAs) Such actions reduce the opportunity for mineral development Withdrawal should, therefore, be done carefully on a selective basis and only where the need to protect the public value of the special feature outweighs the potential mineral values foregone

The 1990 RPA target (estimate) for the decade 1990-2001 was 109 plans of operation per year Expectations for the future are for less activity for the following reasons:

The California Wilderness Act of 1984 withdrew 483,618 acres of Shasta-Trinity National Forests land from appropnation or disposrtion under the mining laws and mineral leasing laws The withdrawal mainly affects locatable minerals on the Forests

No new mining claims may be located wrthin wildernesses, and no new ground-disturbing exploration or prospecting activities may be conducted All existing claims wrthin a wilderness must contain a verifiable discovery as of September 28, 1984 If a discovery has not been exposed within the limits of the claim pnor to the wrthdrawal date, the claim is not valid Plans of operation for invalid claims within a Wilderness cannot be approved As such, pnor to approving a plan of operations providing for mineral activities wrthin a Wilderness, a determination will have to be made as to the validty of any claimed rights

About seven plans of operation have been approved each year for mining activities wrthin what is now the Trinity Alps Wilderness These plans are approved only when pnor existing nghts have been determined

Geothermal lease applications have already been filed on all known areas of geothermal potential within the Forests Many of these leases, which were on the slopes of Mt Shasta, have been vacated Few new applications are expected to be processed in future years

14. Range

Public Issues

Two major issues have emerged with regard to range

a. **Is livestock grazing an appropriate use of wilderness? If so, how should conflicts be minimized between livestock use and recreationists? (Public Issue #9)**

b. **How should livestock grazing be managed to minimize degradation of riparian areas? (Public Issue #10)**

Discussion of Public Issues

a. livestock Grazing/Wilderness

There are eight livestock grazing allotments wthin, or partially within, the Trinity Alps Wilderness

Allotments wthin the Trinity Alps Wildemess administered by the Shasta-Trinity National Forests are

- Big Bar Allotment - 30 head from June I to October 31.
- Battle Canyon Allotment - 42 head from July I5 to October I5,
- Trinity River Allotment - Inactive

Allotments partially wtthin the Trinity Alps Wilderness administered by the Klamath are

- Carter Meadow Allotment - 3 I head from July I6 to October I5,
- South Fork Allotment - 32 head from July I6 to October I5,
- Granite Fox Allotment - 36 head from July I6 to October I5,
- Eagle Creek Allotment - 40 head from July I6 to October 15,
- Mill Creek Allotment - 50 head from July I6 to October I5

Livestock grazing on these allotments is a continuation of use that predates the establishment of the Trinity Alps Wilderness

b. livestock Grazing/Riparian Areas.

Within the lands grazed by livestock are many miles of streams and numerous lakes, ponds, spnngs and wet meadows There are about 25,000 acres of ripanan areas wthin the grazing allotments on the Forests Because of the proximity of water, livestock tend to graze in and/or near these riparian areas Wthout proper management, this could result in overgrazing and in a reduction in riparian resources

Current Management Situation

Historically, livestock grazing on public land reached its peak during the late I800s and declined over the next 50 years The decline in permitted stock on public land was largely a result of a reduction in livestock numbers (primarily sheep) to achieve proper stocking rates In addtion. more reliance on family-owned ranching operations led to decreased demand.

About 2,350 head of cattle, 2, I20 sheep, and 45 horses graze under permit on 26 allotments on the Shasta-Trinity National Forests. These figures total 8,245 animal months (AM) (NOTE An AM is one months use and occupancy of the range by one animal) There are five empty grazing allotments on the Forests Twenty-nine permittees are dependent upon the Forests' range resource to complete their ranching operations An addtional 585 AMs of grazing, for I95 cattle, are permitted on seven (five wtthin Wilderness and two outside) allotments administered by the Klamath National Forest Park of these allotments are located within the Shasta-Trinity National Forests This use involves four addtional permittees

There are 245,834 acres of National Forest lands suitable and/or potentially suitable (may need investment-type improvements) for grazing (see Table III-I0). This total includes. transitory range (177,583 acres), primary range (51,521 acres) and secondary range (I6,730 acres) If all the land suttable or potentially surtable for grazing was made available, more than 72,900 *AMs* could be realized This figure consists of 46,390 *AMs* from transitory range, 21,070 from primary range, and *5,460* from secondary range These outputs assume I,000 pounds of forage per

AM, using 50 percent of the current annual growth for plantviabilrty and taking into accountreductions for wildlife forage Such outputs also assume the need for additional investments for water, distribut'on, and other needs

Table Ill-I0 further describes current capabilities and suitabilities of livestock grazing areas on the Shasta-Trinity National Forests Conditions ofthis range vary from poor

Pnmary Range, Acre	7,951	8,524	-	776	5,265	26,536	2,469		51,521
Secondary Range, Acre	690	-	756	1,339	13,945		-		16,730
Transitory Range, Acre							-	177,583	177,583
Total Range/Acre	**8,641**	**8,524**	**756**	**2,115**	**19,210**	**26,536**	**2,469**	**177,583**	**= 245,834**
Estimated Current Forage Productivrty (M Lbs /Acre)**									
Pnmary Range.	3,975	5.144	-	388	2,369	7,961	1,235	-	21,072
Secondary Range	345	-	151	670	6,275				7,441
Transitory Range							-	84,352	84,352
Total Potential Productivity (M lbs./Acre) Estimated AMs* **	4.320	5.144	151	1,058	8,644	7,961	1,235	84,352	= 112,865
Adjusted Potential Productivity **** (M Lbs Acre)									
Adjusted Estimated AMs	2,376	2,829	83	581	4,754	4.378	679	46,393	= 62,073
Potential Forage Productivity Increase (25%) Over adjusted Productivity (M Lbs /Acre) *****									
Primary & Secondary Range	594	707	21	145	1.189	1,095	170	-	= 3,921
Transitory Range							-	11.598	11,598
Total Potential Productivity (M Lbs /Acre) Potential Adjusted AMs	2,970	3,536	104	726	5.942	5,472	849	57.991	= 77.590

* Includes Chaparral, Bitterbrush. Ponderosa pine, Jeffrey pine, and mixed confer

** M Lbs /Acre = 1,000 pounds per acre

*** *AMs* = animal months, total potential productivity from **all** range lands

**** Total potenbal productivity from all suitable range land i e adjustments made for slope, remoteness, wildernesses, distance to water, access, vegetabve quality, and allotments managed by the Klamath National Forest

***** 25 percent productivity increase was calculated for pnmary and secondary ranges only For transition ranges. two adjustments for potential forage productivity were made (1) 75 percent reduction was applied to existing transition range due to intensive timber management practices, and (2) additional productivity amounts were added back in for brush conversion

to good, with 5 percent being poor, 70 percent being fair, and 25 percent being good

Less livestock grazing over the past decade has resulted in improved range land conditions in some areas. Only about one-third of the suitable range land is grazed because of the low demand for livestock grazing in this area

Primary and secondary ranges consist of meadows, glades, and grasslands ranging from open types to open-timber/bunchgrass types on slopes under 40 percent. Most of the latter type occurs on the north-central and northeastern portions of the Shasta National Forest Mt Shasta and McCloud Ranger Districts have significant areas of open park-like grazing lands While some natural encroachment by trees is occurnng, these areas should remain suitable as forage areas for decades to come

Most transitory range exists as a result of recent regeneration cutting or other timber management activities These activities have opened up the overstory tree canopy, allowing the establishment of a forage base of grasses, forbs. and browse

Most of the allotments on the Forests (except Mt Shasta and McCloud) occur predominately on transitional ranges which include some scattered grass/forb openings or parks **A** reduction in the amount of land being managed for timber production will reduce the amount of area in early seral stages (grass/forb/young browse) This, coupled with the in growth of timber stands into areas previously cut, will reduce the overall amount of available/suitable transitory range land

Livestock grazing problems on the Shasta-Trinity include (1) grazing within high use recreation areas and wilderness where there is a potential conflict with recreational and other resource values, and (2) grazing within riparian areas where there is a potential conflict with sensitive plants and other riparian values

The Shasta-Trinity National Forests have had very few predation problems associated with any livestock allotments Over the last ten years, there have been no requests by permittees to bring in or provide for any type of predator control measures Should such problems arise in the future, the Forests would work through the existing process and appropriate agencies to provide for such an effort.

Management Opportunities

It is expected that the demand for Forest range lands will remain at, or decrease slightly from, current levels over the next decade If increased demand for range land should occur, it could be accommodated in some areas by the development of suitable range that would not be in conflict wrth other resource uses Costs of development could be shared between the permittee and the government, thereby increasing the feasibility of such improvements

Most poor and fair range conditions and damaged riparian habrtats can be improved by using management practices such as: shifting or establishing grazing systems, fencing riparian pastures, developing site specific allotment management plans, and combining or changing allotment boundaries

Few opportunities exist for increased or reestablished grazing within the Trinity Alps or Yolla Bolly-Middle Eel Wildernesses

15. Recreation

Public Issues

Three major public issues emerged with regard to recreation

a **How much of the Forests should be open, closed, or restricted to off-highway vehicle (OHV) use? (Public Issue #11)**

b **How should the Forests supply water-oriented recreation facilities and opportunities to meet increasing demand? (Public Issue #12)**

c To **What extent should Mt. Shasta be allocated to prescriptions that would allow or encourage downhill skiing or other management activities that might conflict with the wilderness or cultural resource values in the area? (Public Issue #22)**

Discussion of Public Issues

a **Off-Highway Vehicle Use.** Concerns have been expressed that OHV use can cause damage to soil, water and wildlife resources The use of OHVs has increased while the lands open to this use have decreased In addtion, conflicts can occur between various OHV users and other recreationists

b **Water-oriented Recreation.** There is a state-wide public need for additional water-oriented recreation activities The Forests have the potential to supply most forms of such recreation However, the current supply of support facilties will not meet estimated demand Use conflicts can occur between various types of recreationists

c **Downhill Skiing / Mt. Shasta.** Over the past 15 years, since the demise of the old Mt Shasta Ski Area Many events have occurred that will effect the long term management of Mt Shasta Those events include the creation of the Mt Shasta Wilderness area, and the recogntion of the Cultural and Native American values of Mt Shasta At issue is what kinds of activities should be allowed in the Mt Shasta area and where can they occur

Current Management Situation

The Shasta-Trinity National Forests are recognized nationally for the wide variety of outstanding recreation opportunities they provide Other Federal agencies, State and local governments, and the private sector also share in the type of recreation activties offered

Recreation on the Forests can best be descnbed in terms of supply and demand Supply is the quanttty of recreation facilities or settings available for vistor use. In the case of developed sites, supply is expressed in terms of capacity This is determined by the number of camping units or parking spaces available For dispened recreation, supply is expressed as a mixture of settings that are conducive to various activties The recreation opportuntty spectrum (ROS) is used to descnbe recreation settings offered, they range from pnmitive to rural The recreation setting supply is measured in acres wthin each ROS class

Demand for recreation is more difficult to determine than supply Demand varies according to numerous facton associated with the preferences of recreationists and the settings offered One indication of probable demand, which is easily measured, is recreation use Current and orojected use levels give an estimate of the recreation settings that may be needed in the future

Tab 11-11
Recreation Opportunity Spectrum

ROS Class	Acres	1989 Recreation Use	Potential Capacity (PAOT)*
Primitive (P)	498,776	231,000	12,469
Semi-primitive Non-motorized (SPNM)	25,514	131,500	2,551
Semi-primitive Motorized (SPM)	544,139	696,500	136,034
Roaded Natural (RN)	1,052,498	1,757,100	2,631,245
Rural (R)	620	19 16,500	6,200

* PAOT - People-at-one-time

Recreation Supply

Recreation Opportunity Spectrum (ROS). ROS is a system that inventones National Forest lands for a variety of existing and potential recreation opportunities based on the size, distance from roads, and degree of development of a given area The ROS classes pertinent to the Shasta-Trinrty National Forests are Primitive (P), Semi-primitive Non-motorized (SPNM), Semi-primitive Motorized (SPM), Roaded Natural (RN), and Rural (R) These are defined in the Glossary in Chapter VIII

Inventoried SPNM and SPM categories include the majority of the 306,060 acres (within 29 areas) that were released for non-wilderness resource management under the 1984 California Wilderness Act (Refer to the Wilderness and Roadless Areas Section in this Chapter and to the Recreation Section in Chapter IV)

Current inventoried acres, recreation use, and potential capacity by ROS class are shown in **Table III-II**

Recreation Resource Information System (Infrastructure database). Recreation inventory and use data on the Forests has been collected for over 30 years The advent of the Recreation Information Management (RIM) System in the mid-1960s developed a valuable data system, however, RIM was abandoned in 1987 The Recreation Resource Information System (Infrastructure database) is currently being developed to meet a growing need for inventory and other data needs for the Forest recreation program A strong commitment to better data collection, as well as thorough demand analysis, is needed for future planning updates

Developed Recreation Facilities. Developed sites include campgrounds and picnic areas, observation and interpretive sites, fishing areas, boating and swimming sites, trailheads, recreation residences, marinas and resorts The ROS settings include the semi-primitive (motorized and non-motorized) and roaded settings (roaded natural and rural)

Approximately 1,300 acres are allocated to developed recreation areas on the Forests These include. 81 campgrounds with 1,355 camping units, 20 picnic areas with 127 units, 14 parking areas for boaters, 3 day use swim areas, and 20 resorts and marinas The total capacity of developed recreation facilities, estimated by the number of PAOT multiplied by the season of use (days), is 1, 147,500 PAOT-days

Developed recreation use (1 5 million recreation visitor days [RVDs]) is at 65 percent of the theoretical maximum capacity for developed facilities (2 3 million RVDs) Regional standards state that if a Forest's developed facilities are reporting use greater than 40 percent of the theoretical maximum capacity, demand is exceeding supply Some developed sites on the Forests are overcrowded and many are in poor condition Most of the Forests' campgrounds were designed and constructed 30-50 years ago and are not suited to today's recreational pursuits Recreation budgets have not kept pace wrth facilities maintenance and reconstruction needs It is estimated that 90 percent of the developed recreation facilities on the Forests are operated below standard

Downhill ski facilities were in operation in the ski bowl on Mt Shasta between 1957 and 1978 Studies for possible redevelopment were delayed pending final wilderness allocation of the California Wilderness Act of 1984 *An* environmental statement was completed in 1988 The Record of Decision selected an alternative involving development of downhill skiing on 1,950 acres of National Forest land on Mt Shasta, with the potential to serve 4,800 skiers-at-one-time (SAOT)

A decision on subsequent appeals required the Forest Service to complete a supplemental environmental analysis Following completion of this document in 1990, several lawsurts were filed objecting to redevelopment of downhill skiing A decision by the US District Court on the first issue addressed in court proceedings has directed the 1990 Record of Decision to be subject to administrative review (appeals) A thorough review of the historic significance of Mt Shasta was completed by the Forest Service during 1993 With the concurrence of the State Historic Preservation office (SHPO), the Shasta-Trinrty Forests forwarded an eligibility recommendation for a portion of the Mountain (over 19,000 acres) to the Keeper of the National Register of Historic Places In March 1994, the Keeper issued a decision finding the entire Mountain (approximately 150,000 acres) eligible, based on its Native American traditional cultural values *As* a result of considerable public interest concerning the content and process of the Keeper's decision, an additional public comment period has been announced in the Federal Register New information and comments are being sought by the Keeper's office during a 60-day period Upon completion of the comment notice and disposition process the keeper could issue a revised or reaffirmed decision

Following completion of the Keepers review and decision, and a Forest Service review and evaluation of impacts of the proposed ski area on the historical property, a new Record of Decision may be issued announcing the start of

the administrative review period Following completion ofthe appeal process the original lawsuits may or may not be refiled in the U S Distnct Court

Mt Shasta Ski Park, located on a lower-elevation section of pnvate land, became operational forthe 1985/1986 ski season It has an estimated capacity of 2,000 SAOT

Dispersed Recreation Settings. Dispersed recreation settings include Forest roads and highways, backcountry areas, rivers, lakes, streams and wildernesses The ROS settings include the primitive, semi-primtive (motonzed and non-motorized) and roaded settings

Roaded settings include scenic byways, highways, wild and scenic rivers, lands adjacent to timber harvest areas, and many lakes within the NRA Developed recreation srtes are generally located wthin the roaded settings In addition to the developed srtes, there are opportunities for many kinds of dispersed recreation Because roaded settings are located on relatively gentle terrain with abundant access, most of the total acreage within the setting is usable The Forest has two designated scenic byways and potential for at least three addtional routes

Semi-primitive settings include wild and scenic rivers, large lakes and backcountry areas These settings provide remoteness, challenge, and solitude Some ofthese areas are managed for motorized travel by boat or OHV travel Other areas are managed for non-motorized travel by foot, horseback or mountain bike Location, access, and attractions affect the semi-primrtive areas level of use As with developed sites, some semi-primitive areas are lightly used Other areas attract enough use so that crowding and user conflicts occur In these settings, terrain and trail access may limit the usable area Although total acreage may be high, recreation use might be concentrated along a trail or shoreline Over the past ten years the need to manage dispersed sites has become important in popular areas in order to accommodate more people and maintain a quality experience for all user groups Support facillties, in the form of parking, signs, and sanitation facilties, have been inadequate

Many semi-primitive areas on the Forests have desirable attractions, but use is limited These areas generally lack an identity, adequate signing, or published information Therefore, many potential vistors turn toward more publicized, Congressionally designated areas like NRAs and Wildernesses

The largest and most remote backcountry areas are classified as pnmrtive All ofthe pnmitive ROS settings on the Forests are within Congressionally designated Wildernesses There are five Wildemesses on the Shasta-Tnnty National Forests Castle Crags, Chanchelulla, Mt Shasta, Tnnrty Alps and Yolla Bolly-Middle Eel

The Forests' OHV Plan designates 239, 175 acres to cross-country travel An addtional 1,383,596 acres restrict OHV use to existing roads and trails because of highly erodible soils, steep terrain, critical wildlife habrtat or other resource conflicts About 500,000 acres on the Forests are closed to OHVs, primarily because of wilderness designation

A Draft Statewide OHV Motor Vehicle Recreational Trails Plan has been developed for the State of California Department of Parks and Recreation This plan presents the concept of a statewide OHV trail system that connects use areas to provide opportunities for long distance trail touring Although the State Plan identrfies specrfic route locations, it recognizes that the actual route may vary. Existing OHV trails and low-standard roads can serve as part of the statewide system and provide long distance touring opportunrties There are 4,300 miles of road on the Forests that are ideal for OHV travel Lands designated as semi-primrtive motonzed would be managed to provide a pnmtive recreation experience while maintaining motorized access.

Recreation Demand Current and Projected Use

The Shasta-Tnnity National Forests include 2 12,000 acres of the Whiskeytown-Shasta-Trinty National Recreation Area (NRA) The NRA was established in 1965 by Public Law 89-336. It is one of only 16 NRAs Nationwide Legislation provides that administration of the NRA be camed out under separate management plans These plans are to be reviewed and revised periodically

Recreation use on the Shasta-Tnnty National Forests is extremely high when compared to other National Forests in the United States It ranks among the top 10 in the Nation An estimated 4 1 million recreation vistor days (RVDs) occurred in 1989, this figure does not include 0 7 million RVDs related to hunting and fishing This use is the result ofthe unique and abundant recreation opportunrties which are easily accessible from Interstate 5, the primary north/south transportation corridor for the West Coast 1-5 passes directly through the Shasta Lake Unrt ofthe NRA and in close proximity to the Castle Crags Wilderness and the Mt Shasta Wilderness and Recreation area Between Shasta Lake and Mt Shasta the interstate parallels the upper Sacramento River From I-5, State Highway 299 west provides access to the Trinrty Scenic Byway, the

Trinity Unit of the NRA, the Tnnity Alps Wilderness, and the Trinity Heritage Scenic Byway.

The current (1989) recreation use of 4 1 million RVDs is distributed as follows

Developed Recreation (Public)--15 Percent. This includes campgrounds, group campgrounds, and picnic areas

DevelopedRecreation(Private)--IO Percent. This includes facilities under special use permit, such as resorts, campgrounds and recreation residences

Dispersed Recreation--70 Percent. This includes boating, hiking, car camping, backpacking, pleasure driving, horseback riding, cross-country skiing, snow play, river rafting, mountain biking, and OHV use

Wilderness--5 Percent. This includes hiking, backpacking, horseback riding, camping, mountaineering and rock climbing

Patterns and distnbution of recreation use on the Forests fluctuates during periods of drought

The 1989 RPA document, "*An* Analysis of the Outdoor Recreation and Wilderness Situation in the United States 1989-2040," lists 1 1 activities that are expected to exhibit the greatest growth in the number of recreational trips away from home In order from greatest to least are pleasure walking, pleasure driving, picnicking, stream/lake/ocean swimming, family gatherings, pool swimming, wildlife observation and photography and other outdoor photography, motorboating, bicycle riding and day hiking Of particular interest is the projected growth in demand to the year 2040 for the following water and snow activities 27 percent increase for motorboating and 233 percent increase for downhill skiing The Shasta-Trinity National Forests will play a major role in meeting these increasing recreational demands

Additional private sector demand is expected in the areas of downhill skiing, outfitter guide services, and resorts This increased demand is addressed in various NRA Plans, wilderness plans and other environmental documents Currently, there are over 1,000 recreation special use permits authorized on the Forests These include resorts/marinas, boat docks, houseboats, campgrounds, and recreation residences The majority of these permits are located in the NRA

The demand for use of five existing recreation residence tracts is expected to continue. However, the tracts occupy prime recreation lands adjacent to Shasta Lake and the South Fork Trinity River This situation puts the tracts in direct competition with recreation uses which would serve a greater segment of the public Periodic review of the demand for public use versus existing exclusive uses will be necessary through future use studies

Management Opportunities

An intensive and innovative recreation program is necessary to resolve resource management needs, people management needs, and the competition for diverse but ample recreation opportunities One way to meet this challenge is to emphasize the unique opportunities offered by various geographic theme areas This approach would disperse recreation use throughout the Forests, and would more fully utilize the many recreation opportunities (including interpretation of resource management practices for visitor education) Many of the opportunities listed in the theme areas correspond directly to the growth areas listed in the previously mentioned RPA document In addition, many partnership opportunities exist along the major Forest travel corridors (Interstate 5, State Highways 36, 89, 97, and 299) that could involve cooperative efforts between private businesses and public agencies (County, State and Federal)

Recreation Theme Areas. The conceptual organization of the recreation potential of the Shasta-Trinity National Forests into theme areas presents a framework for *ex*amining management opportunities over the next five decades Twelve geographic recreation theme areas are listed in **Table III-12** These theme areas respond directly to projected recreation demand increases identified in the 1989 USDA Forest Service RPA Assessment The objective is to identify and develop unique recreation experiences and activities offered by each theme area rather than to provide identical activities in all locations

The potential exists, depending on funding levels and visitor demand, to promote some or all of the theme areas to a greater or lesser extent, including developed and/or dispersed support facilities, interpretation and environmental education The potential also exists to identify and promote additional recreation opportunities offered by each theme area but not currently being used

Primary development opportunities would be promoting recreational potential at the rural community interface With sociological studies showing a trend by the American public to favor shorter recreation trips, day trips, and scenic driving tours (all close to community centers) opportunities abound for development of city-to-forest

Table III-12
Recreation Theme Areas

Major Theme	Recreation Opportunities
Rural Community Interface	City-to-Forest hiking and mountain bike trails, developed day use (pocket parks, group sites, daytnps. unique sites), environmental education and interpretive programs, partnerships with local businesses
Trinity Divide & Castle Crags	Dispersed car camping at lakes, high country summer/winter hut system, rock climbing, wilderness and non-wilderness backcountty
Mt Shasta Recreation Area and Wilderness	Visitor Information Center/Conference Center/Elderhostel, interpretation (volcanic, Nabvehencan, reforestation), winter sports, (skiing, snowmobiling), wilderness mountaineenng, scenic dnves
McCloud Rver (upper, reservoir, lower)	Rverside trail hiking, scenic tours, Visitor Information Station, coldwater fishing. developed sites
Mediune Lake Highlands	Volcanic interpretabon, scenic tours/byway mountain biking. snowmobiling, dispersed spelunking. hunbng
Main Fork Tnnty River	Highway access to nver opportunities (kayaking, rafting, recreabonal mining, group camping, river side biking), Trinity Scenic Byway, steelhead and salmon fishing, Visitor Information Stabon
Trinity Alps Wilderness	Wilderness backcounttytravel, wilderness educabon, alpine lake activities (photography, swimming, fishing)
Yolla Bolly & Chanchelulla Wildernesses/Tedoc Mountain	Day trips, unique sites, equestrian use, wlderness backcounttytravel, old growth forest
South Fork Trinity River/Chinquapin	River/forest solitude, fishing, spelunking, trails, old growth forest (environmental educabon, watershed)
Shasta Unit of the NRA	Developed sites. Visitor Information Center, interpretation, handicapped access, low-water access, lakeshore hiking trails, OHV site, cold and warm water fishing, water sports, houseboabng, commercial resorts and mannas. spelunking
Trinlty Unit of the NRA	Developed sites, Visitor Information Stabon, interpretation. handicapped access, low-water access, lakeshore hiking trails, cold and warm water fishing, water sports, houseboabng, commercial resorts and mannas
Scenic Byways	Trinty Heritage Scenic Byway, Mt Shasta Scenic Highway (Eventt Highway). Proposed Mt Shasta Byway, Trinity Scenic Byway (State Highway 299), Proposed Modoc Volcanic Scenic Byway (Proposed State Highway 36 West Scenic Byway) Red Bluff to Pacific Coast

hiking, equestrian and OHV trails. "pocket" parks, and environmental education activities at the communty interface In areas where paved or well-maintained native-surface transportation corridors are located, the opportunrty exists for promoting and interpreting scenic dnving tours, botanizing, and wildlfe viewing. for example, in the Tnnrty Divide and Medicine Lake Highlands areas

16. Riparian Areas

Public Issues

One major public issue focuses on riparian areas

How wide should riparian management zones (RMZs) be and what management activities should be allowed within them? (Public Issue #13)

There are three related issues

a. How should livestock grazing be managed to minimize degradation of riparian areas? (Public Issue #10)

b How should the Forests supply water-oriented recreation facilities and opportunities to meet increasing demand? (Public Issue #12)

c What river segments should be recommended for inclusion in the Federal Wild and Scenic Riven System? (Public Issue #20)

Discussion of Public Issues

Riparian Reserve Areas. Some of the most productive, sensitive, and diverse sites on the Shasta-Trinity National Forests are within riparian areas All aquatic and ripanan ecosystems, floodplains, and wetlands are included within the defined riparian area These areas are adjacent to streams and other bodies of water and include adjoining areas that need special management for the protection of riparian vegetation and streamcourses

Valley inner gorges, the over-steepened slopes immediately adjacent to some streamcourses, are highly sensitive and management activity within them is generally avoided to protect riparian and water resources.

Just as streams flow together to form a connected network of flowing streams and riven, so do the riparian areas adjacent to the streams Aquatic and nparian ecosystems of ephemeral and intermittent streams are also a part of the entire system, even when surface water does not flow in their channels Changes in these ecosystems are reflected in changes in downstream ecosystems over a period of time Protection of ephemeral and intermittent streamcourse riparian areas not only provides protection in place, but also protects the integrity of interconnected downstream nparian areas

Management objectives within riparian areas are directed toward maintenance and improvement of the riparian ecosystem and protection of streamcourses, water quality, and wildlife habitat. Timber management and other non-dependent resource practices are, therefore, not emphasized or not permitted The publication "Water Quality Management for National Forest System Lands in California" includes several Best Management Practices (BMPs) specific to management of riparian areas These BMPs are used for the riparian areas identified in project planning In addition, npanan reserves as identified in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (ROD) are established as protection zones around riparian systems as a component of the Aquatic Conservation Strategy

In order to protect water quality and, subsequently, ripanan areas, one BMP requires that RMZs be defined in terms of boundaries and appropriate management activities RMZs provide a "buffer" between riparian areas and forest management activities The ROD establishes nparian reserve widths from 100 to over 300 feet on both sides of streams and waterbodies or at widths determined through watershed analysis Timber management within a riparian reserve is prohibited, except; where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded nparian conditions, allow salvage and fuelwood cutting if required to attain Aquatic Conservation Strategy objectives, salvage trees only when watershed analysis determines that present and future coarse woody debns needs are met and other Aquatic Conservation Strategy objectives are not advenely affected, apply silvicultural practices for Ripanan Reserves to control stocking, reestablish and mange stands and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives

Related Issues

a Livestock Grazing in Riparian Areas Refer to the discussion of this public issue in the Range Section of this Chapter

b Increasing Demand for Water-Oriented Recreation Refer to the discussion of this public issue in the Recreation Section of this Chapter

c Wild and Scenic River System Refer to the discussion of this public issue in the Wild and Scenic Rivers Section of this Chapter

Current Management Situation

There are about 2,000 miles of perennial streams, 3,500 miles of intermittent streams, and 53,000 acres of lakes and reservoirs within the Forests. for fish-bearing streams riparian areas generally comprise the area within 300 feet of the high water mark For nonfish-bearing perennial streams nparian areas generally comprise the area within 150 feet of the high water mark For constructed ponds, reservoirs, and wetlands greater than I acre riparian areas generally comprise the area within 150 feet of the high water mark For lakes and natural ponds ripanan areas generally comprise 300 feet of the high water mark For seasonally flowing or intermittent streams, wetlands less than I acre, and unstable and potentially unstable areas ripanan areas generally ccmprise the area within 100 feet of the high water mark Using these standard widths the estimated extent of riparian areas on the Forests is approximately 274,308 acres Actual acreage will be mapped during future inventory work and at the project level to ensure full protection These inventories will include information not only on the extent of the nparian area, but also on the conditions within the area This information will be used in planning management activities within riparian areas to benefit the riparian-dependent resources

Existing ripanan area uses include habitat for fish and other aquatic ecosystem life-forms and wildlife habitat, including some life-forms that live exclusively in riparian areas

Inter-related riparian-aquatic ecosystems found within these areas provide important habitat elements for fish species such as cover, temperature control, substrate composrtion, and water quality and quantity

Ripanan areas provide important habrtats for many wildlife species including the California red-legged frog, willow flycatcher, fisher, and bald eagle

Riparian areas and their forested surroundings are a critical link for maintaining wildlrfe species diversrty and abundance Birds use ripanan areas more than the adjacent upland habitat Twenty-five percent of the local mammals are dependent or highly associated with riparian habitat Most amphibians require aquatic or semi-aquatic conditions for reproduction A few reptiles, such as the western pond turtle and aquatic garter snake, require aquatic systems Refer to Appendix G for a list of species highly associated with ripanan and aquatic ecosystems

In addition to providing aquatic and terrestrial habitats, riparian areas are often the focus of water-related recreation uses Some developed recreation sites. such as campgrounds, are within riparian areas Trails for nature study, wildlife viewing, and sightseeing often include riparian areas Other uses are for livestock foraging and watering, water developments for a variety of consumptive and oonconsumptive uses, and production of wood products

Past land management activities have been inconsistent in the application of riparian area resource management Consequently, there is a wide diversrty of ripanan area conditions throughout the Shasta-Tnnrty National Forests An estimated 5% of the total 274,308 acres of riparian areas on the Forests are in a degraded condition and in need of rehabilitation Ripanan areas may adjust to disturbance over time. wrth some vegetation and streamcourse stabilty returning to a nearly undisturbed condition within years or decades

The condrtion of the Forests' riparian areas varies from sites that have never been disturbed, to areas which have already recovered or are in the process of recovering from disturbance Other areas are in need of restoration efforts to help them recover more quickly Only where drastic changes have occurred has there been a long-term loss of riparian area Road construction, recreational developments, large landslides, cattle over-grazing, and mining activities have produced most of these changes

Due to the proximty of over-steepened inner gorge slopes to npanan areas, disturbance of the inner gorge and any associated landslide has devastating effects on the riparian dependent resources Current direction is to manage inner gorge lands as protective zones for riparian areas Riparian areas, including inner gorges, riparian ecosystems, and wet meadows, are identlfied during project-level planning

Management Opportunities

Nearly all of the resources on the Forests are putting an ever-increasing demand on the lands within riparian areas Because of this, there is a need for increased coordination of uses so that the qualrty of the ripanan areas can be maintained Future management opportunities will focus on the maintenance and improvement of nparian ecosystems

Shasta-Trinrty National Forests' personnel use BMPs for the protection of water qualty, as described in the most current version of 'Water Qualty Management for National Forest System Lands in California" These BMPs provide for watershed and ripanan area improvement and

the conduct of land-disturbing activties in a manner that will not result in the pollution of water from nonpoint sources

Improved application and implementation of these BMPs will be necessary in the future to avoid the degradation of nparian resources that has occurred in the past. To that end a Forest Supplement to the BMP Handbook has been developed It describes addtional measures which can be used to protect ripanan habitat and water quality Use of these BMPs will also minimize future conflicts and provide for the protection or enhancement of riparian areas

In addition to BMPs, special management standards and guidelines are directed toward protecting npanan areas and providing additional wildlife habttat benefits These include increased snag densities, dead and down material, overstory cover, and older over-mature timber stands

In addtion, new measures have been prescnbed for riparian ecosystems (refer to Management Prescription IX [Riparian Management]). These measures are meant to address nine specific goals. RMZs are prescribed for all streams, lakes, ponds, reservoirs, and wet areas These RMZs range from 150 to over 300 feet in width for each side, depending on site conditions Site condtions include such things as surface erosion potential, landslide potential, beneficial uses, wildlife habitat values, and stream character Specific standards and guidelines define appropriate practices within and adjacent to RMZs

Implementation of the new npanan ecosystem standards and guidelines will offer greater protection for riparian areas in the future This increased protection, in conjunction with management opportunities emphasizing riparian ecosystem restoration, will result in improved ripanan area condtions throughout the Forests.

17. Soils

Public Issue

No major public issues focus specfically on soils

Current Management Situation

Soils are the basic resource that support or directly influence most, if not all, other resources This support is through soil productivity for wood, forage, or habrtat vegetation Influence is provided by a complex of numerous soil and environmental charactenstics

The soil types on the Shasta-Trinity National Forests range from very low to high in productivity Soil productivrty is defined as the capacity of the soil to produce a plant community or sequence of plant communities under a specfied system of management The facton that influence the productivrty of the soil are soil depth, percent rock fragments, texture, available water-holding capacity, nutrient status, maintenance of the duff layer, mineral toxicity, and pH Other environmental factors are preciprtation, aspect, slope gradient, and elevation

A total of I05 different soil types have been identified in the Shasta-Tnnity National Forests Dubakella, Deadwood, Goulding and Etsel are typical examples of soils that range in timber productivrty from low to unsuitable (50 to less than 20 cubic feet/acre/year) They are very shallow to moderately deep with 40 percent to 90 percent coarse fragments by volume Unsuitable soils and soils of low productivrty comprise about 42 percent of the Forests' land base

Typical examples of soils of moderate timber productivity (50 to 85 cubic feet/acre/year) are Neuns. Speaker, Marpa, and Washougal They are moderately deep to deep with 20 to 60 percent coarse fragments Soils of moderate productivity comprise about 4 I percent of the Forests' land base

Boomer, Hugo, Shasta, and Cohasset are examples of soils of high productivity (more than 85 cubic feet/acre/year) They are deep with coarse fragments with less than 40 percent of the volume Highly productive soils are found on about I7 percent of the Forests' land base

A Soils Resource Inventory (SRI) has been completed for the Shasta-Tnnity National Forests This SRI is an Order 3 (reconnaissance) level survey which is surtable for displaying Forest soils and their general location for broad land management planning This inventory is not intended for project level planning or layout. Soil/Water Resource Specialists in the Forest Supervisor's Office or those on the Ranger Districts provide soil information and management prescriptions They also recommend mitigation measures for project planning

The greatest threat to the maintenance of soil productivity is erosion--both sheet and gully. Almost any soil is subject to erosion if a sufficient amount of surface water flow is present Some soils have a higher propensrty to erode than others Examples of highly erodible soils are' Hotaw, Chawanankee, Chaix, and Oval: they have developed from coarse-grained granitic bedrock

About 195,000 acres on the Shasta-Trinity National Forests have a high to very high erodibility factor Several management tools are used to prevent unacceptable soil loss resulting from management activities These tools include (I) an Interagency Erosion Hazard Rating system for identifying soil erosion hazards, (2) Management Guidelines for granitic soils for controlling management activities, and (3) Soil Quality Standards (SQS) which require the amount and kind of ground cover to be retained for soil protection

Soil productivity cntenawere used extensively in suitability modeling for vanous resource uses **An** example of soil inputs into suitability modeling for timber is shown in Appendix I of the Forest Plan

All the soils on the Forests are capable of maintaining their productivity over time if they are protected from erosion or degradation from logging or site preparation

Management Opportunities

There will be an increased need to manage the soil resource so that the highest yields are realized, while at the same time protecting basic soil productivity

An Ecological Unit Inventory (EUI) is in progress on the Shasta-Trinity National Forests The goal of EUI is to provide land managers with project level maps and data elements that accurately integrate geology, soils, and vegetation into ecological landscape units with management interpretations This provides the basis of Ecosys-

tem Management The survey and coordination is performed by an interdisciplinary team of professionals

The Soil Quality Standards (SQS) are threshold values that are being established to protect soil productivity from significant change or impairment of the soil's productivity capacity through land management practices Long term impairment or soil change can occur in several ways

Compaction results in a loss of porosity which reduces the rate at which water can enter and pass through the soil Compaction influences the ability of tree roots to respire, which, in turn, reduces tree or other vegetative growth Guidelines call for soil porosity to be within *90* percent of its natural condition

Loss of organic matter. The duff layer is the primary source of nutnent replenishment There is a need to improve upon current knowledge of soil behavior in relation to forest management activities Duff and other woody debris provide much of the ground cover necessary to protect the soil from erosion *As* the duff decays, it is carried down into the sutface honzon, forming the dark humus layer Humus has a very high nutrient and water-holding capacity Guidelines call for approximately 50 percent of the disturbed area to be uniformly covered with organic matter

Loss of large, woody material. Large, woody matenal (greater than 16 inches in diameter and 10 feet or longer) provides habitat for microorganisms, insects, and small animals that convert nutrients into usable forms and spread nitrifying bacteria. Guidelines call for 5 to 20 logs, in varying degrees of decomposition, per acre in contact with the soil

Soil erosion. The degree and rapidity with which a soil will erode is dependent on many factors soil texture, structure and rock fragments, the amount of ground cover, and the degree of compaction The guidelines indicate that management activities should be modrfied and enough ground cover maintained to provide for low to moderate erosion hazard ratings

The Forest Service has completed a soil moisture/seedling survival study and a soil fertility study on a variety of plots in Northern and Central California The results of this study will be used to identify opportunities for increasing productivity.

There is a program in place to monitor the implementation and effectiveness of the SQS

18. Special Areas

Public Issue

One public issue is related to Special Areas That issue is

What areas should be recommended for Research Natural Area (RNA) and Special Interest Area (SIA) establishment? (Public Issue #14)

Discussion of Public Issue

Research Natural Areas (RNAs)

Through research National Forest administraton can understand the Forests' resources better, and, consequently, they are able to manage them more appropriately For more than 50 years, the Forest Service has participated in the creation of a RNA system in the United States The first Federally recognized RNA was established on the Coronado National Forest in 1927

The objectives of RNAs include the following

1 To contnbute to the preservation of examples of significant natural ecosystems for purposes of research, education. and maintenance of biological diversity Land use patterns are changing so quickly that some ecosystems may essentially disappear before they can be studied

   RNA targets are identified by vegetation type and physiographic province The majority of the Shasta-Trinty National Forests lie in two physiographic provinces, the Klamath Mountains and the Cascade Range A small percentage of the Forests lies in three other provinces the Modoc Plateau, the Great Valley, and the Coast Range The RNA system is intended to include representative examples of common, widespread vegetation types in each province and unusual or unique types

2 To maintain natural genetic diventy Both ecological and economic stability require conservation of gene pools.

3 Where appropriate, to protect habitats of threatened, endangered, and sensltive plant and animal species for research purposes The life histories and ecological relationships of most of the Forests' rarest plants and animals are still poorly understood, and this hampers effective recovery of these species

4 To provide benchmarks for forest management activities RNAs serve as undisturbed baselines for measuring the *effects* of management practices on similar areas

   RNAs are not recreation areas In fact, recreational use may be incompatible with RNA objectives

Special Interest Areas (SIAs)

The Forest Service is directed by policy to designate special areas with outstanding natural, recreational or cultural values as SIAs Management objectives for SIAs are (1) to protect these outstanding values, and (2) to encourage public use and enjoyment of the areas so long as such use is not detrimental to the values being protected

SIAs may be established for scenic, historical, geological, botanical. zoological, paleontological, or other special charactenstics Recreational developments wlthin SIAs such as trails, sanltary facillties. and picnic grounds are kept to the minimum needed for public enjoyment of the area

Current Management Situation

Research Natural Areas (RNAs)

The Pacific Southwest Region's RNA Committee has identified several gaps in the array of natural habitat types represented in the Calrfomia RNA system In addition. new target types were added in 1990 as a result of a refinement in the classification of non-forested ecosystems A list of RNA targets and their correlation with RNA candidates on the Shasta-Tnnty National Forests is shown in Appendix F

Only one RNA, the Shasta Mud Flow RNA, is established on the Shasta-Trinty National Forests Approximately 3,703 acres (3,115 acres, net) were designated as the Shasta Mud Flow RNA by the Chief of the Forest Service in 1971 This RNA represents young growth Pacific ponderosa pine (Society of Amencan Forester's cover type 245) for the Cascade Physiographic Province and the scientific geologic values of a volcanic mud flow

Fourteen areas have been screened and found to be viable candidates for RNA status Eight of these are designated for establishment by this plan. See **Table III-13**

Following is a brief descnption of the research values for each of those 14 areas

1. Bald Mountain Creek. The Bald Mtn. Creek area was proposed by the Citizens for Better Forestry as a RNA to serve as a completely undisturbed benchmark watershed representative of other adjacent watersheds under timber management The Bald Mtn Creek watershed would be monitored as a control watershed

2. Bear Creek. The Bear Creek area was proposed as a RNA to serve as a monitoring benchmark watershed to determine the effects of management activities on highly erodible granitic soils The Bear Creek watershed would be monitored as a control watershed

3. Cascade. The Cascade area was proposed to meet the requirements for the red fir vegetation type (SAF 207) in the Cascade Range Physiographic Province This area gets heavy recreation use winter and summer, this use is incompatible with RNA objectives

4. Cedar Basin. This area best fulfills the Port-Orford-cedar vegetation type (SAF 231) target within the Klamath Mountains Physiographic Province Other botanic elements represented within this area include the Sierra Nevada mixed confer (SAF 243) and the Darlingtonia bog vegetation types The basin contains excellent examples of inland Port-Orford-cedar in both pure and mixed stands between 5,400 to 6,400 feet

At least two beneficial research objectives could be met (1) because of infestation of many of the coastal Port-Orford-cedar stands by *Phytophtora lateralis* and the possibilty of further spread in the coastal areas, these stands may provide the best opportunities for protection of the species from the fungus, and (2) these stands of Port-Orford-cedar provide additional genetic material for off-site testing to determine relative susceptibility and resistance of individual trees to *P lateralis* The area also includes a large number of plant communities and 11 different species of conifers

5. Devils Rock-Hosselkus The Devils Rock portion of the RNA fulfills the California black oak vegetation type (SAF 246) target within the Klamath Mountains Physiographic Province The oak stands are dense, and there is little diversity of woody shrubs and herbaceous vegetation Most of the California black oak (*Quercus kelloggii*) trees in this area are 40 to 80 years old, although much older monarchs are present The complex geology in this area adds to the ecological-vegetational values

The Hosselkus portion does not specifically meet a terrestrial vegetation target. The area is being proposed primarily for the unique paleontological values found in rich abundance in the limestone formations here Also, it is known that unique edaphic features often give rise to unique biological entities The recent discovery of a previously unknown relict shrub species, the Shasta snow-wreath (*Neviusia cliftonii*), growing in the limestone formation, is an indication of the area's uniqueness and is proof of its value for research opportunities Moreover, the limestone formaticns support several distinctive ecosystems, containing suitable habitat for the Shasta salamander (*Hydromantes shastae*), a sensitive species, and Shasta eupatory (*Eupatorium shastense*), a limestone-dependent plant endemic to the Shasta-Trinity National Forests The area also satisfies secondary vegetation targets for California black oak (SAF 246), Sierra Nevada mixed conifer (SAF 243). and Pacific ponderosa pine/Douglas-fir (SAF 244) types within the Klamath Mountains Physiographic Province The area has been a focal point for paleontologists since 1895

6. Manzanita Creek. Although this area was proposed to meet the RNA target for Pacific ponderosa pine/Douglas-fir (SAF 244) vegetation type for the Klamath Mountains Physiographic Province, its strongest value is its diversity of vegetation types The SAF 244 type is also represented by the proposed Smoky Creek area on the Hayfork District Other target elements represented here include white fir (SAF 211), Pacific Douglas-fir (SAF 229), and Sierra Nevada mixed conifer (SAF 243) vegetation types Past fires in the area have created a high diversity of subclimax plant communities

The proposed RNA boundary encompasses the entire watershed within the Trinity Alps Wilderness Some 4,000 acres of the watershed were disturbed by the Treloar Fire of July, 1985 There is a gauging station available for controlled watershed studies

7. Murphy Glade. The Murphy Glade area was proposed to meet the requirements for the red fir vegetation type (SAF 207) in the Klamath Mountains Physiographic Province Haypress Meadows RNA, proposed by the Klamath National Forest, also fulfills the red fir target for this province

8. Mt. Eddy. The proposed area fulfills the target requirement for foxtail pine for the Klamath Mountains 'hysiographic Province The Mt Eddy foxtail pine popula-:ion covers 240 acres within the proposed RNA The

foxtail pine population in this area is large and healthy and represents an excellent example of this target The need for this target is high No other RNA proposals wrthin this physiographic province contain significant populations of foxtail pine

Deadfall Basin, which was included within an earlier boundary for this RNA, is recommended instead for SIA status because of its existing recreational use Several populations of sensitive plants could be included in this RNA if its boundanes were expanded to the north This land is now in private ownership but will likely be acquired by the Forest Service

9. Preacher Meadows. The area meets the Sierra Nevada mixed confer forest cover type (SAF 243) target for the Klamath Mountains Physiographic Province The need for this target is moderate to high Undisturbed samples of adequate size in commercial timber stands are difficult to locate in the Klamath Mountain Province The darlingtonia bog and the Calfornia lady's-slipper (*Cypripedium californicum*) add to the value of the area

10. Red Butte-Red Fir Ridge. The area meets the RNA requirements for the red fir vegetation type (*SAF* 207) in the Cascade Range Physiographic Province It represents the undisturbed condltions occurnng at the higher elevations of the red fir range A secondary element of the Callfomia mixed subalpine forest (SAF 256) is also found wlthin the area This area is the only one wlthin the Pacific Southwest Province that is being considered to meet the red fir target The RNA is entirely within the Mt Shasta Wildemess. Recreational *use* pnmanly affects Squaw Creek meadows but not the red fir target

11. Rough Gulch. The proposed Rough Gulch RNA area contains a Douglas-fir/giant chinquapin/beargrass community This area appears to be different from the communities within the Pacific Douglas-fir vegetation type (*SAF 229)* represented by the proposed South Fork Mountain

Table III-13

Area	Name	Size (Acres)	Management Area	Ranger Dirtnct
1	Bald Mountain Creek	800	10	McCloud
2	Bear Creek	4,500	17	Hayfork
3	Cascade	2,000	3	Mt Shasta
4.	***Cedar Basin**	1,160	5	Mt Shasta
5.	***Devils Rock-Hosselkur**	5,550	12	Shasta Lake
6.	**'Manzanita Creek**	7,250	4 (Trinity Alps)	Big Bar
7	Murphy Glade	1,260	22	Yolla Bolla
8.	***Mt. Eddy**	*890*	5	Mt Shasta
9.	***Preacher Meadows**	1,850	4 (Trinity **Alps)**	Weaverville
10.	**'Red Butte-Red Fir Ridge**	1,640	4 (Mt Shasta)	McCloud
11.	***Rough Gulch**	*3,960*	20	Hayfork/Yolla Bolla
12.	***Smoky Creek**	*960*	19	Hayfork
13.	South Fork Mountain	1,180	*20*	Yolla Bolla
14.	***Stuart Fork**	1,500	4 (Trinity Alps)	Weaverville
	Total	**34,500**		

* Recommended far RNA establishment

RNA Many of the chinquapins in the Rough Gulch area are in excess of 3 feet diameter at breast height (dbh) and 100 feet or more tall The area would meet the target requirements for the Pacific Douglas-fir vegetation type (SAF 229) for the Klamath Mountains Physiographic Province The area has secondary targets which are representative of the Pacific ponderosa pine/Douglas-fir vegetation type (SAF 244) and the beargrass community The preferred boundary encompasses the entire Rough Gulch watershed, and includes populations of two sensitive plants Umpqua green gentian (*Frasera umpquaensis*) and pale yellow stonecrop (*Sedum laxum* ssp *flavidum*)

12. Smoky Creek. This area was first proposed to meet the RNA target for Pacific ponderosa pine/Douglas-fir (SAF 244) in the Klamath Mountains Physiographic Province However, Jeffrey pine type (SAF 247), also is well-represented here and is an unmet primary target for the RNA network The Pacific ponderosa pine/Douglas-fir type is represented in the proposed Manzanita Creek RNA Therefore, the focus of the proposed Smoky Creek RNA has shifted to encompass the Jeffrey pine that grows on serpentine soil The proposed RNA boundary follows the perimeter of the North Fork Smoky Creek watershed and includes all of the watershed below the Bramlet Road (FS Road 29)

13. South Fork Mountain The area meets the Pacific Douglas-fir vegetation (SAF 229) target for the Klamath Mountains Physiographic Province No sensitive plants are known to grow in this area This target could be satisfied by the establishment of the Rough Gulch RNA descnbed above

14. Stuart Fork. The area appears to meet the targets for montane chaparral for the Klamath Mountains Physiographic Province Good examples of this vegetation type are extremely difficult to fnd in suitable sizes and in an undisturbed state The major drawback with this area is the difficult access Conversely, location of the area wrthin the Trinity Alps Wilderness would maintain the undisturbed conditions found here

Special Interest Areas (SIAs)

There are no established SIAs on the Shasta-Trinity National Forests However, several places on the Forests have attracted public interest because of their special features Examples include limestone caves, waterfalls, volcanic craters, fossil localities, and serpentine plant communities Nineteen areas are being recommended for formal establishment as SIAs Another 22 candidate areas are being considered as potential SIAs Where boundaries are unclear or resource conflicts exist, currently used areas are proposed for SIA evaluation during the Plan period (see Management Opportunities below)

Table III-14 lists the 19 areas recommended for SIA designation Each is described briefly below.

1. Bigelow Meadow. This is a large, intact nparian meadow system adjacent to the McCloud River The meadow lies within the upper McCloud Rver recreation area Wildlife diversty is high

2. Black Butte. This cinder cone is one of the most visible landmarks on the Forests, it lies adjacent to Interstate 5 However, most people driving by probably do not know that it is part of the National Forest system

3. China Mountain. Located along the crest separating the Shasta and Klamath National Forests, this botanical SIA includes both China Mountain and South China Mountain Foxtail pine and whitebark pine communrties, and a large number of rare and sensttive plant species, are its outstanding values Adjacent Klamath National Forest lands are also designated as a SIA

4. Cory Peak. Cory Peak lies at the south end of the China Mountain/Cory Peak crest zone The California Department of Fish and Game (DFG) has identified Cory Peak as a significant natural area because of the presence of the Sierra Nevada red fox and several high elevation serpentine endemic sensrtive plants One of these is the State-listed Tnnty buckwheat (*Eriogonum alpinum*) The Klamath National Forest is also recommending Cory Peak as a SIA

5. Deadfall Basin. The Basin, below the summit of Mt Eddy, features subalpine vegetation on peridotite, plus several sensitive plants The southeastern boundary of this proposed SIA adjoins the Mt Eddy RNA Access is by the PCT/Sisson-Callahan National Recreation Trail The area is used by hikers, campers, and wildflower enthusiasts

6. Deep Crater. This volcano is the largest example of an explosion crater within the Medicine Lake Highlands Funnel-shapes wtth scattered rock "bombs" typify these craters The primary uses are hunting and access to adjacent private lands

7. Giant Crater Lava Tube System. Located within the Giant Crater Lava Flow is the longest lava tube system in the world, it has a lineal length of about 18 miles Giant Crater constitutes the largest subsidence crater wtthin the Medicine Lake Highlands The area has been or is being

studied by the US Geological Survey, NASA, and various universities The primary activity is hunting and access to adjacent private lands

8. Grizzly Peak. This SIA is located at the boundary of Shasta Lake and McCloud Ranger Districts, six air miles north of Iron Canyon Reservoir It features a panoramic view, unusual disjunct subalpine vegetation, and several rare and senstive plants The PCT traverses this SIA

9. Kangaroo Ridge. This area is on the boundary of the Shasta and Klamath National Forests It is identified by the DFG as a significant natural area for its concentration of rare and sensitive plants, including Scott Mountain bedstraw (*Galium serpenticum* ssp *scotticum*) The Klamath National Forest is also recommending this area as a SIA

10. little Glass Mountain. This feature is an example of a type of volcano which was formed by repeated overflows of thick lava from a vent at its summit. It is composed of obsidian and rhyolite interlayered with pumice, it is estimated to be between 500 to 1,000 years old Most of the thick pumice deposrts surrounding this mountain originated from it. The primary activities include mining, hunting. and access for timber production on adjacent lands

11. Natural Bridge. Natural Bridge is the largest limestone bridge on the Shasta-Trinity National Forests Natural Bridge is a limestone formation riddled with caves, it was the site of a 1852 Wintu Indian massacre The primary activities are rock climbing and picnicking

12. Paint Pot Crater. This volcano or cinder cone was formed as a result of the accumulation of red cinder thrown into the air during moderately explosive eruptions about 2,000,000 to 11,000 years ago Portions of the red cinder were later covered by white pumice blown from Little Glass Mountain. thus giving it a distinctive "painted quality The primary activities ***are*** hunting and timber access on adjacent lands

13. Pumice Stone Mountain. This mountain was formed as a result of the accumulation of cinder thrown into the air dunng moderately explosive volcanic eruptions The cinder cone was later covered by a thick mantle of pumice blown from Little Glass Mountain during its eruption Pnmary activities include hunting and access for timber harvesting on adjacent lands

14. Samwel Cave. Overlooking the McCloud Arm of Shasta Lake, Samwel Cave is an extensive series of limestone fissures and openings. The cave was originally researched by paleontologists, producing important late Pleistocene fossils, as well as a few human-made tools The locale also figures prominently in Native American mythology and is considered a sacred area by present-day Wintu Indians The site is being recommended for designation as a National Natural Histonc Landmark (NNHL) under the auspices of the National Park Service

15. Scott Mountain. This proposed SIA is located at the Scott Mountain crest, just west of Highway 3 The DFG recognizes this as a significant natural area because of several Darlingtonia seeps and several serpentine-endemic sensitive plants, including the Klamath manzanita (*Arctostaphylos klamathensis*) The Klamath National Forest is also recommending adjoining land as a botanical SIA

16. Spatter Cones. These miniature "volcanoes" are formed by hot gasses mixed with molten lava which escaped up through a fissure in the earth's surface A row of five of these chimney-like spatter cones is located on the northern limit of the Giant Crater Lava Flow The area is also an archaeological site Primary uses are hunting and access for timber harvesting on adjacent lands,

17. Tedoc Mountain. This peak is part of the largest of several unique tetonic harzburgite blocks on the Yolla Bolla Ranger District. Rock types range from nearly unaltered dunite to highly serpentinized peridotite Consequently, the resident soils and plant communities are unique and diverse The latter are represented by forest, woodland, chaparral, herbaceous and riparian plant associations There are also relatively barren areas here

A number of serpentine endemic plant species are resident, including several classified as sensitive by the Forest Service These botanical features, which characterize the unique geology and soils of the area, constitute the most outstanding special values The primary activities are hunting, road access to adjacent lands, and botanizing

18. Toad Lake. Toad Lake is recognized by the DFG as a signrficant natural area for its lake and wet meadow vegetation on serpentine It is also recognized for its concentration of sensitive plants, including the riparian-dependent showy raillardella (*Raillardella pringlei*) Access is by Forest Service Road 40N64 and the PCT This area gets moderate recreational use

19. Western Azalea. This botanical SIA was recommended by the Citizens for Better Forestry, an environmental organization It is a spring-fed riparian plant community with a showy population of the native western azalea, it is located close to the Bramlet Road

Some of the areas mentioned above may also qualify under the National Park Service's NNHL System.

As previously mentioned, Shasta Mud Flow has been classified as a NNHL. Mt Shasta has overlapping classifications as a Recreation Area, a National Natural Historic Landmark (NNHL), and a Wilderness. Because of its unique multiple values, Mt Shasta is discussed as a separate topic following this section.

Management Opportunities

Research Natural Areas

In addition to the areas listed in Table III-13, Forest personnel will review additional RNA proposals over the next 5-10 years. The Shasta-Trinrty National Forests contain 87 of the elements (ecosystems) that are targeted by the Pacific Southwest Region for investigation, screening, and possible inclusion into the RNA system. Of the 87 elements, 19 are meadow and wetland types, 11 are riparian and bottomland types, 8 are scrub and chaparral types, 1 is a grassland type, 9 are woodland types, 36 are forest types, 2 are alpine types, and 1 is a limestone type.

Forest personnel will consult with the Regional RNA Committee to set priorities for identdication and establishment of RNAs on the Forests. The most critical RNA needs identfied by the Committee, that could potentially be met on the Shasta-Trinity National Forests, are for Oregon white oak (SAF 233) and Pacific ponderosa pine (SAF 245).

Classification and ranking of RNA targets is incomplete for aquatic, geologic, and biological elements. However, information about the distribution and abundance of these elements, within the State of California, is available through the California Natural Diversity Data Base (CNDDB). This data base was established jointly by The Nature Conservancy and the DFG in 1980. The Shasta-Trinity National Forests' staff consults the Data Base regularly. It helps identify areas suitable for designation as RNAs or for other special management designations.

Special Interest Areas

Many other areas on the Shasta-Trinity National Forests, less well-known by the public, may also be suitable for SIA designation. The following discussion focuses on 22 potential areas, recommended by the public or by Forest Service personnel, as having outstanding special characteristics. The DFG inventory of significant natural areas was also used to generate potential SIAs.

Most of these areas receive little recreation use, largely due to lack of publicity about their special features. Timber resource and mineral values, and other conflicting uses are insignificant. These areas will be evaluated for their suitability as SIAs during the Plan period.

Table III-14 lists recommended and potential SIAs. The potential SIAs are described briefly below.

Big Sand Flat. Big Sand Flat is a Pleistocene lake bed on the McCloud Flats. At first glance it appears to be nearly barren, but on closer inspection there is an unusual community of dwarf lupines, many-flowered gilia, and other herbaceous plants adapted to the sandy soil. *Also* present is a population of the very rare/sensitive plant Columbia cress (Rorippa columbiae).

Blake Mountain. Located about two miles northwest of Blake Mountain, on South Fork Mountain, this meadow area possesses exceptional botanical diversity, as well as fine representative old growth conifers (sugar pine, Douglas-fir, and incense cedar), and their associated plant species in an undisturbed setting. It is part of a string of meadows and springs which run parallel to South Fork Mountain on the northeast side. Suitable habitat occurs here for the sensitive plant Umpqua green gentian (Frasera umpquaensis).

Burnt Lava Flow. The majority of this flow lies on the adjacent Modoc National Forest and is classdied as a "virgin" area. Approximately 250 acres of the flow extend onto the McCloud Ranger District. on the flanks of Medicine Lake volcano. The flow area encompasses a set of three cinder cones which range from 300 to 500 feet in height, they are referred to as Triad Cones.

Cable Creek. This area includes the headwaters of Cable Creek, an area of high botanical species diversity, including many different species of bryophytes. Suitable habitat may exist for the senstive plant Umpqua green gentian (Frasera umpquaensis). This area may serve as a resource study area for restoration/revegetation projects in nearby riparian areas.

Del Loma Cave. This cave is located above the village of Del Loma, along the Trinity River Canyon. It is a small, complex cave about 400 feet long and nearly barren of formations. Crawls connect small rooms, and there are a couple of short, climbable drops. It was reportedly dis-

covered by the Forty-Niners during the years of the Gold Rush The date 1849 is written on the wall

Dobkins/Durney Basin. The Dobkins and Durney Lakes basin, on the north slope of Mt Eddy, has a high concentration of sensitive plants on diorite and on serpentine The area is also noted for its scenic beauty

Dubakella Mountain. Dubakella Mountain was proposed by the California Native Plant Society (CNPS) as a botanical SIA because of its rich flora It was first described by Dr Ledyard Stebbins in a 1972 CNPS publication

Hall City Cave. This small, interesting cave is located on Hall City Creek above the old Hall City Mine, three miles east of Wildwood A 100 foot passage leads to a small lake on a 50 foot long underwater pit

Hirz Mountain. Hirz Mountain is a limestone mass with distinctive flora, including the Shasta National Forest endemic Shasta eupatory (Eupatorium shastense) It is located on the north side of Shasta Lake within the Shasta Unit of the Whiskeytown-Shasta-Trinity National Recreation Area (NRA)

Lower McCloud River Wild Trout Area The Lower McCloud river is a Class I trout stream Fish habitat is in excellent condition Pool riffle ratio is near parity, and there is an abundance of large, deep pools Suitable spawning gravel is abundant The lower 12 miles have been designated as a wild trout stream by the California Department of Fish and Game This stream has adfluvial and resident forms of rainbow and brown trout which are the dominant fish species Bull trout is a State listed endangered species which once inhabited the Lower McCloud river However, no bull trout have been seen since 1975

McCloud Falls. The McCloud Falls lie within a one mile reach of the Upper McCloud River There are three sets of falls formed as a result of the river eroding through resistant lava flows and highly erodible interflow material The Upper Falls drop about 40 feet into a relatively large pool The Middle Falls is actually a continuous cascade extending nearly one-quarter of a mile with a total elevation loss of about 200 feet The Lower Falls is located within Fowlers Campground Lower Falls drops some 20 feet into a deep, but moderately sized pool McCloud Falls is primarily a day use area

McGinnis Springs/Wagon Camp. The McGinnis Springs/Wagon Camp area at the base of Mt Shasta is a 100-acre complex of meadows, springs, and serviceberry thickets Only about half of it is in Federal ownership. The area has historical and biological significance because C Hart Merriam's biological expedition camped at Wagon Camp for about a month in 1898 Some of the earliest plant collections from Mt Shasta were made at this time Merriam's report, Results of a Biological Survey of Mount Shasta, Northern California, was published in 1899 and remains one of the classics of ecological literature

Mount Shasta Scenic Area (Proposed). See Section which follows

New River. The New river area, near the western edge of Trinity National Forest, reportedly supports an excellent example of mixed evergreen forest with two sensitive lewisias and four species of stonecrop (*Sedum* spp) New river was proposed for botanical SIA status by the CNPS

Papoose Hill. This is a relatively young cinder cone volcano of basaltic composition located within the even younger Giant Crater Lava Flow Papoose Hill, about 50 acres in size, is the only undisturbed cinder cone volcano on the southern flank of the Medicine Lake shield volcano

Potem Falls. Potem Falls is an unusually scenic waterfall on Potem Creek, a tributary of the Pit River The Falls is located at the extreme east end of the Shasta Unit of the NRA

Potter Creek Cave. In 1878, Potter Creek Cave yielded the remains of a new species of extinct bear About 25 years later, it yielded the largest collection of Pleistocene fossils of any cave in California including remains of elephant, mamoth, camel, and sloth It is located on Potter Creek on the east side of the McCloud River arm of Shasta Lake, it is reached by boat

From the south, the large entrance of the cave is a prominent landmark on the north side of Potter Creek Canyon It sits on the ridge between Potter and Marble Creeks Its arch is about 25 feet wide and 12 feet high To the rear, 30 feet inside. a small 70 foot-long passageway leads to an opening high on the eastern wall of the Galgotha Room A 42 foot ladder descent is necessary The Galgotha Chamber is 107 feet long and about 30 feet wide at its widest point The maximum ceiling height is about 75 feet

Tilted Rock Lava Flow. This lava flow, one of the more recent within the area, is estimated to be about 1,000 years old and 1,250 acres in size It is an example of an 'aa' type lava flow (See Glossary for definition) Tree molds, created by the advancing lava, remain visible along

certain sections The flow begins north of Pumice Stone Well and terminates at Grasshopper Flat Much of it has been covered by a more recent pumice eruption

Tombstone Peak Caves and Fossil locality. This site is located at the divide separating the Sacramento River from Squaw Valley Creek Lrttle is known about the area except that it is composed of a large outcrop of the McCloud limestone of Permian age It is reported that the site is rich in fossils and that there are a number of caverns in the outcrop

Trout Creek. Trout Creek is a small perennial Class I stream with a signrficant population of redband trout in the upper stream reaches. The lower reach of Trout Creek is intermrttent and does not support a permanent population of fish Redband are a genetically distinct race of trout, and though no longer classified as a sensitive fish species, they still receive special management emphasis Fish habitat in the perennial portion of Trout Creek is in fair condition The stream is dominated by rnffles and lacks large. deep pools Fish habitat improvement projects, that address the development of pools and cover, have already been completed. Additional projects are planned

Twin Lakes Basin. Twin Lakes is adjacent to Tamarack Lake, eight miles southwest of Castle Crags State Park The scenery is outstanding, and the vegetation is diverse It includes a meadow system, riparian and lakeshore communities, and montane mixed conifer forest on serpentine Two sensitive plants are found here thread-leaved penstemon (*Penstemon filiformis*) and Scott Mountain phacelia (*Phacelia dalesiana*) Port Orford-cedar is common along the creek that drains the lakes

Wells Creek Falls. Wells Creek Falls is located about one mile southwest of Tedoc Gap and adjacent to the Wells Creek Campground Wells Creek flows over a massive rock outcrop and falls for nearly 150 feet to a large pool below

Mt. Shasta - National Forest Scenic Area (Proposed)

Public Issue

There were no public issues which specifically relate to Mt Shasta

Several organizations have proposed that Mt. Shasta be designated as a Special Interest Area or National Scenic Area

The upper slopes of Mt Shasta have three special land use designations In 1926, the Secretary of Agriculture designated 29,620 acres as the Mt Shasta Recreation Area In 1976, the Secretary of Interior designated 8,000 acres as a National Natural Historic Landmark In 1984, the U.S Congress designated 38,000 acres as a Wilderness These designations focus attention on the upper slopes of Mt Shasta The lower slopes of Mt Shasta also possess qualities that make it worthy of a special recreation or scenic designation

Current Management Situation

Mt. Shasta dominates the landscape. Mt. Shasta's discovery, exploration and admiration are documented in many historic records and drawings From Native Amencan legends through early explorer's sightings to today's recreationists, the mountain represents something very unique and special The mountain continues to be a focal point for Native Americans, mountain worshippers, skiers, sightseers, climbers, photographers and campers Yearly over 120,000 people travel the Eventt Memorial Highway to the 7,500 foot elevation on Mt Shasta

Facilities include one 9 unrt campground, one 10 unrt walk-in campground, a scenic vista and interpretive trail, 10 trailheads, and a climber's staging area The campgrounds, trailheads, and trails have had limited rehabilitation and maintenance over the last 30 years Much of the management of the Everrtt Memorial Highway corridor is on hold pending development of the Mt Shasta Ski Area

Mt Shasta has received national publicity for its volcanic activrty It is an active stratovolcano and the second highest mountain in the Cascade Range Formed by periodic volcanic activity over the last 100,000 years, Mt Shasta displays many unique geologic features These include iumerous lava flows, mud flows, seven glaciers, three waterfalls and canyons

Management Opportunities.

The Secretary of Agriculture may administratively designate 110,000 acres as the Mt Shasta National Forest Scenic Area Management efforts would focus on restoring and maintaining the outstanding scenic value of this

Table III-14
Recommended and Potential Special Interest Areas

	Area Name	Acres**	MA#	Ranger District	Special Interest feature
1.	*Bigelow Meadow	136	10	McCloud	Ecological
2	Big Sand Flat		2	McCloud	Botanical (Sensitive Plants)
3.	*Black Butte	560	3	Mt. Shasta	Geologic
4	Blake Mountain		20	Hayfork	Botanical
5	Burnt Lava Flow		1	McCloud	Geologic
6	Cable Creek		20	Hayfork	Botanical
7.	*China Mountain	680	5/6	m Shasta	Botanical
8.	*Cory Peak	280	6	Mt Shasta	Botanical
9.	*Deadfall Basin	460	6	Mt. Shasta	Botanical (Sensitive Plants)
10.	"Deep Crater	333	1	McCloud	Geologtc
11	Del Loma Cave		15	Big Bar	Geologic
12	Dobkins / Durney Basin		5	Mt. Shasta	Botanical
13	Dubakella Mountain		19	Hayfork	Botanical
14.	*Giant Crater Lava Tube System	179	1	McCloud	Geologic
15.	*Grizzly Peak	220	11	Shasta Lake	Scenic, Botanical
16	Hall City Cave		21	Yolla Bolla	Geologic
17	Hirz Mountain		8	Shasta Lake	Botanical
18.	*Kangaroo Ridge	190	6	Mt Shasta	Botanical
19.	*Little Glass Mountain	1,440	1	McCloud	Geologtc
20	Lower McCloud River Wild Trout Area		10	McCloud	Ecological
21	McCloud Falls	-	10	McCloud	Scenic
22	McGinnis Springs/Wagon Camp		2	Mt. Shasta	Botanical
23	Mt Shasta Scenic Area		3	McCloud/Mt Shasta	Scenic
24.	*Natural Bridge	64	18	Hayfork	Geologic
25	New River		14	Big Bar	Botanical
26.	*Paint Pot Crater	444	1	McCloud	Geologic
27	Papoose Hill		1	McCloud	Geologic/Ecological
28	Potem Falls		12	Shasta Lake	Scenic
29	Potter Creek Cave		8	Shasta Lake	Paleontologic/ Geologtc
30.	*Pumice Stone Mountain	107	1	McCloud	Geologic
31.	*Samwel Cave	20	8	Shasta Lake	Geologic. Archaeological
32.	*Scott Mountain	128	6	Weaverville	Botanical
33.	*Spatter Cones	5	1	McCloud	Geologic. Archaeological
34.	*Tedoc Mountain	1,060	22	Yolla Bolla	Botanical
35	Tilted Rock Lava Flow		1	McCloud	Geologic
36.	*Toad Lake	650	5	Mt Shasta	Botanical
37	Tombstone Peak Caves and Fossil Locality		9	Mt Shasta	Geologic

* Recommended for establishment as Special Interest Areas in Alternative PRF
** Acreage figures are not available for the potenbal SIAs

Table III-14 (continued)
Recommended and Potential Special Interest Areas

Area Name	Acres**	MA#	Ranger District.	Special Interest Feature
38 Trout Creek Redband Trout Area	-	2	McCloud	Ecological
39 Twin Lakes Basin	-	6	Mt Shasta	Botanical
40. Wells Creek Falls		22	Yolla Bolla	scenic.
41. *Western Azalea	25	21	Yolla Bolla	Botanical
Total	6,98 I			

* Recommended for establishment as Special Interest Areas in Alternative PRF
** Acreage figures are not available for the potential SIAs

mountain landscape, while emphasizing qualrty recreation expenences.

Potential programs, initiatives, and resource management activities would include the following

I Designate the Everrtt Memorial Highway as the "Mt Shasta National Scenic Highway". Include two miles of new highway construction to provide direct access off Interstate 5.

2. Develop an International Visitor Complex within one mile of Interstate 5 This Center would provide for interpretation and education about Mt Shasta's unique histone, cultural, geologic and scenic values

3 Emphasize "pleasure driving, sightseeing, pleasure walking and picnicking" These are four of the top six activities listed in the 1989 RPA assessment that are expected to exhibit the greatest growth in numbers of recreational trips away from home in the next 50 years Develop quality trailheads, day hike trails, scenic vistas, picnic sites and interpretive signs

4. Showcase meadow restoration, landscape management, compatible timber harvest techniques. red fir reforestation, and winter sports opportunities

19. Timber

Public Issues

Four public issues are directly related to timber management They are

a **Should herbicides be used to control vegetation in order to meet timber management objectives? (Public Issue #15)**

b **What should the timber harvest level or allowable sale quantity (ASQ) be? (Public Issue #16)**

c **What silvicultural practices should be used to assure reasonably successful reforestation of harvested lands and to maintain tree species diversity? (Public Issue #17)**

d **What harvest methods, including clearcutting, should be used to meet management objectives? (Public Issue #18)**

Discussion of Public Issues

a **Herbicides/Timber Stand Improvement.** Timber stand improvement (TSI) consists of suppressing competing vegetation (release) and thinning young stands The benefits of TSI are increased survival and growth of desired trees and reduced susceptibility to insects and disease

Over the previous five years, an average of about 8,000 plantation acres were released on the Forests per year, and about 1,600 acres were precommercially thinned

The Annual TSI Needs Report identifies the amount of acreage that has been inventoned and which is in need of TSI treatments The most recent Needs Report (October 1993) shows about 23,000 acres are in need of release, an addtional 22,000 acres need thinning In addtion, an unknown number of acres in need of TSI treatments have not yet been inventoried

Release and thinning treatments are normally accomplished by manual, mechanical, livestock, or chemical methods The treatment method selected for any given site depends primarily on effectiveness and costs of the treatment. Other factors. such as other resource concerns and public opinion, also play a part in selection of treatment methods Precommercial thinning is normally done manually by chainsaw, but some thinning is done mechanically on flat ground

Until 1984, plantation release on the Forests was normally accomplished by chemical methods, using herbicides In 1984, a moratonum was imposed on the use of herbicides until an Environmental Impact Statement (EIS) and Risk Analysis could be completed Since 1984, release treatments have been accomplished by manual or mechanical methods The EIS and Risk Analysis have been completed and the moratorium on herbicides has been lifted

Many of the species which compete with desirable, young trees are vigorous sprouters and rapid growers Experience and studies indicate that non-chemical release methods are often ineffective and/or too costly in terms *of* meeting timber management objectives The analysis done as part of the Regional EIS on Vegetation Management for Reforestation indicates that a ban on herbicide use would result in reduced timber yields and increased costs (See Chapter II, Section E, Direction Common to all Alternatives)

b **Harvest level.** The annual programmed harvest level under the Shasta-Trinity's 1975 Timber Management Plan was about 242 million board feet (MMBF) after adjustments were made for the California Wilderness Act This harvest level was based on a suitable timber land base of about 1,074,000 acres

The actual volume sold between 1975 and 1992 averaged about 200 MMBF per year (95 MMBF on the Shasta Forest and 105 MMBF on the Trinrty Forest) The actual sell volume was less than the programmed harvest level due primarily to budget limitations, poor timber markets during the early 1980's, and certain restrictions on the timber land base (such as herbicides and roadless areas)

The listing of the northern spotted owl and subsequent implementation of the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl have further reduced the Forests' timber sale program The actual volume sold on the Forests between 1990 and 1992 averaged about 90 MMBF per year and for 1993 the volume sold was 55 MMBF

c **Reforestation.** The National Forest Management Act (NFMA) regulations specify that when trees are cut to

achieve timber production objectives, the cuttings will be made in such a way as to assure that the lands can adequately be restocked to minimum Regional standards within five years after final harvest This standard applies to even-aged and uneven-aged silvicultural systems

Regeneration of trees is achieved by either natural or artificial methods Artificial regeneration by planting is the most commonly used method to assure adequate and prompt regeneration Most of the artificial regeneration on the Forests has occurred in areas harvested by clearcutting and shelterwood cutting, and non-stocked areas which have resulted from wildfires Over 130,000 acres have been planted by artificial regeneration Many of these plantations are less than 20-25 years of age Over the previous decade an average of about 9,500 acres was regenerated by planting annually

Shade intolerant species, such as ponderosa/Jeffrey pine and Douglas-fir, are the most commonly planted species The more shade tolerant species, such as red and white fir and incense cedar, are planted in smaller amounts with a greater reliance on natural regeneration Minor amounts of lodgepole pine and sugar pine are also planted on the Forests

Depending on the species and site conditions, between 400 and 600 seedlings are planted on each acre The recommended stocking standards are between 200 to 250 trees per acre This "overplanting" allows for seedling mortality due to poor planting stock, improper planting procedures, animal damage, and/or moisture stress from other competing vegetation.

The seedling survival rate after one growing season has consistently been about 85-90 percent for the pines and 70-75 percent for Douglas-fir The success of planted seedlings, along with the natural regeneration that occurs, has resulted in a high percentage (95 percent +) of the Forests plantations meeting minimum stocking standards within five yean after harvest

Natural regeneration is not normally practical due primanly to the unreliability of natural seed sources Past experience wth natural regeneration in shelterwood and selection cuttings has resulted in failures Stands that were not adequately regenerated in a timely manner were understocked In addition, shade tolerant species and hardwoods occupied the sites, while little or none of the more valuable species, such as pine and Douglas-fir, regenerated

d. **Clearcutting/Harvest Methods.** Forest stands are managed by one of two silvicultural systems even-aged and uneven-aged management. Regeneration methods under even-aged systems include clearcutting, green tree retention (regeneration wrth reserve trees), shelterwood cutting, and seed-tree cutting Methods under uneven-aged systems include group selection and single-tree selection. These systems, and their application, are described and analyzed in Appendix J

Based on experience and silvicultural information, even-aged management is the preferred silvicultural system for the commercial forest types found on the Shasta-Trinity National Forests This is particularly true when timber growth and yield are a primary management objective Also, using the criteria from the Regional Guide for the Pacific Southwest Region, August 1984, the silvicultural system which is most appropriate for the timber types and the timber management objectives on the Forests is the even-aged system Uneven-aged management may be appropriate where resources other than timber are emphasized and a continuous forest cover is desired.

Uneven-aged management is not feasible on a sustained basis on slopes over 40 percent, due to high costs and operability problems resulting in extensive damage to residual trees Uneven-aged management is also infeasible in stands which are severely understocked, over-mature, or infected with dwarf mistletoe or root diseases Areas managed under the uneven-aged system require that more land be dedicated to roads, landings, skid trails, etc , than lands under even-aged (estimated 20 percent more) This is because of the smaller openings found in uneven-aged management

The 1975 Timber Management Plan and Environmental Impact Statement (EIS) selected even-aged management as the preferred method for the Plan period (1975 to present). Clearcutting has been the primary method used to regenerate stands under this Plan Between 1984 and 1990, about 8,700 acres per year, or about 49 percent of the acres harvested, were clearcut This figure represents about 0.4 percent of the total Forest acres The average size of the clearcut openings has been about 10 to 12 acres in recent years

Other even-aged management systems in use have been the seed step and overstory removal step of shelterwood cutting and intermediate commercial thinning Only a limited amount of true selection

cutting has occurred on the Forests under uneven-aged management (less than one percent of the acres harvested) This method has been used primanly in highly sensrtive visual or npanan areas where other resource objectives preclude even-aged systems

Current Management Situation

Forest Land Description. Of the 2,121,547 acres of National Forest lands on the Shasta-Trinity National Forests, about 76 percent, or 1,623,000 acres, is forested with commercial conifers Of that amount 1,077,775 acres are classified as tentatively sutable and available for timber production

Tentatively suitable timber lands occur in four major commercial forest cover types mixed conifer, Douglas-fir, ponderosa pine, and red fir Lodgepole pine, knobcone pine. and hardwoods are also found, but they are in limrted supply wrth minor timber yields About six percent of the tentatively suitable timber land base is occupied by brush and other non-commercial species and is devoid of commercial trees Grey pine is the predominant non-commercial confer forest type found on the Forests

See **Figure III-4** for the general location of the major commercial forest types on the Forests

Mixed confer is the most prevalent forest type Approximately 87 percent of the tentatively suitable timber lands on the Forests fall into this category Mixed-confer stands dominate most of the mid-elevation zone on both Forests These stands contain various mixtures of ponderosa or Jeffrey pine, Douglas-fir, white fir, sugar pine. and incense cedar Productivity vanes greatly, wrth the average timber site being Dunning Site Class III on the Trinity side and Site II on the Shasta side (Refer to the Dunning Site Class Table below)

Dunning Site Class

Site Class	Mean Annual Growth (Cubic Feet/Acre)
I	120+
II	85-119
III-IV	50-84
V	20-49
VI	<20

The Douglas-fir type is found only in the South Fork Mountain area of the Trinity Forest Pure stands of productive Douglas-fir grow there Only about two percent o he tentatively surtable timber lands on the Forests fall into :his type The average timber site is Dunning Site Class I

The ponderosa pine type is found only in the Mt Shasta and eastern McCloud Flats area on the Shasta Forest This :ype makes up about one percent of the tentatively suitable timber lands on the Forests The average timber site is Dunning Class IV

The red fir type grows at higher elevations above 6,000 feet About four percent of the tentatively sutable timber ands fall in this category Most of the red fir found on the Trinity Forest grows within Wildernesses Red fir grows in pure stands, in a mixture with white fir, or with lodgepole pine Productivity vanes greatly but is generally high The average timber site is Dunning Class III

Hardwood types grow on about nine percent (190,000 acres) of the Forests Nearly four percent of the tentative-$ suitable timber land is occupied with pure hardwood stands, however, hardwoods are not considered a commercial timber species The primary commercial value of hardwoods is for firewood and biomass for energy producing wood-burning plants Hardwoods also provide non-commercial values, such as for soil productivity and wildlfe and habtat diversity

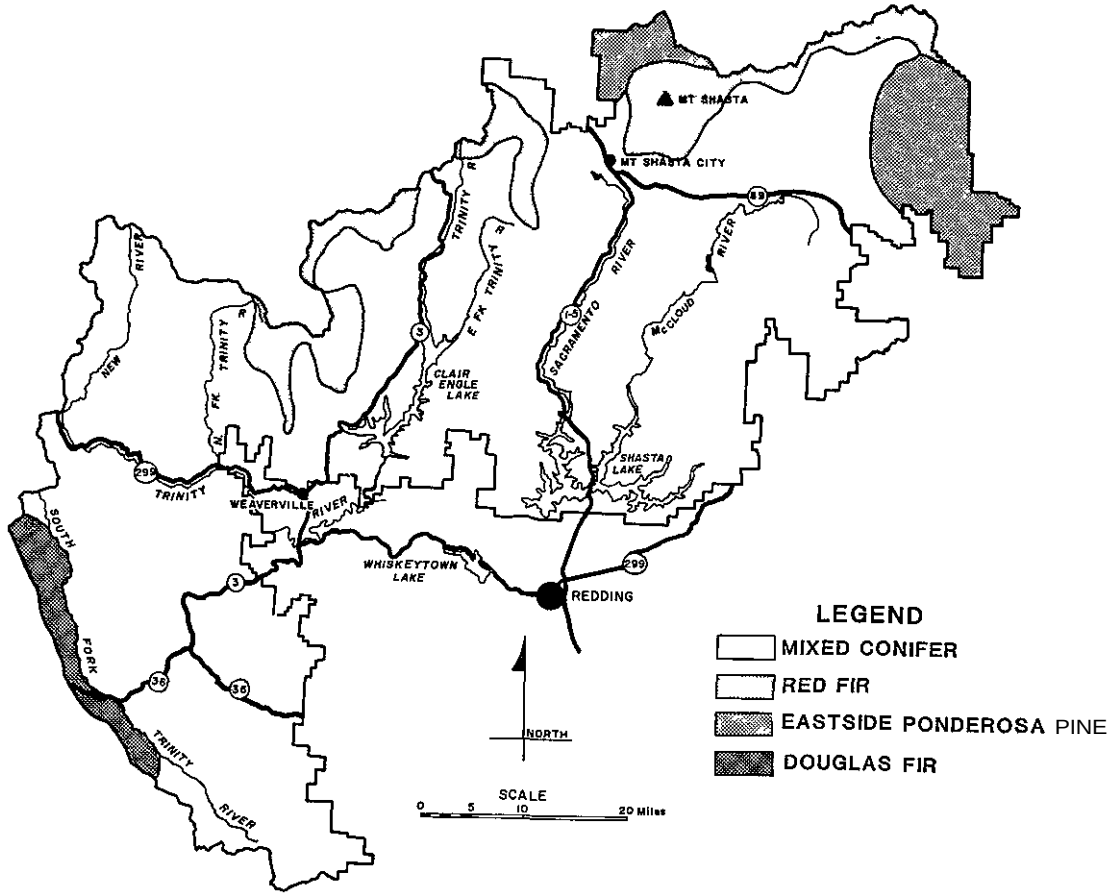
The predominant confer species on the Forests are Douglas-fir, ponderosa pine. red and white fir, sugar pine, and incense cedar The predominant hardwood species are black oak and live oak A breakdown of the pnmary timber species found on the Forests is shown in **Table III-15.**

The current size and age class distnbution of the Forests' commercial conifer timber is not in an even, or regulated, condition There is a vast amount of land in the small sawtimber class and less in the smaller and larger size classes, as displayed in **Table III-16.**

There are over 300,000 acres of understocked stands, or about one-third of the tentatively suitable timber land base, on the Forests These areas are understocked because of natural events such as wildfires, or because of past management practices relating to partial cutting These stands are growing at a rate significantly less than their potential Many acres of these understocked stands are in need of a regeneration cut and reforestation in order to bring them up to full stocking and optimum growth

Except for the seedling/saplings class, most of the existing stands on the Forests have culminated in mean annual increments of cubic foot growth In fad, many stands are

Figure III-4
Major Commercial Forest Types



over-mature and have reached the point where they are not putting on any new growth (mortality is equal to or greater than growth) These stands are not fully utilizing site potential for timber production and are growing at a rate far less than their potential growth rate In order to maintain or increase harvest levels, these stands should be regenerated and converted to fast-growing, young-growth stands

Early Logging/Timber Management Plans. Timber harvesting began on the Forests in the early 1900s Most of this early logging was done by railroad to remove high value pine from the flats of the Shasta Forest There were no long-term timber management objectives at the time

The concern for a sustained yield of timber and the need for a timber harvest schedule, based on inventory and growth, prompted the first formal timber management plans in the early 1950s The latest timber management direction was established in the May 8, 1975, Shasta-Trinity National Forest Timber Management Plan and Final Environmental Impact Statement Among other things,

Table 111-15
Percent Species Composition
(based on basal area/acre)

Species	Percent	
	Shasta NF	Trinity NF
Douglas-fir	33	38
Ponderosa Pine	29	12
Jeffrey Pine	nominal	3
Sugar Pine	5	6
Lodgepole Pine	1	nominal
Western White Pine	nominal	1
Knobcone Pine	nominal	nominal
white Fir	6	2
Red Fir	5	1
Incense Cedar	4	14
Black Oak	14	3
Live Oak	1	13
Tanoak	nominal	2
Pacific Madrone	nominal	3
Other Species	2	2
Total	100	100

Data Source Forest Timber Inventory - 1980 (updated 1989)

this Plan set an annual potential timber yield for the Forests based on timber inventory condrtions in the 1960s

Several of the assumptions on which these potential yield calculations were based have changed or have proven incorrect Recent changes in multiple-use direction for timber producing lands (such as for spotted owls), as well as reductions in the amount of land suttable and available for timber production (such as for new wilderneses, land withdrawals [e g , late-successional reserves], and recent land exchanges), have significantly changed the Forests' timber base

Suitable Timber Land Base. The National Forest Management Act (NFMA) of 1976 required the Forests to do an assessment of lands which are capable, avalable, and tentatively suttable for timber production Based on this assessment, which was completed in 1990, 622,870 acres on the Shasta side and 454,905 on the Tnnty side, for a total of 1,077,775 acres, have been identifed as tentatively surtable for timber production Of this amount, 924,230 acres are suttable for all silvicultural systems (including clearcutting), 37,945 acres are surtable for all systems except clearcutting (pnmanly high elevation red fir), and 115,600 acres are suttable for stand maintenance or salvage only (due to site limitations such as low soil

Table III-16
Timber Size/Age Class Distribution

Size Category	Approximate Diameter Range	Approximate Age Range bears)	Percent of Conifer Land
Seedlings, Saplings	0-5"	0-30	9
Poles	5-11"	30-80	8
Small Sawtimber	11-24"	80-180	69
Medium-Large Sawbomber	>24"	180 +	14
Two-Storied Stands	mixed	mixed	<1

productivrty, high rock content, and soils with poor water-holding capacty)

Lands classified as unsuitable for timber (1,05 1,749 acres) because they are non-productive, non-regenerable, unstable, or unavailable are removed from the timber base, and no timber harvest is planned Only stand maintenance or salvage for other resource purposes is permitted on unsurtable timber lands

Timber Supply. The Shasta-Trinity National Forests are among the major timber producing forests in California The Shasta-Trinity, Klamath, Six Rivers, and Plumas National Forests account for approximately one-half of the potential yield and timber sale volume from the National Forests in the State

An estimate of the Shasta-Tnnity National Forests' timber supply situation resulted from timber inventories completed in 1980 and updated in 1989 to reflect current conditions According to these Inventories, there are about 19 0 billion board feet of standing timber on the Forests on lands classified as tentatively suitable for timber production

Table III-17 summarizes the current (1989) situation for the timber resources on the Forests, including inventory volumes, suitable acres, and growth for each timber strata

The Forests supply timber to about 20 local mills This timber helps satisfy local, regional, and national demands for lumber and other wood products Nearly all of the Forests' timber is processed in the local impact counties of Shasta (40 percent), Trinity (26 percent), Tehama (16 percent), and Siskiyou (12 percent) The annual capacrty of the mills in the local area is estimated at between 700 and 800 MMBF

The Shasta-Trinity National Forests have supplied approximately one-fourth of the total timber volume harvested in the local area over the last several years The average volume harvested between 1975 and 1992 was about 97 MMBF per year on the Shasta Forest and 115 MMBF per year on the Trinity Forest In 1993 the volume harvested was 34 MMBF on the Shasta Forest and 37 MMBF on the Trinity Forest This volume is expected to remain lower than average outputs of the past decade because of the listing of the northern spotted owl, and concerns for retention of "old growth" and ripanan ecosystems

As of September 30, 1993 the volume under contract on existing timber sales on the Forests was about 48 MMBF The volume under contract has been steadily declining in recent years

Over 200 MMBF of merchantable timber outside of Wildernesses was burned and killed during the wildfires of 1987 and 1988 Over 90 percent of this timber has been logged or has been prepared for salvage

Timber Demand. Demand for timber is relatively high because mill capacity in the local area is about four times the Forests' annual sell volume, leading to highly competitive bidding on most sales Purchasers of Shasta-Trinity National Forests' timber sales are centered in the Red Bluff-Anderson-Redding areas In addtion, appreciable quantities are processed in the smaller, surrounding communities of Hayfork, Weaverville, Burney, and Yreka The mills in these smaller communities rely heavily on the Forests' timber, with as much as one-half of the processed timber coming from the Shasta-Trinrty Timber harvest levels have a signliicant effect on those communlties most dependent on the wood products industry

In recent years, due to high demand, all of the timber offered for sale on the Forests has been sold Sales typically sell for several times more than the advertised rates Timber sale receipts normally exceed the cost of preparing and administering sales, regenerating the timber, and building timber haul roads Even in this healthy timber market, the possibility exists for individual timber sales to be sold below cost, however, below cost timber sales are rare

Real timber prices have steadily increased over the years, as reflected in the average dollars per thousand board feet (MBF) paid for timber sales on the Forests These long term price trends reflect the increasing scarcity of timber in relation to demand

Demand for the mqor conifer species on the Forests can be reflected in their relative stumpage values Sugar pine and ponderosa pine are high value species, Douglas-fir and incense cedar are moderate value species, and the true firs, red and white fir, are low value species.

The demand for hardwoods for home heating has risen dramatically, since the cost of electricity has increased However, there are large quantlties of hardwoods on the Forests The majorrty of the hardwood is located in inaccessible areas or on steep slopes Black oak, tanoak, chinquapin, madrone, and live oak are the most common hardwoods available Hardwoods also provide an important element to the habitats of certain wildllfe species Increased demands for hardwood could create use conflicts in the future

Management Opportunities

Several opportunities, associated with timber management activities, exist in terms of timber and other resource values

Timber growth and yield can be enhanced by replacing understocked and poorly-growing stands with fully stocked, thrifty confer stands Understocked stands should be a high priority for regeneration in order to capture growth potential and maintain or enhance future yields This would, in turn, ensure a continued supply of wood fiber from the Forests and help meet consumer demand

The loss of trees to forest pests can be reduced by maintaining healthy, vigorous stands through timber management activities such as thinning and salvage, and by managing other vegetation which competes with the trees

Vegetation manipulation, through timber management, can also provide the means to enhance or improve other resource values, such as creating suitable wildlfe habitat

Opportunities also exist to reduce the visual (environmental) effects of timber harvesting. particularly even-aged regeneration cutting such as clearcutting Some ways in which this could occur would be to (1) reduce the number of acres clearcut, (2) reduce the size of clearcut openings, and (3) increase the number of standing residual trees left in a clearcut after harvest and site preparation

Opportunities exist to increase the use of uneven-aged silvicultural systems, such as selection cutting, pnmarily to meet wildlife and visual objectives Opportunities also exist to test growth and yield assumptions under uneven-aged management by practicing intensive uneven-aged management in selected areas and monitoring yield results

Over the past several years, an increasing number of procedural requirements have been placed on the planning and implementation of timber management practices New laws, Executive Orders, and policies have been enacted or adopted that have assigned values higher than timber to special or unique resources Other procedural requirements, growing from a recognition of the environmental effects associated with intensive timber management, have affected the amount of land available for timber production

The most signlficant changes that have affected the future production of timber are management of threatened and endangered (T&E) and sensitive plant and animal habrtats, reservation of wide zones around npanan areas, protection of significant cultural resources, management of Wilderness and roadless areas, and the maintenance of natural-appearing areas as seen from heavily-traveled roads or recreation areas These requirements will be reflected in the current timber inventory and land base in the Forest Plan

This round of planning allows Forest personnel to balance the opportunities for a sustained yield of timber along with other important forest resource requirements and opportunities using the most recent information and data available

The 1990 Forest and Rangeland Renewable Resources Planning Act targets (1990 RPA targets) for the Forests' timber resource call for a Total Sale Program Quantity (TSPQ) of 195 MMBF per year The 1990 targets also call for a 14 percent reduction in the number of acres being clearcut Opportunities for meeting these targets, and ways to best achieve them, will be examined during this planning process

Table III-17
Timber Condition Classes, Area, Estimated Volume, and Growth Rates
Shasta-Trinity National Forests

Condition Class		Area Tentatively Suitable (M Acres)		Average Conifer Volume Per Acre (MBF)		Estimated Total Volume (MMBF)		Average Current Annual Growth (CF/AC/YR)		Potential Mean Annual Growth of Replacement Stands (CF/AC/YR)	
Timber Strata*		Sharta	Trinity	Shasta	Trinity	Shasta	Trinity	Shasta	Trinity	Sharta	Trinity
Mixed Conifer	M2G	11 8	23 1	17 1	22 4	201 8	5174	17	58	79	52
	M2P	9 7	7 8	4 6	8 2	44 6	64 0	11	14	79	52
	M3G	161 7	149 2	29 1	289	4,705 5	4.31 1 9	47	40	79	52
	**M3P	2103	1073	10 7	16 8	2,2502	1,802 6	30	34	79	52
	M4G	42 6	78 6	29 1	28 9	1.239 7	2.271 5	46	40	79	52
Douglas Fir	D3G		1 7		35 7		60 7		68		104
	D3P		1 2		15 1		18 1		30		104
	D4G		10 0		48 0		480 0		50		104
Ponderosa & Jeffrey Pine	P3P	9 2		7 5		69 0		22		52	
Ped Fir	R2N	4 5		6 9		31 0		9		83	
	R3G	20 0		33 8		676 0		38		83	
	**R3P	10 4		9 7		100 9		17		83	
	R4G	1 3		33 8		43 9		37		83	
Knobcone Pine	KPX	6 0		3 6		21 6		9		Unest	
Lodgepole Pine	LPX	7 8		9 8		76 4		26		37	
Plantations	PL	74 2	65 2	0	0	0	0	Unest	Unest	79	52
Hardwoods	HX	36 6	8 2	Unest	Unest	Unest	Unest	Unest	Unest	Unest.	Unest
Brush	SX	16 8	2 6	Unest	Unest	Unest	Unest	0	0	Unest.	Unest.
Total		622 9	454 9			9.460 6	9.526 3				

* Size class (crown diameter)
2=pole-size timber (6-12 feet)
3=small sawtimber (13-24 feet)
4=medium/large sawtimber (25+ feet)

Density Classes:
G = good stocking (40-100%)
P = poor stocking (10-40%)
N&X = all density classes

** These Strata include size class 3 and 4

20. Visual Quality

Public Issue

One public issue relates to visual quality

How and where should visual quality be protected and enhanced? (Public Issue #19)

Discussion of Public Issue

Visual effects of management practices have become more apparent in recent years There is public concern that scenic quality has declined overall and that certain silvicultural practices and road building activtties have contributed to this decline There is also concern that visual quallty does not receive adequate emphasis This is most notable along sensltive travel corridors Others feel that visual resource practices are too restrictive on management activities, particularly timber harvesting and mining

Current Management Situation

Several factors help contribute to a better understanding of the visual quality situation (I) the current visual management policy. (2) the existing visual condition, (3) the trend of the Forests' visual condition. (4) the potential supply of scenic quality, and (5) the public demand for scenic quality

Visual Management Policy

Views from designated State and Federal highways. identified as being eligible for designation as Scenic Highways, are managed to protect scenic quality In addition, developed recreation areas and wildernesses are managed to protect scenic values

About 370 miles of roads on the Forests are managed so that adjacent beauty and attractiveness can be maintained or enhanced In addtion, many miles of streamsides and lakeshores are managed to maintain or enhance beauty and attractiveness Views from designated scenic byways and wild and scenic rivers are managed to maintain or enhance beauty and attractiveness

The Shasta and Trinity Units of the Whiskeytown-Shasta-Tnnity National Recreation Area (NRA) were designated by Congress "for the public outdoor recreation use and the conservation of scenic, scientific, historic, and other values " (Public Law *89-336)* The NRA is managed accordingly

The Mt Shasta Recreation Area possesses "much scenic beauty which should be conserved and developed for use and enjoyment by the general public for purposes of outdoor recreation " It is presently managed for those purposes

Existing Visual Condition

The lands within the Shasta-Trinity National Forests have been divided into three vanety classes Distinctive (Variety Class **A),** Common (Variety Class B), and Minimal (Variety Class C) These variety classes are a measure of the scenic attributes of the landscape such as landform, water, and vegetative pattern Over time, landscapes within the three variety classes undergo physical alteration because of road building, timber harvesting, campground construction, mining, etc

The term existing visual condition is a measure and classification of the degree of physical alteration There are six visual condition classes on the Forests These vary from Class I areas, which are unaltered, to Class VI areas which are physically altered on a large scale (Refer to the Glossary, Chapter VIII, for a description of each of the six classes)

Table III-18 shows the existing visual condttions, by vanety class, that are found on the Forests *As* shown in the table, the most dominant physical alterations have occurred in the least scenic areas (Common and Minimal Variety Classes) while the least amount *of* physical alterations has occurred in the most scenic areas (Distinctive Variety Class)

Trend of the Forests' Visual Condition

Inventories indicate there is an historic trend toward more change and a less natural appeanng landscape This trend has been accelerating during the past 35 yean As one means to measure this trend, a visual quality index has been developed for the Forests **Figure 111-5** illustrates the estimated change in the visual quality index over time

Table III-18
Existing Visual Condition by Varlet) Class

Visual Condition	Variety Class		M Acres'
I Untouched	A	Distinctive	206.5
	B	Common	673 9
	C	Minimal	28 7
II Unnoticed	A	Distinctive	33 4
	B	Common	750.9
	C	Minimal	222.3
HI Minor Disturbance	A	Distinctive	4.9
	B	Common	93.7
	C	Minimal	26.8
IV Disturbed	A	Distinctive	0 4
	B	Common	33.6
	C	Minimal	27. I
V Major Disturbance	A	Distinctive	0.0
	B	Common	6 5
	C	Minimal	12.8
VI Drastic Disturbance	A	Distinctive	0 0
	B	Common	0 0
	C	Minimal	0 0
TOTAL			2,121 5

Visual Quality Objectives

The inventoried visual quality objectives (VQOs) are based upon estimates of public concern for scenic quality (sensitivity levels), the scenic qualrty of the landscape (variety class), and distance of the landscape from the principal viewing area. Acres of inventoried VQOs by variety dass are shown in **Table III-18a** VQOs identify

Table III-18a
Inventoried Visual Quality Objectives *(VQOs)*
by Variety Class

	Variety Class				
	A	B	C	Total (M Acres*)	Percent
Inventoried VQO					
Preservation	1432	354.9	0.6	498 7	23 5
Retention	75 0	100.5	0.0	175 5	8 3
Partial Retention	36 4	432 9	121 3	590 6	27 8
Modification	0 0	493 4	1042	597 6	*28* 2
Maximum Modification	0.0	167.0	92. I	259 I	12 2
TOTAL	254.6	1,548.7	3182	2,121.5	100.0

* M Acres = thousand acres National Forest land only

how much a management activity can contrast visually with the character of the landscape **figure III-6** illustrates an example of each VQO

Management Opportunities

Supply of Scenic Quality

New management techniques are being adopted that will modify the impacts affecting the scenic resource. Smaller openings. as in uneven-aged selection cutting, will normally meet a higher visual quality standard than larger openings

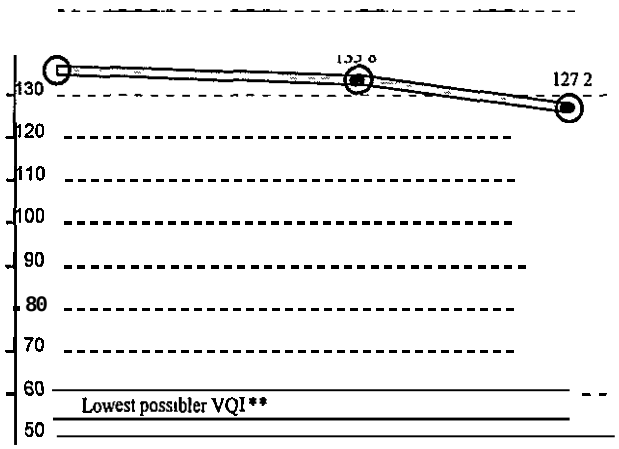
Many opportunities exist to protect and enhance the visual quality on the Forests There are ways to support the tounsm industry by managing the scenic setting along travel routes and near major tourist destinations Similarly, there are opportunities to manage the scenic setting near important recreational features and high use areas In some instances, scenic settings could be enhanced by creating vistas or managing vegetation for the visual characteristics recreationists find most appealing Finally, there are opportunities to manage additional areas, to maintain or enhance the present visual qualities, and to improve access on and around Mt Shasta

There are also opportunities to lessen the visual effects of timber harvesting activities through the location and design of harvest units Smaller openings, as in uneven-aged selection cutting, will normally meet a higher visual quality standard than larger openings

Public Demand for Scenic Quality

Indicaton of the demand for visual quality are expressed in the following ways (1) the desire of more Forest visitors to seek pleasant visual settings for their recreation pursuits, (2) the increasing desire of urban minorities and low-income residents to travel and sightsee in scenic **areas:** (3) he increasing concem for scenic resources, (4) the increasing number of laws designating management areas where visual quality and aesthetics are primary considerations, and (5) the report by the President's Commission on the American Outdoors which emphasizes the value and importance of scenic quality

Figure III-5
Trends in Visual Quality Condition
Visual Quality Index (VQI)

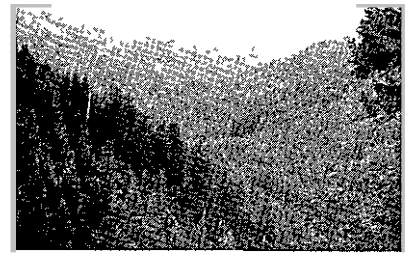


/QOs may deviate from the inventoried VQOs depending on the management objectives and direction for the and These adopted VQOs dictate the level *of* visual quality to which the landscape will actually be managed Jnder the current management direction, no more than seven percent of the net acres on the Forests would be managed under a maximum modification VQO

Figure III-6
Visual Quality Objectives (VQOs)

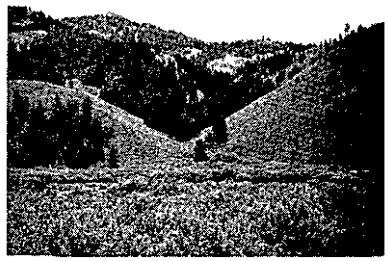
Preservation P

Only ecological changes permitted



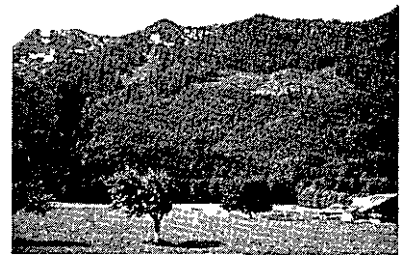
Retention R

Management activities are not visually evident



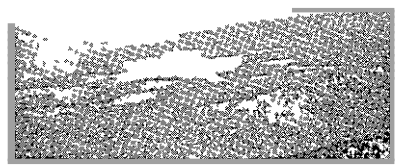
Partial Retention PR

Management activities remain visually subordinate



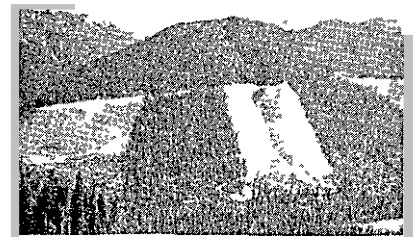
Modification M

Management activities in foreground and middleground are dominant, but appear natural



Maximum Modification MM

Management activties are dominant, but appear natural when seen as background



Unacceptable Modfication UM

Activities that contrast excessively in form, line, color or texture from the character. istic landscape do not meet visual quality objectives

21. Water

WATER QUALITY

Public Issues

One major public issue focuses on water quality

How should watersheds be managed to maintain or enhance water quality and fisheries? (Public Issue #6)

One other issue relates to water

How wide should riparian management zones (RMZs) be and what management activities should be allowed within them? (Public Issue # 13)

Discussion of Public Issues

Water Quality Maintenance and Enhancement. The water on the Shasta-Trinrty National Forests is probably its most valuable, widely used, renewable natural resource Water produced from the Forests' watersheds is used throughout the State for power generation, irrigation. domestic consumption, and many other beneficial uses The varied users of the Forests' water require a consistently high level of water quality The water resource is also used for sustaining a variety offish, wildlife, and other instream water uses

Forest management activties have the potential to affect water quality, and, subsequently, to affect the utility of the many beneficial uses of the water produced Management activities, including road building in steep, rugged terrain, have long been recognized as sources of non-point water quality pollution Non-point pollution is controlled by containing the pollutant at its source, thereby precluding delivery to surface water and protecting water quality The means of watershed management to meet the end of water qualrty maintenance or enhancement is an issue that concerns all recipients of the Forests' water

Related Issue

Riparian Reserve Area. Refer to the discussion of this issue in the Riparian Area Section

Current Management Situation

Water Quality Management. The qualrty of water that is produced as runoff from the Shasta-Trinity National Forests is measured against water qualrty objectives established by the Clean Water Act and the Rver Basin Plan objectives established by the State of California

Water quality on the Shasta-Trinity National Forests varies wth water source, flow, sources of pollution, and timing of water yield Parameters of water quality, which pertain to the forest environment, include sediment, temperature, pH, dissolved solids, heavy metals, chemicals (pesticides and fertilizers), and bacteria and protozoans from human and animal waste All of these parameters. wth the exception of pesticides and fertilizers, occur at some natural level in the aquatic environment The natural level of these parameters in the water consttute the background or natural water quality This natural water quality also varies with water source, flow, and timing of water yield

Water quality is regulated by the Clean Water Act, under the direction of the Environmental Protection Agency (EPA) and the California State Water Resources Control Board Local regulation is provided in the Trinity River Basin by the North Coast Regional Board, and in the Sacramento River Basin by the Central Valley Regional Board Water Qualrty Control Plans for both Regions contain Water Qualrty Objectives (standards), Beneficial Uses, and a "Statement of Policy with Respect to Maintaining High Quality Waters in California." These Plans regulate water quality of the waters of the Shasta-Trinity National Forests just as they regulate all other water; of the respective river basins

Water quality is maintained and improved through the application of state certified and EPA approved Best Management Practices (BMPs) for controlling non-point sources of pollution to surface water Methods and techniques for applying the appropnate BMPs are identified during on-site investigation of forest projects that have the potential to degrade surface water quality

BMP implementation is montored during and after project execution Effectiveness montoring is also conducted following project completion to ensure that the BMPs meet their stated objective to protect water qualrty Implementation and effectiveness reviews are conducted in cooperation with the Central Valley and North Coast Regional Water Quality Control Boards If monitoring indicates that water quality standards are not being met, or have the potential of not being met, then corrective

action is taken Corrective action considers the cause of failure orthreatened failure of BMP objectives. The cause could be due to the inadequacy ofthe BMP Itself, a failure of the implementation process, or an inadequacy of the standard being measured More detailed discussions of BMPs and the implementation process are presented in Appendix E of the Forest Plan

Protection offloodplains and wetlands, from management activities involving dredging and filling, are regulated through the permitsystem ofthe Clean Water Act, Section 404, administered by the U S Army Corps of Engineen There are exemptions and blanket authorizations wrthin the law that afford "general permits" for most forest management activities. 40 CFR 232 3, Subsection "c" identifies six activities exempt from permit requirements Among them are normal silvicultural activities, construction and maintenance of forest roads, maintenance and emergency reconstruction of dams, bridges and abutments/approaches Some examples of Forest activities that could be affected by the permit system include road or campsite development within floodplains or wetlands that requires fill material placement, installing or removing boat ramps, or fish habitat enhancement projects such as gabion placement

Impacts to wetlands are minimized to the extent appropriate and practicable with the use of BMPs Where unavoidable adverse impacts remain, compensatory mitigation measures are undertaken in accordance with the guidelines provided in the Management Agency Agreement between the EPA and the Army Corps of Engineen These determinations are made on a case-by-case basis at the project planning level

The water quality of streams within watersheds disturbed by forest management activities meets quality objectives dunngthe dry part oftheyearwhen erosion and sedimentation processes are curtailed. Exceptions include water draining from old mining sites, direct discharges of pollutants, or areas where direct streamside canopy has been removed Further degradation of water quality can occur in the rainy season within disturbed watersheds. Most National Forest management activlties have either no affect or only a short term affect on water quality Unsurfaced roads, especially those that are poorly maintained. cause long-term water quality degradation

Watershed Condition. Watershed condition is a description of the health of a watershed, or portion thereof, in terms of the factors which affect hydrologic function and soil productivity Hydrologicfunction controls the manner in which water travels through the watershed as surface and groundwater resources Forest management activities influence the natural hydrologic function of watersheds in a number of ways Examples of these influences include changes in peak stream flows, erosion (sheet, rill and mass wasting). soil compaction, and vegetation removal. Additionally, cumulative effects which include the relativetiming, location, type and level of management activities are signlficant because they can influence the magnitude of any of the above factors

Watershed condition can be classified by evaluating the cumulative watershed impacts This method calculates soil disturbance and compaction from roading and timber harvest activities in equivalent road acres (ERAs) A watershed's sensitivity is evaluated and classfied and a threshold of concem (TOC) value is assigned This value is expressed in percent ERA, wrth lower sensitivity watersheds having a higher TOC than the highly sensitive watersheds The TOC value is meant to indicate a point

Tabl 1-19
Watershed Condition Classes

Characteristics	CLASSES 1	2	3
ERA Levels as a Percent of TOC	<40	40 - 80	>80
Stream Channel Conditions	Good to Excellent	Fair to *Good*	Fair to Poor
Soil Productivity	Maintained at optimum levels	Maintained at lower levels than Class I	Maintained at lower levels than Classes I and2
Water Qualrty	Exceeds objectives	Meets objectives	Meets or is below objectives
Potential for Degraded Water Quality or Soil Productivity	Low	Low to moderate	Moderate to high

where, tfapproached or exceeded, the nsk ofwatershed degradation is considered significant and mitigation measures should be implemented to lessen the hazard (See Appendix H)

Watershed condition classes are defined in terms *of* the level of ERAs for individual watersheds with respect to their TOC **Table III-19** summarizes the typical characteristics of the three watershed condrtion classes

Sixty-one watersheds have been identrfied wrthin the Forests (refer to map, **Figure 111-7). These watersheds range from 11 to 410 square miles** in size An inventory of the existing watershed condrtion of these watersheds indicates that most are presently Class I and Class 2 **(Tables H-I and H-2** in Appendix H) However, seven watersheds have relatively high disturbance levels which cause them to be a Class 3 These watersheds are the East Fork of the South Fork Trinty River, Rattlesnake Creek, Butter Creek, Plummer Creek, Gulch, Hyampom and Upper Hayfork Creek Cumulative effects have occurred wrthin subwatersheds of these watersheds, and there is a significant risk of initiating cumulative effects wrthin the main channels which drain these watersheds

In addition, some watersheds were extensively affected by the 1987 and 1988 wildfires Although these watersheds are in condition Class 2, they could undergo cumulative watershed effects in some of their subwatersheds (e g , Salt Creek and the Upper South Fork Trinrty River watershed)

Management Opportunities

All areas of declining watershed condition would be treated to regain natural watershed stability Restoration would be conducted at a rate commensurate with RPA targets for watershed improvement Watershed improvement on the Shasta-Trinity National Forests would be accomplished through the implementation of a Forest Watershed Improvement Program to identify, assess, and fund improvement of degraded watersheds

The 1990 RPA targets for watershed improvement on the Forests are to restore 700 acres per year during the first decade, 710 acres per year dunngthe second decade, and 450 acres per year during the third decade Implementing the target rate on the watershed improvement needs identrfied to date would result in complete watershed restoration sometime during the second decade A more extensive/complete inventory is needed, however, to identify all areas wrthin detenorated watersheds that are in need *of* improvement

The 1984 Regional Guides include direction for treating all lands that are in a declining watershed condrtion by the year 2000 Because of the constraints involved and the magnitude of the areas needing improvement (some 11,000 acres), this direction would probably not be met The intent, however, is to treat areas of declining watershed condrtion as rapidly as possible

BMPs are used for the protection of water qualrty as described in the most current version of "Water Quality Management for National Forest System Lands in California" (This document is available at any Pacrfic Southwest Region National Forest office) In addrtion. a Forest Supplement to the BMP Handbook describes addrtional measures which can be prescribed to protect water qualrty These BMPs prevent land-disturbing activrties from polluting water from non-point sources. Use of these BMPs would also insure the protection or enhancement of ripanan areas

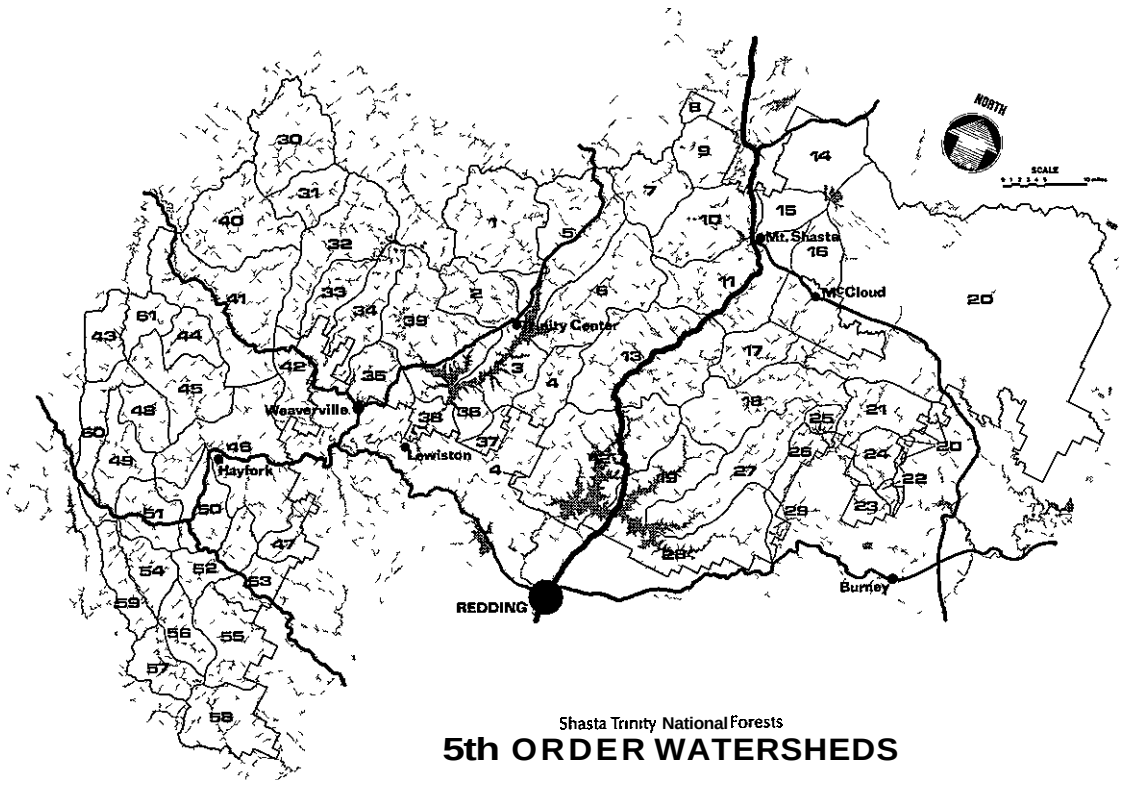
A new BMP monitonng handbook has been developed and is being implemented throughout the National Forests in the Pacific Southwest Region (Region 5) The handbook provides for a uniform procedure for monitoring BMP implementation and effectiveness The procedure includes BMP activity reviews, monrtoring of specific BMP applications, and monitoring of water quality and beneficial uses downstream from the BMP applications Monitoring efforts and results would continue to be shared with the Centra Valley and North Coast Regional Water Qualrty Control Boards

The degradation of watershed condition and cumulative watershed impacts would remain a concern in the future However, they could be minimized through the application of cumulative impact assessments on all projects occurring on National Forest lands Through the dispersement of management activities. both in time and space, the identification and proper management of sensrtive lands and the proper application of BMPs, watershed condition can be maintained and cumulative impacts can be prevented from occumng

WATER YIELD

Public Issues

No public issues focus specifically on water yield



Shasta Trinity National Forests

5th ORDER WATERSHEDS

Watershed boundaries are only approximate of this scale

Current Management Situation

The Shasta-Trinrty National Forests are wrthin the Upper Sacramento and Trinity River Basins The basins produce an average annual runoff of *6,972,000* acre-feet ofwater Of this total, about 5,450,000 acre-feet of water flows from National Forest lands *(See* Appendix H for a display of average water yield by National Forest watershed)

Beneficial Uses. Of the 5 45 million acre-feet of water yielded from Shasta-Tnnrty National Forests' watersheds annually, almost all is used for human beneft in some manner Water is extensively used both for consumptive and nonconsumptive uses Beneficial uses denved from water flowing from National Forest land occur within the forest environment as well as downstream many miles from its source The Water Quality Control Plans for the North Coast and Central Valley Regions list potential as well as existing beneficial uses for the waters of the major tributaries on the Forests

Shasta and Clair Engle (Trinity) Lakes provide water for fish habitat, many forms of recreation, hydroelectric power production, and extensive downstream agricultural irrigation Major sources of hydroelectric power on the Shasta-Trinrty National Forests also come from the Pit River Lake Britton, Lake McCloud, and Iron Canyon Reservoir are all diversions for hydroelectric power About 60 to 70 small-scale hydropower projects are being developed on smaller water sources

About 1,900 miles of fishable streams, 131 natural lakes, and 11 manmade reservoirs, wrthin the Forest boundaries, provide a variety of recreational opportunrties

Nine communrties wrthin the Forests have organized water supply agencies that obtain community water from surface sources They are Big Bar, Castella, Covington Mill, Craigview, Del Loma, Hayfork, Lakeshore Heights, Trinity Center, and Weaverville Shasta and Trinrty Lakes also provide domestic water to several communrties and/or resorts Jones Valley, Silverthorn Resort, Bridge Bay Resort, Mountain Gate, Shasta Dam Public Utilities District, and Fairview Marina There is no formal agreement with these users regarding the management ofthe appropriate watersheds The quality of the water for this domestic use meets State objectives In addition to community systems, many individual domestic water systems are scattered throughout the Forests Current management direction is to protectwaterqualrty for domestic use, and this has been effective in precluding unacceptable impacts

Demand for consumptive water is expected to increase in proportion to the population growth and the distribution ofthis growth throughout the State Demand for instream uses and uses associated wrth impounded water will also increase The water produced from the Shasta-Trinity National Forests is of sufficient quality and quantrty to meet demands during the next 10 years More information about consumptive and nonconsumptive water needs is required in order to develop future plans for meeting these needs

What role the Shasta-Tnnrty National Forests will have in meeting future water needs for the State of California is unknown The Forest Service would cooperate fully wrth the State Water Resources Control Board in its efforts to manage the water resource and protect beneficial uses

Forest personnel have identified 133 future water use needs which would require an additional 137 acre-feet of water annually These needs are related to management activities, such as future recreation developments and range improvements, where water diversion and consumptive use is required

Water Yield Increases. The opportunrty to increase water yields through vegetative management is limited Estimates of increases of runoff, through extensive vegetation conversion, indicate that a two percent increase in runoff could be achieved This estimate was based on a long-term conversion of forest land to vegetation with a lower transpiration rate, such as the conversion of brushland to grassland

The opportunrty to manage the Forests' snowpack to control water yield timing is extremely limrted as well The amount of precipitation incorporated into season-long snowpacks represents only a tiny portion of the total annual precipitation and subsequent runoff

Water Rights. The Shasta-Trinrty National Forests hold 43 reservation principal water rights and 83 appropnative water rights These rights cover uses from domestic supplies for campgrounds to livestock watering The Forests also hold a number of "Statement of Water Use" files, primarily for dust abatement on roads and for fire protection These uses are transitory, sporadic, and temporary depending on the immediate needs These uses have a lower prionty than filed water rights and instream beneficial uses There are records of over 200 water rights held by private interests within the Forests' boundaries, but the records do not include ripanan rights users

Future National Forest water needs are limited Most of the water needs would be met by dnlling wells to extract

ground water All future needs would be met pursuant to State law

Management Opportunities

Management opportunities for the immediate future are descnbed under 'Water Quality."

22. Wild and Scenic Rivers

Public Issue

One public issue emerged relating to Wild and Scenic Riven That issue is

What river segments should be recommended for inclusion in the Federal Wild and Scenic Rivers System? (Public Issue #20)

Discussion of Public Issue

Portions of the North Fork, South Fork, the mainstem Trintty Rver and the New River were added to the National Wild and Scenic Rvers System in 1981 Several other rivers and streams on the Forests have the potential for Wild and Scenic designation The effects that designation would have on private land use concerns some private landowners, especially those along the McCloud River

Current Management Situation

In 1968, Congress established the National Wild and Scenic. Rivers System and encouraged states and local governments to participate in the program In 1972, the State established a California System under the Callfornia Wild and Scenic Rvers Act (Behr Bill) In 1976, the Forest Service and the Calfornia Department of Fish and Game (DFG) entered into a Memorandum of Understanding on cooperative relationships in handling Wild and Scenic Rver matters for both the National and State systems This agreement included cooperation in carrying out studies and in prepanng management plans

The Wild and Scenic Rivers Act precludes or substantially limits the construction of dams and other water resources projects which might affect the free-flowing nature of a river

Designation does not open private lands to public access Landowners can continue to post their property Developed access points and recreation user facilities usually help reduce the trespass and impact on both private and public lands

The Federal government would consider acquiring private lands, if necessary, to protect the values of the nver corridor or to provide public access Acquisition may be by purchase, exchange, or donation, and may be for fee title to **all** or part of the land, or for easements. In almost all cases, this is accomplished on a willing seller - willing buyer basis

With a scenic easement the landowner maintains ownership, but agrees to limit the type of use or development that can occur When an easement is acquired, the landowner retains title to the land The landowner also retains the right to sell it, rent it, leave it to heirs, or restnct public access Scenic easements not only protect the river values, but they can also act to protect private properties from adverse development on adjacent private lands

Federal agencies use condemnation only as a last resort to prevent land use or developments from degrading the outstanding values of the river corridor

Condemnation of lands is a rare occurrence There are 100,000 acres of private land wthin the corridors of the rivers that the U S Forest Service manages in California, Oregon, and Washington These lands have never been acquired through fee ttle condemnation

The Wild and Scenic Rivers Act places greater restrictions on the use of condemnation than exists for other areas of the National Forests, National Parks and other Federal areas For example, in the National Forests or National Parks, condemnation is available to acquire fee ttle to any private lands needed for public purposes This is not true for private lands within Wild and Scenic Rver boundanes because the Act includes specific restrictions on the use of condemnation Fee title condemnation is prohibited if more than SO percent of the corridor land is publicly owned Most rivers considered for designation are more than 50 percent publicly owned

The effect of designation on road construction. timber harvesting, and mining varies by whether the river is classified as wild, scenic, or recreational The types of classification are defined **as** follows

--WILD Those rivers or sections of rivers that are free of impcundments, with watersheds or shorelines essentially primtive, generally inaccessible except by trail, and with unpolluted waters These represent vestiges of primitive America Most of these wild river segments are located on public lands

--SCENIC Those rivers or sections of rivers that are free of impoundments, wth shorelines or watersheds

still largely primitive and shorelines largely undeveloped, but accessible in places by roads

--RECREATIONAL. Those rivers or sections of rivers that are readily accessible by road or railroads, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past

On Wild segments no roads or other provisions for over land motorized travel would be permitted within one-quarter mile of the nver bank However; one or more inconspicuous roads leading to the river area, for the purpose of providing access, may be permitted Also, unobtrusive trail bridges could be allowed The cutting of trees would not be permrtted except when needed for a primrtive recreation experience or to protect the environment New mining claims would be prohibited within one-quarter mile of the river. Existing mineral activity must be conducted in a manner that minimizes sedimentation and visual impairment and protects Wild and Scenic River values

On Scenic segments roads may occasionally bridge the river area Short stretches of conspicuous or longer stretches of inconspicuous and well-screened roads could be allowed Consideration would be given to the type of use for which roads are constructed and the type of use that would occur in the river area A wide range of silvicultural practices could be allowed provided that such practices are carried on in away that there is no substantial adverse effect on the nver and its immediate environment New mining claims could be allowed and existing operations would be allowed to continue However, mineral activity must be conducted in a manner that minimizes sedimentation and visual impairment and protects Wild and Scenic River values

On Recreational segments paralleling roads could be constructed on one or both river banks There could be several bridge crossings and numerous river access points Timber harvesting would be allowed However, some restrictions could apply to immediate river environments to preserve scenic and fish and wildlife values New mining claims could be allowed and existing operations would be allowed to continue Mineral activty must be conducted in a manner that minimizes sedimentation and visual impairment and protects Wild and Scenic River values Refer to Appendix E for a detailed discussion of wild and scenic rivers

Current Supply. In July 1980, the Governor of Califomia petitioned the Secretary of Interior to include certain segments of the previously designated California Wild and Scenic Rivers System as part of the National System In January 1981, approximately 106 miles of the Trinity River system on National Forest lands were designated as part of the Wild and Scenic Rivers System within the Shasta-Trinity National forests The designated Wild and Scenic Rivers are shown in **Table III-20**.

Wild and Scenic River Demand. Public demand for existing Wild and Scenic Rivers, as measured through current recreation use, is low to moderate Projected demand for free-flowing rivers, as measured through growing public interest, is expected to increase significantly in the next five decades As more dams and diversions are constructed in the Western States, the availability of Wild and Scenic Riven will decrease Therefore, it is likely that the desire for additional river designations will continue as long as the related concerns of water quality maintenance, fishing habitat protection, and scenic protection remain in the forefront

Management Opportunities

In 1982, the Department of Interior completed an inventory and screening of potential rivers and river segments A total of 134 6 miles of additional rivers within the Forests' planning area were identified under the National Rvers Inventory Public comments on the Shasta-Trinity National Forests' Draft Environmental Impact Statement (DEIS), issued in August 1986, recommended that Squaw Valley Creek also be considered as a potential nver

Field analysis indicates that 10 5 miles of Squaw Valley Creek are eligible for designation Segments of the public also recommended Canyon Creek and Hayfork Creek for designation While these streams were not listed on the Nationwide Rivers Inventory, they total about 21 5 miles and 14 0 miles, respectively, and have been determined to be eligible for designation

Forest personnel have made a preliminary administrative recommendation that will receive further review and possible modification by the Chief of the Forest Service, Secretary of Agriculture, and the President of the United States The Congress reserves the right to designate rivers to the National Wild and Scenic Riven System

A Coordinated Resource Management Plan (CRMP) has been adopted for long term management of the Lower and Upper McCloud River (See Appendix N of the proposed Forest Plan) This agreement is between private landowners, the Forest Service, Pacfic Gas & Electric, Nature Conservancy, CalTrout, and the DFG This plan will effectively maintain the outstandingly remark-

able values ofthis potentialwild and scenic nver If,for any reason, the terms ofthe CRMP are notfollowed and the wild and scenic nver eligibiltty is threatened, the Forest Service will recommend these segments for FederalWild and Scenic designation

A Wild and Scenic Rver Plan has been completedfor the South Fork of the Trinity Wild and Scenic Rver System Plans are still needed for New Rver, North Fork Tnntty Rver, and the Trintty Rver

Future issues relating to ripanan resources will be addressed through implementation of management prescriptions and Forestwide standards and guidelines which deal with water qualtty, fishenes habitat, and scenic resource management Additional formal designations, under a National Wild and Scenic Rven System, may be requiredto more fully addressthese concerns and to bnng into the System more diverse examples of unrepresented ecosystems and physiographic provinces Close coordination with responsible State agencies will be needed

Table III-20
Current and Potential
Wild and Scenic Rivers (Miles)

River Segment	Currently Designated: Wild NFS	Scenic NFS	Ret. NFS	Total NFS	All*	Potential: NFS Only	All*
Beegum Creek Main Fork			-			10.0	10.0
Beegum Creek South Fork					-	7.0	7.0
Canyon Creek				-		17.5	21.5
Hayfork Creek			-		-	11.5	14.0
McCloud River (above dam)			-		-	14.7	24.3
McCloud River (below dam)		-	-			6.1	23.3
New River	7.3	5.0	8.7	21.0	21.0		
Sacramento River						6,1	37.3
North Fork						6.0	6.0
Middle Fork					-	5.4	5.4
South Fork		-				10.2	10.4
Trinity River (main stem)	0.0	5.3	27.9	33.2	111.0		-
No. Fork Trinity (lower section)	12.7	0.0	2.3	15.0	15.0	*	
No. Fork Trinity (upper section)	-	-	-	-	-	11.7	11.7
So. Fork Trinity (lower section)**	19.3	11.8	6.1	37.2	53.0	-	-
So. Fork Trinity (upper section)	-	-	-	-	-	24.8	26.3
Squaw Valley Creek	-	-	-	-	-	10.0	10.5
Virgin Creek	-	-	-	-	-	11.7	11.7
Total	39.3	22.1	45.0	106.4	200.0	152.7	219.4

* Includes National Forest and private lands

** Number per approved South Fork Environmental Impact Statement (for information only)

23. Wilderness and Roadless Areas

Public Issue

One public issue relates to Wilderness and Roadless areas That issue is

How should the Forests' roadless areas be managed, including the Mt. Eddy Further Planning Area? (Public Issue #21)

Discussion of Public Issue

Approximately 498,776 acres, or 24 percent of the Shasta-Trinity National Forests, are Congressionally designated as Wilderness These lands are within the Castle Crags, Chanchelulla, Mt. Shasta, Trinity Alps, and Yolla Bolly-Middle Eel Wildernesses One roadless area, Mt Eddy, was designated for further planning and is evaluated for wilderness classification as a part of the current planning process

The 1984 California Wilderness Act stated that those roadless areas not designated as either wilderness or further planning be managed for multiple use purposes and that they be reviewed again for wilderness when the Forest Plan is revised Most of the roadless areas are designated as habitat conservation area/late-successional reserves for spotted owls and other old-growth forest related species (refer to the discussion in the Wildlife Section)

Current Management Situation

The Wilderness Act of 1964 established a National Wilderness Preservation System to be composed of Federally owned areas designated by Congress as "wilderness" Under the Act, wilderness is defined as "an area where the earth and its community of life are untrammeled by man - where man himself is a visitor who does not remain" It is further defined as "a unit of undeveloped Federal land that retains its primeval character without permanent improvements on human habitation, which is protected and managed to preserve its natural condtions "

Supply. The 1964 Wilderness Act designated the Yolla-Bolly-Middle Eel Wilderness, 36,805 acres of which are located on the Shasta-Trinity National Forests

In the late 1970s, 48 roadless areas were identfied during the roadless area review and evaluation process (RARE II) as potential new wildernesses A roadless area is an area of 5,000 acres or larger that is substantially undeveloped and natural The study of these areas culminated with the passage of the California Wilderness Act (PL 98-425) in 1984

The 1984 Act established the Castle Crags, Chanchelulla, Mt Shasta, and Trinity Alps Wildernesses totaling 461,971 acres In addition, the Act placed the Mt Eddy Roadless Area, containing about 7,720 acres, in a further planning category and released 29 other roadless areas to be managed for multiple-uses other than wilderness during the Plan period (10 - 15 years)

Existing Wildernesses

Castle Crags

This wilderness. located on the Mt Shasta Ranger District, lies southwest of Dunsmuir just off Interstate 5 It contains 10,483 acres, and elevations range from 2,300 to 7,200 feet It shares its southeast boundary with Castle Crags State Park This wilderness is characterized by outstanding and spectacular sheer granite cliffs and spires along an east-west ridge Many small lakes and streams are found in the area Campanula shetleri, a sensitive plant, is found in three separate microsites here The area is bisected in an east-west direction by the Pacific Crest National Recreation Trail (PCT) The area is used primanly by hikers and backpackers

Chanchelulla

The Chanchelulla Wilderness lies in rural Trinity County about 10 miles southeast of the community of Hayfork The area is within the Hayfork and Yolla Bolla Ranger Districts Wth an elevation of 3,200 to 6,400 feet, topography within its 7,800 acres is moderate to steep The natural low flow of local streams offer limited fishing opportunities The summit of Chanchelulla Peak has religious significance for Native Americans (Wintu)

Mt. Shasta

The Mt Shasta Wilderness has 38,560 acres of contrasting topography and is managed for year-long recreation use It lies within the McCloud and Mt Shasta Ranger Districts The wilderness surrounds Mt Shasta from about the 6,000 to 8,000-foot level to its peak (14,162 feet) In

addition to its wilderness designation, the mountain was designated the Mt Shasta Recreation Area by a 1926 Secretary of Agriculture Order, and a National Natural Landmark in 1976 by the Secretary of Interior It has received national publicity for its potential volcanic activity It is an active strato volcano and the second highest mountain in the Cascade Range Formed by periodic volcanic activty over the last 100,000 years, Mt Shasta and its surrounding lands display many unique geologic features including numerous lavaflows, mud flows, seven glaciers, and three waterfalls The area offers a variety of activities including cross-country skiing, mountain climbing and hiking

Trinity Alps

The Tnnity Alps Wilderness is within portions of the Shasta-Trinity, Klamath and Six Riven National Forests This wilderness area has 405,128 acres of contrasting topography and vegetation, elevations range between 2,000 and 9,000 feet The eastern portion of the Alps is characterized by high granite peaks, alpine meadows, and mountain lakes The west side is rugged timbered terrain Unique geologic features include Limestone Ridge, Manzanita Cave and Soldier Creek Cave Major peaks dominate the area More than 528 miles of hiker/equestrian trails are maintained for recreation use About 19 miles of the PCT pass through the area Within the wilderness there is a 3 mile segment of New River and a 14 mile segment of the North Fork Trinity River, both are components of the National Wild and Scenic Rivers System Twelve miles of Virgin Creek, 18 miles of Canyon Creek and 12 miles of North Fork Trinrty are being considered for Wild and Scenic River status Seasonal mining takes place in portions of the wilderness Fisheries and wildlife as well as sensitive plants are important considerations here

Yolla Bolly-Middle Eel

The 146,696 acre Yolla Bolly-Middle Eel Wilderness lies within the boundaries of the Mendocino, Six Rivers, and Shasta-Trinty National Forests (36,805 acres are on the Shasta-Trinrty) Its elevation ranges from 2,600 to 7,863 feet Devils Hole and Buck Creek are extremely rugged although most topography is generally moderate A short segment of the South Fork Trinity River is being considered as an addition to the National Wild and Scenic Rivers Systems

Further Planning Areas

Mt Eddy Roadless Area, containing 7,720 acres, is the only area in this category Areas in the further planning category are to be considered for both wilderness and non-wilderness options during the Forest planning process (See Appendix C for detailed information on Mt Eddy)

Released Roadless Areas

The 1984 California Wilderness Act released 29 inventoried RARE II roadless areas totaling 306,060 acres, to be managed for multiple uses other than wilderness (see **Table III-21**) A brief description of each of these areas is found in Appendix C By law, wilderness designation will not be considered for these areas during this planning cycle

A substantial portion of a number of these areas has been roaded since the RARE II inventory These areas are Bonanza King, Dog Creek, Eagle, East Girard, Salt Gulch, Slate Creek and Wells Mountain

Controversy over the management of 16 of these areas emerged during a public comment period held between August 1986 and January 1987 This public comment period was associated with the previous Draft Environmental Impact Statement (Draft EIS) which was withdrawn Some segments of the public urge intensive resource management in these roadless areas, including road construction and timber harvesting Others support proposals for non-development, such as semi-pnmitive non-motorized recreation prescriptions and/or Research Natural Area designation

These 16 roadless areas contain 167,076 acres Of that total, 74,369 acres have been inventoned as tentatively suitable for timber management The areas contain the following mix of inventoried visual quality objectives (*VQOs* - a classification based on scenic variety class and sensitivity level)

9,900 Acres of Retention
57,070 Acres of Partial Retention
72,260 Acres of Modification
27,850 Acres of Maximum Modification

Demand. Public demand for the existing wildernesses, as measured through recreation use, is low to moderate

Recreation Visitor Days (RVDs) for 1989

Wilderness	RVDs
Castle Crags	8,000 RVDs
Chanchelulla	1,000 RVDs
Mt Shasta	41,000 RVDs
Trinity Alps	181,000 RVDs
Yolla Bolly Middle Eel	3,000 RVDs

Projected demand for wilderness and roadless recreation opportunities is expected to increase significantly in the next five decades

Projected total RVDs (based on RPA disaggregation)

Year	RVDs
1989	234,000
2000	255,000
2010	318,000
2040	372,000

Projected demand for wilderness and roadless recreation opportunities is expected to increase signficantly in the next five decades The 1989 RPA document "**An** Analysis of the Outdoor Recreation and Wilderness Situation in the United States 1989-2040" projects future increases in wilderness demand, based on projected future demand for activities commonly occurnng in Wildernesses Day hiking is projected to increase 193 percent, backpacking 155 percent, general outdoor photography 105 percent, and wildlife observation and photography 74 percent The report goes on to say that increasing environmental concem, needs for biological monitonng, decreasingly available undisturbed spaces, and other trends strongly support a prediction for demand growth of non-recreational uses of wilderness

There are scattered parcels of private land wlthin the Wildernesses Because of potential conflicting resource management objectives. it is desirable to acquire these inholdings There are also conflicts between recreationists and cattle grazing pnmarily related to adverse effects on drinking water sources Trail maintenance has been deferred for many years, therefore, many trails require extensive rehabilitation A number of trails. some built dunng intensive gold mining days and others located for early grazing use, should be closed and/or relocated to reduce safety and erosion problems

Management Opportunities

In the Mt Eddy Further Planning Area, a number of potential uses exists, e g , dispersed recreation, developed recreation, wilderness. research natural area, wildlife and timber management

Opportunities exist to manage the remaining 16 released roadless areas under a vanety of prescriptions which are explained in alternative development Most of these roadless areas are designated as habitat conservation areas/late-successional reserves for spotted owls and other old-growth forest related species (refer to the discussion in the Wildlife Section) The wilderness prescnption would not be used for these areas during this planning cycle

An Environmental Impact Statement and Wilderness Management Plan have been prepared for the Mt Shasta Wilderness Management would focus on restonng and preserving resource conditions while providing a qualrty wilderness experience ***An*** Environmental Assessment and Wilderness Management Plan for the Castle Crags Wilderness and an Environmental Impact Statement and Wilderness Plan for the Trinity Alps Wilderness are also in the process of being prepared Forest personnel are just beginning the planning and environmental documentation process for the Chanchelulla Wilderness The Yolla Bolly-Middle Eel Wilderness Management Plan is being reviewed and updated jointly by the Mendocino, Six Rivers, and Shasta-Trinity National Forests These wilderness management plans would provide specific management direction in support of the general standards and guidelines found in the Forest Plan

Figure III-8
Forest Wildernesses

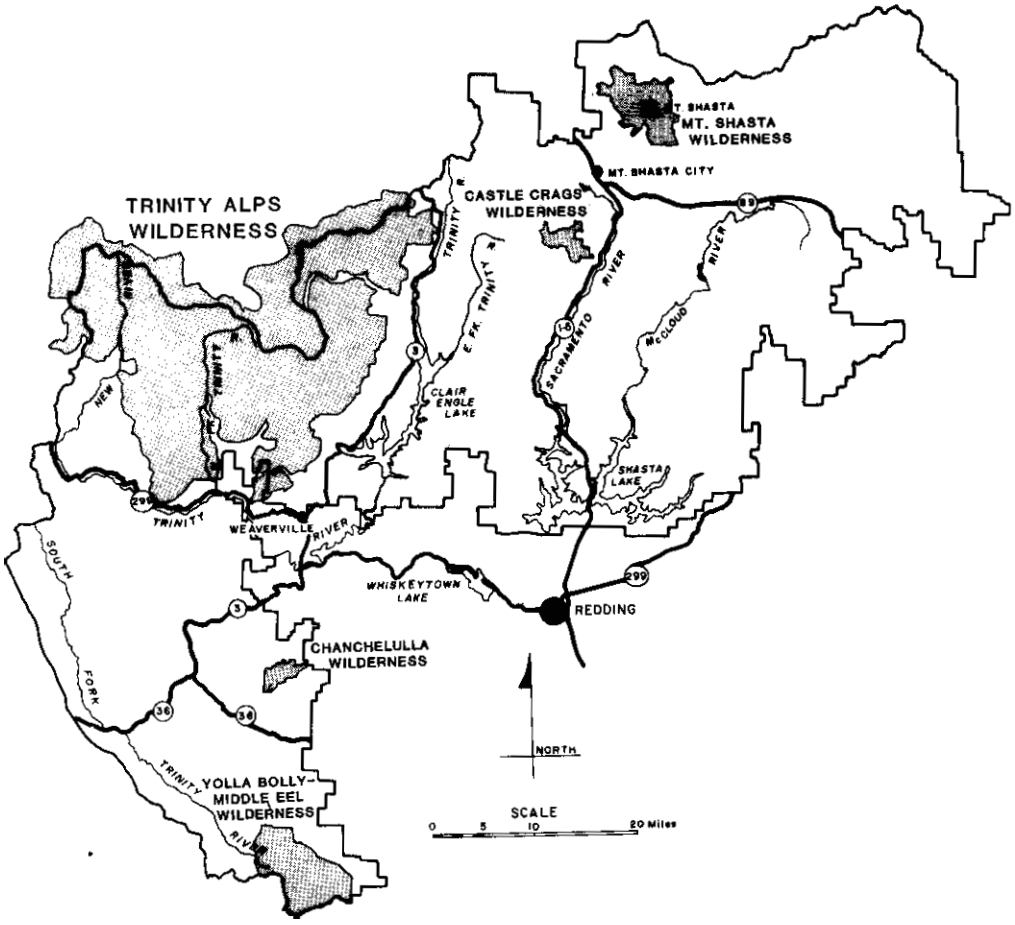


Table III-21
Released Roadless Areas

	Name	Total Acres	Acres Tentatively Suitable for Timber Management
	Backbone	9,976	3,960
	Bell-Quinby B	11,707	6,455
	Bonanza long	16,386	6,219
*	Castle Crags B	1,732	851
*	Chanchelulla	3,865	2,160
	China Springs B	707	413
*	Chinquapin	21,520	13,290
	Cow Creek	23,152	5.557
*	Devils Rock	13,896	9,250
	Dog Creek	5,543	4,919
	Eagle	6,798	3,396
*	East Beegum	7,963	1,274
*	East Fork	5,195	3,041
	East Girard (total acres)	27,914	22,513
*	(Nature Conservancy Portion only)	(226)	(140)
*	Fisher Gulch	4,472	1,437
	Kettle Mountain	4,865	2,590
*	Little French Creek	11,227	2.301
*	Mt Shasta B	2,958	1,734
	Murphy Glade	1.018	980
*	Panther	11,727	2,683
	Pattison	28,326	13,823
*	Penney Ridge	4,844	724
	Salt Gulch	6,657	4,178
	Slate Creek	6.616	6,064
*	South Fork	17,261	5.372
*	Underwood	3,219	2,035
	Wells Mountain	6,144	4,921
*	West Beegum	5,480	1.124
*	West Girard	34,892	15.813
	TOTAL	**306,060**	**149,077**

*Sixteen areas of concern to the public

24. Wildlife (General)

Public issues

Two major public issues focus on wildlife:

1 **How should the Forests' vegetative resources be managed for ecosystem diversity? Special consideration would be given to providing habitats that maintain or enhance populations of threatened and endangered (T&E) species and viable populations of sensitive species and/or management indicators. (Public Issue #2). (Refer to the Biological Diversity and Riparian Area Sections in this Chapter and to the T&E write-up at the end of this Section.)**

There is public concern that a wide variety of ecosystems should be maintained on the Forests to specfically provide for the

a maintenance and/or enhancement of habitats for Federally listed T&E species (plants and animals),

b maintenance and/or enhancement of habitats sufficient to provide for viable populations of all other existing species (plants and animals),

c maintenance and/or enhancement of the Forests' existing ecosystems and the biodiversity (plants and animals) associated with them, and

d maintenance and/or enhancement of special elements or components of these ecosystems (i e , snags, down logs, cliffs, vegetative seral stages, etc)

2 **How much of the older vegetative seral stages existing on the Forests should be retained? (Public Issue #3)**

There is public concern that sufficient amounts of old growth habitats be retained and/or enhanced on the Forests to provide for

a viability of all species (plants and animals) requiring this type of habitat for all or part of their yearly life cycle, and

b sufficient representation and retention of this ecosystem component for the sake of maintaining vegetative biodiversity.

There is also a related issue'

How wide should riparian management zones (RMZs) be and what management activities should be allowed within them? (Public Issue #13). (Refer to the Riparian Area Section in this Chapter.)

Discussion of Public issues

Wildlife Habitat/Ecosystem Diversity. Along with their concern about global warming, ozone depletion, acid rain, and deforestation, people are also concerned about wildlife and plant species The public wants habitat to be retained and restored so that species populations are well distnbuted and maintained at healthy levels

Certain components and types of habitat are important to wildlife breeding and survival Over time, forest management activities have decreased the amount of snags, down logs, hardwoods, and older over-mature forests that are available for wildlie This decrease has led to concerns about the effect this is having on wildlife

The Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted owl (ROD) signed on Apnl 13, 1994 and Interim Forest Direchve (Forest Service Handbook, FSH, *2409* 24) requires implementation of standards for diversity, snags, seral stages, and dispersion for wildlife habitat Although these measures are being implemented to retain some snags, down logs, and older over-mature forests, concern remains that these measures may not be sufficient enough to be beneficial for wildlife

Older Over-Mature Habitat. The public is also concerned about wildlife species that require older over-mature habitat for their survival Older over-mature habitat has declined in the west, and people are concerned about retaining it for themselves and for the wildlife that inhabit it The ROD reserves over 535,000 acres of the Shasta-Trinity National Forests as late-succession reserve for management of "old growth" ecosystems

Current Management Situation

The Forests' diversity of habitats helps provide for the needs of about 370 wildlife species either seasonally or on a year-round basis (Refer to the Biological Diversity Section in this Chapter) The Forests' wildlife are made up of 240 species of birds, 85 species of mammals, and

45 species of reptiles and amphibians The quality and quantity of habitat vanes from optimum for some species to marginal for othen

Alongwrth amphibians, reptiles, birds and mammals, there are hundreds, if not thousands, of invertebrate species of a less conspicuous nature including arthropods (insects, crayfish, spiders, scorpions, ticks, centipedes, and millipedes), and mollusks (clams, slugs, and snails) There is limited data available on the needs and occurrence of these invertebrates In addrtion, very little is known about arthropods or mollusks Therefore, this section will focus only on birds, mammals, reptiles, and amphibians

Development and implementation of the wildlife program on the Forests is a complex and comprehensive effort For ease in understanding the program is displayed and referenced in a five year wildlife program strategy

On National Forest lands, the Forest Service is responsible for managing wildlife habrtat The California Department of Fish and Game (DFG) and the U S Fish and Wildlife Service (USFWS) share the responsibility for managing wildlife populations Because the success of species management is dependent on habrtat and population management, close coordination is required between the three agencies Memorandums of Undemanding outline each agency's roles and responsibilities in this cooperative effort

The Forest Service, including the Shasta-Trinity National Forests, has formed partnenhips with many public groups interested in wildlife and habltat conservation National or local Memorandums *of* Understanding have been developed with the DFG, the Mule Deer Foundation, Defenders of Wildlife, National Wildlife Federation, Rocky Mountain Elk Foundation. National Audubon Society, and many more groups Several on-going partnerships between the Shasta-Trinity and outside organizations are active in conservation programs

The public enjoys wildlife for consumptive (hunting, trapping. etc) and/or non-consumptive (photography, viewing. scientfic study, etc) purposes

Consumptive Species

Generally, consumptive wildlife species can be divided into several groups

Big game – includes black bear (*Ursus amencanus*), elk (*Cervus conadensis),* mule deer (*Odocoileus hemionus*), and wild pig (*Sus scrofo*)

Deer hunting is one of the most popular hunting sports on the Forests The DFG administen the hunting of resident animals. The actual seasons, levels of harvest, etc are regulated by the Califomia Fish and Game Commission (FGC) Together, the DFG and USFWS administer regulations for hunting migratory species

Small game -- includes gray squirrel (*Scaurus griseus*), Douglas squirrel (*Tamiasciurus douglasii*), hares (*Lepus* spp), and rabbits (*Sylvilagus* spp)

Upland game -- includes band-tailed pigeons (*Columba fasciata*), blue grouse (*Dendragapus obscurus*), mountain quail (*Oreortyx pictus*), mourning dove (*Zenaida macroura*), ruffed grouse (*Bonasa umbellus*), turkey (*Meleagris gallopavo*), and Califomia quail (*Callipepla californica*)

Waterfowl --includes ducks and geese (*family Anatidae*), and

Furbearers -- includes bobcat *(Lynx rufus*), beaver (*Castor conadensis),* coyote (*Canis latrans*), and gray fox (*Urocyon cinereoargenteus*)

Non-Consumptive Species

Non-consumptwe species. as well as consumptive species, provide opportunrties for viewing, photography, nature study, and associated experiences of camping. hiking, and boating Most wildlife species are in the non-consumptive category Included in this category are species that are listed as threatened or endangered by the State and/or Federal Government, or as sensitive by the Regional Forester

Management Indicators

The management indicator approach is used to reduce the complexity of discussing all the wildlife species on the Forests Assemblages or groups of wildlife associated wrth vegetative communrties or key habitat components have been identfied and selected as Management Indicators These assemblages were chosen because (a) they represent the vegetation types, seral stages, and special habrtat elements necessary to provide for all wildlife species on the Forests, and (b) their population changes are believed to indicate the effects of management activities on other wildlife populations Management options for the as-

semblages will be directed under the standards and guidelines and implemented through the five year Wildlife Program Strategy. Not all of these assemblages are used as management indicaton for every project, however. (Refer to Appendix G for a complete list of common and scientfic names of the species within the assemblages.)

Assemblages of Management Indicators include:

(I) Late Seral Stage wildlife assemblage:

(2) Openings and Early Seral Stage wildlife assemblage,

(3) Multi-habrtat wildlife assemblage,

(4) Snag and Down Log wildlife assemblage:

(5) Riparian wildlife assemblage,

(6) Aquatic wildlife assemblage,

(7) Hardwood wildlife assemblage,

(8) Chaparral wildlife assemblage, and

(9) Cliffs, Caves, Talus, and Rock Outcrops wildlife assemblage

Each assemblage represents at least one of three categories of management indicaton.

1. **Featured Species --** Species commonly hunted or trapped, or of high value for non-consumptive recreational uses;

2 **Species Habitat Indicators** --Species with specfic and potentially limrtmg habitat requirements that may be significantly affected by Forest management activrties; or species associated wrth special habttat elements; and

3 **Ecological Indicators --** Species whose population parameten can be used to show the environmental condrtions (qualty and quantity) of habitats for other species or ecosystems

A Discussion of the Wildlife Assemblages -- Management Indicators

I. Late Seral Stage Wildlife Assemblage

Many wildlife species are associated with forested habrtats that are in the late seral stages (see Appendix G for a descnption of seral stages) There are three later seral stages included in this assemblage 4a, 4b-c, and 4c-older The average age of these older forest stages is greater than I10 yean, 4c-older (old grow or older over-mature) is greater than I80 yean. These forests have large diameter trees which are at least 2I inches Tree cover and density range from fairly open canopies to dense canopies of multiple layers of trees Older over-mature habttat is included in this category These seral stages are important to wildlife as they provide cover, thermal cover, large trees

Table III-22
Wildlife Assemblages and the Management Indicator Category

	Wildlife Assemblage	Category
I	Late Seral Stage.	Ecological Indicator
2,	Openings and Early Seral Stage	Ecological Indicator
3.	Mulb-Habitat	Featured Species
4.	Snag and Down Log	Habrtat Indicator
5.	Riparian	Habitat Indicator
6	Aquatic	Habitat Indicator
7	Hardwood	Habrtat Indicator
8	Chaparral	Habitat Indicator
9.	Cliffs, Caves, Talus, and Rock Outcrops	Habrtat Indicator

for nesting, large snags and down logs, vertical diversty, older over-mature habitat, etc

Forested habitats are managed indirectly through application of standards and guidelines for such things as snags, hardwoods, and seral stages Current management policy is to maintain sufficient seral stage diversty, including 4c-older seral stage, to maintain viabilty of the wildlife species associated or dependent on these later stage habitats (refer to Forest Service Handbook [FSH] 2409 24)

At least 15 percent of each forest type is maintained in these three later seral stages Five percent or more is maintained in the 4c-older stage At least five percent is maintained in the 4a stage which has a fairly open canopy Five percent or greater is maintained in the 4b-4c stage which has a moderately dense canopy closure of at least 40 percent Along with these requirements, reserved areas such as wilderness, wild and scenic rivers, research natural areas, and spotted owl habitat conservation areas/late-successional reserves have some late seral forest diversity which provides habitat needed for species dependent or associated with older over-mature forests

Through forest management activrties, the later seral stages and the wildltfe species assemblage associated wrth them need to be monitored Some species represented in this assemblage are northern spotted owl, goshawk. fisher, marten, Trowbridge shrew, and Northern flying squirrel

2. Openings and Early Seral Stage Wildlife Assemblage

Meadows, shrublands, and early forest seral stages provide diversity within the forest landscape Natural openings are maintained to provide wildlife habitat Early forest seral stages are created through even-aged timber management activities These openings are temporary as they grow into older conifer plantations Other openings are created in a mosaic pattern over the forest landscape At least five percent of the Forests is maintained in meadows, shrublands, and young grass/forb plantations Another five percent is maintained in plantations of shrubs, seedlings, and saplings (refer to FSH 2409 24 for standards and Appendix G for description)

Many wildltfe species are associated with or dependent upon openings Openings are a unique habrtat among forest stands They provide forage areas for some big game species and habrtat for small birds and mammals which, in turn, become prey species for carnivores

Through forest management activities, there is a need to monrtor the openings. early seral stages, and the wildltfe species assemblage associated with them Some species represented with this assemblage are the racer, western meadowlark, Callfornia quail, song sparrow, western harvest mouse, brush mouse, brush rabbit, California vole, and deer

3. Multi-Habitat Wildlife Assemblage

Some wildltfe species depend upon a vanety of vegetated habrtats, seral stages, and special habitat components Their needs may vary from winter to summer, from night to day or during breeding season, for example A number of harvest species are represented in this multi-habitat assemblage black bear, mule deer, elk, and turkey With forest and specific habrtat management, there is a need to monitor these species and the habitat attnbutes of the assemblage

Black Bear - The black bear is a big game species found throughout the Forests Between 300 and 400 of them are harvested annually Bear harvest is regulated by the State. Black bear are extremely vulnerable to hunting and poaching in well roaded areas Black bear require a diversity of habrtats to provide for their diet and hibernation needs Oaks and berry producing shrublands are especially important

The year-round need of bears is provided partially by management direction for down logs, openings. early seral stages, caves, and by additional requirements for vehicle access management

Bear and people have had encounters at some campgrounds on the Forests These encounters are significantly greater during years of drought when forage becomes scarce The problem is being partially resolved through better trash management and education of the visrting public

Because of the demand for bear hunting, there is economic value associated with bear management Bear; around campgrounds also result in increased costs to recreation management

Mule Deer- Two sub-species of mule deer live in the Forests Rocky Mountain mule deer (*O h hemionus*) and black-tailed deer (*O h columbianus*) These deer interbreed Generally, in the extreme northeast corner of the Forests, some deer genetically appear to be Rocky Mountain mule deer On the rest of the Forests, the deer appear to be black-tailed mule deer. Because of the confusion over

sub-species, the deer on the Forests are referred to at the species level, mule deer

Deer are found throughout the Forests and their popula- [illegible] is estir[illegible] d t[illegible] b[illegible] 62,000 Suitable range and habitat is available [illegible] th[illegible] deer p[illegible]p[illegible]la[illegible]n Between [illegible]000 [illegible] [illegible]0C [illegible] are harvested annually Deer numbers are capable of sustaining a much higher harvest particularly on th[illegible]ity [illegible] t[illegible] wev[illegible]; the ty[illegible] timing, and duration of the hunting season is not conducive to heavier harvests

Deer are managed under four separate deer herd management plans in cooperation with the DFG Hayfork, McCloud, Weaverville, and Yolla Bolly *Also*, the counties exercise deer management authortty via Sections 458 and 459 of the Fish and Game Code of California Under this authority the Boards of Supervisors have veto power over any doe hunts in their respective county

Deer herd management plans identify general herd and habitat management goals Management for deer includes both direct and indirect management

Direct management consists of water developments, fencing of riparian areas, prescribed buming of chaparral, road closures, and administrative vehicle control areas dunng hunting seasons In addtion, selected bitterbrush areas are specifically managed for deer on the McCloud Flats and in the Military **Pass** area on Mt Shasta District. Browse improvements on winter range habitat also occur Financing for these projects comes directly from Forest Service funds, DFG (Hill Bill), partnership contributions (Mule Deer Foundation), and county fines monies (administered by County Board of Supervisors)

Indirect habitat improvement occurs through coordination with other resource programs Over time, coordinated resource planning results in the management of key habitat elements for deer Direction is provided for hardwood retention and seral stage diversty to beneft deer.

Deer poaching is a problem in some areas on the Forests This problem is being addressed in transportation planning for large projects, and measures are being taken to reduce overall road density During the deer hunting season, a road closure area is established to decrease disturbance to deer and increase the quality of hunting This multi-Forest coordinated closure is being considered for expansion by private landowners in the McCloud area.

Deer hunting boosts the local economies during hunting season Addtional discussion on the economic value of deer is found later in this section under "Economics. Supply and Demand"

Elk - Historically, elk were native to this area By the late 1800's elk were no longer believed to be present on the Forests Rocky Mountain elk were reintroduced in 1916 near what is now the east-side of Shasta Lake. **A** small herd of Roosevelt elk was reintroduced onto the Klamath National Forest north of the Trinity Alps in 1990. The herd is expected to grow larger in the future and may expand into habitat in the northern Tnnity Forest Elk have also been observed on the McCloud Ranger Distnct These sightings could be members of the Shasta Lake herd or Grass Lake herd from the Klamath Forest The Grass Lake herd became established several miles north of Mt Shasta after emigration from Oregon The Shasta Lake elk herd is hunted under a permit system (10 permits per year)

Elk occupy about 150,000 acres of habtat mostly on the Shasta Lake District. Meadow restoration projects have begun through cooperative efforts with the Rocky Mountain Elk Foundation. Another 280,000 acres of potentially suitable habitat needs to be analyzed and considered for reintroductions and elk herd expansions in the Trinity area

Turkey - Merriam's turkey populations expanded onto the Shasta Lake Distnct after they were introduced to Shasta County in the 1960's The population is estimated at about 4,000 Turkeys now inhabit about 250,000 acres around Shasta Lake east of Interstate 5 Another 80,000 acres, in other portions of the Forests, can be managed for introduction of them Reintroduction efforts should be analyzed in cooperation with the Wild Turkey Federation.

1 Snag and Down log Wildlife Assemblage

Snags and down logs are components of decadence and are diversty requirements for many wildlife species. Past timber management practices have eliminated a large portion of this resource The current management practice is to maintain sufficient large snags and logs for the wildlife species requiring this key habitat component. (Refer to the FSH 2409 24 for the standards.)

There is a need to monitor the impacts that timber and fire management activities may have on the snag and down log components and the wildlife assemblage associated with them Some species represented by this assemblage are long-toed salamander, rubber boa, pileated woodpecker, black bear, westem screech owl, pygmy owl, sawwhet owl, and tree swallow

5. Riparian Wildlife Assemblage

Nationwide, there is an increased emphasis on riparian management Riparian vegetation is dependent on a high water table Within ripanan areas are a wide diversity of plant and wildlife species Many wildlife species are dependent on this habitattype and adjacent vegetation With the dense canopy providing cover, shade, and cooler temperatures, npanan forests provide comdors. connective habitat, and migration routes

Timber and range management activities can impact ripanan areas through changes to habitat and change in plant species composition This habitat can also be affected by the removal of surrounding canopy and increasing air and water temperatures Roads, trails, and campgrounds within npanan areas can also alter this habitat Current management direction from the ROD is to provide ripanan reserve areas ranging from 150 to over 300 feet in width for each side, depending on site conditions for all streams, lakes, ponds, reservoirs, and wet areas In addition, the use of Best Management Practices (BMPs) helps provide for water quality protection

Because of the emphasis placed on ripanan management and the significant use this habitat receives by wildlife, the npanan wildlife assemblage should be a management indicator The riparian assemblage would represent species using the terrestnal vegetation of the nparian zone With timber, range, and recreation management activities, there is a need to monitor the riparian areas and the wildlife species assemblage associated with them Wildlife species dependent on various nparian habitats will be monitored to determine the impacts of Forest Service management activities Some species represented by this wildlife assemblage *are* California red legged frog, black salamander, yellow warbler, willow flycatcher and fisher

6. Aquatic Wildlife Assemblage

There are several large reservoirs, and many lakes, rivers and streams within the Forests Along with fish, many wildlife species are dependent on water for their living or fish for their diet Current management direction is to manage nparian reserves of a minimum 150 feet along perennial streams and lakes, a minimum 300 feet along all perennial fish-bearing streams, and a minimum 100 feet along all seasonally flowing or intermttent streams, wetlands less than 1 acre, and unstable and potentially unstable areas The use of BMPs also helps provide for water quality protection Aquatic systems are managed to meet the goals and objectives of the Aquatic Conservation Strategy of the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl

Aquatic dependent wildlfe rely on good water qualrty, adequate water quantity, nparian and forested cover, fish or aquatic insects, and large woody debns These wildlife can be grouped within an aquatic wildlife assemblage Some species represented by this assemblage are tailed frog, western pond turtle, bald eagle, nver otter and water shrew A partnership with Duck's Unlimited can be established to manage areas for ducks, shorebirds and other aquatic dependent wildlife

7. Hardwood Wildlife Assemblage

Hardwoods are found throughout the Forests either in pure stands or as individual trees in conifer forest types (see the Biological Diversrty Section in this Chapter) Wildlife species use hardwoods for forage, nesting, and shelter Acorn production from the oaks is especially important as a food source Many hardwood species are bund on sites that are unsuitable for management activities, so there is ltde likelihood they will be signficantly altered by timber management practices Some hardwoods, such as black oak, can be found on sites suitable for timber production

Hardwoods are managed for sustainablity on a landscape basis to meet desired future ecosystem conditions

Hardwoods have a high value to wildlife Some species represented by this assemblage are acorn woodpecker, scrub jay, evening grosbeak, white breasted nuthatch and Hutton's vireo

8 Chaparral Wildlife Assemblage

Chaparral is the general name given to a diverse combination of shrubs that provide habitat for many wildlife species Chaparral is maintained as a shrubland It is also included within the early seral stage category Through time, plantations cycle from the early seral stage to the later forested seral stages

Chaparral habitat is important for a vanety of wildlife Yany rodents inhabit chaparral, and deer and other herbivores find forage here Chaparral can vary in elevation, and can provide winter range, summer range, escape cover and fawning areas for deer The shrubs provide flowers, seeds, and leaves for birds in addition to providing cover and nest sites

With chaparral and species habitat management, there is a need to monitor chaparral and the wildlife species in its assemblage Some species represented by this assemblage are bushtit, green-tailed towhee, wrentit, and mountain lion

Prescribed burning of selected shrublands is the major form of chaparral management on the Forest The majority of this work has been accomplished for the enhancement of forage for deer Prescribed buming creates a mosaic that benefts many other species inhabiting the chaparral community

9. Cliffs, Caves, Talus, and Rock Outcrops Wildlife Assemblage

Cliffs, caves, talus, and rock outcrops are geologic features that provide unique habitat for wildlife. These features provide nesting, denning, and shelter, and they are managed on a site-by-site basis Some sites are considered as special features and are managed for their protection Because of rough, broken terrain and less vegetation, these features are normally undisturbed For example, cliffs and talus are avoided by construction activities Some species represented by this assemblage are Shasta salamander, canyon wren, peregrine falcon, and Townsend's big eared bat

Economics: Supply and Demand

Current Supply-Demand Situation. Game species on the Forests provide hunting opportunities for local sport hunters from Klamath, Lassen, Modoc, Shasta, Siskiyou, Tehama, and Trinity Counties Hunters from as far south as the Los Angeles Basin, as well as the states of Oregon and Nevada, also frequent the area Expenditures by the sport hunting public are an importantsource of income for local businesses and contribute significantly to the economy of local counties

There are an estimated 282,000 consumptive, wildlife user days (WUDs) on the Forest In order of highest to lowest are big game hunting, upland game, small game, trapping (furbearers), and waterfowl hunting The estimated value of these WUDs is $16,474,000 Pnmary consumptive species are mule deer, black bear, quail, wild turkey, band-tailed pigeon, and gray squirrel

Based on the total number of hunters and hunting licenses sold between 1981-1989, demand for consumptive use in Northern Callfornia, for most ofthe above species, has steadily decreased at an average rate of3 percent per year. The demand for high quallty (high success rates) deer hunting remains unfilled. This is evidenced by the number of hunters applying for special hunts in the north state Also, the demand for turkey huntingis continuing to grow Shasta County is the turkey hunting center for the State

It is estimated thatthere are between 20,000 and 30,000 deer hunters on the Forests each year. Small and upland game hunters combined are estimated at 30,000 The total number of trappers is unknown, but proportioning out the reported harvest results in a value of $50,000 per year being taken in pelts of various furbearers

Non-consumptive use and demand on the Forests nearly equals that of consumptive use The monetary value, though, is much higher at $37,250,400 Current demand for non-consumptive species is primarily in the form of observation, nature study, photography, and so on Bird watching is one of the most popular and widespread hobbies There are many outdoor recreation and wildlife groups, based out of Redding and Mt Shasta, that enjoy wildllfe viewing and study on the Forests. With the current high use and expected increase in the use, there is a need to develop wildlife viewing sites and interpretation on the Forests

Future Supply-Demand Situation. The demand for consumptive species (hunting, trapping, etc) is expected to decrease The 1990 RPA program predicts a six percent decline in big game hunting and a 17 percent decline in small game hunting The demand for high qualty (high success rate) deer hunting will continue

The demand for non-consumptive use of wildlife species on the Shasta-Trinity National Forests is increasing at a faster rate than consumptive use and may result in protective legislation and allocation of habitats Nation-wide non-consumptive use is increasing signlficantly The 1990 RPA program predicts an increase of over 150 percent in 50 years

Management Opportunities

There are many opportunities to manage habtat and ecosystem diversity Wildlife habitats are managed through project design, habitat improvements, protection, and mitigation Wildlife habitats are also managed through application of standards and guidelines for riparian areas, mags, down logs, hardwoods, and seral stages, for example

Several habitat improvements are needed on the Forests to benefit avanety of species There is an opportunity to increase the viewing and hunting possibilities for the featured hunted species deer, bear, elk and turkey Water, as a drinking source, has a low availability and poor distribution, especially during a drought cycle Guzzler installation, spring development, riparian improvements and closures can help meet drinking water needs Prey and vegetative forage needs to be maintained or increased in chaparral, hardwood, and conifer forest communities Prescribed fire or crushing of decadent browse, orchard pruning, oak thinning, etc will improve food availablity, abundance, variety, and nutritional value

Two emerging programs are the Watchable Wildlife and Neotropical Migrant Bird Programs The Watchable Wildlife Program emphasizes increasing the access, interpretation, and education for public enjoyment of viewing, nature study, and photography of wildlife The goal of the Neotropical Migrant Bird Program is to maintain. enhance, and restore declining populations of these birds The need and Opportunity exists to determine the status and possible causes *of* population changes *of* these migrant birds Mapping habttat changes, bird banding, and breeding bird surveys will help determine the status and changes There is also an opportunity to market the species, habitat, and program for Watchable Wildlife and Neotropical Migrant Birds Creation of view srtes, viewing pamphlets and brochures, news releases, magazine articles, local presentations, etc , can be used to promote the enjoyment of wildlife viewing and nature study opportunities *An opportunity* exists to increase partnerships with civic, recreation, and conservation groups interested in these species

Several funding sources are available for habitat management program management funds, challenge cost share funds, partnership contributions and Knutsen-Vandenberg (KV) funds The opportunity to manage habitat beneficially is increasing because of the increased emphasis on wildlife Funding has increased in the challenge cost-share/partnership programs During the past several years between $100,000 and $300,000 worth of wildlife associated work has been accomplished annually under the Forests KV program

There is also an opportunity to increase the wildlife habitat management program through increasing partnenhips with other agencies and sports groups Currently about 2,000 acres are receiving benefits from partnerships with private. state and Federal agencies *An* addrtional 1,500 acres of direct habitat improvement (i e , prescribed burns) and 5-10 structures (guzzlers, bamcades. etc) are also being constructed.

Even though there will be a decrease in the volume of timber harvested. there will remain a high need and opportuntty for mrtigation, enhancement, and protection The need and opportuntty to implement the deer herd management goals and objectives will continue The need and opportunrty to implement the Trintty River basin wildlife management plan for riparian and upland habrtats will also continue

The potential exists to manage a substantially larger wildlife program on the Shasta-Tnnrty National Forests The number of acres and structures completed annually could increase significantly over the present There is an opportunity to stock other areas with elk and turkey transplants With the growth of existing and stocked populations of elk and turkey, there will be an opportunity for increased viewing and hunting *of* these species Along with elk, turkey, and deer, there is a need and opportunity to manage habitat (berry fields, down logs, den srtes) for bear

Wildlife habrtat is affected not only by the amount of timber harvested, but by the type of harvest as well The harvest effect on habitat successional stage may be either positive or negative depending upon the species habttat requirement Opportunities exist to minimize the negative effects and to accentuate the positive through consideration of wildlife habitat requirements dunng compartment and project planning

There are standards for maintaining later forest seral stages (including older over-mature habitat) for wildltfe There is an opportunity to design land allocations and prescnptions to benefit wildlife habttat, including older over-mature habitat associated species Alot of the Forests' land base is wrthin current management allocations (wildernesses, wild and scenic nvers, research natural areas, and late-successional reserve areas, and riparian reserve areas) to be managed for the benefrt of the later seral stage habrtat There is also an opportunrty to implement standards for hardwood management, snags and down log density, and management of meadows, wetlands and npanan areas *for* wildltfe beneft

Road construction is also a wildlife management concern The effect of new roads is two-fold First, there is a reduction of habltat as vegetation is removed for right-of-way clearing Second is the increased use of the newly roaded area by recreationists Recreation vehicle traffic and other dispened recreation activities increase near the roads Through consideration of wildlie habttat needs in planning for roads and through temporary or permanent closure of roads, impacts can be minimized Road density needs to be decreased to lessen wildltfe disturbance and harassment Seasonal or permanent road closures and

managing road traffic through design and maintenance can be done to decrease access. An opportunty exists to expand the McCloud Flats seasonal road closure onto private lands

The developments on lands of intermingled ownership within the Forests is another wildlife concern Not only is there potential habitat loss from vegetation removal, but disturbances reduce the effectiveness of this land and the surrounding land as habitat. This is a particular concern with regards to deer herds, Availability of winter range is a limiting factor to deer herd size When deer herd winter range is on private land that has potential for development, the biological potential becomes limited on National Forest land Opportunities exist to lessen this impact through acquisition or exchange for lands that are key wildlife habtats

There is a need to monitor the implementation and effectiveness of standards and guidelines, management prescriptions, projects, etc The wildlife assemblages will be used as management indicators and some of them will be monitored A monitoring and implementation plan is needed to guide the wildlfe program accomplishments There is a need to verify management assumptions, models, prescriptions, and concepts Other opportunities and needs are to upgrade the Geographic Information System (GIS) technology and application, increase use of the ecosystem approach, gain additional data on species population levels and habitat conditions, and use an ecosystem approach for land stewardship

Future management direction should reflect a need to maintain special habitats, habitat components, and distribution of habitats while maintaining viable populations of all wildlife species

Threatened, Endangered, and Sensitive Wildlife

Public Issues

There is one public issue which focuses on threatened, endangered, and sensitive animals It is

How should the Forests' vegetative resources be managed for ecosystem diversity? Special consideration would be given to providing habitats that maintain or enhance populations of threatened and endangered (T&E) species and viable populations of sensitive species and/or management indicators. (Public Issue #2)

There is also one related public issue

How much of the older vegetative seral stages existing on the Forests should be retained? (Public Issue #3)

Discussion of Public Issues

Nationwide there has been a reduction in certain fish, wildlife, and plant species due, in part, to pesticide contamination, excessive timber harvesting, reduction in water quality, and a reduction in the quantity and quality of available habitat This reduction has resulted in placing certain species on Federal and/or State lists of threatened and endangered (T&E) species The US Forest Service has management authority only over those elements related to habitat alteration on National Forest lands

Forest management activities can alter the amounts of available and suitable habitats such as older over-mature stands (old-growth) or special components of such stands (snags and dead/down material) In addition to direct alterations of habitat, the potential exists for indirect disturbance from noise and vehicle and people harassment

Current Management Situation

Policy direction for the Forest Service is to manage "habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain viable populations of such species" Forest Service activities and programs are to assist in the recovery of T&E species and to avoid actions that may cause a species to become threatened or endangered.

State/Federal Lists. Various species "lists" are maintained by the US Fish and Wildlife Service (USFWS), the U.S. Forest Service, and the State of California There is considerable overlap between the species found on the State and Federal lists, however; neither *list is* identical

Both the Federal Government and State of California maintain "threatened" and "endangered" species lists (as authorized by the Endangered Species Act of 1973 and California Endangered Species Act of 1984, respectively)

Generally, a 'threatened species is one which is likely to become endangered within the foreseeable future An "endangered" species is one whose prospects of survival and reproduction are in immediate jeopardy

The Federal Government also maintains a list of "candidate species" which are species that, in the opinion of the USFWS may become threatened or endangered The "candidate species" includes two categories, (1) those species which the USFWS has substantial information about to support the listing and (2) those species which the USFWS has inconclusive information about that is necessary to support a listing

Management direction for Federally listed threatened and endangered species is in individual species recovery plans or local territory management plans All projects in the vicinity of habitat essential to the survival of these species are evaluated for their potential effect on the species and/or its habitat If necessary, modfications are made to the project to eliminate any possible negative impacts

Many times the reason for the decline of a species is outside the control of the Forest Service Migratory species, such as the bald eagle and peregrine falcon, and their prey species. were subjected to pesticide contamination after World War II This contamination, from sources outside the Forests, led *to* their low population levels and eventual listing as endangered Since the nationwide ban of DDT in 1972, populations of bald eagles and peregrine falcons have been increasing

The State also maintains a list of "rare" plants, as authorized under the Native Plant Protection Act of 1977 These species are not threatened with extinction, but their numbers are so small that they may be endangered if their habitat is degraded (Refer to the Botany Section)

In addition to the Federal and State listed T&E species, the Pacific Southwest Region (Region 5) has designated certain animal and plant species as "sensitive" These include species requiring special management considerations due to low or unknown population numbers and/or the potential for their habitats to be degraded State listed threatened, endangered, and rare species may also be included in this category As new information becomes available, the sensitive species list is updated according to Forest Service direction

Policy direction for sensitive species is to "implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions" The Regional Forester's "sensitive" species list includes 42 plants, 2 birds, 2 mammals, and 1 fish for the Shasta-Trinity National Forests (Refer *to* **Appendix G** for a listing of threatened, endangered, and sensitive species found on the Forests).

Management Indicators

The management indicator approach is used to reduce the complexity of discussing all wildlife (some 370 species) on the Forests Certain assemblages or groups of wildlife have been identified and selected as management indicators These assemblages were chosen because (1) they represent the vegetation types, seral stages, and special habitat elements necessary to provide for all wildlife species on the Forests, and (2) their population changes are believed to indicate or represent the effects of management activities on other wildlife populations

Six of *the* Forests' threatened, endangered, and sensitive (TE&S) wildlife species have been selected as management indicaton and will be discussed in more detail throughout the document. The management indicaton that are not TE&S were discussed at the beginning of this section **Table III-23** lists the TE&S species by category Those categories are defined as follows

Recovery Species -- Species identified for population increases because they are on a State or Federal threatened or endangered species list

Species Habitat Indicators -- Species with specfic and potentially limiting habitat requirements that may be significantly affected by Forest management activities (may include Forest Service sensitive species)

In addition to the above, the USFWS has identified seven category 2 species known to live in the Forests These species include (1) the California red-legged frog (*Rana aurora draytoni*), (2) Pacific western big-eared bat (*Plecotus townsendii townsendii*), (3) California wolverine (*Gulo gulo luteus*), (4) White-footed vole (*Arborimus albipes*), (5) Franklin's bumble bee (*Bombus franklini*), (6) Siskiyou ground beetle (*Nebria gebleri siskiyouensis*), and (7) the Klamath Mountains ground beetle (*Nebria sahlbergii triad*)

Other sensitive/State threatened species include the Sierra Nevada red fox (*Vulpes vulpes necator*), Shasta salamander (*Hydromantes shastae*), and the Trinity bristle snail (*Monadenia setosa*) These species were not selected as management indicators, and, therefore, will not be discussed in this document

I. Threatened

Northern Spotted Owl (NSO). The spotted owl was listed as a threatened species by the USFWS on July23, 1990 The NSO prefers dense stands of mature, mixed confer and Douglas-fir However, recent surveys have indicated some variance in their habitat use Habitat capability is thought to have been reduced through forest management practices that benefit early and mid seral stage habltat Because of the concern overviabilrty for the NSO and other species which prefer this type of habitat, the NSO is an important species for management within the late seral stage assemblage

Based on habitat capabilty estimates and increased inventory efforts, the Forests provide habitat for about 142 nest sites and/or reproductive pain (1991) Timber type mapping indicates the potential may exist for additional nesting sites and/or breeding pairs The potential exists to provide habitat for about 200 reproductive pairs over time

Historically, because of other demands for the resources found in spotted owl habtat, special management considerations were needed to maintain species viability In 1982, a network of 72 spotted owl habitat areas (SOHAs) was established for the NSO according to direction provided in the "Regional Guide for the Southwest Region" This network, approved by the Regional office in January 1982, was spread across the Forests wherever existing habitat or potential habitat occurred within the species' native range. The network was tied in with adjacent Ranger Districts, National Forests, and Forest Service Regions from Washington to Northern Calfornia

Wherever possible, network sites were located where known pairs existed SOHAs were placed to reduce as many potential conflicts with other resources as possible, while still meeting the needs of the owls (i e in wildernesses, riparian areas, research natural areas [RNAs], highly unstable areas, etc). Not all known spotted owl pairs and suitable owl habitak were placed in the network The intent was to provide habitat "to support an adequate number of reproductive individuals and to distribute the habitat in such a way that those individuals could interact with othen on the Forest(s)"

A major consideration was to manage for NSOs throughout their entire historic range To do so it was necessary to establish some habitat areas in places where insufficient habitat existed because *of* checkerboard land ownership, environmental limitations on vegetation, past wildfires, or past management practices

The Shasta-Tnnrty National Forests' matrix consisted of 72 SOHAs The Forests' goal was to provide 1,000 acres of suitable owl habitat in each territory Thirteen of the 72 natnx territories were unavailable for timber harvest (i e , :he existing Shasta Mud Flow RNA and five Wildernesses)

Table III-23
Threatened, Endangered and Sensitive Species

Species	status		Category
Peregrine Falcon (*Falco peregrnus*)	FE	SE	Recovery Species
Bald Eagle (*Haliaetus leucocephalus*)	FE	SE	Recovery Species
Northern Spotted Owl (*Strix Occadentalis*)	FT		Recovery Species
Marbled Murrelet (*Brachyramphus marmoratus*)	Fr		Recovery Species
Willow flycatcher (*Empidonax trailii*)	FS	ST	Species Habitat Indicator
Goshawk (*Accipiter gentilis*)	FS		Species Habitat Indicator
Pacific Fisher (*Martes pennanti*)	FC2	FS	Species Habrrat Indicator
Marten (*Martes americana*)	FS		Species Habitat Indicator

FE = Federally listed endangered; FT = Federally listed threatened, FC2 = Federal candidate 2; FS = Federal sensitive; SE = State listed endangered, ST = State listed threatened.

Twelve matrix territories were unsuitable for timber production (i e , inner gorges, wild rivers, the Shasta Unrt of the NRA, and proposed RNAs) Twenty matrix terrrtories had less than 2,000 acres of existing and potential habitat Therefore, the only option which was considered on 1,000 acres of suitable habttat and 650 acres of replacement habrtat on the above 45 matrix territones was no scheduled timber harvest The remaining 27 matrix terrrtones were managed for timber harvest

The NSO was petrtioned for listing in 1989 AS a result, the Interagency Spotted Owl Scientific Committee (ISC) was established wrth the charge of developing a long-term management plan for the NSO In May 1990 the final report, A Conservation Strategy for the Northern Spotted Owl (Thomas et al 1990), was released This document determined that the SOHA management plan would be ineffective in providing long term viability for the species Therefore, the Conservation Strategy developed habitat conservation areas (HCAs) centered around concentrations of known pairs and blocks of contiguous nesting/foraging habitat throughout the range of the species Four different types of HCAs (categories 1, 2, 3 and 4) were identified and delineated Each category of HCA was based on the number of existing and future expected pairs of owls The Shasta-Trinity National Forests have all or portions of 22 category 1, 2, and mapped 3 HCAs containing approximately 529,800 acres of National forest lands

In addrtion, this strategy identified the need for linking blocks of habitat by maintaining vegetative attributes necessary for dispersal across the forest landscape These dispersal attributes are referred to as the 50-1 1-40 rule This rule established a quarter-township as the unit of analysis and states that "for every quarter-township, timber harvest shall be permitted only when 50 percent of the forest landscape consists of forest stands with a mean diameter at breast height (dbh) of 1 1 inches and a canopy closure of 40 percent"

In addrtion to the areas identified by the ISC Committee, the USFWS designated critical habrtat for the NSO on January 1 5, 1992 While most of this habttat overlaps the previously identified HCAs, there were 121,509 additional acres identified outside of HCAs

The Forest Service issued a Record of Decision for the Final Environmental Impact Statement (FEIS) on Management for the Northern Spotted Owl on March 3, 1992 The FEIS was updated and amended as a result of a court order

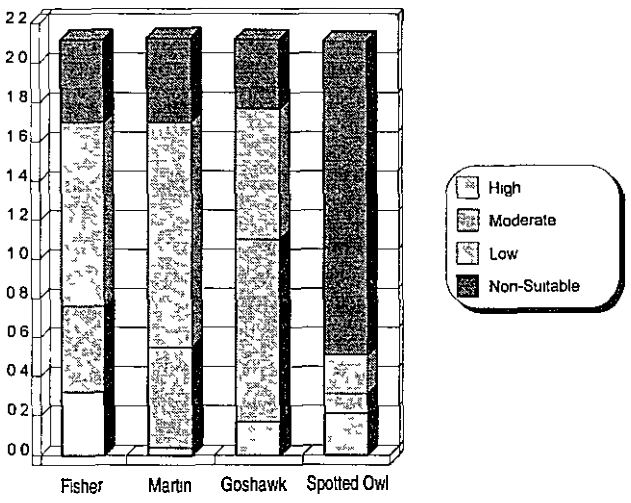
The Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Wrthin the Range of the Northern Spotted Owl (ROD) was issued for the Final Supplemental Environmental Impact Statement on April 13, 1994 by the Secretanes of Agriculture and Interior The ROD established a system of late-successional reserves that incorporate most of the former system of HCA's but permit management activities that benefit late-successional habitat In addrtion the 50-11-40 Rule was replaced wrth a strategy establishing a system of corndors along ripanan areas and green tree retention requirements within matrix areas to meet dispersal requirements

Based on habitat capability models, it is estimated that there are about 31 1,000 acres of high and moderate suitable habitat on the Forests (See **Figure 111-9**) This is defined by seral stages 4c and 4c-older using existing vegetative maps

The Forest Service in Caltfornia, Oregon, and Washington is involved in a research, development, and assessment (RD&A) program for spotted owls In this program long-term research will identify, more precisely, the habrtat needs of the NSO In addition, the the ROD identifies the need to prepare analysis and plans for late-succesional reserves

Spotted owls are closely associated with older over-mature forests, so in order to understand the owl, it is necessary to study its specrfic older over-mature habrtat

Figure III-9
Suitable and Non-Suitable Habitat for Selected Sensitive Species (Million Acres)



requirements Studies of the owl's home range, habtat requirements, birth rates, dispersal, survival, and population-prey relationships are providing insight into the physical and biological charactenstics needed to support this species

Owl studies are also underway in second-growth stands to try and determine whether these stands can be silviculturally treated to make them suitable for owls This understanding can provide a basis for developing silvicultural approaches to timber management that maintain this older over-mature associated species and protect long-term timber production

Marbled Murrelet. On September 28, 1992, the North American subspecies of the marbled murrelet (Brachyramphus marmoratus) was listed as a threatened species by the USFWS

The marbled murrelet is a small sea bird of the Alcidae family Its normal range extends from British Columbia south through Washington, Oregon, and Central California

Marbled murrelets feed primarily on fish and invertebrates near shore marine waten, and the majority of them are found within or adjacent to the marine environment

They spend the majority of their lives on the ocean, however, they come inland to nest in larger, older trees Some have been observed nesting inland up to 50 miles in Washington and up to 30 miles in Northern Caltfornia

Portions of the Trinity National Forest fall within 35-50 miles from the coast and have the potential to provide suitable nesting habitat As of November 1, 1992, there had been no verified sightings and/or nests on the Forests

2. Endangered

Bald Eagle. The bald eagle is listed as endangered by State and Federal Governments Bald eagles in the Western United State are being managed under the guidelines of the Pacific Bald Eagle Recovery Plan (1986) The recovery plan divides the western states into 47 management zones with each zone assigned a recovery target based on capability and historic eagle distribution The Shasta-Trinlty falls within all or portions of three zones, California/Oregon Coast (zone 23), Shasta/Trinity (zone 24), and Pit River (zone 25)

Eagles are dependent on large lakes, reservoirs, and/or river systems Most bald eagles found on the Forests are within the Whiskeytown-Shasta-Tnnrty National Recreation Area (NRA) at Shasta and Trinlty Lakes Addrtional suitable habitat and active nesting terrrtories exist on Siskiyou Lake, McCloud Reservoir, Iron Canyon Reservoir, Pit River, and the Trinlty River.

It is estimated that up to 25 pair of bald eagles (25 percent of the breeding pain in California) nest on the Forests However, not all these pairs nest every year Enough habitat exists for some expansion of these populations The Forests' goal for the recovery effort of this species is 5 additional pair (for a total of 30) As new territories are discovered, territory plans are developed and the new sites are managed accordingly

An administrative study has been initiated on the Forests to further help determine the habrtat requirements of nesting bald eagles on Shasta and Trinity Lakes This information will be the basis for developing a new bald eagle management plan for each lake These plans will include all of the known existing territory sites plus any future potential srtes

From the information gathered so far it appears that the bald eagles which nest on the Forests do not migrate There are no large wintering concentrations like there are in the Klamath Basin and selected reservoin throughout California However, the Papoose Arm of Trinrty Lake, recognized by the State as a wintering area, has historically wintered about 30 eagles annually

Peregrine Falcon. The peregrine falcon is both a State and Federally listed endangered species Seven known nesting pair live within the Forests (1990) It is estimated that there is suitable habitat for an addrtional seven nesting pairs However, no Intensive survey has been completed for all potential nesting habitats Based on 1990 survey data and a rapidly expanding Northern California interior mountains population, the Forests' capabilrty is unknown but appears to be able to support about 14 pairs Throughout Caltforniathereare about 100 known nesting sites

Peregnne falcons nest on cliffs Most of the cliffs on the Forests have been located and rated for potential occupancy (1979), however, only a few of these srtes have been thoroughly surveyed Outside of the breeding season the peregrine falcon migrates Peregrine falcons banded on the Forests have been recovered as far south as Mexico

The peregrine falcon receives full protection as delineated in individual nest territory plans. These plans carry out direction identfied in a recovery plan for the peregrine falcon

Habitat management for the peregrine falcon is applied mainly to the nest stes As new nest sites are discovered, nest territory plans are written Peregnne falcon management has, at times. impacted the timing of some projects. such as timber sales, but overall there has been very little impact on other resources A primary concern is to protect the habitat area from disturbance dunng the breeding season

Peregnne falcons on the Forests are monltored for nest occupancy and productivity This monitoring is coordinated through an interagency Memorandum of Understanding w t h the BLM, the USFWS. the National Park Service, and the DFG

3. Sensitive

Sensitive wildlife species on the Shasta-Trinity include the goshawk, marten. pacific fisher, and willow flycatcher The amount of potentially high, moderate, and low suitability habltat is presented in Figure III-9

Goshawk. The goshawk is designated as a sensitive species by Region 5 The goshawk can be found throughout the Forests in late and other successional stages of most conifer timber types Most of the known stes on the Forests are on the McCloud Ranger District Goshawk distribution and habitat use varies from the Trinty side to the Shasta side

Management practices can reduce the amount of available goshawk nesting habtat Because of a concern to maintain viability of this species and othen that depend on older over-mature timber for habtat, the goshawk has been selected as a representative in the late seral stage wildlife assemblage

Based on the amount of mature and older over-mature habrtat available, the Forests have sufficient habtat to support about 200+ nesting pairs and the potential to support over 250 pain The Forest provide protection for each known nest site, dunng project planning and implementation So far, this has not caused a signlficant economic impact. but as more stes are found the impact will increase

Besides protection of individual goshawk nests, addtional habrtat can be found in reserved areas (i.e wildernesses) and other places managed for older over-mature habltat to meet diventy requirements

Marten. The marten is a close relative of the Pacific fisher and both belong to the mustelid family It is partially diurnal (daytime) and is seen occasionally by Forest Service employees and vistors The marten is also on Region 5's sensitive species list

The marten is generally found on large, contiguous tracts of mature and over-mature mixed confer, Douglas-fir, red fir and lodgepole pine above 4,000 feet Red fir is the preferred vegetation type There are about 95,950 acres of red fir on suitable and unsutable land on the Forests Existing data shows that there is a skewed distribution of martens on the Forests

Marten sightings on the Trinrty side appear to be isolated to the red fir zone while those on the Shasta side (north of Shasta Lake) are well distnbuted throughout many vegetation types Based on habtat capabilty models, it is estimated that there are 590,000 acres of high and moderate suitable habitat (see Figure III-9) This is defined by seral stages 4b, 4c and 4c-older above 4,000 feet, using existing vegetative maps Field venfication of suitability will take place as part of the Forests' monitoring program

Some segments of the public are concerned that the reduction and fragmentation of older over-mature habrtat may jeopardize viability of the species Because of this concem the marten has been selected as a representative in the late seral stage wildlife assemblage Current management direction is based on the same strategy as the spotted owl However, in order to provide linkage with the surrounding Forests. addtional areas have been identified for special management consideration

The marten is no longer trapped, and, therefore, no revenue is generated The marten is another species that is provided for through management of diversrty Overall, the timber volume may be reduced by managing for some older over-mature habitat

Pacific Fisher. The fisher is a Region 5 sensltive species and was petltioned for listing as a threatened species in 1990 Due to the lack of information about the Pacfic fisher. the USFWS was unable to make a determination on its status Therefore, it was classfied as a category 2 species It appears that the fisher prefers riparian, deciduous, and dense stands of many coniferous types It is a nocturnal and reclusive animal that few people have seen

The fisher prefers large, contiguous tracts of mature and older over-mature mixed conifer, Douglas-fir, red fir, and in some areas lodgepole pine forests Based on habitat capability models, it is estimated that there are *790,000* acres of high and moderate suitable habitat on the Forests (See Figure 111-9). This is defined by sera stages 4b, 4c, and 4c-older using existing vegetative maps Field venfication of suitability will occur as part of the Shasta-Trinity's monitoring program

Some segments of the public are concerned that management of habitat for spotted owls and other older over-mature habitat species may not be sufficient to maintain viable populations of the fisher Because of this concern the fisher has been chosen as a representative of the late seral stage wildlie assemblage to gauge the effectiveness in managing for species dependent on mature and over-mature conlferous forests The fisher could also be impacted by fragmentation of habitat

Current management direction is to provide a diversity of habitats and habitat elements including late-successional reserve areas and to maintain ffteen percent of each fifth order watershed in mature to late-successional vegetation In addition, the snag requirement is I 5 snags per acre, with at least 3 snag over 24 inches dbh

This direction, plus the implementation of the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northem Spotted Owl and habitats found in other areas (e g wildernesses, riparian reserves, unroaded non-motorized prescriptions) should provide for viability of the species There are no constraints on other resources other than those required for diversity/older over-mature requirements and the needs of other species which may have similar habitat requirements for all or part of their lifecycle.

It is no longer legal to trap fisher, so no revenue is generated from a consumptive standpoint

Willow Flycatcher. The willow flycatcher is a Region 5 sensitive species and has been listed as threatened by the State of Callfornia. This species is associated with riparian woodland vegetation, primarily willow and alder, but is known to use upland shrub-type vegetation

The willow flycatcher is a neotropical migrant normally arriving at breeding temtory locations between late May and early June It nests in willow thickets along the edge of streams, lake, ponds, and other wet areas throughout the Forests Decreases in its population have been recognized throughout its range These downward trends have been attributed to over grazing, flood control structures, development within the riparian zones, and nest parasitism by the brown-headed Cowbird (Molothrus ater)

Livestock grazing has the potential to impact this species, because livestock and the willow flycatcher both use the willow species. Where willow is present, livestock tend to browse the lower four feet of the willow plant. This is the same portion of the willow used for nesting by the willow flycatcher Because of the concern to maintain viability of this species and others dependent on riparian habrtat, the willow flycatcher has been selected as a representative in the riparian wildlife assemblage kparian ecosystems and willow flycatcher density and distnbution will be monitored as part of the Forests' monitoring program

4. Extirpated

Several wildllfe species no longer exist on the Shasta-Trinity National Forests These include the Californiagrnzzly bear (Ursus chelan), bighorn sheep (Ovis canadensis), and wolf (Canis lupis) The State Fish and Game Commission has no plans to reintroduce these species

Management Opportunities

Future management goals for TE&S species will be directed towards (I) reaching viable populations in the case of T&E species, and (2) maintaining or, if possible, increasing existing viable populations of sensitive species.

Forest personnel will continue to survey for additional populations and habitats of TE&S species Comprehensive surveys have begun for bald eagles, peregrinefalcons, and NSOs These surveys will intensify as management activities continue on the Forests Additional inventory and/or surveys will be necessary to determine location, distribution, and habitat requisites of additional species and populations.

T&E species will continue to be managed under existing recovery goals identified in individual species recovery plans Following is a bnef discussion of the management options that exist for the Federally listed species known to inhabit the Shasta-Trinity

Northern Spotted Owl. Opportunities exist to (I) inventory and assess late-successional reserves, (2) develop and implement late-successional reserve analyses and plans; (3) develop silvicultural prescriptions commensurate with

NSO habitat attributes, (4) monitor NSO habitat use within the managed forest landscape, and (5) create nesting habitat through the development of snags where nesting habrtat attributes are limrted

Marbled Murrelet. In the future there will be a need to survey the western side of the Trinity National Forest for the marbled murrelet If discovered, appropriate action would be taken to provide for the recovery of the species and/or its habtat

Sensitive species will continue to be managed sothatviable populations will be maintained wrthin the forest landscape Opportunities exist to maintain and/or enhance habrtat for the goshawk, marten, Pacific fisher, and willow flycatcher

Bald Eagle. Opportunrties for the bald eagle are to (I) increase inventory efforts along the mainstem of the Trinity River, (2) provide additional nest groves adjacent to major bodies of water, (3) continue research on Trinity and Shasta Lakes to determine how nesting bald eagles interact with resource management activities, and (4) develop management plans for the long-term management on Trintty and Shasta Lakes

Peregrine Falcon. Opportunities for this species are to (I) increase interagency cooperation and coordination toward down and/or delisting, (2) update old inventory (*1979)* of habitat to determine habrtat capabilrty for the northem interior mountains. and (3) provide for enhancement of cliffs for addrtional peregrine nesting habitat

Goshawk. Opportunities for the goshawk are to (I) provide protection at the project level as determined through watershed analysis, (2) increase inventory and monrtonng efforts across the Forests, and (3) continue monitoring goshawk as part of the Forests' monitoring

Marten. Opportunrties for the marten are to (I) consider martin as a part of late-succesional reserve analysis and planning, (2) inventory, assess, and map habitat and population distribution. (3) develop silvicultural prescriptions for the managed landscape commensurate to marten habrtat requisites, and (4) monitor marten as part of the Forests' ongoing program

Pacific Fisher. Management opportunities are to (I) consider fisher as a part of late-succesional reserve analysis and planning, (2) inventory, assess, and map habitat and population distribution, (3) provide for administrative study to determine habtat use within the managed and unmanaged landscape, (4) develop silvicultural prescnptions for the managed landscape commensurate to fisher habitat requisites, and (5) monitor fisher as part of the Forests' monitoring program

Willow Flycatcher. Management opportunlties for the willow flycatcher are to (I) inventory, assess. and map habtat and population distribution, (2) determine effects of management activties on the willow flycatcher, (3) re-establish willow stands around springs and seeps in the McCloud area consistent with riparian reserve standards and guidelines to improve habtat, and (4) monitor willow flycatcher populations and/or habitat as part of the Forests' monitonng program

Managing wildlife habitats in accordance with capability models would provide for continued viability and ensure that none of the species become threatened or endangered because of Forest Service activities

Chapter V

Environmental Consequences

Chapter Contents

Chapter IV - Environmental Consequences

CHAPTER IV
Environmental Consequences

Introduction
A

This chapter describes the environmental consequences of implementing the four alternatives discussed in Chapter II (Individual Alternative Descriptions). The discussions center around what will change, how much, and why. This chapter is also the basis for the comparison of alternatives displayed in Chapter II, Part F. A summary of the environmental consequences, by alternative, is included in Chapter II, **Table II-27**.

Chapter III, Affected Environment, describes the situation and conditions which exist in the planning area. It provides the basis for understanding the consequences of implementing the Forest Plan or its alternatives. Chapters III and IV lead to an understanding of the environment that will be created as a result of implementing any of the alternatives. The environment to be created for each alternative is discussed in Chapter II under the individual alternatives.

Environmental consequences, commonly called impacts or effects, result from applying various combinations of management prescriptions. The different mix of prescriptions in each alternative produces different levels of resource outputs, goods, and services. These, in turn, cause different affects on the quality of the environment. In other words, the level of output attained, the land base from which it is produced, and the intensity with which management practices are applied, translate into varying environmental consequences for each alternative.

No extreme environmental consequences will result from implementing any of these alternatives. This is assured by the inclusion of Forest Standards and Guidelines in all alternatives. They mitigate adverse impacts and ensure long-term productivity of the land.

Incomplete or Unavailable Information. There is less than complete knowledge about many of the relationships and conditions of wildlife species, forests, physical and biological ecosystem functions, the economy, and communities. The ecology, inventory, and management of large forests is a complex and developing discipline. The ecology of specific systems, their dynamics and relationships, and the interaction *of* resource supply, the economy, and community stability is not fully understood.

The Shasta-Tnnity National Forests Planning Team and EIS Interdisciplinary Team examined the data and relationships used to estimate the effects of the alternatives. There is a substantial amount of creditable information about the topic of this environmental impact statement: the centra relationships and basic data are well established. The best available information was used to evaluate the alternatives. While additional information would in some cases add precision to estimates or better specify a relationship, the basic data and central relationships are sufficiently well established relationships. Though new information could be helpful, no missing information was evaluated to be essential to a reasoned choice among the alternatives as they are constituted.

Economic Consequences
B

Comparisons between alternatives for all major economic effects are summarized in several tables in Chapter II. The modeling and analysis assumptions behind these estimates of effects are described in Appendix **B.** The effects of each alternative on present net value (PNV), county receipts, employment, income, and the Forest budget were chosen for display in this chapter (See **Table IV-1**).

Present Net Value (PNV). PNV is a measure of relative economic scale and efficiency. All future costs and benefits of each alternative were discounted to the 1989 base period. The dfierence between discounted benefits and discounted costs is the PNV. This discounting of values to a common period makes possible a comparison of benefts and costs that occur at different times.

Subject to each alternative's unique set of constraints, the Forest Planning Model (FORPLAN) allocated land uses and scheduled activities to maximize PNV.

County Receipts. Returns are distributed back to four counties (Shasta, Siskiyou, Trinity, and Tehama), in the amount of 25 percent to help finance roads and school budgets. The majority *of* these payments come from the value of harvested timber. Additional payments come from land use permrts, grazing fees, recreation permits, and user *fees.*

Income and Employment. The production of goods and services from the National Forests affects the economy of the local area by generating income and employment. To

measure this effect, an input/output model was used to develop income and employment multipliers (see Appendix B for details) The results shown in **Table IV-I** include direct. indirect and induced income and employment Timber harvest, recreation visitor days, wildlfe and fish user days, total expendrtures, and grazing animal months are the driving forces in generating income and employment

Forest Budget. The Forest budget consists of the tota annual cost *of* managingthe Shasta-Trinty National Forests under each altemative excludingthe cost of fighting fires and cooperativefunds Asubstantial portionofthe budget enters the local economy

By order of importancethe vanation of PNV by alternative occursfor the following reasons (I) the amountoftimber harvested, (2) the percent of full versus low standard visttor days of recreation, (3)the number of wildlife and fish user days, and (4) the amount of water produced Receipts to counties. employment, income, and budget vary primanly **as** a function of timber harvested The economic difference between alternatives is minimal due to the constraints on the land base Previous Final plans wth a much larger tentatively sutable land base allowed for much larger variations in the economic consequences of the alternatives See Chapter II, Economic Comparisons, for more information on why and how these outputs vary by alternative

Adiscussion ofthe economic consequences by altemative follows Since timber outputs are signrficantly reduced from historic levels, county receipts and employment levels are also reduced PNV, income, and the Forest budget have not decreased proportionately due to increases in untt values of outputs

Alternative PRF (Preferred Alternative). PNV ranks third highest when compared to all four alternatives PNV is lower than Alternative CUR Reducedtimber harvestand associated revenue is the pnmary reason why

County receipts and employment and income are the third highest when compared to the other alternatives These outputs are all lowerthanAlternative CUR because of lower timber harvest

The Forest budget is the second highest among all the altematives This budget is higher than Alternative CUR because of the complexties involved in ecosystem planning and increased timber associated costs

Tat IV-I
Comparison of Economic Effects - First Decade
(Percent Indicates Relationship *to* Alternative CUR)

	PRF	RPA	CUR	CBF
Present Net Value				
(MM$* - 1989)	8,221	8,469	8,239	8,128
(percent)	0	+3	0	-1
Annual County Receipts				
(MM$ - 1989)	5	8	7	4
(percent)	-29	+14	*0*	-43
Annual Employment				
(Jobs)	3,633	3,888	3,682	3,208
(percent)	-1	+6	0	-13
Annual Income				
(MM$ - 1989)	I38	I48	I40	I22
(percent)	-1	+6	0	-13
Annual Forest Budget				
(MM$ - 1989)	42	43	40	38
(percent)	+5	+8	0	-5

* MM$ = million dollars

Alternative RPA *(1990* Program Emphasis). PNV is the highest of all altematives The highest timber harvest level and an emphasis on dispersed high standard recreation are the primary reasons why this alternative has an increase over Alternative CUR

County receipts and employment and income are the highest when compared to the other alternatives This is a reflection of the high timber harvest level

The Forest budget is the highest among all the alternatives The budget is higher than Alternative CUR because of increases in the timber, recreation, wildlife, and water programs

Alternative CUR (No Action/No Change). PNV ranks second when compared to the other alternatives The emphasis on low standard recreation and meeting only 75 percent of the demand for developed and wilderness recreation after decade 2 is the primary reason for the lower PNV

County receipts and employment and income are the second highest when compared to the other alternatives. This is because this alternative has the second highest timber harvest level

The Forest budget is the second lowest among the alternatives dunng the first decade This is a reflection of the high timber harvest level and the low recreation, wildlife, and water programs

Alternative CBF (Citizens for Better Forestry). PNV ranks fourth when comparing the four alternatives PNV is lower than Alternative CUR. This alternative has the same recreation and fire program as Alternative PRF However, the smaller suitable timber base, lower timber harvest, emphasis on less intensive timber practices, and longer rotation ages result in a lower PNV than Alternatives PRF and CUR

County receipts and employment and income are the lowest when compared to the other alternatives These outputs are all lower than Alternative CUR because of the lower timber cut

The Forest budget is the lowest among the alternatives during the first decade This budget is lower than Alternative CUR because the reduced timber program lowers the budget more than the higher recreation and wildlife programs increase the budget

Social Consequences

C

Overview. Chapter III identified the social groups most likely to be affected by the different outputs, land allocations, and management practices associated with the alternatives shown in Chapter II It also described the basic characteristics of the social groups and their linkages to the Forests These social groups are categories of people who share the same interests and concerns They are not mutually exclusive, and individuals may be included in more than one group or none of the categorized groups The social groups identified are resource utilization emphasis, resource amenity emphasis, recreationists, and Native Americans This chapter displays the social effects of the alternatives on these groups It is assumed that these groups include minorities, women, handicapped, elderly, those for whom English is a second language, and those of different ethnic origins

Minority groups may not be affected any differently as special groups than they will be as a part of one of the social groups discussed in Chapter III Shasta-Trinity National Forests' personnel are committed to giving equal treatment to all individuals and social groups, including minorities, women, handicapped, elderly, and English as a second language groups in providing services, opportunities, and jobs None of the alternatives has discriminating effects

The alternatives do, however, raise social issues When two or more groups within the Forests's sphere of influence differ significantly in their expectations for resource use, and when the alternatives have different effects on the social groups, there is a potential for conflict

There are generally ways to resolve or reduce the conflict if adequate social information is available Thus, social analysis is a major part of the Forests' planning process Four social variables are used in determining the social consequences of implementing the altematives These variables are (I) lifestyles, (2) attitudes, beliefs. and values, (3) social organization, and (4) population These social variables are defined in Chapter III, Part D **Table, IV-2** is a simplified summary of the effects alternatives have on social group variables It may aid in understanding the discussion of each alternative which follows

Consequences Specific to an Alternative

Alternative PRF (Preferred Alternative). Timber harvests have decreased significantly for all alternatives when compared with historic levels There is a relative difference

Table IV-2
Effects of Alternatives on Social Group Variables

	ALTERNATIVE			
	PRF	**RPA**	**CUR**	**CBF**
Lifestyles				
Resource Utilization Emphasis	Little Support	Most Supports	Supports	Least Supports
Resource Amenity Emphasis	Substanbally supports	supports	supports	Most Supports
Recreationists	Substanbally supports	supports	supports	Substanbally supports
Nabve Americans	Mixed Support	Mixed Support	Mixed Support	Mixed Support
Attitudes, Beliefs, and Values				
Resource Utilization Emphasis	Coincides Least with	Coincides Least With	Coincides Least With	Coincides Least with
Resource Amenity Emphasis	Substantially Coincides With	Coincides With	Coincides Wth	Coincides Most with
Recreationists	Substantially Coincides With	Coincides With	Coincides With	Substanbally Coincides With
Nabve Americans	Coincides Wth	Coincides Wth	Coincides Wth	Coincides With
Community Stability and Cohesion				
Resource Utilization Emphasis	Less Stable	Stable	Stable	Least Stable
Resource Amenity Emphasis	Stable	Less Stable	Stable	Most Stable
Recreabonists	N/A	N/A	N/A	N/A
Nabve Americans	Stable	Less Stable	Stable	Stable
Population Service Needs				
Resource Utilization Emphasis Resource Amenity Emphasis Recreabonists Native Amencans	---------- All Alternatives - Little Change			

* The communrty is generally the most stable and cohesive under Alternative CUR, since the Forest Service outputs would not be growth inducing There would be considerable new economic growth, but it would be from sources other than the Forest Service The alternatives which are more growth inducing or cause an economic reversal would offer less communrty stability and cohesion

between alternatives, but because of the low level of output common to all alternatives, the social effects are similar

Timber outputs will be about 78 percent of Alternative CUR and 37 percent of historic levels Groups linked economically to the Forests' outputs will benefit slightly less than under Alternative CUR. Opportunities for recreationists will be enhanced moderately

Expectations of persons in favor of preservation values will likely be supported by the amounts of wilderness designated by recent legislation. dispened recreation opportunities, and protection of scenic resources

There will be a change to population and land use from the mix of resource outputs associated with this alternative. Direct, indirect and induced employment, dependent on timber outputs from the National Forest, will be reduced from historic levels

Alternative RPA *(1990* RPA Program Emphasis). Implementation of this alternative will produce the highest level of timber outputs of all the alternatives However, timber outputs will only be about 50 percent of the average level sold over the past 13 years This will result in a reduction in employment for those groups dependent on the forest products industries

Recreation opportunties will be enhanced. The reduced emphasis on timber harvest will cause an increased land base for recreation and other amenity resource opportunities This increase will be noticed most by recreationists, amenity emphasis groups, and Native Americans This alternative will produce the highest market outputs of all the alternatives It will have the lowest negative impact to the lifestyle stabilty of people linked economically to natural resources

The outputs of this alternative will be the most growth inducing of all the alternatives Although, since timber outputs are significantly lower than historic levels, this alternative will actually have negative impacts to population growth rates as compared wth historic levels

Alternative CUR (No Action/No Change). Under Alternative CUR continuing management direction will have a negative impact on groups employed in and those dependent on traditional forest products industnes Actual harvest levels, rather than external market factors, will begin to play a greater role on National Forest lands. Existing recreation opportunities will continue, especially hunting, fishing, and boating activities

In the short term, most social groups will feel negative impacts from greater community instability since the reduced Forest Service outputs will be growth curtailing There will probably be new economic growth, but it will be from sources other than the Forest Service

Alternative CBF (Citizens for Better Forestry). Recreationists and amenity emphasis groups will benefrt from the increased recreation opportunties which emphasize their attitudes and values Amenity emphasis groups and Native Americans will beneft from the emphasis on less development and more dispersed recreation opportunties such as hunting and fishing Native Amencans employed in the forest products industry will be adversely affected.

The lifestyles and values of recreationists and amenity emphasis groups will be recognized by less intensive (long rotation) management. This will result in the least disturbance of esthetic resources (visual qualrty and recreation opportunrties). However, due to the constraints on the land base the total difference from all other alternatives is minimal

Lower timber outputs, about 28 percent of historic levels, will be detrimental to most groups, especially those people economically linked to the Forests. This alternative will deter economic growth the most due to changes in land use from timber to non-timber uses **A** loss of community stabilty and cohesion will result from a greater out-migration of timber workers Some unemployment problems will be softened by other new sources of economic growth such as recreation

Resource Consequences

D

This section discusses, for each of the Forests' resources, the environmental impacts which will result from implementation of any of the four alternatives considered in detail in this Final EIS . These impacts are discussed on the basis of direct and indirect effects, short-term uses versus long-term productivity, and irreversible or irretrievable commitments of resources

Each resource is also discussed from the standpoint of

- Consequences which do not vary or are common to all alternatives, and
- Consequences which vary among alternatives and/or are unique or specific to a given alternative

Outputs and changes in condrtions are estimated into the future, and the differences between altematives are displayed Analyses and detail on the means of estimating the effects of each alternative are included in the planning records on file in the Forest Supervisor's Office, Redding, Calrfornia The maps of the alternatives, included in a separate packet, graphically illustrate how the alternatives vary in spatial distribution of management emphasis across the Forests.

I. Air Quality

Consequences Common to All Alternatives

In general, forest management activities consistently implemented with any of the alternatives will have very little, if any, measurable effects on air quality

The dispersed nature of outdoor recreation use, even at highest total volumes, will yield low quantities of pollutants from such sources as campfires, motorboats, and driving for pleasure The measurable air movement, which normally occurs in the mountainous settings of both Forests over 90 percent of the time, adequately disperses these pollutants

Within the Class I, Yolla-Bolly-Middle Eel Wilderness significant air quallty related values will be determined in cooperation with the Mendocino National Forest These values will be monitored to assure prevention of signficant deterioration as required by the Clean Air Act

Activities such as timber harvest cleanup, woody lake debris cleanup, and wildllfe habitat improvement could produce some air pollution (visibility impairment and particulate matter) for short periods of time All alternatives emphasize utilization of woody debris over burning when feasible

Where burning is required to meet management objectives, regulations require that the pollution itself be minimized by the methods used In addition, burning should be carried on only when favorable meteorological conditions exist (e g , wind, fuel moisture, temperature. inversion layers) These management activities will be timed and coordinated with other agencies to meet air qualrty standards Wildfires, which could adversely affect air qualrty, will occur under all atternatives The number of acres that will be burned annually from wildfire is estimated at 11,000 acres per year for all alternatives except Alternative CUR (15,000) Since wildfire is unplanned, it is exempted by the Clean Air Act from meeting air qualrty standards

The number of fuels treatment acres by prescribed fire is de-emphasized for all alternatives compared to the past 10 years This change is due to biomass utilization, reduced timber harvest, and road building The total acreage of fuel treatment for wildlife. timber, and fire management vanes from approximately 5,880 acres per year in Alternative CBF to approximately 30,000 acres per year in Alternative PRF While utilization of this matenal is being emphasized, a signficant portion of the fuels reduction will still occur through prescnbed burning The alternatives with the highest number of acres being treated will have the highest prescnbed burning programs Although these acreages are signlficantly different, no degradation of air quality within the Class I area will occur because

1 The Yolla Bolly-Middle Eel Wilderness is geographically located on the southernmost tip of the Tnnity National Forest Therefore, it is located away from areas of potential burning

2 Burning prescriptions will be designed to avoid smoke intrusion into sensitive areas

3 Burning will be coordinated with other agencies to achieve compliance with all applicable air quality standards

4 Only short-term degradation will occur in the burn areas

5 A no burn alternative will be selected if degradation is anticipated

Consequences Specific to An Alternative

The following analysis makes a comparison of altematives based upon (1) the amount of fuels treated (acres), (2) the number of acres harvested, (3) the number of miles of road constructed, and (4) the number of recreation visitor days (RVDs) in the first decade

Alternative PRF (Preferred Alternative). When compared to Alternative CUR, this altemative will have 324 percent more fuel treatment acres, nearly the same number of predicted RVDs, 39 percent less acres harvested, and 86 percent less new road construction Using probable annual pollutant generation from these sources, air quality related to activities on the Forests will improve when compared to Alternative CUR

Alternative RPA *(1990* RPA Program Emphasis). This altemative will result in relatively no change in air pollutants from those occurring in Alternative CUR Acres treated for fuels will decrease 7 percent, RVDs will increase 9 percent, road construction will remain the same, and acres of timber harvested will decrease by 8 percent when compared to Alternative CUR

Alternative CUR (No Action/No Change). Under this alternative it is estimated that fuels will be treated on a total of 7,080 acres annually. About 23 miles of new road construction will be added to the existing system each year, there will be 5,362,000 RVDs, and a total of 9,660 acres of timber harvested annually. While this alternative has the greatest potential for creating air pollution, it will still be signlficantly less than that which occurred in the recent past

Alternative CBF (Citizens for Better Forestry). This alternative, when compared to Alternative CUR, will result in 17 percent less acres of burning for fuel treatment, about the same RVDs, 35 percent less new road construction, and 39 percent less timber harvest acres. It will, therefore, generate less air pollutants than Alternative CUR This alternative will have the least impact on air quality

2. Biological Diversity

Consequences Common To All Alternatives

There are many factors that relate to the concept of ecological biodiversrty For purposes of this document, a basic assumption was applied The most effective and efficient manner in which to maintain biological diversty and its associated attributes throughout forested and other vegetative landscapes is to allow for a diverse spectrum of ecosystems, their attributes, and associated species

The diversty of terrestrial and aquatic species and/or their habrtats is addressed in the wildlife and/or fisheries sections Therefore, this section will deal pnmarily with the maintenance, enhancement, or change within the major vegetation types and/or their seral stages over time, and how they affect richness, evenness, and pattern (components of diversity)

In each alternative 70-80% of the acres of vegetated lands will be allowed to "cycle naturally" after landscapes are brought into a condition where their response to natural disturbance will be acceptable Thinning and other fuels management related activities will be required where fire has been unnaturally excluded from the ecosystems for the past 80-100 years These treatments will put the vegetation in a condition where natural events will not alway result in undesirable catastrophic damage

Cycling naturally is defined as continuing through the processes of succession without major human-induced management Natural processes will occur such as insects, disease, flood, fire, windthrow. etc Some management such as fish/wildlife habrtat improvement projects. will be allowed to occur The potential estimated effects of "cycling naturally" for a 50 to 150 year period (very short ecological timeframe) will include but not be limrted to

- Loss of human-induced early seral stage areas.
- tending stands to move towards climax conditions (older seral stages),
- accumulation of dead standing/down materials,
- loss of existing human-induced fragmentation (clearcuts, roads),
- more homogeneous stands,
- reduction in total numben of some plant/animal species (early seral stages) wrth increases in others (moderate to older stages),
- an increase in the area occupied by climax species.
- initial increase of shrub/hardwood species in some areas,
- reduction of shrub/hardwood species in closed canopy srtuations,
- occurrence of natural fire wrth some human-induced fire suppression, and
- reduction in active road systems

The above types of affects will be beneficial for some species, detrimental for some, and neutral for others

On the 500,000 acres subject to vegetative activities, the major effects on diversty components are related to commercial wood products emphasis and wildllfe habitat management activrties Therefore, the following factors, which are common to all the alternatives analyzed in this Final EIS, will be tracked

1, Timber management activities, including silvicultural systems,

2. Natural and induced changes in seral stage composition on the Forests,

3. Interspersion or mosaic effects of suitable timber lands wrth lands that are unsuitable for timber. and

4 Management of chaparral

Under all alternatives, treatment of chaparral (major vegetation type) will result in a variety of benefits and effects through (1) conversion of existing chaparral to timber, (2) conversion of existing chaparral to a grass-rejuvenated brush mix, and (3) conversion of existing decadent brushfields to younger, more available stands of brush

Conversion of chaparral to timber is not emphasized and will be done only where cost-effectwe and compatible wrth wildlife values Most of the chaparral and brush is decadent and of limited value for grass and browse for livestock and deer and of no value for timber production

Any amount of treatment will help bring these lands under more productive management

Some of the major effects of managing chaparral include

1 Increased edge and diversity for wildlfe (mosaic pattern),

2 Reduction of fuels to minimize fire hazards,

3 Increased short-term (less than 7 years) water yields,

4 Creation of younger, more vigorous chaparral fields on unsuitable timber lands,

5 Re-establishment of timber stands on suitable timber lands, and

6 Increased forage and browse for domestic livestock in some areas and wildlife utilization in other areas

Richness

None of the alternatives will reduce the number of existing mqor vegetation types or species that exist on the Forests below the level of viability On the 1,400,000 acres not being actively managed, components of richness such as snag densities, seral stages, hardwoods, riparian, etc , will cycle naturally

On the 500,000 acres being actively managed, standards and guidelines for diversty components such as snag densities, seral stages, hardwoods, ripanan, etc., will be required in each altemative. This will assure a certain level of diversity which, along with the lands not being actively managed, will maintain the viability of all existing non-threatened, endangered, and sensitive (TE&S) plant and animal species in all alternatives Therefore, richness will not be discussed further in this section (refer also to the Wildlife section)

Evenness

Effects of Timber Management Activity. A mqor element of timber management activity is the rate at which timber stands are managed One measure is the average age at which timber stands are harvested This is often referred to as the rotation age.

Shorter rotations (average 110 years), as used in Prescription VIII (Commercial Wood Products Emphasis/Timber Management), will convert some areas occupied by older seral stages to areas occupied by the early and mid-seral stages (seral stages 1, 2 and 3) Late seral stages (seral stage 4) will generally not be produced on the 500,000 acres available for timber management under these shorter rotations In the past, such treatments were applied primanly under a clearcut concept Clearcutting will be reduced in Alternatives RPA, and CUR. Clearcutting will be eliminated in Alternative CBF, and minimal in PRF Many areas will be subject to leaving an average of 15 percent of the area of regeneration harvest units in existing green trees (called green tree retention or GTR) This will provide a greater degree of vertical structural age class diversty and some retention of older over-mature trees It should be noted, however, that the majority of existing older seral stages are placed in set-asides and late-successional reserves under all alternatives

Longer rotations (average 120 years), as used in Prescriptions III (Roaded Recreation) and VI (Wildlife Habtat Management), will convert areas occupied by older seral stages to areas occupied by the early to mid-seral stages (seral stages 1, 2, and 3) A minimal amount of late seral stages (seral stage 4) will be produced on these lands. More retention of hardwoods and less intensive site prep vegetative management, resulting in more grass/forb areas, will occur here than under the shorter rotations GTR will also be applied with clearcutting signdcantly reduced

Long rotations (200+ years) will provide for more mid to ate seral stage (seral stages 3 and 4) areas Less early seral stages will occur than in intensive and modified management.

Seral stages 3a and 4a will not be produced under normal silvicultural treatments However, the GTR treatment will allow for 3a and 4a stands In addition, these seral stages will also be provided for on lands which are cycling naturally

On lands where timber management will not normally occur and/or occurs at low levels, vegetative diversity will change primarily through natural succession This will favor the late seral stages (seral stage 4) in some areas, especially those areas not subject to frequent fire events

The amount of "unsurtable" timber land varies between alternatives It includes wilderness, research natural areas, riparian corridors, wild and scenic riven, National Recreation Areas, late-successional reserves, and inclusions of unsuitable lands inside large areas of sultable lands These

large block of land will allow for natural succession and diversity to occur

Chaparral. There *are* some 149,300 acres of chapanal types on the Forests These will tend to cycle naturally wrth the exception of a fairly low level of induced management pnmanly in the form of prescnption fire

Hardwoods. Mature hardwood trees within conifer stands, in excess of stocking levels established for desired future conditions during landscape analysis, can be removed and young hardwood habtats will not be allowed to reach maturrty on lands subject to timber management activities.

Application of land allocation prescnptions and specific management standards to mitigate against the above losses, and the interspersion of undeveloped lands and inclusions of other habitat types, provides for dispened mature hardwood habitats in all of the alternatives

Hardwood types (stands of almost pure hardwoods) will not be managed intensively for timber production in any of the alternatives

Natural and Induced Changes in Seral Stages. As previously descnbed in Chapter II, one of the standards for diversrty requires that a minimum of 5 percent of each of the Forests' major vegetation types be maintained in each identified seral stage for that type

Refer to **Table IV-3** for a breakdown of seral stages by alternative While maintaining diversity for each major type is important, **about** 96 percent (1,558,510 acres) of **all** major commercial bmber vegetabon types on the Forests fall into mixed conifer (including red and white fir) Hardwoods and chapanal provide the next two major types wrth 190,000 acres and 149,000 acres, respectively These will tend to cycle naturally over time Therefore, the seral stage assessment will be made and tracked over time for the mixed confer types only All other major vegetation types will be evaluated and tracked on a project by project basis dunng planning and implementation

Seral stage 3a will average 15 percent for all altemabves by the end of the 5th decade Seral stage 4a will average 6-7 percent for all alternatives All alternatives will be within 2 percent of each other for seral stages 3a and 4a over 5 decades Seral stage 4a will also be enhanced by the application of GTR

The amount of land in seral stage 1 averages 6-7 percent at the end of the 5th decade in all alternatives Under all alternatives, seral stages 3b and 3c, combined. will average 29-30 percent by the end of the 5th decade Seral stages 4b and 4c, combined, will average 15-16 percent by the end of the 5th decade

Pattern

Effects of Interspersion *oi* Suitable and Unsuitable Timber Lands. The Forests have identfied two major classes of land. (1) lands sutable for timber production, on which timber vegetation manipulation will occur, and (2) lands

Table IV-3
Seral Stage Acres by Alternative*
(rounded to nearest thousand acres)

		Year 2040 (end of 5th Decade)			
		ALTERNATIVE			
Seral Stage	Current Situation *(1989)*	PRF	RPA	OUR	CBF
1	58,000	116,000	103,000	104,000	115,000
2	48,000	61,000	82,000	77,000	58,000
3a	311,000	242,000	244,000	236,000	242,000
3b & 3c	520,000	498,000	480,000	475,000	483,000
4a	148,000	105,000	101,000	111,000	105,000
4b & 4c	334,000	250,000	252,000	250,000	251,000
4c-older	211,000	368,000	358,000	364,000	370,000

* Total all major timber vegetation types combined.

unsuitable for timber production on which timber vegetation will not be actively managed The amount of suitable timber land vanes between alternatives (see **Table II-18**)

The proportion of unsurtable timber lands occurnng as inclusions within moderately managed prescriptions (i e., Prescriptions III [Roaded Recreation], VI [Wildlife Habitat Management] and VIII [Commercial Wood Products Emphasis/Timber Management] ranges from 13 to 31 percent depending on the alternative Thus, about one-fifth of the lands in these prescriptions will help provide an interspersed pattem of suitable and unsurtable lands This mosaic will greatly reduce the possibilty of large contiguous, homogeneous timber stands subject to intensive timber management and will help to provide movement corridors and islands of habitat within and between larger stands of vegetation

Rparian areas occurring within Prescriptions III, VI, and VIII will also create mosaic patterns and provide movement corridors In addition to the above, all alternatives have about 1,400,000 acres or 70 percent of the Forests' land base in a combination of Land Allocations Congressionally Reserved or Late-successional Reserves and Prescription VII (Threatened, Endangered and Selected Sensitive Species).

Effects of Silvicultural Systems. The choice of silvicultural systems to best provide for habitat diversty depends on which wildlife species and assemblages are to be emphasized Regardless of which treatment is used in a stand, some species and/or assemblages will benefrt and others will not.

Overall, a mix of silvicultural systems in the Forests will probably best achieve habitat diversty objectives See 'Effects of Timber Management Activty' earlier in this section for more discussion on silvicultural systems

Consequences Specific to an Alternative

Evenness

Seral stage analysis was assessed in two ways (1) on a Forest-wide basis using the percentage of the amount of a given seral stage at a particular point in time as compared to the total Forests' vegetated land base: (2) the percentage or amount of a given seral stage at a particular point in time as compared to the amount of the Forests in that seral stage in 1989

Both of the above assessments indicate that the standard of having at least 5 percent in any given seral stage for all major vegetation types will be met in all alternatives at the end of the 50 yean (year 2040). The only exception to this might be within the mixed conifer type for seral stage 2

The Forest-wide assessment previously discussed indicates little difference between alternatives The major difference is between the alternatives being considered in this Final EIS as compared to Alternative CUR in the previous Draft The magnitude of reduced intensively managed timber lands is very signficant The following assessment of seral stage acres shows differences between the alternatives (See **Table IV-3)**

All seral stage percentages vary little between alternatives through decade 5

The quantity or amount of vegetated land that will occur under the various management intensities can be generally assessed by comparing the amount of acres of each prescription group by alternative **(Table 11-14)** Alternative RPA has almost exactly the same percentage (26) of Prescription VIII (Commercial Wood Products Emphasis/Timber Management) lands as does Alternative CUR Alternatives PRF and CBF are similar wrth 8-10 percent less land base in Prescription IV (Roaded, High Density Recreation) and VIII than occur in RPA and CUR Alternative CBF has almost twice as many acres in Prescription I (Unroaded Non-Motorized Recreation) as does Alternative PRF and at least 6 times as much as Alternatives RPA and CUR All other land allocations *are* quite similar between alternatives with no more than an average variation of 5 percent

Pattern

The greatest change in existing pattem of vegetative seral stages will occur on lands with eiy high degree of habitat manipulation Opportunity for greatest changes in existing pattern, especially in the seral stage 4 stands, will occur in Alternatives RPA and CUR which have 26 percent of the land base allocated to Prescription VIII, and 23 percent of the land base allocated to Prescriptions III and VI.

Under Alternative RPA, proposed chaparral management programs will vary from 5,000 to 10,000 acres treated per year Under Alternative CBF 3,000 to 5,000 acres will be treated per year Alternative CUR will involve 1,000 to 3,000 acres per year Under Alternative PRF 3,000 to 5,000 acres will be treated in the 1st decade, this will increase to between 5,000 and 10,000 acres per year in

decades 2 to 5 While the range being treated varies, the overall combined environmental consequences will not change signrficantly between alternatives due to the relatively low rnagnltude of the chaparral program in any alternative Potential increased outputs of wildlie user days, deer population increases, etc , will also be relatively low and very localized Net effect or benefit will be to help maintain existing levels of outputs.

All alternatives range from 18 - 26 percent of allocated lands being in Prescnption III or VI combined which will be the next most intensive in terms of timber management GTR will contnbute to vertical seral stage diventy and to pattern as will application of the wide ripanan reserve corndon.

The total amount of acres of 4c-older will increase from a start[illegible] of 211 000 [illegible] to [illegible] 350,000 acres for all alternatives by th[illegible] end of the 5th [illegible]de Alternative CBF will have the most with an estimated 3[illegible]00 acres

3. Biomass

Consequences Common To All Alternatives

The issue related to biomass involves what wood material can be used for energy production while still meeting ecological needs, as well as what prionties would be followed in its allocation The two main sources of biomass on the Forests are logging residue (slash from timber sales) and precommercial thinning residues

Under all alternatives, the Forests' policy would be to ensure that enough firewood is available to meet the demand for personal use In addition, sufficient biomass material must also be left on the ground to meet ecological needs for soils, plants, and animals Therefore, the only material considered available for biomass utilization would be logging residue and thinning slash that is surplus to firewood and ecological site needs

Overall, the availabilty of biomass material from logging residues is on the decline due to reductions in the timber land base This is caused by setting aside suitable timber lands for the protection of other resource values, such as the spotted owl

Consequences Specific To An Alternative

The supply of biomass is affected primarily by the level of timber harvest and by the amount of land from which it is obtained. Therefore, Alternatives RPA and CUR would result in the largest amounts of available biomass Alternative CBF would provide the least opportunity for biomass utilization **Table IV-4** shows the allowable sale quantty (ASQ) and the number of acres harvested each year in the first decade for each alternative

The amount of precommercial thinning in the Ist decade would not vary signficantly between alternatives The amount of thinning would vary from a high of about 3,100 acres per year in Alternative CUR to a low of 2,500 acres per year in Alternative CBF

Much of the biomass material currently generated is economically unavailable for collection Increased value of residue as a source of energy could increase the amount that could be utilized Improved biomass collection technology could also make unavailable material utilizable Should biomass use increase in the future, altematives with less potential available biomass may experience conflicts between the use of residues for power generation and personal use firewood

Sawmill residue, which is currently a major source of energy fuel, is expected to continue to provide a larger source of biomass than in-forest logging residue Again, alternatives with higher harvest levels (ASQ) would provide more potential mill wastes for energy production than alternatives with a low ASQ

Table IV-4
Factors Which Affect the Amount of Material Available for Biomass

	ALTERNATIVE			
	PRF	RPA	CUR	CBF
Allowable Sale Quantity (ASQ) Ist Decade (MMBF*)	82 0	I 124	1058	65 3
Annual Harvest Acres Ist Decade	6,430	8,890	9,660	5,880
Precommercial Thinning Acres Ist Decade	2,600	2,800	3,100	2,500

* MMBF = million board feet

4. Botany

Consequences Common to all Alternatives

All alternatives would provide for the protection of plants that are listed as sensitive by the Regional Forester This is in accordance with Forest Service policy as set forth in Forest Service Manual 2670

There are no Federally listed threatened or endangered plant species on the Shasta-Trinity National Forests Trinrty buckwheat (*Eriogonum alpinum*) is listed as threatened by the State of Callfornia

All sensitive plant populations, currently known or identified in the future, would be placed in Prescription VII (Threatened, Endangered, and Selected Sensitive Species) All project proposals would be assessed for their potential impacts to known sensitive plant populations or suitable habitats

Suitable habitat would be managed and monitored to increase or sustain viable populations of sensitive plant species throughout their recognized range

Project proposals would be modified if loss of sensitive plants or habitat in the project area would lead to a decline in viability of the species on the Forest

Consequences Specific to an Alternative

All alternatives protect existing populations of sensitive and endemic plants, but unoccupied surtable habrtat is not conserved unless specified in a conservation strategy for the species Therefore, this unoccupied habitat is vulnerable to impacts

Sensitive plant populations are not static and may move into new habitat over time as the result of successional changes or other factors Types of impacts that may cause loss or degradation of potential sensitive plant habrtat include road building (and associated quarrying of road material), livestock grazing, off-highway vehicle use, fire suppression, and timber harvest

It is difficult to predict the consequences of habrtat loss and disturbance Permanent loss or degradation of habitat can be assumed to have negative effects Temporaiy surface disturbance of habitat may have negative, neutral. or even beneficial effects depending on the species

In general, higher outputs for commodities such as timber (including road construction for access) and forage are correlated with greater losses of suitable habitat for sensitive plants Alternatives RPA and CUR are, therefore, likely to have greater negative consequences for sensitive plant viability than Alternatives PRF and CBF Because of large amounts of set-aside acreage in all alternatives, the chances of loss of suitable habttat are much less than that associated with past management

The need to identify each sensitive plant's ecology and life requirements is addressed in the Standards and Guidelines section of Chapter 4 of the Forest Plan

5. Facilities

Transportation System

Consequences Common to All Alternatives

Little new arterial road construction will be anticipated under any of the alternatives considered but reconstruction is anticipated The collector/local road system will be increased under all alternatives, but at a much slower rate than the past 10-15 years In all cases the amount of new road construction will decrease significantly in the 3rd, 4th, and 5th decades

In general, the number of miles of local roads needed for timber management purposes will vary directly with the level of timber harvesting proposed under a given alternative, therefore, the amount of land disturbed will increase accordingly as harvest levels increase In all alternatives the amount of land disturbance from road building will be much less than the recent past due to the low level of timber harvest being proposed As the amount of road and/or trail construction increases, the more likely a particular road/trail location will have to be modified to avoid cultural resources properties, sensitive plant sites, and threatened and endangered species habitats This type of mitigation through avoidance will be present in any of the alternatives considered in this Final EIS Since this will be an impact resulting from the application of non-discretionary policies (i e , mandatory legal requirements or minimum management requirements [MMRs]), they will be common to all alternatives Consequently, there will be no significant differences between alternatives with respect to these non-discretionary features

Consequences Specific to An Alternative

The principle indicator of both short and long-term environmental impacts caused by the transportation system will be watershed condition Watershed condition is based on the cumulative watershed impact using equivalent roaded acres (ERA) below the threshold of concern (TOC) The ERA threshold calculation is an appropriate indicator of the number of acres that will be disturbed based on the miles of road built See **Table IV-5** under the geology discussion in this chapter for the comparison

With respect to road closures or obliterations, these directions are included under Forest standards and guidelines (e g , 7e) and within each management prescription as defined by the associated standards and guidelines (refer to the Forest Plan)

Some road improvements will be treated as necessary to preserve environmental conditions, improve safety conditions, and increase the structural strength for road maintenance and haul efficiency This need will vary by alternative The greater the number and diversity of public users, the greater the need for this type of improvement

By the end of the fifth decade, the total miles of roads vanes considerably between alternatives, with Alternatives RPA and CUR having the most and Alternative PRF having the least In all alternatives, about 85 percent of the road system will be complete by the year 2010

The rate of road construction and the eventual road density will be greater in areas where timber is managed under uneven-aged selection systems

From the standpoint of opportunities to develop a road system, Alternative PRF will constrain and/or prohibit road construction the most Road construction will be least constrained under Alternatives RPA and CUR Alternative CBF will constrain road development slightly more than Alternatives CUR and RPA None of the altematives materially affects the unroaded character of most of the California Wilderness Bill released acres (see Appendix C) This is because many of those acres are in late-successional reserve land allocation and/or administratively withdrawn Prescriptions I and II Consequently, they will have little or no road construction

Other Facilities

Consequences Common to All Alternatives

No major effects, changes, or differences between alternatives will be anticipated with respect to buildings and administrative facilities Future changes, such as improved communication and transportation, may eliminate the need for some of the remote administration sites There will be an on-going need to upgrade and replace some of these facilities

6. Fire and Fuels

Introduction

Implementation of any alternative will influence the number of acres expected to be burned by wildfire and the acres that will receive fuel treatment The environmental consequences from these events are common to all alternatives The magnitude of the consequences depends on the event and is described for each alternative

Consequences Common to All Alternatives

Wildfire. Under all alternatives, fire and aviation management direction will be to initiate a suppression response for control of all wildfires including private lands under direct Forest Service protection Interagency fire cooperation will be emphasized under all alternatives Suppression response within wildernesses may be changed from control to containment or confinement when specific Wilderness Area Management Plans are approved

In past plans there was a large variation of acres allocated to timber harvest and associated fuels treatment and acres treated for natural fuels In addtion, there were different suppression efficiency levels applied to the alternatives The suppression level is the most efficient level (MEL) as determined by the National Fire Management Analysis System (NFMA) in all alternatives except Alternative CUR Alternative CUR is set at current levels which is *29* percent lower than MEL This results in a large variation in predicted wildfire acres by alternative

Due to the allocations to late-successional which limit timber harvest and fuel treatments for the predicted life of the Plan, and reduced harvest levels and harvest intensrty on those acres available for timber harvest it is predicted that the vanation in wildfire acres will not be measurably different by alternative Except for Alternative CUR, the only variation in the fire and fuels program predicted by alternative will be in the number of acres of fuels treatment for timber related and natural fuels Although there will be differences they will not measurably affect the number of wildfire acres predicted in the short term It is estimated that approximately 11,000 acres will be expected to burn by wildfire anually in all alternatives except CUR (15,000 acres)

In each altemative, the placement of fire lines and camps for the suppression of wildfires and the implementation of prescribed fires, can be affected by the presence of cultural properties, sensitive plant sites, threatened and endangered species habitats, and other features which must be protected under mandatory legal requirements The effects of wildfire on individual resources will vary, wrth negative effects generally increasing as fire intensities increase Regardless of intensities. wildfire can cause negative consequences to young plantations, water quality, air quality, and visual qualrty Air qualty will receive short-term degradation during bum-out Visual and water quality will be temporarily degraded until restoration and recovery occur and the bumed areas are revegetated

Young plantations (less than 30 yean old) can sustain very high, if not total, mortality when burned by wildfire This is because the small, thin-barked trees are very vulnerable to heat when surrounding vegetation is burned When management activities occur within established plantations, measures are taken to reduce fuel accumulations and thereby reduce flammability and fire intensties

Positive consequences from low intensty wildfire include (1) increased or rejuvenated wildlrfe habrtat, **(2)** improved range land, (3) increased water yields, and **(4)** reduced potential for damaging wildfires *As* fire intensty increases, *effects* on wildlife and grazing become less and less positive until negative consequences often occur at the very high intensrty levels (Level **5** and Level 6)

Fuels Management. Prescribed fire is one of the most common methods of fuel treatments and it is expected to continue in the future Utilization of wood fiber material (biomass) is becoming more common as a source of energy production Utilization of biomass will not only assist in reduction of fuels after harvest activties but also after other management activities (i e , stand tending) Utilization is the preferred fuel treatment method in all alternatives

The environmental effects of prescnbed fire are evaluated on a site-speck basis as bum plans and prescnptions are developed Negative effects of prescribed fire are related to air quality, visual qualrty, water qualrty, and soil productivrty The overall effects of prescribed burning will depend on the amount of fuel treatment planned under each alternative The acres of fuel treatment expected under each alternative are shown in the following section, Consequences Specific to An Alternative

The environmental consequences resulting from prescnbed fire differ between broadcast burning and the burning of piled material The application of these techniques is determined by slope of the burn site Slopes less

than 40 percent can be piled for burning, slopes over 4C percent are broadcast burned

Broadcast burning is limited to a much narrower time frame than pile burning because weather and fuel characteristics have less tolerance in the prescription As a result, smoke is concentrated in a shorter period of time than it will be if piles were burned

Pile burning permits more positive protection of sensitive soil productivity and water quality (because of the escape factor -- i e., riparian management zones) Situations permitting piling also provide better economic circumstances for increased marketability of the residue (tractor ground). Burning prescripbons for piles occur over a much longer penod of time than do prescriptions for broadcast burning. This permits positive compliance with air quality requirements

The prionty of natural fuel treatment will be (I) public safety, (2) areas with signlficant capital investments (i e , structures, plantations etc); (3) high fire occurrence areas, and (4) for coordinated resource benefts

Consequences Specific to An Alternative

Alternative PRF (Preferred Alternative). About 30,000 acres (26,500 acres of ecosystem management related fuels and 4,400 acres of activity fuels) will be treated annually by utilization and/or prescribed fire during the Ist decade

Overall it is intended to treat all landscapes in a manner that returns them to a condition that would have happened naturally had fire not been excluded for the past 80-100 years Fuels from timber harvesting will be decreased due to a decrease in overall harvesting on the Shasta-Trinity National Forests. All vegetation treatments including fuels treatment and timber harvest will be done in conjunction with the overall requirements or desired future condition of the ecosystem

Alternative RPA *(1990* RPA Program Emphasis). Natural and activity-created fuels will be treated by utlization and/or prescribed fire during the Ist decade at an estimated rate of about 6,580 acres annually (I ,880 acres of ecosystem management related fuels and 4,700 acres of activity fuels)

Alternative CUR (No Action/No Change). Natural and activity-created fuels will be treated by utilization and/or prescnbed fire during the Ist decade at an estimated rate of about 7,080 acres annually (I ,880 acres of ecosytem management related fuels and 5,200 acres of activity fuels)

RIternative CBF (Citizens for Better Forestry). Natural and activity-created fuels will be treated by utilization and/or prescribed fire during the Ist decade at an estimated rate of about 5,880 acres annually (I ,880 acres of ecosystem management related fuels and 4,000 acres of activity fuels)

7. Fisheries

Consequences Common to All Alternatives

Under all alternatives potential impacts to the fisheries resource, from sediment loading as a result of human activrties within the forest, will be greatly reduced This is due in part to the reduction in timber harvest levels and road building and the large increase in set-aside lands Risk of sediment loading on the 500,000 acres still subject to vegetative modification activrties such as timber harvest, wildlife habitat improvement, and road construction will remain but will be more than adequately mrtigated by the riparian standards and guidelines in the Forest Plan

Other associated risks to the fisheries resource include (I) increased recreational sportfishing which can be detrimental to certain declining or sensrtive fish stocks, (2) livestock use in ripanan areas, and (3) fuel treatment which can cause nparian area and streamcourse damage This risk is minimal, however, since broadcast burning is not allowed in nparian areas

Potential impacts of resource management activities will be greater to streams than to lakes Visual quality standards in the Shasta and Trinlty Units of the Whiskeytown-Shasta-Trinity National Recreation Area (NRA) and in riparian areas near lakes and perennial streams will be managed to maintain their scenic values and near natural appearance Management activities adjacent to ephemeral and intermittent streams have the potential to cause soil disturbances which may result in lowered water quality standards and increased sedimentation of downstream fish habitats Forest-wide standards and guidelines, land allocation constraints, Best Management Practices (BMPs) and supplemental management area direction will be implemented to minimize impacts of program activities and ensure viable population levels of fisheries management indicators

The original base year (Fiscal Year [FY] 1982) of 363,000 pounds of commercial salmon being produced from National Forest lands has been added to by the increase in production from the Trintty River Hatchery Hatchery production has increased salmon productivity on National Forest lands by an additional 328,000 pounds or a new total of 691,000 pounds All alternatives reflect this new base equally Hatchery production is projected to be maintained in a "steady-state" for the next 50 yean and thereby continue to reseed the mainstem Trinrty River

The original base year (FY 1982) of 113,000 pounds of sport salmon being produced from National Forest lands has been added to by the increase in production from the Trinity River Hatchery Hatchery production has increased salmon productivity on National Forest lands an additional 240,000 pounds for a new total of 353,000 pounds All alternatives reflect this new base equally

Until salmon habrtat assessments are completed, the greatest emphasis on habitat improvement for anadromous fish will be placed on steelhead trout

Once the prescnbed structural goals are attained, new projects will be identified and implemented for the anadromous and inland fish habitat improvement programs New project construction and maintenance will be implemented to replace and maintain lost and damaged structures

The ripanan standards and guidelines identify Key Watersheds as cornerstone to the viability of anadromous fish populations not only on the Shasta-Trinity, but also to the vital network of connected riverine ecosystems wrthin the Klamath/Trinity River Basin Key Watersheds are areas that provide aquatic and npanan habrtat essential to the maintenance, recovery, or enhancement of anadromous fish populations Most importantly is that the potential affects upon aquatic ecosystems will receive first priority in the development and application of management alternatives

The following Key Watersheds or Key Watershed areas have been proposed for the Shasta-Trinity National Forests

1 Upper South Fork Trinity River
[Hayfork Creek to Headwaters]

2 East Fork South Fork Trintty River
[Mouth to Headwaters]

3 New Rver
[Mouth to Virgin Creek]

4 Slide Creek
[Mouth to Headwaters]

5 Virgin Creek
[Mouth to Headwaters]

6 North Fork Tnnrty River
[Mouth to Headwaters]

7 Canyon Creek
[Mouth to Headwaters]

The interrelated riparian and aquatic habrtats are limrted ecosystems in the Forests They yield, or have the potential to yield, high productivity levels of fish and wildlife Anadromous and inland fish populations are dependent upon good water qualty and quantty, instream and bank (shoreline) habltat diversty, minimal sediment yield from surrounding watersheds, diverse aquatic and terrestrial food items, and a dynamic breeding population for their continued existence Alteration or disturbance of their restricted habitat, depending on the extent, may lead to population declines Several aspects of multiple-use management on National Forest lands may impair the capability of a watershed ecosystem or a riverine habitat to produce healthy fish stocks

Recreation Management

California's recreation-oriented population will continue to increase and demand better or greater diversty in freshwater fishing opportunlties over the next 50 years Continued declines of salmon and steelhead populations and associated stream closures have reduced this diversty. The Shasta-Trinrty's fisheries program is intended to improve recreational sportfishing opportunities above current levels Three challenges arise (I) historically used anadromous fish habitat is currently under-utilized as a result of reduced fish numbers, (2) the *effects* of six years of drought on anadromous and inland fish populations has not been assessed, and (3) the recovery of salmon and steelhead stocks must proceed wlth a scientifically sound ecological strategy plan This plan must endorse the key aspects of protection and restoration Maintenance and/or enhancement of wild fish stocks is essential

Fishing demand at Shasta and Trinity Lakes, inland coldwater lakes (i e. Iron Canyon, Lewiston, McCloud) and inland coldwater streams (i e Upper McCloud and Prt River) will increase at developed recreation facilities High mountain lakes will receive an increase in dispersed angler pressure

Fishing diversity will be enhanced on the Upper Sacramento Rver as the wild trout population rebounds from the disastrous chemical spill of July, I99 I Even as the Forest Service takes posltive steps toward better watershed ecosystem and riverine habitat management, external influences or disturbances may negate the recovery of declining salmon and steelhead stocks. It is anticipated that winter-run steelhead population declines will rebound allowing for more angler fishing diversity wlthin the Trinity River and select tributaries. Summer steelhead and spring-run chinook stocks will probably remain low, but they will improve as long-term recovery measures are implemented

Finally, *efforts* to improve anadromous fish habitat, redband trout habrtat, inland coldwater trout habltat in major perennials, and inland warmwater fish habrtat will be increased Natural recovery, coupled with habitat improvement efforts will result in. (I) achieving and maintaining healthy and robust fish populations and their habitats, (2) providing better fishing opportunities, and (3) increasing the diversty of fish species being sought by anglers However, these *efforts* will probablyfall short of meeting potential fishing demands on the Shasta-Trinrty National Forests The combination of past natural and human disturbances may be of such great magnitude that long-term recovery of potentially fishable stocks may be several decades away

Roads and Facilities Management

One of the primary factors that has the potential to impact anadromous or inland fish streams is sediment loading Salmon and steelhead declines are generally associated with agriculture, urbanization, damming, timber harvesting, and road building as well as commercial and recreational over harvest of stocks Loss of highly productive watershed ecosystems and nverine habitat may be the single most consistent contributor to salmonid populations that are listed as "at risk of extinction" Road building can be a contributor of downstream sediment-loading This results in riverine habitat damage on and *off* National Forest lands

Protection will be increased in key watersheds to facilitate the recovery of anadromous fish Further road obliteration and road closure opportunities, especially in the South Fork Trinty Rver basin, will be analyzed and implemented to prevent or reduce potential sediment loading to fish-bearing streams New road construction will decrease signficantly Road reconstruction, which takes into consideration riparian and fish habitat needs, will remain fairly constant over the 50-year period The number of miles of road maintenance will increase over the same time period

The consequences of this action will be (I) curtailing the loss of stream and river habrtat complexty: and (2) establishing ecologically healthy watersheds throughout the Forests. These watersheds will be capable of sustaining diverse and abundant riparian habitats, assuring good

water quality and quantity as well as the harmony associated with resilient and productive ecosystems

Vegetation Management

Potential impacts resulting from vegetation management practices will have a signrficantly reduced nsk of impacting anadromous or inland coldwater fish streams when compared to a decade ago Most of the existing land base on the Forests has been allocated to Wilderness. National Wild and Scenic Rivers, Late-successional Reserves, wide Riparian Reserve corridors, and/or identified as Key Watersheds, or other constraining designations Anadromous and inland coldwater streams will benefrt from the increased emphasis on ripanan habrtat protection

Under all alternatives, potential impacts to the fisheries resource, from sediment loading, will be greatly reduced This is due to the reduction in timber harvest levels and associated road building and the significant increase in set-aside lands Risk of sediment loading on the 500,000 acres still subject to vegetative modification activrties such as timber harvest, wildlife habitat improvement and road construction will remain but will be mitigated by the riparian standards and guidelines in the Forest Plan

Even with the decrease in timber harvesting. it is still necessary to prevent the impairment of a functional ecosystem by eliminating the introduction of undesirable sediments into streamcourses or negating irretrievable damage to ripanan habrtats Land allocation Rparian Reserves identifies the nine objectives of the Aquatic Conservation Strategy which includes as a key component the protection of riparian reserve areas Functional standards and guidelines have been established for timber, roads and facilities. range, recreation. minerals. fire/fuels as well as for lands and hydropower developments and watershed and habrtat restoration to ensure the integrity and protection of these riparian habitats

There is a potential for more sediments to exist with an increase in the number of acres treated for timber harvest and related road construction The application of Rparian Reserve corridors should reduce nsks of potential impacts

Livestock Management

Livestock can adversely affect ripanan vegetation through trampling and grazing, they may also affect aquatic habrtats or water quallty Management standards and guidelines, including mtigation measures, will be implemented as necessary to protect ripanan habitats from existing and/or future adverse impacts

Livestock use on existing National Forest allotments is expected to remain constant over a 50-year period No new allotments will be added to the Forests' base Impacts to nparian habrtats are expected to be localized Where conflicts occur, they can be resolved Conflicts will occur more to inland coldwater streams than anadromous fish streams

Implementation of better range improvement efforts such as water guzzlers, fencing, or rest rotations should be analyzed where livestock/riparian conflicts are identified

Fire/Fuels Management

Prescribed fire for fuels management and habrtat wildlife improvement have the potential to damage nparian areas and streamcourses if not properly controlled. This risk is minimal, however, since only treatments that maintain or enhance attainment of the Aquatic Conservation Strategy are permitted

Habitat Improvement

Through the application and management of key watersheds, Forest personnel will place an increased reliance on the natural long-term recovery of non-sensitive (fall-run chinook salmon and winter-run steelhead) and sensitive (spring-run chinook salmon and summer steelhead) anadromous fish habitat in the Trinlty hver basin This is not intended to eliminate the fish habitat restoration or watershed rehabilrtation program, but rather to compliment it

Habrtat improvement opportunrties will be identified and implemented to the benefit of anadromous, inland coldwater, and inland warmwater fish populations Implementation of the program varies according to emphasis and time frames Outputs are displayed only to the program's prescribed goals

Successful accomplishment of the fish habitat improvement program, wrth its projected increases in fish production, is dependent upon (1) ecosystem strategy planning. (2) capability of fish habrtats to respond to applied treatments, (3) adequate fish numbers to seed improved habitats, and (4) success in the mitigation of potential impacts to streams, watersheds, and riparian areas from land use and development activities

Consequences Specific to An Alternative

Alternative PRF (Preferred Alternative)

Habitat Improvement

This alternative will treat 1,500 acres for nonstructural habitat improvement and install 3,200 structures for anadromous fish over the 50-year period For inland coldwater fish habitat (streams and lakes), 700 acres of nonstructural habitat improvement will be undertaken and 2,000 structures installed Similarly, 1,000 acres of nonstructural habitat will be treated and 2,500 structures installed to benefit warmwater fish species

Habitat improvement for non-sensrtive anadromous fish species (fall-run chinook salmon and winter-run steelhead) will be increased on selected stream systems within the Trinity Rver basin Habitat improvement for sensitive anadromous fish species (spring-run chinook salmon and summer steelhead) will be evaluated and implemented on a limited basis Low population numbers, coupled with under-utilization of stream habitats, will determine the need, desirablity, and feasibility of a habrtat improvement program for these sensitive fish species

Habitat improvement for warmwater fish species will be increased at Shasta and Trinity lakes Fish habitat improvement will increase on mqor perennial inland fish streams. Surveys will be undertaken to analyze the need to implement habitat improvement on minor perennial inland fish streams

Watershed rehabilitation projects will occur on strategic ephemeral and intermrttent streams to protect and maintain rainbow trout and winter-run steelhead habitat in downstream perennial stream areas Direct fish habitat improvements for rainbow trout and winter-run steelhead will occur in major and perhaps some minor perennial streams to accommodate a greater portion of major consumptive sportfishing

Implementation of this alternative will result in the improvement of recreational sportfishing opportunities on the Forests above that of current levels

Alternative RPA *(1990* RPA Program Emphasis)

Habitat Improvement

This alternative will treat 1,500 acres for nonstructural habitat improvement and install 6,000 structures for anadromous fish over the 50-year period For inland coldwater fish habitat (streams and lakes), 1,750 acres of nonstructural habitat improvement will be undertaken and 2,500 structures installed Similarly, 2,250 acres of nonstructural habitat will be treated and 3,750 structures installed to benefit warmwater fish species

Habrtat improvement for non-sensitive anadromous fish species (fall-run chinook salmon and winter-run steelhead) will be increased on selected stream systems within the Trinity River basin and implemented for the first time in the Beegum Creek drainage Habrtat improvement for sensitive anadromous fish species (spring-run chinook salmon and summer steelhead) will be evaluated and implemented on a limited basis Low population numbers, coupled with under-utilization of stream habitats, will determine the need, desirablity, and feasibility of a habitat improvement program for these sensitive fish species

Habitat improvement for warmwater fish species will be significantly increased at Shasta and Trinity Lakes Habitat improvement will be increased on minor and major perennial inland fish streams

Watershed rehabilitation projects will be extended beyond strategic ephemeral and intermittent streams to significantly protect, maintain. and enhance rainbow trout and winter-run steelhead habitat in downstream perennial stream areas Direct fish habitat improvements for rainbow trout and winter-run steelhead will occur in major and minor perennial streams to accommodate a significant portion of major consumptive sportfishing

mplementation of this alternative will result in the significant improvement of recreational sportfishing opportunities on the Forests above that of current levels.

Alternative CUR (No Action/No Change)

Habitat Improvement

This alternative will treat 1,000 acres for nonstructural iabitat improvement and install 3,520 structures for anadromous fish over the 50-year period For inland coldwater fish habitat (streams and lakes), 200 acres of ionstructural habitat improvement will be undertaken and 1,000 structures installed Similarly, 650 acres of nonstructural habitat will be treated and 1,600 structures nstalled to benefit warmwater fish species

Habitat improvement for non-sensitive anadromous fish species (fall-run chinook salmon and winter-run steelhead) will continue at a low to moderate emphasis level within he Trinity River basin predominantly within tributaries of

the South Fork Trinity River Habitat improvement for sensitive anadromous fish species (spring-run chinook salmon and summer steelhead) will be evaluated and implemented on a limrted basis Low population numbers, coupled with under-utilization of stream habrtats. will determine the need, desirablity, and feasibility of a habitat improvement program for these sensitive fish species

Habtat improvement for warmwater fish species will continue at a low to a moderate emphasis level at Shasta and Trinity Lakes Treatment of reservoir habitats will depend heavily on establishing working partnerships with local and regional groups Partners will contribute 80 percent or more of the improvement costs Very limrted fish habrtat improvement will occur on a few major perennial inland fish streams No fish habitat improvement will occur on minor perennial inland fish streams

Watershed rehabilitation projects will occur on strategic ephemeral and intermittent streams to protect and maintain rainbow trout and winter-run steelhead habrtat in downstream perennial stream areas Direct fish habitat improvements will occur first for steelhead trout, second for largemouth bass, third for redband trout, and finally, for rainbow trout in a few major perennial streams to accommodate consumptive sportfishing

Implementation of this alternative will result in the improvement of recreational sportfishing opportunities predominantly for anadromous fish It will also reflect an increasing management desire to emphasize warmwater fishenes at Shasta and Trinity Lakes and redband trout management at Trout Creek

Alternative CBF (Citizens for Better Forestry)

Habitat Improvement

This altemative will treat 1,500 acres for nonstructural habitat improvement and install 3,200 structures for anadromous fish over the 50-year period For inland coldwater fish habrtat (streams and lakes), 700 acres of nonstructural habitat improvement will be undertaken and 2,000 structures installed Similarly, 1,250 acres of nonstructural habtat will be treated and 2,100 structures installed to benefrt warmwater fish species

Habitat improvement for non-sensitive anadromous fish species (fall-run chinook salmon and winter-run steelhead) will be increased on selected stream systems within the Trinity River basin Habitat improvement for sensitive anadromous fish species (spring-run chinook salmon and summer steelhead) will be evaluated and implemented on a limited basis Low population numbers, coupled with under-utilization of stream habrtats, will determine the need, desirablity, and feasibility of a habltat improvement program for these sensitive fish species.

Habitat improvement for warmwater fish species will be increased at Shasta and Tnnity Lakes Fish habrtat improvement will increase on major perennial inland fish streams Surveys will be undertaken to analyze the need to implement habitat improvement on minor perennial inland fish streams

Watershed rehabilrtation projects will occur on strategic ephemeral and intermrttent streams to protect and maintain rainbow trout and winter-run steelhead habitat in downstream perennial stream areas Direct fish habitat improvements for rainbow trout and winter-run steelhead will occur in major and perhaps some minor perennial streams to accommodate a greater portion of major consumptive sportfishing

Implementation of this alternative will result in the improvement of recreational sportfishing opportunities on the Forests above those of current levels

Threatened, Endangered, and Sensitive Species

Consequences Common *to* All Alternatives

All future sites of Federally-listed threatened or endangered (T&E) species will be fully protected and managed according to Prescription VII (Threatened. Endangered, and Selected Sensitive Species) All alternatives will meet the intent of the respective recovery plan for each designated species

Threatened. At present, there are no known Federally-listed threatened fish species on the Forests

Endangered. At present, there are no known Federally-listed endangered fish species on the Forests

Sensitive. All known or future sites necessary to provide for viable populations of sensitive fish species will be fully managed and/or protected as necessary Overall. the amount *of* Prescription VII habitat will fluctuate by no more than five percent among each of the four alternatives

Forest-wide and management prescription standards and guidelines, Best Management Practices (BMPs), npanan management zones (RMZs), and supplemental manage-

ment area direction will be implemented to protect and maintain T&E and sensitive fish habitat to ensure the viability of fish stocks among all alternatives.

The spring-run (summer) steelhead is the only fish species listed as sensitive by the Shasta-Tnnty National Forests The spring-run chinook is recognized as a sensitive fish species in the Klamath River system but not wlthin the Trinity River Basin. Summer steelhead habitat will be managed initially for species preservation, especially in the South Fork Tnnty River. Key tributaries containing summer steelhead populations will remain closed to fishing until the California Department of Fish and Game (DFG) determines the closure's efficacy Summer steelhead will not be managed for major consumptive sportfishing unless an increase in population numbers car be projected by DFG to sustain such a fishery. This will result in a loss of fishing diversity on the Forests for the immediate future

Salmon, steelhead, and trout populations may benefit from reduced management activities, such as timber harvest, road building, and prescribed burning in riparian areas The increased emphasis on key watersheds, highly restrictive riparian management standards and guidelines, the establishment of late-successional reserves, and the development of Wild and Scenic Rver Management Plans will also benefit these fish species These actions will result not only in the maintenance and protection of known summer steelhead habitat, but also in the strengthening and diversifying of populations over time

8. Forest Pests

Consequences Common to All Alternatives

All alternatives will continue to follow an integrated pest management (IPM) approach This will allow use of strategies most appropnate to the situation and the theme of the alternative Because Alternative CBF prohibits the use of pesticides there will be limits in controlling some pests Not all insect, disease, and animal injury is undesirable in the forest ecosystem, but for the purpose of this section damage will refer to that which adversely affects management goals and objectives

Maintaining and improving forest health is a goal which may be defined differently for each alternative The health ofa forest is partly defined by the human desires associated with each area If adverse impacts of pests on a resource increases or threatens to increase to a level that interferes with management objectives, the options available to control this damage will be evaluated and the selected option will be integrated into project activities Biological effectiveness, environmental safety, and compatibility with other resources and concerns will be considered when selecting a pest management option

Implementation of any of the alternatives will involve different levels of pest management opportunrties and will likely result in varying severities of pest-related injury on the Forests Indicaton of pest-related injury include tree mortality, reduced growth, top-killing, and reduced quantity and quality of seed production Damage can result in sawtimber defect, understocking, failure and delay of regeneration, reduced srte productivrty, degradation or closure of recreation srtes. increased incidences of hazardous trees, and undesirable vegetation changes The latter changes can affect numerous resources, including visual quality, wildlife and fishenes habrtat, and wilderness qualrty

Vegetation management provides the best opportunities to prevent or reduce the amount and impact of pest-related damage, although direct actions against pests may be necessary in specfic srtuations In order to compare the consequences of each alternative on forest pests, the intensity of vegetation management is used as a proxy to indicate the opportunity to prevent and reduce damage With greater opportunity to manage vegetation, less damage will be anticipated

Areas where the vegetation is managed intensively will present the greatest opportunity to reduce or prevent pest losses Other areas where condition of the vegetation is important, such as developed recreation srtes, will also present signlficant pest management opportunrties. Areas such as wilderness and semi-pnmltive recreation, on the other hand, will present minimal opportunities to control pests Areas managed non-intensively will have moderate pest management opportunrties

The differences between alternatives in forest pest activity will be a result of the management objectives and prescnptions implemented in each alternative The percent of the total Forests' land base, categorized as having "maximum", "moderate". "limrted", or "minimal" opportunity to prevent or reduce pest-related damage by vegetation management, is displayed by alternative in **Figure IV-I**

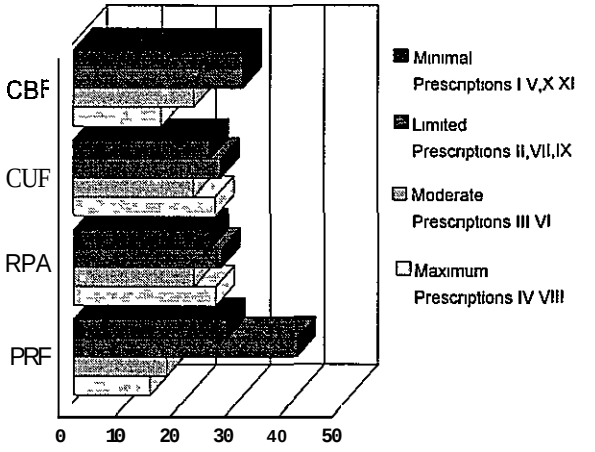
A discussion of silvicultural systems and their relationship to forest pest activity and control is found in Appendix J

Consequences Specific to an Alternative

Alternative PRF (Preferred Alternative). This altemative will have an intermediate level of opportunity for minimizing pest activity The lower acreage of moderately to intensively managed lands compared to Alternatives RPA and CUR will reduce the intensity of stand management activrties and increase damage from forest pests Areas where vegetation is managed intensively should have low levels of pest activity

Alternatives RPA *(1990* RPA Program Emphasis) and CUR (No Action/No Change). These two alternatives will have the greatest opportunrties for minimizing pest activity

Figure IV-I
Opportunities for Minimizing Forest Pest Activity



They will also have the greatest need if timber outputs are to be attained Pests of mature forests, e.g. decays and wood borers, will become less important, while pests of youngertrees, especially in plantations, will become more significant Pest damage should be the lowest of all alternatives

Alternative CBF (Citizens for Better Forestry). Pest management opportunities will be the least of all alternatives Because herbicides will not be used and there will be restrictions on the use of pesticides, including biologicals, opportunrties for IPM will be limited This is especially true of defoliators in some areas, this may affect visual quality Plague occurrences may increase in developed recreation areas because of the lack of pesticide use This may conflict with existing agreements wrth other public agencies, such as county health departments and the Animal and Plant Health Inspection Service (APHIS). No pest suppression in wildernesses may result in increased damage and increased costs of suppression to surrounding areas outside of wilderness. This may also conflict with other agencies' responsibilities, specifically the eradication of exotic organisms The emphasis on lower intensity timber management will increase the level of pest activity and injury.

9. Geology

Consequences Common to All Alternatives

No alternative will affect the physical presence of minerals Therefore, geology, as it relates to mineral deposits, is common to all alternatives

Volcanic and seismic hazards will be constant and unchanged for all alternatives However, the hazard of initiating slope instability and resulting impacts to water qualty will differ by alternative Although slope stability investigations are performed for nearly every land disturbing project, slope failures can occur as a result of unforeseen circumstances or a function of an intensive storm event which exceeds design standards To minimize slope failures, highly unstable areas have been identded and a Forest standard and guideline has been developed that prohibits management activities on these lands

Compared to a decade ago, vegetation treatments are occurnng on fewer acres Clearcutting has been significantly reduced Road construction has also been reduced These facton contribute to less potential impacts to landsliding Standards and guidelines offer resource protection for soil qualrty, including compaction, erosion and productivity, and for ripanan areas Therefore, the nsk ofwater qualty degradation through management related mass wasting is not signrficant

Consequences Specific to An Alternative

Each alternative will have a different nsk of initiating slope instability due to the amount of road construction, number of stream crossings, and intensty of timber harvesting

As the level of roading and harvesting increases, the nsk of initiating slope failures will likely increase Therefore, in this analysis, acres oftimber harvest and acres of new road construction will be used as indicators of the relative nsk of initiating slope instabilty for each of the altematives **Table IV-5** lists these acres

The alternatives were ranked in terms of relative nsk, which was based on the number of acres of timber harvested New road construction is limited for all alternatives (See **Table IV-5)** Therefore, new road construction will not be included in this evaluation The ranking of alternatives, which resulted from the application of these criteria, (from the least to the greatest risk) was as follows PRF, CBF, RPA, and CUR The following discussion expands on the reasons for this relative ranking All altematives are compared to current direction. Altemative CUR

Alternative PRF (Preferred Alternative). This alternative will have about 33 percent fewer acres of timber harvest than Alternative CUR Therefore, this alternative has the second lowest potential for slope instability

Altemative RPA (1990 RPA Program Emphasis). Compared to Alternative CUR the implementation of this alternative will have a slightly lower potential for initiating slope instability There will be an 8 percent decrease in timber harvested acres compared to Alternative CUR

Alternative CUR (No Action/No Change). Implementation of this altemative will result in harvesting timber on an average of 9,660 acres This is the greatest of all the alternatives Slope failures related to management activities have been observed during extreme storm events However, these landslides occurred on only a small portion of the managed land base, and at the same time that landslides occurred on unmanaged lands This trend will likely continue if this altemative is implemented

Alternative CBF (Citizens for Better Forestry). Implementation ofthis alternative will result in a 39 percent decrease in timber harvested acres This alternative has about the same nsk as Altemative PRF but less than all the other alternatives considered

Tabl V-5
Timber Harvest Acres and-Road Construction by Alternative
(Average Annual Acres for the-First Decade

Alternative		Timber Harvest (acres)	Road Construction (acres)
PRF	(Preferred Altemative)	6,430	5
RPA	(1990 RPA Program Emphasis)	8,890	40
CUR	(No Action/No Change)	9,660	40
CBF	(Citizens for Better Forestry)	5,880	28

10. Heritage Resources

Consequences Common To All Alternatives

One of the issues identified during the early public involvement period concerned the disturbance or destruction of cultural resources that has occurred, or is thought to have occurred, as a result of Forest Service activities (Public Issue #1). In order to address this issue in a positive manner, as well as to respond to related management concerns, new direction has been developed in the Forest Plan. This direction is embedded in all alternatives under Prescription XI (Heritage Resource Management), in the Forest standards and guidelines, and in the monitoring plan (contained in the Forest Plan).

Prescription XI directs that highly significant cultural resources will be protected indefinitely from potentially damaging activities such as timber harvesting and road construction. The Forest standards and guidelines provide mechanisms to ensure that cultural resources potentially affected by land management activities will be identified and assessed as to their eligibility for the National Register of Historic Places. Eligible properties will be protected or adverse effects to them will be mitigated. Cultural resources not assigned to either Prescription XI or the standards and guidelines, will be managed according to the Archaeological Resources Protection Act of 1979 and Shasta-Trinity National Forests' Supplement #6 to Forest Service Manual 2361. The Forest standards and guidelines also ensure Native American access and use of sacred sites and provide for collection and/or use of traditional resources in all alternatives.

The monitoring plan in the Forest Plan includes periodic inspection of activities to assess whether or not the above management direction is being met. This will be accomplished through an annual program which samples projects that included active protection of cultural resources. The intensity of sampling will be adjusted annually if the results of monitoring depart from established criteria.

The effects to cultural resources associated with Prescription XI will be the same for all alternatives, (i.e., all sites will be protected regardless of the alternative). For the remainder of sites on the Forests, there will be instances where potential adverse *effects* will need to be mitigated. In all such cases, the required interagency consultations (i.e., (36 Code of Federal Regulations [CFR] 800) will be undertaken. The specific number of sites that might be affected is difficult to quantify precisely, since that number will result from a case-by-case analysis of costs (mitigation funds needed) and benefits (e.g., timber outputs gained).

It is unknown how the alternatives will contribute to or detract from the State Historic Plan. The existing State Plan does not specify any particular preservation targets for types of cultural resources, nor any goals for regions in California. However, the State Plan is being updated and revised. It is likely that many of the cultural resources associated with Prescription XI will contribute in some measure to the goals of the new State Plan.

The short-term versus long-term effects on cultural resources associated with Prescription XI will be the same. The short- and long-term *effects* to sites receiving other management direction (i.e., properties associated with Forest standards and guidelines and those sites not eligible for the National Register of Historic Places) will be more difficult to measure. Over the short-term (e.g., 10 years), the number of sites that will be lost (with or without mitigation) will be few in number. In the case of timber, the threat will occur for each site only once during the timber harvesting cycle.

Over the long-term, it is possible that some sites not associated with Prescription XI will be lost, particularly those located on suitable timber lands. Specific cultural resources are generally considered non-renewable. However, since less than one-fourth of the Forests has been intensively inventoried during the last 15 years, perhaps as many sites remain to be found as have already been located. The potential of losing sites, however, is greatly reduced from past levels due to the greatly reduced timber programs and the large amounts of set-aside acres in all alternatives.

Two important benefits relating to cultural resources can be associated, to varying degrees, with all alternatives (1) the development of specific management direction that varies according to the value of a cultural resource should lead to more cost-effective management, as well as the preservation of highly significant sites, and (2) all alternatives continue resource management activities (particularly timber) that have, in the past, been indirectly responsible for most of the inventory, recording, and evaluation of cultural resources throughout the Forests. Regardless of the alternative selected, Forest personnel will continue to consult with other agencies such as the State Historic Preservation Office, the Keeper of the National Register of Historic Places, the Advisory Council on Historic Preservation, etc., as required by the National Historic Preservation Act, and other legislation.

The application of Forest Standards and Guidelines, as well as Prescnption XI, will pose some constraints on the management of other resources. The constraints may be one of two kinds a financial cost or a land use limitation For example, construction of a road through an archaeological site, where it is infeasible to avoid the site, may require funds for mitigation In the case of timber management, some areas might not be harvested because of the presence of significant cultural resources The specific constraints are developed when a project is actually designed

Consequences Specific To An Alternative

AS stated above, sites assigned to Prescription XI will be protected by all alternatives The remaining sites (the majority) will be managed according to Forest standards and guidelines In trying to estimate the effects of specific alternatives on cultural resources, it was concluded that using prescnptions with high to moderate ground disturbance, particularly activties associated with timber harvesting, will best approximate the risk to cultural resources These include Prescriptions III (Roaded Recreation), IV (Roaded, High Densrty Recreation), VI (Wildlife Habitat Management), and VIII (Commercial Wood Products Emphasis/Timber Management) It must be realized, however, that simply because cultural resources are located in areas assigned to these prescriptions it does not mean that the sites will be adversely affected

During the last decade, the vast majority of cultural resources located in such areas (e g , timber sales) have been protected This pattern will not change markedly Most site damage in the past has been inadvertent New direction in the Forest Plan shall significantly eliminate such unintentional. adverse occurrences Therefore, the following discussions are not intended to predict quantitatively any actual number of cultural resources to be disturbed. but rather, the potential of each alternative to cause effects that will need to be mtigated in some manner

Alternative PRF (Preferred Alternative). Several measures were used to compare the alternatives One involved summing all the acres assigned to the most land disturbing prescriptions for the four alternatives This involved summing Prescnptions III (Roaded Recreation), IV (Roaded, High Densrty Recreation), VI (Wildlife Habrtat Management), and VIII (Commercial Wood Products Emphasis/Timber Management) Another measure was the number of suitable timber acres for each alternative, while another was the annual timber harvest for each alternative Using these measures, Alternative PRF is estimated to have only a moderate potential to adversely affect cultural resources Timber outputs, acres of surtable timber land, etc , are all relatively low

Alternative RPA *(1990* RPA Program Emphasis). This alternative is similar to Alternative CUR in its potential to affect cultural resources Timber outputs, reforestation outputs, etc , are the highest of all alternatives It ranks highest among all alternatives for its potential to affect cultural resources

Alternative CUR (No Action/No Change). This alternative has the highest number of acres assigned to prescriptions involving ground disturbance It is second to Alternative RPA in the number of sultable timber acres and proposed timber outputs **(Tables IV-II** and **IV-21)** Specific, potential risks to cultural resources include timber harvesting, reforestation, timber stand improvement, recreation, and road construction and reconstruction, etc

RIternative CBF (Citizens for Better Forestry). This alternative has some of the lowest figures for timber and reforestation outputs, miles of road to be constructed and reconstructed, etc Of all the alternatives, Alternative CBF will probably have the least potential to damage or adversely affect cultural resources

H. lands

Consequences Common to All Alternatives

Included under this subject heading are discussions of the environmental consequences common to all alternatives on' (I) landownership adjustments, including land purchase programs, (2) interagency exchange, (3) non-recreational special-use management, (4) land withdrawals, and (5) property line-related encroachment.

landownership Adjustment. The ownership pattern within the Shasta-Trinity National Forests provides considerable opportunities for landownership adjustments through land exchanges, donations, and purchases Adjustments will provide consolidated ownership patterns in areas of intermingled landholdings so that lands can be managed more effectively The resulting compact ownerships make possible lower maintenance, supervision, and improvement costs Examples of land exchange benefits (consequences) are

I Shorter boundaiy lines, easier to mark and maintain,

2 Fewer trespass problems, claims, and lawsuits,

3 Lower costs for road construction and maintenance due to more compact ownership,

4 Increased flexibility to develop lands in ways not otherwise possible or practicable, and

5 Reduced need for rights-of-way over private land

Also, exchange or purchase often makes valuable lands avalable for public use Additional examples of public benefts that can result from proper acquisitions are

I Better control of erosion in mountain watersheds which supply water to downstream users or communities.

2 Acquisition of important recreation lands, or other lands such as critical wildlife habitat,

3 Protection of the wilderness environment, and

4 Isolated timber lands can be made economically accessible for easier forest management

The intent, regardless of alternative, will be to continue favorable land exchanges with private landowners, such as Sierra Pacific Industries, John Hancock Insurance Company (successor to Champion International Corporation), and Roseburg Lumber Co Forest personnel are evaluating opportunities for additional exchanges with these companies

Some of the private lands to be acquired under future exchanges are located within existing Wildernesses Exchanges involving these lands will continue until the goal of acquiring high priority classified lands and adding them to the National Forest system is achieved The trade-off, therefore, will be between the amenity values on the offered private lands versus the timber volumes being foregone to private ownership from the selected National Forest lands

L d p rch a programs are financed principally through t d and Water Conservation Fund money authorized by Congress However, partnerships v h Tr for lic a and the Nature C an y, s ell a the endo nt fi h are an d to acquir ng lands High priorities for funding are for acquisition of private lands within existing or proposed Wildernesses, National Recreation Areas (NRAs) u d/c approved itic composites Th purchase program is based on a willing seller/willing buyer a rangement

Rega dl of th alt tive, th presence of cultural properties, sensit v e plant sites, threatened and n-dangered species habitats, and other s, which must be protected under statutes, can cause modifications in landownership adjustment activities F > ca ap l N: tional Fc lands with f features identified for disposal und a land exchange car be deleted fi a prop t on ly, N Forest lands th these ur i tu can be identified for addition to th National Forest stem in order t me :t the objectives of the legislation

The impact of these features on the Shasta-Trinity's land exchange p wil t vary b alternatives ecause the ilt mate goals a d v e for landownership adjustment through exchange will be common t ll alternatives. W ith sp c t i land chase, th larger the acquisition program the more li th above considerations will have to be taken nto account

Non-Recreational Special Uses. The Forests' ownership pattern necessitates that some occupancy and use of National Forest land be permitted so private or other public lands can be appropriately used. None of the alternatives considered are expected to impact this pro-

gram Special-use permits are issued, when proper, upon compliance with reasonable condltions for the protection and administration of the National Forests

Land use activities are generated from sources outside the Forest Service Demands for special-use permits are expected to be the same for all alternatives with similar impacts on the Forests' resources Some anticipated resource consequences are the loss of land for other Forest uses, erosion or other resource damage from inadequate maintenance of private roads, and restrictions on some forest management activities in the vicintty of private uses

Withdrawals. Lands may be wlthdrawn from mineral entry, at an agency level, for roadside zones, administrative, recreation, and power sttes To protect the integrity of some campgrounds, Section 507 of the Federal Land Policy Management Act of October 21, 1976, "Right-of-Way Reservation", may be requested Some lands are also withdrawn by Congress for Wilderness and Wild and Scenic Riven, and at the Department level for Research Natural Areas

In compliance with Public Law 94-579 (Section 204), each agency level withdrawal will be reviewed in conjunction with the Secretary of the Interior to determine whether it should continue and for how long This review has been completed.

Land Surveys and Occupancy Encroachment. The Forests' landline location program has increased significantly during the past five years Consequently, the discovery of occupancy encroachment has also increased These encroachments.{applicable, can be handled by the Small Tracts Act

Landline location needs will not vary substantially by alternative Therefore, there will be little or no difference in relative impacts of the descnbed alternatives on encroachment cases related to property lines

The consequences of not surveying landlines can be simply explained by the fact that landowner or land managers, either private or Federal, cannot manage land if they do not know where it is It is important to have the precise landlines when the land values are higher, and when the land is more intensely managed

Transportation and Utility Corridors. Corridors have not been designated in any alternative because there is inadequate information to prejudge the future needs for rights-of-way access across the National Forests Forest-wide directions provide for establishment of future corridors, if needed Therefore, there will be little or no dfierence in relative impacts of the described alternatives Proliferation of rights-of-way outside existing corridors will be minimized

Rights-of-way for the Forests' Transportation System. Rights-of-way over about 100 miles of roads and 45 miles of trails are still needed These roads and trails are part of the Forests' transportation system The consequences of not acquiring these rights-of-way are

1 Road or trail segments can be closed by the landowners (either general or selective closures),

2 Some projects, such as timber sales, will be deferred, and

3 Additional costs will be incurred to reroute those private road segments where it is physically and economically feasible

Hydroelectric Power. Existing hydroelectric power facilities will be allowed to continue under all alternatives New hydroelectnc projects will also be allowed, subject to environmental analysis and impact mitigation requiremerits on an individual project basis These projects will be subject to prohibitions or restrictions imposed by designation of areas (Wild and Scenic Riven and Wildernesses) and/or the application of management prescnptions The Wilderness Act prohibits development of hydroelectric facillties in existing wildernesses (except in rare cases) The Wild and Scenic Rvers Act precludes hydroelectric development in designated or proposed Wild and Scenic Rven A rare exception, however, is a project in a "recreational" designated segment that does not affect the river values There are 498,776 acres designated as Wilderness and 33,728 acres in Wild and Scenic Rivers. for a total of 532,504 acres, on which hydroelectric development will be prohibited

The development of hydroelectnc power is a process that is initiated by agencies, companies or individuals outside the Forest Service The Federal Energy Regulatory Commission (FERC), upon consultation with the Forest Service, is responsible for determining whether proposals for hydroelectric development are (1) compatible with purposes for which the National Forests were created, and (2) consistent with the Nation's need for energy in light of the other public needs for the land proposed for development The Forest Service is responsible for determining what conditions are necessary to protect National Forest resources in a license for a hydroelectric project. Should a project be exempted from licensing by FERC, the Forest

Service is responsible for permitting and determining the terms and conditions of any such permit. Exempted projects are subject to requirements by local agencies such as the California Department of Fish and Game (DFG).

Hydroelectric development will be controlled and impacts mitigated by the development of site specific environmental analysis and documentation of effects for each proposal before a decision is made to permit the project.

Consequences Specific to An Alternative

Approximately 320 acres of land will be purchased per year under Alternatives PRF, CUR, and RPA. Approximately 480 acres will be acquired by purchase under Alternative CBF.

There will be no specific consequences resulting from implementation of any of the alternatives on non-recreational special uses, withdrawals, interagency exchange, land surveys and occupancy encroachment, transportation and utility corridor, and rights-of-way for the Forests' transportation system.

The alternatives considered in the Forest Plan will affect the development of hydroelectric power because of the number of acres allocated to Wilderness, Wild and Scenic Rivers, and Prescription I (Unroaded Non-Motorized Recreation). Prescription I will severely restrict access and the ability to economically transport power. The Wild portion of Wild and Scenic Rivers will be managed under Prescription I. Designation as Wilderness or Wild and Scenic Rivers will be prohibitive to development and allocation to Prescription I severely restrictive. The restrictions placed on hydroelectric development by alternative are shown in **Table IV-6**.

Alternative CBF most severely restricts hydroelectric development. Alternative CUR is least severely restrictive with Alternatives RPA and PRF in the middleground. These alternatives will be most applicable to small-scale development. Overall, Alternative CBF has the greatest impact on hydroelectric development, Alternative CUR has the least.

Table IV-6
Acres by Alternative Affecting Hydroelectric Development

	PRF	RPA	CUR	CBF
Prohibitive				
(1) Wilderness	—	—	—	7,720
(2) Wild and Scenic				
(a) Wild	13,440	—	—	18,176
(b) Scenic	5,336	—	—	8,032
(c) Recreation	4,448	—	—	11,104
Total	23,224	—	—	**45,032**
Severely Restrictive				
Prescription I *(net)*	65,048	*22,092*	5,027	120,630
Total	65,048	*22,092*	**5,027**	120,630
GRAND TOTAL	*88,272*	22,092	5,027	165,662

* Wild portions of Wild and Scenic Rivers have been subtracted *to* avoid duplication.

12. law Enforcement

Consequences Common to All Alternatives

In comparing the existing law enforcement problems associated with any of the alternatives, the consequences will be similar The law enforcement problems will be more a function of social morality and economics, rather than a given alternative intent or emphasis

The cannabis issue is probably the most visible law enforcement situation However, in recent yean substantial progress has been made in reducing violations Adramatic increase in the problem can be expected f there is a significant reduction in areas available for timber harvest A reduced timber harvest holds the potential for a two-fold impact The economic incentive to produce marijuana, as an alternative income, will occur simultaneously with a reduced deterrence created by the reduction of management activty and legitimate presence in large tracts of land suitable for cannabis cultivation Another potential consequence of significantly reduced timber harvest, in addrtion to outright theft of timber, is wildland arson An alternative source of income for idle timber harvest equipment is rental to the agency responsible for tire suppression activities A second financial incentive for arson is the perception that burned timberland will potentially be offered for salvage logging operations

Additionally, to the extent that land use allocations or resource management activities differ from established public use patterns or expectations, conflicts can be expected to occur Road closures for resource protection purposes, campground closures due to budget reductions, and restrictions on traditional use for the protection of endangered species are expected to result in increased trespass and vandalisim

13. Minerals

Consequences Common to All Alternatives

Most environmental consequences resulting from mineral activities are similar in all alternatives For example, the protection of cultural resources may require the incorporation of special stipulations in plans of operation and mineral leases in order to mitigate advene impacts *Also,* this may be true for other features or resources for which protection is required by statute, such as threatened and endangered species habltat and sensltive plants Such measures may be used under any alternative Since the protection of some resources is dictated by laws and regulations, the impacts on the management of the mineral resources are similar in all alternatives When any mineral resource is utilized, its depletion as a natural resource is irreversible, but the commodity has entered the market

Locatable Minerals. Any person proposing to conduct mineral operations, such as prospecting, exploration, development, extraction, or reclamation, which might cause surface disturbance must submit a Notice of Intention to Operate wlth the local District Ranger If the District Ranger determines that the operations will likely cause signlficant disturbance of surface resources, the operator must submit a Plan of Operations as directed in 36 CFR 228 Through approval of mutually acceptable plans of operation, operations are conducted so as to minimize adverse environmental impacts

Mining activities may vary from simple projects involving little surface disturbance to complex, high-density programs that disturb all *of* the surface land area These complex programs may involve detailed rehabilitation planning Depending on the size of operation, short-term effects may have considerable impact on surface resources while the long-term effects may be moderated through reclamation In a large-scale operation, reclamation planning takes into account the reality of the situation It takes into account the benefits derived from a surface configuration much differently than prior to the mining operation

leasable Minerals. A number *of* geothermal and oil and *gas* lease applications covering the Shasta-Trinity National Forests has been received by the Bureau of Land Management Leases are issued only after the Forest Service submits recommendations regarding each application The recommendations are based on an environmental analysis and the consequences resulting from the foreseeable development of the resource. The leases contain standard stipulations/conditions which protect the environment. Additional stipulations/conditions are added to place emphasis on site-specific needs

The stipulations/conditions are structured so that they can be applied on a site specific basis which will protect the environmental attributes of the area. Further restrictions can be used to mitigate surface disturbance of special resources such as cultural resource sites Adverse environmental effects will be mltigated by the application of standard and site specific lease stipulations

Discovery during exploration may lead to long term development In this event appropriate environmental analysis will take place prior to developing the resource The development will provide road access to other forest resources and disperse land uses Long-term development will eventually result in the depletion of the resource At the same time, the mineral commodity will be entered into the market place for consumption

Mineral Materials. These materials include common varieties of sand, gravel, rock, cinders, etc They are quarried or excavated under authority of a mineral materials permit The permit contains standard terms and conditions which are adequate to protect the environment A reclamation plan is required for operations with significant ground disturbance Long-term advene effects on surface resources are appropriately mitigated

Consequences Specific to An Alternative

Assuming that an environmentally suitable plan of operations is developed, adverse impacts from mineral development are expected to be minimized under all alternatives Outputs are directly related to the amount of land open to mineral entry

Some areas are withdrawn from location under the General Mining Laws in order to restrict activties **A** withdrawal maintains other public values in the area or reserves the area for a particular public purpose or program Withdrawals are made, where needed, to reserve areas such as Research Natural Areas (RNAs), Wildernesses, wild nvers, selected administrative sites, etc

The baseline withdrawal acreage **as** of 1984 is *927,000* acres The potential for additional wlthdrawals varies by alternative Withdrawals will be a direct function of the number of acres commited to RNAs, Wilderness or wild portions of Wild and Scenic Rivers Acres displayed for RNAs are those outside existing withdrawn areas such **as**

wildemess, or areas to be withdrawn by wilderness in the displayed alternative

Alternative PRF (Preferred Alternative). This alternative allocates 23,260 acres for RNAs. none for Wilderness, and 6,432 for wild nvers, for a total of 29,692 acres

Alternative RPA *(1990* RPA Program Emphasis). This alternative has the least number of acres allocated, 13,400 for RNAs, none for Wilderness, and none for wild rivers This altemative has the least potential for withdrawals

Alternative CUR (No Action/No Change). This alternative allocates 21,470 acres for RNAs, none for wildemess, and none for wild nvers

Alternative CBF (Citizens for Better Forestry). This alternative allocates 26,970 acres for RNAs, 7,720 for Wilderness, and 7,808 for wild rivers for a total of 42,498 acres This alternative has the greatest potential for withdrawal acres

14. Range

Consequences Common to All Alternatives

The *necessity* to protect and/or mitigate the *effects* of grazing upon unique resource attnbutes will not vary between alternatives These resource attributes are cultural properties and threatened and endangered species habitats which are protected under statute For example, under any of the alternatives considered in this Final EIS, allotment management plans are required to employ management strategies compatible with other resources Since measures such as these will be common to all alternatives, there will be no differences in the nature of the impact ofthese non-discretionary resources between alternatives.

The **actual** sustained grazing program will be significantly less than potential due to. (I) demand being significantly less than supply, (2) recreation conflicts (i e , concentration of livestock in and around popular camping sites and water sources), and (3) unfavorable benefit-cost ratios for range improvement

Consequences Specific to An Alternative

Each alternative can be evaluated in terms of animal months (AMs), livestock grazing impact, and management intensty needed to protect and/or improve range condition *AMs* as used here should not be considered absolute values but as trends in livestock grazing emphasis With AMs (See **Table IV-7**), the assumption is that if the trend is upward or downward, the number of animals and/or allotments will be increased or decreased, respectively Actual AMs can vary considerably each year due to changes in climate, forage conditions, and availablity

Grazing impact is described in terms of high, moderate and low High impacts assume that essentially all of the available forage (standard of take one-half of current year's growth and leave one-half) will be fully utilized by livestock grazing Moderate impacts assume that 40 to 70 percent of the forage will be utilized Low impact assumes that most of the available forage will not be utilized

Management intensty needed to protect and/or improve range condition is also described in terms of high, moderate and low High intensty includes such things as ripanan corridor fencing, fencing pasture areas, water development, and vegetation planting or seeding. Moderate management intensty may include some fencing and water development, but not as much as high intensty Moderate intensty will also include considerable herding of livestock to control impacts Low management intensty will involve some herding of livestock to control range impacts

Alternative PRF (Preferred Alternative), Alternative CUR (No Action/No Change), and Alternative CBF (Citizens for Better Forestry). Under these alternatives, *AMs* will basically be the same. Grazing impacts will be moderate on primary and secondary ranges and light to moderate elsewhere including nparian areas Management intensity will be moderate to high with increased emphasis of riparian area management Grazing will be phased out of wilderness areas in Alternatives PRF and CBF.

Alternative RPA *(1990* RPA Program Emphasis). Under this alternative the AMs will be increased by about 20 percent over current levels Grazing impacts will be moderate to heavy on primary and secondary ranges and light to moderate on riparian and other remaining areas Management intensity will be high

Table IV-7
Animal Months (AMs)
(Average Annual *AMs*)

Alternative		AMs
PRF	(Preferred Alternative)	8,300
RPA	(1990 RPA Program Emphasis)	10,000
CUR	(No Action/No Change)	8,300
CBF	(Citizens for Better Forestry)	8,300

15. Recreation

Consequences Common to All Alternatives

The current management direction in the Whiskeytown-Shasta-Tnnrty National Recreation Area (NRA) Management Plan will be carried forward in all alternatives The Forest Plan will serve as the document to which the NRA Management Plan will be tiered

Proposed recreation opportunity spectrum (ROS) classes are linked to the management prescriptions assigned to a specific alternative according to the theme of that alternative Thus, the inventoried ROS has the potential to change from one ROS class to another Under all alternatives, designated Wildernesses will be managed to the pnmitive ROS class (includes all inventoried primitive ROS as well as inventoried semi-primitive non-motorized ROS within the Wilderness boundaries)

The emphasis on developing and maintaining partnenhips will be common to all alternatives

The management and protection of resource features which fall within the purview of minimum management requirements (MMRs), (e g , encompassed by laws and regulations) will be common to all alternatives These features will have a similar effect on the recreation resources regardless of alternative For example, proposed recreation activities and improvements, such as off-highway vehicle (OHV) use, and trail and campground construction, will be limited by the existence of significant cultural resource properties. sensitive plant sttes. and threatened and endangered species habitats needing protection

Consequences Specific to An Alternative

Alternative PRF (Preferred Alternative). Alternative PRF will provide developed recreation opportunities adequate to meet estimated demand for the next 50 yean The conceptual organization of the Shasta-Trinity National Forests recreation potential will be framed into theme areas Twelve geographic recreation theme areas will examine management opportuntties over the next five decades The consequences of this organization will be that unique recreation experiences and activities offered by each theme area will be identified, rather than providing identical activities in all locations Additional recreation opportunities offered by each theme area, but not currently being used, will be identified and promoted in the Ist and 2nd decades

Recreation use will increase approximately 50 percent over the next 50 yean Existing developed sites will be rehabilitated at the rate of 8,750 people-at-onetime (PAOT) per decade New developed sites will be constructed to meet projected demand Dispened use will increase approximately 50 percent by the end of the planning horizon

This alternative will result in no changes from current acreages in the primitive and semi-primitive non-motonzed ROS classes The change in semi-primitive motorized is approximately a 15 percent increase from current There will be a 15 percent decrease in the roaded natural ROS class, and no change from the current acreages in the rural ROS class

OHV opportunities will decrease slightly (from the current 243,020 to 239,175 acres) for areas open and usable during the summer Described another way, Alternative PRF will have 586,609 acres closed, 1,259,688 acres restricted, and 275,250 acres open (includes usable and unusable) to OHV use This will be offset by an increase in designated OHV travelways

As a result of timber management activtties, hydroelectnc projects, and increased use of lake surfaces, there will be a minor decrease in the semi-primitive character of the landscape due to road construction and harvest areas Resource management activrties will be evident but will harmonize wtth the natural environment Increased demand for competing winter sports activities and water-oriented recreation activities will lead to a limited amount of use conflicts

Development of downhill skiing facilities in the Mt Shasta area will be encouraged to accommodate up to 5,000 skiers-at-one-time (SAOT) A site-specific environmental statement has been completed to examine the environmental effects of this proposal

Alternative RPA *(1990* RPA Program Emphasis). This alternative will provide developed recreation opportunities to meet demand levels through the planning horizon The conceptual organization of the Shasta-Trinrty National Forests recreation potential will be framed into theme areas Twelve geographic recreation theme areas will examine management opportunities over the next five decades The consequences of this organization will be that unique recreation experiences and activities offered by each theme area will be identified, rather than providing identical activities in all locations The difference from

Alternative PRF is that addrtional recreation opportunities offered by each theme area, but not currently being used, will be identified and promoted over the next 5 decades Total recreation use bythe end ofthe planninghorizonwill be approximately 7 3 million recreation visitor days (RVDs)

As in Alternative PRF, this alternative will result in no increases in acreage in the primitive and semi-primitive non-motorized ROS classes The semi-primitive motonzed class will have aslight increase from inventoried acreage, and there will be a slight decrease in the roaded natural ROS class. There will be no change from current acreages in the rural ROS class

OHV opportunities will be slightly greater than the current situation (from 243,020 acres to 256,120) *for* areas open and usable during the summer In addition, designated OHV travelways will be increased Alternative RPA will have 543,959 acres closed, 1,259,908 acres restricted, and 3 17,680 acres (includes usable and unusable) open to OHV use

There will be some decrease in the semi-primitive character in many areas ofthe landscape as a result of increasing timber outputs Resource management activities will be evident but will harmonize wrth the natural environment

Downhill skiing in the Mt Shasta area will be encouraged to accommodate up to 5,000 SAOT with possible future expansion to 13,000 SAOT based on demand A site-specfic environmental statement has been completed to examine the environmental effects of this proposal

Alternative CUR (No Action/No Change). In Alternative CUR developed recreation opportunities will be adequate to meet demand in the first decades However, in the remaining decades, the supply of developed recreation opportunities will fall short of demand The management organization will not be conceptualized into geographic theme areas Consequences will include a continuation *of* current management which will attempt to meet all opportunity demands in all areas There is the possibility that the development of unique opportunities will be missed Only 20 percent of developed sites will be operated at the standard service level As the demand for developed sites increases, the midweek period will become more heavily used The quality of developed recreation use will decline due to cutbacks in maintenance and services The quality of the recreation experiences will also decline due to the crowded condrtions that will exist

Dispened recreation activrties that are dependent on trail and water use will be emphasized in this alternative due to their more cost-effective nature The quality of the dispersed recreation experience will decline for some users

This alternative will result in no changes to the current ROS class acreages

OHV opportunities will remain as designated in the 1980 Forest OHV Plan, as amended Designated OHV travelways will increase. Alternative CUR will have 533,3 10 acres closed, 1,233,033 acres restncted, and 355,200 acres open (including usable and unusable) to OHV use

As a result of resource management activities requiring road access, there will be some decreases in the semi-primitive character of the landscape Resource utilization activities will be evident but will harmonize with the natural environment

Under this alternative, downhill skiing facilities in the Mt Shasta area will be encouraged to accommodate up to 5,000 SAOT A site-specific environmental statement has been completed to examine the environmental effects *of* this proposal

Alternative CBF (Citizens for Better Forestry). This alternative will provide recreation opportunities adequate to meet estimated demand Existing developed sites will be rehabilitated at the rate of 1,100 PAOT per decade and new developed sites will be constructed at the rate of 1,050 PAOT per decade The management organization will not be conceptualized into geographic theme areas. Consequences will include a continuation of current management which will attempt to meet all opportunrty demands in all areas There is the possibility that the development of unique opportunities will be missed This alternative will result in a slight increase in both the primitive and semi-primitive motorized ROS classes There will be a significant increase over inventoried acres in the semi-primrtive non-motorized ROS class, and a significant decrease in the rural ROS class acres There will be aslight decrease in roaded natural acreages

OHV opportunrties will be less than the current situation for areas open and usable in the summer (existing 243,020 to 220, 195 acres proposed) Described another way, this alternative will have 687,650 acres closed, 1,180, 157 restricted, and 253,740 acres open (including usable and unusable) to OHV use Designated OHV travelways will increase

This alternative has the least amount of changes *of* any altemative in semi-primitive characteristics on a large portion of the landscape

Under Alternative CBF downhill skiing opportunrties will be limrted Downhill skiing facilities on Mt Shasta will be developed to serve a maximum of 1,500 SAOT

16. *Riparian Areas*

Refer to the sections on fisheries and water quality in this chapter for a discussion of environmental consequences associated with npanan areas.

17. Soils

Consequences Common to All Alternatives

Land management practices, such as timber harvesting, reforestation, site preparation, and vegetation type conversion, can affect soil productivity The removal of vegetation from a site, as in timber harvesting. also removes plant nutrients Removing vegetation from a site for reforestation or type conversion exposes the soil to erosion and leaching of nutnents Soil compaction by mechanized equipment can reduce root aeration The direct effect of these site alterations can be the eventual loss of commodity outputs

Research has shown that timber harvesting and site preparation for reforestation, if done following Soil Qualrty Standards (SQS) and Best Management Practices (BMPs), result in no significant loss of soil produdivity in the short term 'The indication is that there is also ltle or no long-term loss in soil productivity, at least in highly productive srtes If there ts a long-term loss of productivrty, it will probably be more apparent in low productivity soils The construction of system roads, however, does remove areas from Droduction

Consequences Specific to An Alternative

The SQS and BMPs that mitigate soil erosion, compadion, nutrient loss, and organic matter loss will protect soil productivity They will be employed for each alternative However, there is still a slight potential that soil productivity can be affected

Each alternative has a different potential effect on soil productivity Indicaton of this variable effect are best displayed and discussed in terms of management activrties that will resutt in soil disturbance The indicators used here are acres of timber harvest and acres of road construction

Compared to a decade ago, fewer acres are being harvested No acres are scheduled to be treated by clearcutting So, clearcutting has been reduced from an average of 5,500 acres to close to 0 acres per year in Altemative PRF In addition, new standards and guidelines have been implemented which offer greater resource protection for soil qualrty, including compaction, erosion and productivity, and for riparian areas

The assumption is that the greater the number of acres harvested, the higher the potential for soil compaction and erosion which will affect soil productivrty *Also,* more miles of road construction result in more acres of soil taken out of production **Table IV-5,** under the Geology Section of this chapter, displays the acres of timber harvest and the acres of road construction by alternative The following discussion considers potential impacts of each alternative in relation to current management, Alternative CUR

Alternative PRF (Preferred Alternative). This alternative will have about 6,430 acres of timber harvest, or about 33 percent fewer acres than Alternative CUR, thus there will be a slightly lower potential for soil productivrty degradation About 5 acres of land will be taken out of production by road construction each year

Alternative RPA (1990 RPA Program Emphasis). This alternative will have less potential for adversely affecting soil productivity from Alternative CUR There will be about 8,890 acres of timber harvest, or about an 8 percent decrease in this alternative over CUR About 40 acres of land will be taken out of production by road construction each year

Alternative CUR (No Action/No Change). This alternative will have the greatest risk of adversely affecting soil productivrty There will be an average of about 9,660 acres of timber harvested per year This timber harvest, and the subsequent reforestation srte preparation adivrties, often expose the soil to potential erosion *Also,* in this alternative, about 40 acres of land will be taken out of production by road construction each year

Alternative CBF (Citizens for Better Forestry). There will be about 5,880 acres of timber harvested, or about 39 percent fewer acres than in Altemative CUR There will be 28 acres of land removed each year from productivrty because of road construction

1 Analysis of Soil and Site Properties in Paired Clearcut and Uncut Douglas-fir Stands on the Galice Formation, Fox Planning Unit, Six Rivers National Forest, Robert F Powers and Charles P Weatherspoon, Pacific Southwest Forest and Range Experiment Station, Redding, CA 96001, January, 1984

18. Special Areas

RESEARCH NATURAL AREAS (RNA)

Consequences Common to All Alternatives

Under all alternatives the established Shasta Mud Flow Research Natural Area (RNA) will be retained The characteristics of young-growth ponderosa pine stands and the geologic values of a volcanic mud flow will be maintained

Under all alternatives areas suitable for RNA purposes, but not yet identified, can be lost due to allocation to management prescriptions and uses which will alter the natural vegetation and landscape This effect will be minimized through early identification of areas which fulfill RNA network requirements Refer to Appendix F for a complete listing of the target ecosystems needed for the Regional network of RNAs

Consequences Specific to An Alternative

The impacts related to RNA establishment can be viewed from two aspects, (1) impacts to the RNA program, that is, opportunities gained or lost in reference to RNA targets, and (2) secondary impacts of RNA establishment on other resources

With reference to the first aspect, areas recommended for RNA establishment vary by alternative See **Table IV-8** for a listing of recommended RNAs

Designation of an area as a RNA will also have an impact on the resources located within that RNA Resource conditions within each RNA are descnbed in Appendix F, **Table F-2.** Some uses will be restricted or prohibited under an RNA designation For example, all motorized, dispersed recreation uses, developed recreation uses, timber harvesting, road construction, mineral development, and other ground-disturbing activities will be prohibited

Non-motorized dispersed recreation will be limited to day use Thus, dispersed camping will be discouraged, if not prohibited Even day use will be carefully controlled and limited, depending upon the purposes of the RNA and the nature of studies to be conducted within the RNA

Conversely, the immediate short-range effect of identifying land for RNA purposes will be to prohibit candidate areas from human disturbance associated with land management activities except where specific projects have been initiated

Alternative PRF (Preferred Alternative). This alternative allocates 23,260 acres of National Forest lands in eight candidate RNAs to Management Prescription X (Special Area Management) Records will be prepared establishing these areas

Stuarts Fork is recommended pending further site evaluation Its allocation may be made later in an amendment to the Forest Plan

Other candidate lands will be evaluated prior to proposing their establishment as RNA's Any decision concerning their allocation to Management Prescription X (Special Areas), as an RNA(s), will be made later in an amendment to the Forest Plan

Final establishment of these areas will meet 8 out of the 34 established RNA targets shown in Appendix F, **Table F-1** These targets are shared by the Klamath, Lassen, Six Rivers, and Shasta-Trinity National Forests

Alternative RPA *(1990* RPA Program Emphasis). This alternative allocates 13,400 acres of National Forest lands in five candidate RNAs to Management Prescription X (Special Area Management). Four of the five areas are within existing Wildernesses Established Records will be prepared after this Plan is issued

Other candidate lands will be evaluated prior to proposing their establishment as RNA's Any decision concerning their allocation to Management Prescription X (Special Areas), as an RNA(s), will be made later in an amendment to the Forest Plan

Final establishment of these areas will meet 5 out of the 34 established RNA targets shown in Appendix F, **Table F-1** These targets are shared by the Klamath, Lassen, Six Rivers, and Shasta-Trinity National Forests

Alternative CUR (No Action/No Change). This alternative allocates 21,470 acres of National Forest lands in eight candidate RNAs to Management Prescription X (Special Area Management) Established Records will be prepared after this Plan is issued

Other candidate lands will be evaluated prior to proposing their establishment as RNAs Any decision concerning

Table IV-8
Allocation of Research Natural Areas - By Alternative
(Net National Forest Acres)**

Name of Area	Acreage	PRF	RPA	CUR	CBF
1.Bald Mountain	800	-	-	-	800
2.Bear Creek	4,500	-			4.500
3.Cascade	2,000	-		-	2,000
4.*Cedar Basin	1,160	1,160	1,160	1,160	1,160
5.*Devils Rock-Hosselkus	5,550	5,550	-	4,980	5,550
6.*Manzanita Creek	7,250	7,250	7,250	7,250	-
7.Murphy Glade	1,260	-	-		1,260
8.*Mt. Eddy	890	890	-	890	890
9.*Preacher Meadows	1,850	1,850	1,850	1,850	1,850
10.*Red Butte-Red Fir Ridge	1,640	1,640	1,640	1,640	1,640
11.*Rough Gulch	3,960	3,960	-	2,200	3,960
12.*Smoky Creek	960	960			960
13.South Fork Mountain	1,180	-	-		*900*
14.*Stuart Fork	1,500		1,500	1,500	1,500
TOTAL (Number of Areas)	34,500 (14)	23,260 (8)	13,400 (5)	21,470 (8)	26,970 (13)

* Recommended for establishment
** These figures do not include the already established Shasta Mud Flow, 3, 115 acres

their allocation to Management Prescnption X (Special Areas), as an RNA(s), will be made later in an amendment to the Forest Plan

Final establishment of these areas will meet 8 out of the 34 established RNA targets shown in Appendix F, **Table F-1** These targets are shared by the Klamath, Lassen, Six Rivers, and Shasta-Tnnity National Forests

Alternative CBF (Citizens for Better Forestry). This alternative allocates *26,970* acres of National Forest lands in 13 candidate RNAs to Management Prescnption X (Special Area Management) Established Records will be prepared after this Plan is issued

Other candidate lands will be evaluated pnor to proposing their establishment as RNA's Any decision concerning their allocation to Management Prescnption X (Special **Areas),** as an RNA(s), will be made later in an amendment to the Forest Plan

Final establishment of these areas will meet 13 out *of* the 34 established RNA targets shown in Appendix F, **Table F-1** These targets are shared by the Klamath, Lassen, Six Rivers, and Shasta-Tnnrty National Forests

SPECIAL INTEREST AREAS (SIA)

Consequences Common to All Alternatives

A number of SIAs will be recommended for classification in all alternatives (See **Table III-14** in Chapter III and **Table** IV-10) If these **areas** were not classified, they will be exposed to a vanety of resource management activities

which can have the potential to cause disturbance Examples of such activities include salvage logging, road building, mining, and dnlling associated wrth geothermal development

Table IV-9 indicates the relative risks of environmental disturbance that will be involved for each of the areas if they were not classified

Impacts resulting from any future potential mineral developments will be mitigated through classlfication of the areas, followed by mineral withdrawal

Consequences Specific to An Alternative

Alternative PRF (Preferred Alternative). A total of 19 SIAs will be recommended under this alternative. These areas are (1) Bigelow Meadow, (2) Black Butte, (3) China Mountain, (4) Cory Peak, (5) Deadfall Basin. (6) Deep Crater, (7) Giant Crater Lava Tube System, (8) Grizzly Peak, (9), Kangaroo Ridge, (10) Lrttle Glass Mountain, (11) Natural Bridge, (12) Paint Pot Crater, (13) Pumice Stone Mountain, (14) Samwel Cave, (15) Scott Mountain, (16) Spatter Cones, (17) Tedoc Mountain, (18) Toad Lake, and (19) Western Azalea

Recommendation of these areas (6,981 acres total) will cause insignlficant impacts on the environment from both a short-term and long-term aspect There will be an insignificant amount of timber resource outputs and mineral values foregone

In addition. *22* other areas, which may qualify as SIAs, will be further analyzed for possible classlfication Management direction will be provided to evaluate each potential area

Alternative RPA (1990 RPA Program Emphasis) Thirteen areas, involving 5,458 acres, will be recommended for classification as SIAs under this alternative Six addrtional areas will be analyzed for possible classification

Alternative CUR (No Action/No Change). Nine of the SIAs recommended in Alternative PRF will be recommended for classlfication under this alternative (See **Table IV-10**) However, no additional areas will be analyzed for classification as SIAs

Alternative CBF (Citizens for Better Forestry). This alternative will recommend 15 areas for SIA establishment (1) Blake Mountain, (2) Cable Creek, (3) Deep Crater, (4) Giant Crater Lava Tube System, (5) Lrttle Glass Mountain, (6) Lower McCloud River Wild Trout Area, (7) Mt. Shasta Scenic Area, (8) Natural Bridge, *(9)* Paint Pot Crater, (10) Pumice Stone Mountain, (11) Samwel Cave, (12) Spatter Cones, (13) Tedoc Mountain, (14) Trout Creek Redband Trout Area, and (15) Western Azalea

Areas not recommended for SIA classification will be available for all other uses Managementactivrties that may have major impacts to SIAs eliminated from consideration might include

Grazing. Sensitive biotic communities can be severely disturbed and degraded when they are overstocked with livestock A lack of management direction in these areas can result in a significant loss of the target habrtat

Timber Harvest and/or Other Special Forest Products Removal of the vegetation by harvesting can result in disturbance to unique vegetative species or associations typical of some SIAs

Road Construction. Construction of roads can adversely affect proposed areas Roading can disturb unique geological areas.

Mining and Geothermal Development. Exploration for and development of mines or geothermal areas can adversely affect all of the areas Exploratory dnlling operations, surface or underground mining excavations, settling ponds, leaching ponds and waste disposal srtes will remove vegetation, possibly affect both surface and subsurface drainage, and disturb land surface features

Off-Highway Vehicle (OHV) Use. OHV use causes soil erosion and compaction and displacement along the vehicle track Dust on plants can contribute to reduced plant growth Fragile botanical communities can be damaged by such use

MT. SHASTA

Consequences Common to All Alternatives

Management direction is already implied for all alternatives in Mt Shasta's designation as a Wilderness, a National Natural Historic Landmark (NNHL), and a Recreation Area (under the Secretary of Agriculture's 1926 Land Order) In addition, the management direction for Management Areas 3 (Mt Shasta) and *5* (Forest Wildernesses-Mt Shasta Wilderness) will be followed in all alternatives

Table IV-9
Risk of Disturbance to Special Interest Areas
(if they are not classified)

	Area Name	Risk	
1	Bigelow Meadow*	G, OHV	++
2	Big Sand Flat	G, OW	++
3	Black Butte*	M, OHV	+
4	Blake Mountain	G, L, OHV	++
5	Burnt Lava Flow	L, M, OW	+++
6	Cable Creek	G, L	++
7	China Mountain*	G, L, M, OW	++
8	Cory Peak*	G, L, M, OHV	++
9	Deadfall Basin*	G, L, M, OHV	++
10	Deep Crater"	M, OW	+++
11	Del Loma Cave	M, OHV	+++
12	Dobkins/Durney Basin	G, M, OHV	++
13	Dubakella Mountain	M, L, OHV	++
14	Giant Crater Lava Tube System*	L, M, OW	+++
15	Grizzly Peak*	M, OHV	+
16	Hall City Cave	L, M, OW	+++
17	Hirz Mountain	M	+
18	Kangaroo Ridge*	G, L, M, OHV	++
19	Little Glass Mountain*	M, OW	++
20	Lower McCloud Rver	G, OW	++
21	McCloud Falls	G, L, OW	++
22	McGinnis Springs/Wagon Camp	G, L, OW	++
23	Mt Shasta Scenic Area	G, L, OW	+++
24	Natural Bridge*	L, OW	+
25	New Rver	G, L, OHV	++
26	Paint Pot Crater*	M, OHV	+++
27	Papoose Hill	M, OW	+
28	Potem Falls	L, OW	+
29	Potter Creek Cave	M	+++
30	Pumice Stone Mountain*	M, OW	+++
31	Samwel Cave*	M	+++
32	Scott Mountain*	G, L, OHV	++
33	Spatter Cones*	L, OW	+++
34	Tedoc Mountain*	G, L, M	++
35	Tilted Rock Lava Flow	L, M, OHV	+
36	Toad Lake*	G, OW	++
37	Tombstone Peak Caves and Fossil Locality	M, OW	+
38	Trout Creek	G, L, OHV	++
39	Twin Lakes Basin	G, L, OW	+
40	Wells Creek Falls	OW	+
41	Western Azalea*	L, OW	++

* Recommended for establishment as Special Interest Areas

Key G = Grazing/Pack Animals, L = Logging Activities, M = Mining/Geothermal Activities, OHV = Off Highway Vehicles, + = Low Risk, ++ = Moderate Risk; +++ = High Risk

Consequences Specific to an Alternative

The consequences associated with Mt Shasta will vary depending on the degree of management emphasis placed upon Mt Shasta and the surrounding area As noted above, some emphasis has already been provided through a mixture of administrative and legislative designations

Alternative PRF (Preferred Alternative). Under this alternative, the Mt. Shasta Management Area (Management Area 3) will be informally designated a Special Manage-

Table IV-10
Special Interest Areas 'Recommended' for Establishment
Comparison of LMP Alternatives

Area Name	PRF	RPA	CUR	CBF
1. Bigelow Meadow	136	136		-
2 Black Butte	560	560		-
3 Blake Mountan				155[1]
4 Cable Creek				Unspecified[1,2]
5 China Mountain	680	-	-	-
6 Cory Peak	280			-
7 Deadfall Basin	460	460		-
8 Deep Crater	333	333	333	333
9 Giant Crater Lava Tube System	179	179	179	179
10 Grizzly Peak	220		-	-
11 Kangaroo Ridge	190		-	-
12 Little Glass Mountain	1,440	1,440	1,440	1,440
13 Lower McCloud River Wild Trout Area			-	Unspecified[1,2]
14 Mt. Shasta Scenic Area				Unspecified[1,2]
15 Natura Bridge	64	64	64	64
16 Paint Pot Crater	444	444	444	444
17. Pumice Stone Mountain	107	107	107	107
18 Samwel Cave	20	20	20	20
19. Scott Mountain	128			-
20 Spatter Cones	5	5	5	5
21 Tedoc Mountan	1,060	1,060	1,060	1,060
22. Toad Lake	650	650		-
23 Trout Creek Redband Trout Area	-		-	Unspecified[1,2]
24 Western Azalea	25			5
Total Acres	6,981	5.458	3.652	3,812 (+)
Number of SIAs	19	13	9	15

1 These five areas are being 'recommended' in Alternative CBF only Therefore, they are shown as 'potential' SIA in Table III-16, which reflects Alternative PRF only

2 Boundaries have not been set

ment Area in recognition of its unique values This Management Area will be a single, coordinated unit to focus attention on the Mt Shasta area as a whole This informal designation will recognize the many uses and values which abound in the Mt Shasta area

Based on this concept, there will be few apparent changes in the outputs of goods and services over the current management situation However, there will be slightly higher management costs than represented by Altemative CUR This will be brought about by such things as more intensive signing, additional visitor information services,

and multiple resource coordination, tied to a goal which emphasizes Mt Shasta.

Alternatives RPA (1990 RPA Program Emphasis) and CUR (No Action/No Change). Under these alternatives no changes will be made over the current management emphasis Therefore, no addtional environmental consequences are anticipated

Alternative CBF (Citizens for Better Forestry). Underthis alternative the Mt Shasta Management Area (Management Area 3) will be designated as a SIA and named the Mt Shasta Scenic Area In effect, the area will be recognized specfically for its unique scenic and recreational values Other unique features will be recognized but not necessarily emphasized There will be no changes in the management of the areas contiguous to the proposed scenic area boundaries No environmental consequences will be anticipated for these areas as a result of SIA classification

19. Timber

The consequences of implementing the alternatives are closely related to the public issues The consequences focus on three basic questions (I) what lands will be used for timber production?, (2) to what intensity will timber management be practiced on these lands?, and (3) what timber management practices will be applied to these lands? To assess and predict the consequences of each alternative on the timber resource, the following items are addressed

- surtable timber land base,
- management intensity on the suitable timber lands;
- silvicultural and harvest practices,
- allowable sale quantity (ASQ), long-term sustained yield and growth, and
- management requirements and mitigation measures

The conceptual background for these items is given in the next section That section also describes consequences that are common to all alternatives Consequences that are specific to an alternative are shown in **Table IV-II** and discussed in the subsequent sections

Consequences Common to All Alternatives

Suitable Timber Land Base. The production of timber is largely dependent upon the quantity and qualtty of lands allocated to that use Using the timber suitability process directed by the National Forest Management Act (NFMA), Shasta-Trinity National Forests personnel have identified about I ,077,800 acres as capable, available, and tentatively suitable for timber production This represents about 5 I percent of the Forests' land base This is the base from which the suitable timber lands are selected for each alternative

During the formulation of each alternative, some of the lands originally identlfied as tentatively suitable were determined to be unavailable or not appropriate for timber production in order to meet the objectives of the alternative This occurred if the land was (I) assigned to other resource uses that precluded timber management (e g wildemess and research natural areas), (2) assigned to other resource uses that limrted timber management activities so severely that timber management requirements can not be met (e g unroaded non-motorized recreation areas and riparian management zones), or (3) determined not to be cost efficient in meeting timber management objectives over the planning honzon (e g. non-stocked brushfields) These lands are classified as not suitable or available for timber production under the alternative, and the amount of land in this category varies by alternative

Late-Successional Reserves have the most significant effect on the reduction of the suitable timber land base in all alternatives

Non-stocked lands on tentatively suitable timber land are not included in the suitable timber land base in any of the alternatives

Removing land that is tentatively suitable from the suitable land base in an alternative reduces the potential allowable timber harvest level The magnitude of this reduction depends not only on the amount of land removed but also on its relative productivity Reductions can be mitigated by increasing the intensity of timber management on the remaining suttable acres The following section discusses this concept

Timber Management Intensity on Suitable Timber Lands. Timber management intensity on suitable timber lands, for all alternatives, is categorized as regular or marginal

Regular management is characterized by high to moderate timber yields (70-100 percent of potential) using the appropriate mix of silvicultural practices and intensities to obtain these yields Reduced yields are due to limitations on silvicultural practices or intensities in order to meet other resource objectives Marginal management is characterized by minor yields (20 percent of potential), primarily from sanitation/salvage cutting, due to site limitations or resource objectives which severely restrict timber management

Timber management intensity is determined by the management prescriptions in an alternative The standards and guidelines in the management prescriptions determine the intensity at which the timber can be managed within those prescription areas The amount of land allocated to each of the two intensity levels varies between alternatives

Timber intensties affect the rate at which timber stands can be managed Cubic foot volume growth of managed stands, with no intermediate thinning yields, culminates at 50 to 80 years of age Timber stands which exceed this

Table IV-II
Timber Consequences of Each Alternative

		ALTERNATIVE			
	Unit of Measure	PRF	RPA	CUR	CBF
Suitable Timber Land	M Acres*	530 0	638 1	635 8	495 4
Suitable Land by Intensity Class	M Acres				
Intensive/Modified		434 6	537 7	502 8	327 7
Minimal		95 4	100 4	133 0	122 7
Tentatively Suitable Land - Not Suitable Under the Alternative	M Acres	547 8	439 7	442 0	582 4
Silvicultural Practices					
Regeneration Cutting-Decade 1	M Acres				
Clearcut		0 0	38 1	31 6	0 0
Green Tree Retention		20 0	9.3	17.8	26 9
Selection		15 0	0 0	3 0	14 0
Reforestation	M Acres				
Total - Decade 1		35 0	47.0	52 0	41 0
Total - Decade 5		35 0	47.0	52 0	41 0
Percent of Forest Reforested After 5 Decades	Percent	8	11	12	10
Timber Stand Improvement					
Total - Decade 1		53 0	71 0	78 0	62 0
Total - Decade 5		53 0	71 0	78 0	62 0
Allowable Sale Quantity	MMBF**				
Average Annual - Decade 1		82 0	112 4	1059	65 3
Average Annual - Decade 5		90 4	123 9	1166	68 1
long-Term Sustained Yield (LTSY)	MMBF	103 3	1367	1274	75 3
Growth	MMBF				
Average Annual - Decade 5		1560	172 8	1905	101 4
BF/Acre/Year - Decade 5***		285	271	300	205

* M Acres - Thousand Acres
** MMBF = Million Board Feet
*** Board Feet per Acre per year

age will not be growing at optimal rates and should be regenerated wtth a new stand in order to maintain maximum productivrty of the site

Most of the existing timber stands on the Forests are beyond the age of culmination of growth The rate at which these stands are regenerated and converted to young, faster growing managed stands has a signficant effect on harvest levels This "conversion penod" for existing stands will vary between alternatives, due primarily to the mitigating requirements and objectives of the alternative

Alternatives with pnmary emphasis on timber management will have relatively shorter conversion periods than alternatives which will emphasize wildlfe, recreation and aesthetic values An indication of this is reflected in the number of acres in the younger (0-50 years) age classes

The rate at which replacement or regenerated stands are allowed to be harvested is another important factor which affects harvest levels This cutting rate is referred to as the rotation length or age Replacement stands under timber management prescriptions will be allowed to cycle on varying rotation lengths, depending on the theme and objectives of the alternatives Rotation lengths for replacement stands usually correspond closely to the conversion periods for existing stands

In all of the alternatives, the average size of the trees harvested in the future will generally be smaller than the trees harvested today This is because most of the trees

harvested in the future will be younger than the trees currently being harvested

Silvicultural and Harvest Practices

Silvicultural Systems (Cutting Practices) - The silvicultural systems selected to manage any particular area will be determined through site-specific analysis by an interdisciplinary team The final prescription will depend on factors such as management objectives, current stand and site conditions, environmental considerations, cost effectiveness, and the desired future condition of the vegetative cover This standard will apply to all alternatives

Both even-aged and uneven-aged systems will be used in all alternatives, although the amount of acres managed under each system will vary considerably See Appendix J for a discussion of the major silvicultural systems and their application

Regeneration cutting in understocked and poorly-growing stands will be emphasized in all alternatives Even-aged systems, using clearcutting, green tree retention (GTR), and shelterwood cutting, will be the primary practices used in areas to be managed intensively for timber production, where timber growth and yield is an important consideration Even-aged systems will normally be appropriate on these areas due to low sensitivity to other resource issues, single-storied stand structures, presence of little or no manageable understory, high incidence of insects and/or diseases, speaes that are relatively intolerant to shade, steep slopes, and minor risk of regeneration failures

Where forest timber growth and yield is unregulated, e g Late-Successional Reserves, timber harvest will be incidental to providing for other resource values Silvicultural treatments such as thinning and biomass removal, salvage, sanitation, and regeneration can be permitted to meet specific nontimber resource objectives

The amount of clearcutting varies considerably between alternatives For assessing consequences, projected clearcutting acres for each alternative can be compared against the 1990 Resources Planning Act (RPA) target The RPA target for the Forests is to reduce the amount of clearcutting by at least 14 percent from the base year in the 1st decade of the Forest Plan For the base year (1984-1990) an average of about 8,700 acres per year was clearcut All alternatives meet this target

GTR will be employed in all alternatives GTR will normally retain 15 percent of the harvested stand in patches and individual trees which are larger than the mean diameter of the stand These trees will be retained for multiple rotations of the stand This practice will result in a yield reduction of about 15-30 percent compared to pure clearcutting due to the loss of volume in the green trees retained and the shading effect of the reserve trees on the newly regenerated stand

Uneven-aged systems, using selection cutting, will be employed in all alternatives where other resource objectives are emphasized and a continuous tree cover is desired Average per acre timber yields from regenerated stands under uneven-aged systems are projected to be about 10 to 20 percent less than under even-aged systems, due to the effect of shading and competition from surrounding trees Management costs per acre are also predicted to be 10 to 20 percent higher under an uneven-aged system due to smaller openings

Overstory removal cutting in two-storied stands, with scattered overstory and a fully stocked understory, will be a silvicultural option in all alternatives

Intermediate commercial thinnings in overstocked stands will be practiced in all alternatives Stand maintenance (sanitation/salvage cutting) will be the primary practice used in areas where marginal management is specified

All cutting practices, including clearcutting, will be considered on about 85 percent of the tentatively sutable timber land base Cutting practices on the remaining 15 percent will be limited to methods other than clearcutting due to artificial regeneration limitations These areas include high elevation red fir, soils with low site productivty, soils with high rock content, and soils with poor water holding capacity

From a growth and yield standpoint, clearcutting and shelterwood cutting produce the highest timber outputs Therefore, alternatives with a larger proportion of acres in these practices will produce the highest ASQ

The major environmental consequences related to silvicultural systems are biological (i e , productivity, species diversity, etc) and managerial (i e , costs, scenic quality, watershed and soils, etc) These are discussed in detail in Appendix J, Major Silvicultural Systems and Their Application

Reforestation - Most of the reforestation activities in all alternatives will occur as a result of regeneration cutting of timber stands Regeneration cutting by clearcutting, GTR, shelterwood cutting and selection cutting will be needed

to optimize progress toward a regulated forest Regeneration cutting is necessary to increase the long-term productivity of the land by replacing older, slow-growing stands with young, fast-growing stands Reforestation activities will include ste preparation and planting in all alternatives

Successful reforestation depends on a number of facton, including but not limited to the following (a) adequate and timely site preparation, (b) good planting stock, (c) proper stock handling, (d) good planting job, and (e) seedling protection after planting The risk of failure will be greatest under those alternatives requiring the most reforestation

Regenerated stands will vary in size in all alternatives Clearcut, GTR, and shelterwood openings will generally be 2 to 20 acres in size Selection cutting openings will be less than *two* acres

Existing stand structures (proportion of species, tree sizes, and ages) will be altered under all alternatives where regeneration cutting occurs

Existing tree species will be maintained in all alternatives Diversity of tree species, indigenous to an area, will be assured by application ot the following standards in all alternatives (a) an appropriate mix of tree species will be planted in areas to be artificially regenerated, (b) the regeneration of both shade tolerant and intolerant tree species will be encouraged in areas to be naturally regenerated, and (c) manageable, salvable, advanced reproduction will be left in areas planned for regeneration cutting

The planting of a mix of species native to the area, plus the addition of natural regeneration of species common to the area, will ensure against a monoculture situation Planting of Douglas-fir, white and red fin, cedars sugar pine, and ponderosa and Jeffrey pines will continue under all alternatives The more shade-intolerant species. such as ponderosa pine and Douglas-fir, will be the primary species planted

Replacement of the more shade-tolerant species. such as whte and red firs, and cedars will rely more on natural regeneration, since these species can regenerate and survive in the shade of the other tolerant species and brush Maintaining a mix of native tree species is consistent with current reforestation practices No major changes will be anticipated in any of the alternatives

Opportunties to reforest suitable timber lands which are non-stocked with conifers (e g brushfields) will be considered, but not emphasized, under any of the alternatives Minor acreages of non-stocked lands may be converted to confers under any of the alternatives.

The amount of reforestation varies by altemative For assessing consequences, projected reforestation (planting) acres can be compared against the historical level of reforestation activty over the last nine years, and the percent of the Forests' acres that will be reforested over the next five decades.

The actual reforestation acres accomplished over the previous decade averaged about *9,500* acres per year on the Forests

Timber Stand Improvement (TSI) - Substantial TSI work, including release from competing vegetation and precommercial thinning, will be practiced under all alternatives The amount of acres treated will vary between alternatives.

Most of the TSI activities will occur within areas which have been reforested (plantations) TSI is often necessary to assure plantation establishment and to maintain growth and vigor of regenerated stands Maintaining trees in a healthy, vigorous condtion is also the best defense against insect and disease damage The control of competing vegetation and proper stocking through release and thinning will foster these conditions under all alternatives

4 full range of vegetation management methods must be made available to successfully treat competing vegetation These methods include manual, mechanical, prescribed fire, biological, and chemical (herbicide) methods as well as grazing Herbicides will be avalable for use in all alternatives, except Alternative CBF Herbicide use will be limited to those stuations where it is essential to achieve the desired land management objectives

The effects on timber yields and costs due to restrictions on herbicide use are discussed in Chapter II If herbicide use is restricted, yields will be less and costs will be more

The consequences of the alternatives on TSI work can be assessed by comparing the projected acres of TSI with the historical level of TSI activty over the past five yean The actual TSI acres accomplished from over the previous decade averaged about 8,000 acres per year on the Forests

Allowable Sale Quantity and long-Term Sustained Yield and Growth

Allowable Sale Quantity (ASQ). The ASQ is the maximum amount of timber that may be scheduled for sale from the suitable land base Although it is expressed as an average annual quantity, ASQ actually applies on a decade basis, because the amount of timber sold each year may vary The ASQ is determined by the amount of suitable land, the management intensty applied to those lands, and the silvicultural practices applied

The pnnciple of non-decliningyield applies in **all** alternatives This requires that the ASQ for any decade must be equal to or greater than that of the previous decade

Yields from hardwoods are not included in the ASQ in any of the alternatives Hardwoods will not be managed for commercial timber purposes (sawlogs) However; utilization of hardwoods which are by-products of commercial conifer sales will be permitted under all alternatives

One of the measures used to assess the consequences of an altemative on the ASQ is to compare the proposed ASQ with the actual volume sold under the old Timber Management Plan The actual volume sold from 1975 through 1992 averaged about 200 MMBF per year

Another measure used to assess the consequences of an alternative on the ASQ is to compare the proposed ASQ with the timber targets (timber offered) from RPA The RPA timber target is 195 MMBF per year in the first decade of the Plan

The 1990 RPA targets for timber offered in the first decade will not be attained under any of the alternatives This is because the target was based on projected plans prior to the listing of the northern spotted owl **as** a threatened species

The wildfires of 1987 had a negligible effect on ASQ, since most of the inventory on suitable lands was salvaged and most of these burned-over areas were reforested in a timely manner

Finally, timber yields from the remaining suitable timber land base are often reduced due to other resource requirements, such **as** wildlife habitat, visual objectives, and riparian areas, in response to minimum management requirements (MMRs) and forest issues

The attainment of the 1990 RPA timber target will require a significant increase in the suitable timber land available for timber production, and/or a relaxation or elimination of requirements which limit timber yields from suitable lands

long-Term Sustained Yield (LTSY) - The LTSY is the highest wood yield that may possibly be sustained from lands managed for timber production It is a function of the amount of suitable timberland, the productive capacity of that land, and the management intensity applied thereon Like the ASQ, LTSY will normally be higher for alternatives with more land managed under intensive timber management The ASQ approaches, but does not reach, the LTSY dunng the 160 year planning horizon in any of the alternatives

Growth - Due to a relatively large existing timber inventor/ on the Forests, it is possible to harvest more timber than is grown for quite a few decades. However, growth exceeds harvest in all decades in all alternatives. This is due to numerous constraints on the amount of timber that can be harvested (e g green tree retention requirements) Growth must equal or exceed the amount harvested in all alternatives in order to maintain timber yields over time. Future growth can be improved by regenerating existing understocked or poorly-growing stands

One of the measures of growth is to compare the average total growth per year in the fifth decade on the suitable timber lands in each altemative Alternatives with higher annual growth will produce higher, sustainable timber volumes over time

Another measure of growth is the average annual growth per acre in the 5th decade Alternatives with higher growth per acre have higher quality timber land (i e more productive land) in their timber land base.

Management Requirements and Mitigation Measures

The Pacific Southwest Region's (Region *5)* minimum management requirements (MMRs), minimum implementation requirements (MIRs), and timber policy requirements, as well as the Forests' management requirements which are common to all alternatives, constitute the mitigation measures which will be applied under ill of the alternatives considered Refer to Chapter II and Appendix **B** in this Final EIS for a detailed description of these requirements These basic mtigation requirements will affect the allocation and schedulirig of timber lands with

resulting impacts on timber resources, outputs, and costs in all the alternatives

About 40 percent of the tentatively suitable timber land base will be removed from the timber base and classified as unsutable for timber production in all alternatives due to these minimum requirements

Additionally, mitigation measures will be reflected in the management emphasis on resources such as riparian management zones, wildlrfe habtats. and visually senstive areas on suitable timber lands The effect of these requirements on the timber resource will vary between alternatives based on the theme of each alternative

Consequences Specific to An Alternative

Each alternative has its own unique timber land allocation and timber harvest schedule, establishing the amount, sequence, and rate at which stands will be harvested The alternative harvest schedules are choices in balancing current wants and demands between competing uses, in response to public issues

Alternative PRF (Preferred Alternative). This alternative will produce moderately high timber outputs compared to the other alternatives It will have an ASQ of 82 MMBF per year This is the third highest harvest level of all the alternatives This ASQ will be 59 percent less than the average annual volume sold over the last 18 years

In this alternative, the tentatively sutable timber land base is about 530,000 acres Addtional lands are removed and classified as unsutable for timber production due to allocations to prescriptions with no scheduled timber outputs The primary prescriptions affecting this reduction in the timber base are (1) unroaded non-motorized recreation, (2) ripanan reserves along streams, lakes and wetlands and (3) senstive wildlrfe species

About 50 percent of the suttable timber land under this alternative will be managed wth a commercial wood products emphasis in the context of ecosystem management The primary factors causing reductions from past levels are (1) maintenance of visual quality along senstive roads and recreation areas, and (2) maintenance and enhancement of wildlife habitat for game species

Regeneration cutting will occur on about 6 6 percent of the sultable timber land in the 1st decade Clearcutting is a permitted cutting practice but is expected to be used on a small percentage of the total acres harvested in the 1st decade

The average annual acres to be reforested in the 1st decade will be about 63 percent less than the average annual acres reforested on the Forests over the last nine yean In 50 years about 8 percent of the forest will consist of stands which are less than 50 years of age

This alternative has the third highest LTSY capacity of all the alternatives, exceeded by Alternatives RPA and CUR

Average annual growth in the 5th decade will be moderate, exceeded by Alternatives RPA and CUR

Alternative RPA (1990 RPA Program Emphasis). This altemative will produce the highest timber outputs of all the alternatives It will have an ASQ of 1 12 4 MMBF per year This will be about 44 percent lower than the average annual volume sold over the last 18 years

This alternative will not meet the 1990 RPA timber target However, t will come closer to meeting this target than any of the other alternatives

In this alternative, the tentatively suitable timber land base is about 638,000 acres Addtional lands are removed and classified as unsuitable for timber production due to allocations to prescriptions with no scheduled timber outputs The primary prescriptions affecting this reduction in the timber base are (1) research natural areas, (2) dispersed recreation sltes. and (3) bitterbrush areas for wildlife

This alternative has the most acreage allocated to commercial wood products emphasis of all the alternatives About 75 percent of the sutable timber land under this alternative will be managed with a commercial wood products emphasis in the context of ecosystem management About 25 percent of the sutable timber land will be managed wth resource emphasis other than commercial wood products This is the least amount of any of the alternatives The primary factors causing this reduction are (1) maintenance of visual qualrty along senstive roads and recreation areas, and (2) maintenance and enhancement of wildlife habitat for game species

Regeneration cutting will occur on about 7 4 percent of the sutable timber land in the 1st decade Clearcutting will be the primary cutting practice used on about 43 percent of the acres harvested in the 1st decade This is about 6 percent lower than current practices, and the highest of all the alternatives

The average annual acres to be reforested in the 1st decade will be about 51 percent less than the average annual acres reforested over the last nine years In 50 years about 11 percent of the Forests will consist of stands which are less than 50 years of age

This alternative has the highest LTSY capacity of all the alternatives

Average annual growth in the 5th decade will be relatively high, exceeded only by Alternative CUR

Alternative CUR (No Action/No Change). This alternative will produce moderately high timber outputs compared to the other alternatives It will have an ASQ of 105 8 MMBF per year This is the second highest harvest level of all the alternatives, and will be about 47 percent less than the average annual volume sold over the last 18 years

In this alternative, the tentatively suitable timber land base is about 636,000 acres Additional lands are removed and classified as unsuitable for timber production due to allocations to prescriptions with no scheduled timber outputs The primary prescriptions affecting this reduction in the timber base are (1) research natural areas, (2) brtterbrush areas for wildlife, and (3) dispersed recreation areas

About 63 percent of the suitable timber land under this alternative will be managed with a commercial wood products emphasis in the context of ecosystem management The primary factors causing this reduction are (1) maintenance of visual quallty along sensitive roads and recreation areas, (2) maintenance and enhancement of wildlife habitat for game species, and (3) protection of riparian management zones along perennial and intermittent streams

Regeneration cutting will occur on about 8 2 percent of the suitable timber land in the 1st decade Clearcutting will be the primary cutting practice used on about 33 percent of the acres harvested in the Ist decade This is about 16 percent lower than current practices

The average annual acres to be reforested in the 1st decade will be about 45 percent lower than the average annual acres reforested on the Forests over the last nine years This is the highest of all the alternatives In 50 years about 12 percent of the Forests will consist of stands which are less than 50 years of age

This alternative has the second highest LTSY of all the alternatives

Average annual growth in the 5th decade under this alternative will be the highest of all the alternatives.

Alternative CBF (Citizens for Better Forestry). This alternative will produce moderately low timber outputs compared to the other alternatives It will have an ASQ of 65 3 MMBF per year This will be about 68 percent less than the average annual volume sold over the last 18 years

In this alternative, the tentatively suitable timber land base is about 495,000 acres Additional lands are removed and classified as unsuitable for timber production due to allocations to prescriptions with no scheduled timber outputs The primary prescriptions affecting this reduction are (1) unroaded non-motorized recreation allocated to many former roadless areas, (2) retention of old-growth habitat for wildlife, and (3) riparian management zones along perennial and intermittent streams

This alternative has the least acreage allocated to commercial wood products emphasis of all the alternatives

About 53 percent of the suitable timber land under this alternative will be managed with a commercial wood products emphasis in the context of ecosystem management The primary facton causing this reduction are (1) maintenance of visual quallty along senstive roads and recreation areas, and (2) maintenance and enhancement of wildlife habrtat for game species

Restrictions on the use of clearcutting and the non-use of herbicides will also reduce timber outputs Regeneration cutting will occur on about 8 3 percent of the surtable timber land in the 1st decade Clearcutting will not be practiced in this alternative

The average annual acres to be reforested in the 1st decade will be about 57 percent less than the average annual acres reforested over the last nine yean In 50 years about 10 percent of the Forests will consist of stands which are less than 50 years of age

This alternative has the lowest LTSY of all the alternatives

Average annual growth in the 5th decade will be the lowest of all the alternatives

20. Visual Quality

Consequences Common to All Alternatives

In all alternatives, the most highly used areas of the Forests will be managed for scenic qualrty Examples include the Shasta and Trinity Units of the Whiskeytown-Shasta-Tnntty National Recreation Area (NRA), candidate state scenic highways, riparian zones, developed recreation sites, townsites, and highly used dispersed recreation areas

Visual Objectives in the National Recreation Area. The two units of the NRA will be managed to conserve the scenic values contributing to public enjoyment Management activities such as road construction, development of recreational facilities, timber harvest, etc , are either not scheduled or will be accomplished in a manner which will conserve the scenic nature of the area

Riparian Areas. Riparian areas near major water features, such as lakes and perennial streams, will retain a near natural appearance

Visual Corridors. The foreground and middleground of several candidate state scenic highways will be managed for scenic qualrty These highways include all of US Highway 97, State Highway 3, State Highway 89, and portions of State Highway 36 and Interstate 5 In addition, State Highway 299 and the remaining portions of State Highway 36 and Interstate 5 will be managed for scenic quality in the foreground in all alternatives Management of the middleground, along these addtional roads, will differ significantly between alternatives All alternatives, except Alternative RPA. will also provide visual resource protection in the foreground of roads

Developed Recreation Areas. Most developed recreation areas will be managed to maintain a natural or near-natural appearance in the foreground

Wildernesses. Wildernesses will be managed to maintain as near a natural landscape appearance as possible Minimal management activities, such as trail building and maintenance, will occur inside wilderness boundaries

Wild and Scenic Rivers. The foreground of wild and scenic rivers will be managed to maintain a natural or near natural appearance

Special Areas. Research Natural Areas, Special Interest Areas, special wildlife habitats and significant cultural resource areas will be managed to maintain a natural appearance

Visual Appearances Outside Heavily Used Recreation Areas, Wilderness and Special Areas. Timber harvesting, road construction, and other resource management activties will occur on a small portion of the land base when compared with historic levels These activities will be moderately visible from low sensitivity travel routes The contrast between soil color and vegetation will be very apparent where heavy vegetative manipulation occurred Smaller openings will lessen this effect Vegetative patterns will become more mosaic and vegetative sizes will appear more diverse than at present In some areas, site preparation activrties and roads can create continuous unnatural linear patterns on the landscape

In other large, contiguous areas where soil productivrty is low, management activities will generally be limited to occasional road construction, timber salvage, and vegetative manipulation for wildlife purposes In most cases, these activties will not dominate the landscape

The direct environmental effects on the visual resource include some change in visual appearance of the landscape in some areas of the Forests outside the Wildernesses These changes will be created by managed activities implemented to different visual quality levels The rate of implementation, quantity, and visual quality objectives (VQOs) applied will create different long-term and short-term impacts

Consequences Specific to An Alternative

Visual Quality Objectives (VQOs) As a whole, the degree of natural appearance of the Forests will vary between alternatives The distribution of adopted VQOs between alternatives is shown in **Figure IV-2**

The geographic distribution of VQOs dictates the visual appearance that different types of visitors will observe VQO acreages shown in the figures and tables are estimates

Impacts on Distinctive Landscapes. Distinctive landscapes (Variety Class A) will be affected differently under each alternative It is estimated that distinctive landscapes will be managed to the visual quality levels shown in **Figure IV-3**

Visual Condition and Visual Quality Indices. The existing visual condtion of the Forests is a benchmark from which

Figure IV-2
Adopted Visual Quality Objectives (VQOs)

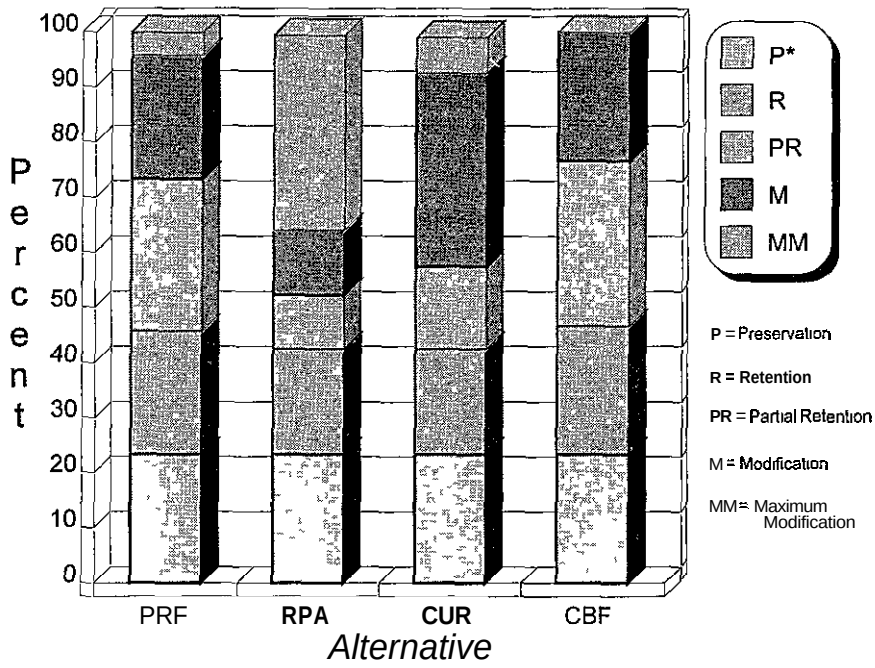
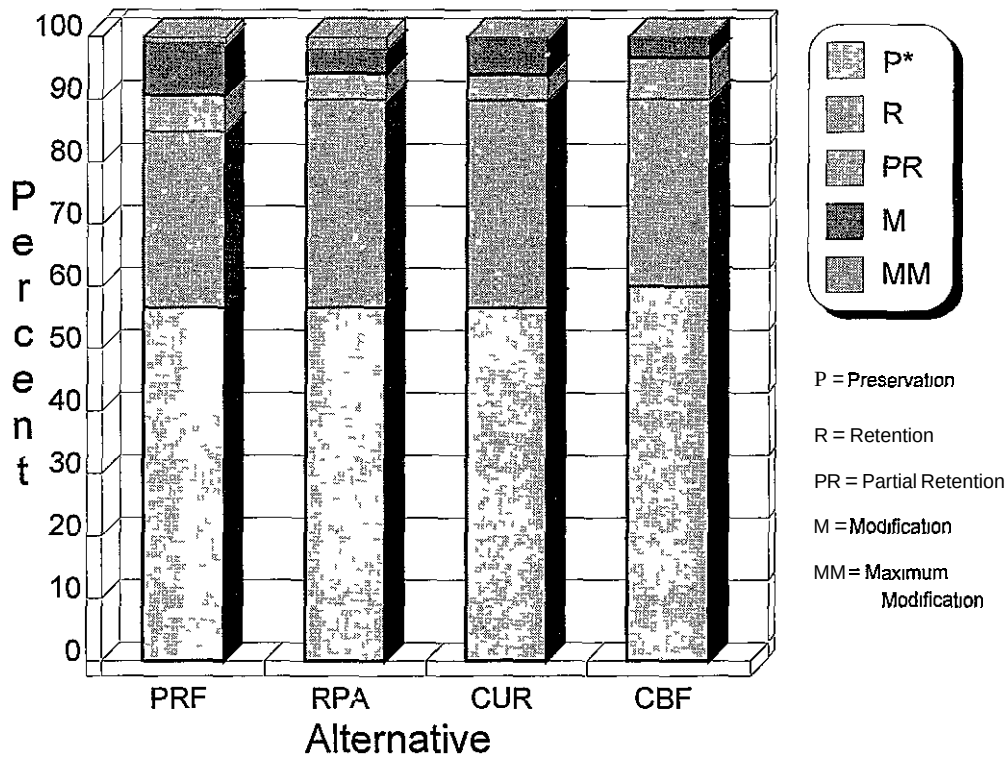


Figure IV-3
Estimated VQOs of Class "A" Landscapes



an estimate can be made of the effects on, and the rate of change to the landscape

The Visual Quality Index (VQI) is one measure used to compare the impacts of the alternatives on visual resources in relation to existing visual condition Ratings were assigned according to research-based assumptions of public preferences for certain categones of landscapes Refer to the Glossary for details Also refer to Chapter II for a discussion of the comparative impacts of the altematives on visual quality using VQI as a parameter

It is estimated that the overall visual quality of the Forests will increase from the existing visual condrtions in all alternatives

Visual Rehabilitation. The existing visual condtions of some areas on the Forests will not meet the visual condition level proposed for those areas in the altematives As a result, visual rehabilrtation will be required to bring those areas into conformance with proposed visual quallty levels Visual rehabilitation can take the form of natural vegetative growth or it can require active measures to correct a problem

Direct and Indirect Effects. On areas to be conserved in a near-natural appearance, management expenses will increase due to reduced harvest untt size, increased inrtial roading and fuel management costs More protection will be given to the visual quallty and maintaining recreation settings in a near natural state

Indirect effects of areas managed to visual standards of Modification (M) and Maximum Modification (MM) will include a change from near natural to one where management activities are evident but appear natural

Alternative PRF (Preferred Alternative). The VQI will increase 3 percent from its present level (as measured from existing level of 127 3 to the maximum level of 131 5)

This alternative will protect fewer miles of road in the foreground and middleground than Alternative CBF Visual transrtions between the candidate state scenic highway travel corridors and the more remote areas of the Forests will be gradual Transttions between the foreground of most other travel corridors and the more remote areas will be more abrupt Interstate 5 will be managed for a near natural appearance in the foreground In the middleground, management activities will dominate the landscape.

More miles of wild and scenic nven will be protected than in Alternatives CUR or RPA This alternative provides for more semi-primrtive landscape settings than Alternatives CUR or RPA Less of the landscape will be subject to MM visual standards than in Alternatives CUR and RPA

Overall, this alternative provides more protection for the visual resource than any other alternative **Table IV-12** summarizes some of the signficant information about this alternative

Alternative RPA *(1990* RPA Program Emphasis). The VQI will increase I percent from Its present level (as measured from the existing level of 127 3 to the maximum of 128 1)

Visual transitions between the candidate state scenic highway travel corridors and the more remote areas of the Forests will be gradual Transitions between the foreground of most other travel corridors and the more remote areas will be more abrupt

This alternative will protect fewer miles of wild and scenic rivers, fewer acres of semi-pnmttive landscape setting, and will produce more acres of MM VQOs than any other alternative

Overall, the landscape quality for this alternative and Alternative CUR will increase at the lowest rate of all alternatives. **Table IV-13** summarizes some of the important visual quality information about this alternative

Alternative CUR (No Action/No Change). The VQI will increase 2 percent from Its present level (as measured from the existing level of 127 3 to the maximum level of 128 1)

Visual transitions between the candidate state scenic highway travel corndon and the more remote areas of the Forests will be gradual This altemative will provide for more protection in the foreground of travel corndon than Alternatives PRF and RPA

Fewer miles of wild and scenic nvers will be protected in this alternative than in Alternative PRF. A less semi-primrtive landscape setting will occur in this alternative than in Alternatives PRF and CBF

Overall, this altemative and Alternative RPA provide the lowest increase in protection for the visual resource **Table IV-14** summarizes some of the important information about this altemative

Alternative CBF (Citizens for Better Forestry). The VQI will increase 1 percent from its present level (as measured from the existing level of 127 3 to the maximum of 128 1).

Visual transitions between the candidate state scenic highway travel corridon and the more remote areas of the Forests will be gradual. Transitions between the foreground of most other travel corridors and the more remote areas will also be gradual.

More miles of wild and scenic riven will be protected than in any other altemative. This alternative provides more semi-primitive landscape settings than any other alternative Natural appearing landscape settings will be wider in npanan areas than in any other alternative. None of the landscape will be subject to MM visual quality standards

Overall, this alternative provides slightly less protection for the visual resource than Alternative PRF **Table IV-15** summarizes some of the significant information about this alternative

Table IV-12
Visuat Resource-Summary
-Alternative PRF-
(Preferred Alternative)
(M Acres)

Visual Condition Class	Existing Visual Condition	Future Visual Condition
I	909 I	498 7
II	1,006 6	467 I
III	125 4	356 2
IV	61.1	679 6
V	19 3	1199
VI	0 0	0 0

Existing Visual Quality Index 127 3
Future Visual Quality Index 131 5
Visual Rehabilitation (M Acres) 116 5

Table IV-13
Visual Resource Summary
-Alternative RPA-
(M Acres)

Visual Condition Class	Existing Visual Condition	Future Visual Condition
I	909. I	498 7
II	1,006 6	400.3
III	125 4	200 3
IV	61 I	251 I
V	19 3	771 I
VI	0 0	0 0

Existing Visual Quality Index 127 3
Future Visual Quality Index 128 I
Visual Rehabilitation (M Acres) 123 3

Table IV-14
Visual Resource Summary
-Alternative CUR-
(M Acres)

Visual Condition Class	Existing Visual Condition	Future Visual Condition
I	909 I	498 7
II	1,006 6	405 4
III	1254	328 8
IV	61.1	742 8
V	19 3	145.9
VI	0 0	0 0

Existing Visual Quality Index 127 3
Future Visual Quality Index 129 8
Visual Rehabilitation (M Acres) 111 8

Table IV-15
Visual Resource Summary
-Alternative CBF-
(M Acres)

Visual Condition Class	Existing Visual Condition	Future Visual Condition
I	909 I	506 4
II	1,006 6	492 6
III	1254	638 0
IV	61 I	484 5
V	19 3	0.0
VI	0 0	0 0

Existing Visual Quality Index 127 3
Future Visual Quality Index 128 I
Visual Rehabilitation (M Acres) 149 4

21. Water

WATER QUALITY

The indicators used to describe the effects of the alternatives on water quality are the extent of ground disturbing activities, impacts to watershed condition, and soil and water resource improvement. Assumptions are (1) the lower the level of ground disturbing activities, the lower the risk of degrading water quality, (2) the lower the level of cumulative impacts within a watershed, the lower the effect on watershed condrtion, and (3) the greater the number of acres of soil and water resource improvement, the greater the level of water quality improvement

Consequences Common to All Alternatives

Riparian Area and Streamcourse Protection. On the Shasta-Trinity National Forests, riparian areas are an extremely important, yet limited, portion of the land base They are used by many species of resident and transient wildlife. Rparian areas are desirable for developed and dispersed recreation, they are highly productive forage and timber areas, and they represent the most diverse vegetative conditions on the Forests Forest standards and guidelines, land allocation constraints (e g Riparian Reserves), Best Management Practices (BMPs), and supplemental management area direction assures that each of the alternatives will protect the riparian areas and streamcourses on the Forests

Soil and Water Resource Improvement. By the most recent estimates there are approximately 11,800 acres of degraded watersheds, as a result of past disturbance, that can be effectively treated on the Forests The 1990 RPA targets for watershed improvement on the Forests are to restore 700 acres per year during the 1st decade, 710 acres per year during the 2nd decade, and 450 acres per year during the 3rd decade Implementing the target rate on the watershed improvement needs identrfied to date will result in complete watershed restoration sometime during the 2nd decade Actual rates of implementing identified improvements will occur commensurate with funding regardless of the alternative chosen. A more *ex*tensive and complete inventory is needed, however, to identify all areas within deteriorated watersheds that are in need of improvement

Restoration of degraded watershed areas will have several direct effects on the environment (1) erosion will be reduced and, therefore, productivity stabilized, (2) commodity production potentials will be increased, (3) State Water Resource Control Board Management Agency Agreement commitments will be met, (4) visual quallty will be enhanced, and (5) inland and anadromous fish habrtat will be stabilized or improved by reduced sedimentation

Consequences Specific to An Alternative

Ground Disturbing Activities.

In order to disclose the potential effects of each alternative on water quality, the following indicators will be used

- Acres of fuel treatment for timber planting site preparation and wildlife habitat improvement In using this indicator, the assumption is made that as the acres of fuel treatment increase, the potential for riparian area and streamcourse damage also increases Broadcast burning within riparian management zones (RMZs) is not allowed in any alternative which further protects riparian areas and streamcourses (See **Table IV-16**)

- Miles of new road construction This indicator is expressed as the average miles of new road constructed

Table IV-16
Average Annual Fuel Treatment and Wildfire Acres
(First Decade [in acres])

Alternative		Treatment	Wildfire	Total
PRF	(Preferred Alternative)	**30,000**	11,000	41.000
RPA	*(1990* RPA Emphasis)	6.580	11,000	17,580
CUR	(No Action / No Change)	7,080	15,000	*22,080*
CBF	(Citizens for Better Forestry)	5,880	11,000	**16,880**

per year (averaged over a 5 decade planning period) for each of the alternatives The assumption used is that as more roads are built there will be a greater risk to water qualty degradation Risks are minimized, however, by excluding any road construction wrthin RMZs and by using a full range of road construction strategies related to BMPs

- Timber harvested area This indicator combines four types of harvesting methods and places an adjustment weight on each The weights are used to compensate for the relative amount of ground disturbing activity associated wlth the method Clearcut acres are given a weight of I 0, greentree retention acres on slopes over 40 percent are given a weight of 0 8, green tree retention acres on slopes less than 40 percent have a weight of 0 4, and group selection harvesting also has a weight of 0 4 All methods were totalled for the purposes of alternative comparison

Alternative PRF (Preferred Alternative). This alternative will have a lower potential for adverse effects to water quality than Alternative CUR While total fuel treatment will average 30,000 acres per year, much of this will be accomplished through removal of biomass and thinning rather than burning In addtion, this alternative provides for the greatest protection along streams, lakes and wetlands of any of the alternatives New road construction will average 3 miles per year, while CUR will average 23 miles Total weighted harvest activity planned for this alternative is 2,892 This amount is 28 percent less than the weighted harvest activrty planned for CUR

Alternative RPA *(1990* RPA Program Emphasis). This alternative will have the next to highest potential for degradation of water qualrty It is lower than Alternative CUR because of the change in emphasis in more recent RPA plans, wth less emphasis on commodity production Total fuel treatment averages will amount to 6,580 acres, 7 percent less than the amount planned for CUR (7,080 acres) New road construction will actually be the same for this alternative as for CUR, averaging 23 miles per year. This alternative plans for a total weighted harvest activity of 3,812, 6 percent less than the activity planned for CUR

Alternative CUR (No Action/No Change). Wth the implementation of this alternative's management practices, an annual average of about 7,080 acres of National Forest land will be treated or burned These activities will pose a risk of water qualty degradation that will have to be mttigated Possible effects can be temporary accelerated erosion wlth delivery of sedimentt o water courses Other potential effects of burning can be loss of aquatic and wildlie cover, loss of streamside temperature control shade, and degradation of aquatic habitat

Alternative CBF (Citizens for Better Forestry). This alternative represents the least nsk of all alternatives to potential water quality degradation Under this alternative the average annual acreage of tota fuel treatment will be 5,880 acres This amount is 17 percent less than the amount planned under Alternative CUR (7,080 acres) Yearly road construction for this alternative is planned at 15 miles per year, averaged over a 50 year planning period This represents 29 percent fewer roads than CUR Total harvested area, as determined by the weighting methodology is only 1,607, or 60 percent less than CUR

WATERSHED CONDITION

For each alternative the status of watershed condition classes was determined through evaluation of cumulative watershed effects Refer to procedures discussed in Appendix H Watershed acres in each watershed condttion class were calculated and plotted for decades I and 5

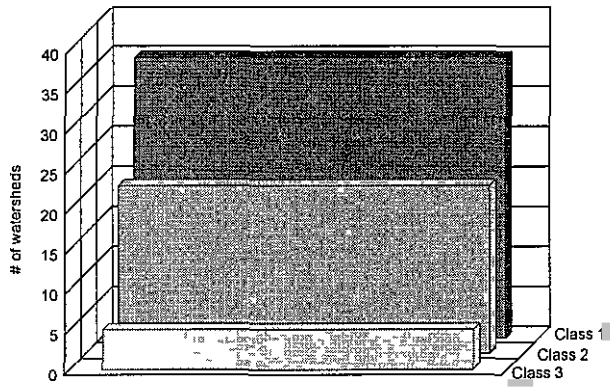
Tabl IV-17
Watershed Condition lasses by Alternative
(Number of /atersheds)

Alternative		Class	Decade I			Decade 5		
			I	2	3	I	2	3
PRF	(Preferred Alternative)		41	19	I	59	I	I
RPA	(1990 RPA Emphasis)		36	23	2	59	I	I
CUR	(No Action / No Change)		39	21	I	60	I	0
CBF	(Citizens for Better Forestry)		37	22	2	57	3	I

Figure IV-4
Watershed Condition Class by Alternative

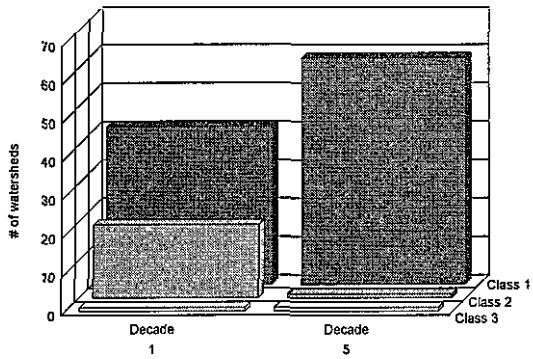
Present Situation

1993



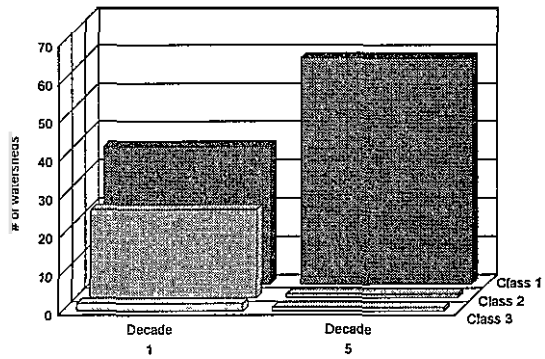
Alternative

PRF



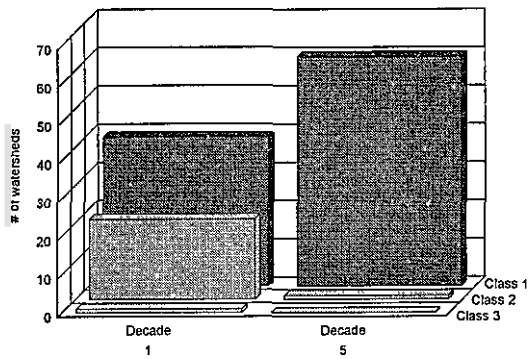
Alternative

RPA



Alternative

CUR



Alternative

CBF

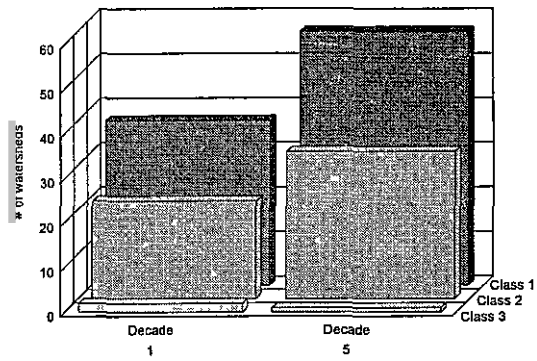


Figure IV-4 includes five separate bar charts which illustrate these trends for each of the alternatives

By using Alternative CUR as a reference of the existing stuation at decades 1 and 5, each of the akematives can be compared to one another Addrtionally, **Table IV-17** lists the number of watersheds in each watershed condition class for decades 1 and 5

For each akemative, the status of watershed condrtion classes will change over time Some watersheds in class 1 condrtion (generally good to excellent) will change to class 2 (generally fair to good). In two altematives, some watersheds will change to class 3 (generally fair to poor) Expenence indicates that as more watersheds decline to watershed condrtion class 2, the greater the potential for watershed degradation wrthin some subwatersheds Additionally, watersheds which decline to watershed condition class 3 have a greater potential for degradation However, because the extent and intensrty of ground disturbance is decreasing greatly compared to histonc levels, watersheds are recovering in each alternative analyzed Implementation of any of the altematives will result in an improvement in watershed condition. beginning in the 1st decade

Cumulative Watershed Effects. Over the short term, all watersheds on the Forests, except for the Rattlesnake Creek watershed. are projected to be well under the threshold of concem (TOC) Special management emphasis on cumulative watershed effects will be given to this watershed in addition to other watersheds which were degraded by the 1987 fires Due to this management emphasis, in conjunction wrth watershed improvement projects which are ongoing, there should be no irreversible impacts No signrficant adverse impacts will occur

To insure watershed condtion and protection against water qualrty degradation from cumulative effects, BMPs will be implemented A standardized cumulative effects analysis methodology will also be applied to subwatersheds at the project level This will aid in preventing subwatersheds from exceeding their individual TOC

If impacts remain below threshold in these subwatersheds, they will also remain below threshold in the larger fifth-order watershed, and the consequences of cumulative *effects* will be avoided

Direct effects, such as the degradation of stream channels, fish habrtat, npanan vegetation, reduced reservoir life, damage to hydroelectnc facilties, and the destruction of stream crossings and facillties adjacent to or within flood plains, should be minimal Addrtionally, indirect effects to recreation opportunities, fishenes, beneficial uses and upslope instability should also be minimal

Another aspect of watershed condtion is the potential for cumulative watershed effects resulting from uncoordinated land management activrties on public and pnvate lands Because of the potential problems which can result, Forest personnel have adopted a "Yair share" policy In effect, this means that the forests will constrain management levels on National forest lands to equivalent roaded acre (ERA) levels which will be proportional to the percentage of National Forest land in a watershed

There are 14 watersheds within the Shasta-Trinity National Forests which contain between 35 to 68 percent privately owned lands Without cooperative planning there is a risk that uncoordinated management activities can contnbute to cumulative watershed effects Some subwatersheds can be impacted from combined management activities on both private and National Forest lands This will be especially true for the larger contiguous land holdings as well as in the "checkerboard" ownership areas

Therefore, the "Yair share" policy may not always be possible to apply, since it might lead to adverse effects Because of this, management opportunities on National Forest lands may be limrted for a penod of time to allow for watershed recovery A second option will be the implementation of special mrtigation measures, such as road surface stabilization or wider npanan management zones to help minimize the risk of additional cumulative impacts Ideally, through mutual application of BMPs and cooperative planning and scheduling, National Forest managers can work with private landowners to protect these watersheds from undergoing cumulative impacts

Table IV-18
Average Annual Water Yield by Alternative
(50 year average in thousand acre feet)

Alternative	Water Yield
PRF	5.436
RPA	5,460
CUR	5,455
CBF	5,436

WATER YIELD

Consequences Common to All Alternatives

Water yield increases are directly related to the extent and amount of vegetation treatment In this regard, water yield increases in each altemative will be induced ("spin off') outputs resulting principally from timber harvesting activrties in each altemative. As the volume of timber harvested (or land base altered) increases, water yields will increase; and as the harvested land base decreases, water yields decrease

Harvest acres and volumes are displayed and discussed in the Timber Section of this chapter The indicator used here to descnbe the effects of each alternative on water yield is the expected average annual yield in thousands of acre-feet averaged over a 50 year period These yields are displayed in **Table IV-18.**

Consequences Specific to an Alternative

Alternative PRF (Preferred Alternative). This alternative will produce, on the average, 19,000 acre-feet of water less per year than Alternative CUR This will be a decrease of about 0 4 percent

Alternative RPA *(1990* RPA Program Emphasis). In this altemative the average annual water yield will increase 5,000 acre-feet compared to Alternative CUR This will be an increase of about 0 *09* percent

Alternative CUR (No Action/No Change). Alternative CUR will produce the average yield of water that is currently being produced from National Forest land (5,455 M acre feet) Consequently, water available for use on the Shasta-Trinity National Forests and downstream will remain the same, fluctuating from year to year depending on the annual changes in precipitation

Alternative CBF (Citizens for Better Forestry). The average annual water yield for this alternative will be 19,000 acre-feet less than Alternative CUR This will be a decrease of about 0 4 percent

22. Wild and Scenic Rivers

Consequences Common to All Alternatives

The existing Wild and Scenic Rven System. consisting of about 106 4 miles of the Trinity Rver system, remains the same under all alternatives Because these designations already exist, there are no environmental consequences associated with the existing Wild and Scenic Riven System

In managing the three classrfications of rivers (Wild, Scenic, and Recreation), three distinct management prescriptions are proposed within the one-quarter mile corridon For wild river segments Prescription I (Unroaded Non-Motorized Recreation) is applied (except in wilderness), for scenic river segments Prescription II (Limited Roaded Motorized Recreation) is applied, and for recreation river segments Prescription III (Roaded Recreation) is applied Restrictions on management activities and uses are most severe along wild river segments and least severe along recreation segments

The above prescriptions will also apply to additional river segments being proposed for designation in each of the alternatives Therefore, the major differences between alternatives are the number of miles of wild, scenic, and recreation riven that are proposed for designation

Generally speaking, the larger the number of miles. the greater the advene effect will be on potential water diversion for energy and agriculture and potential mineral development opportunities On the other hand, the greater the number of miles, the greater the positive effect on the watershed, riparian areas, fisheries, and water qualrty Refer to Appendix E for detailed discussions of wild and scenic rivers

Consequences Specific to an Alternative

Table IV-19 indicates the recommended wild and scenic rivers' classifications on National Forest streams for each of the alternatives

Alternative PRF (Preferred Alternative). Under this alternative the existing 106 4 miles of wild and scenic nven will be supplemented by about 79 7 miles of National Forest streams being proposed for Congressional designation

G f the 79 7 miles of National Forest land involved, 48 5 miles are recommended for Wild River, 17 3 miles for Scenic River and 13 9 miles for Recreation Rver

The McCloud Rver and Squaw Valley Creek are not recommended for wild and scenic nver classification However, the charactenstics which made the McCloud River eligible for classrfication will be retained through a Coordinated Resource Management Plan with the private landownen along the river

Within the one-quarter-mile corridor along the 48 5 miles of Wild Rver the environmental consequences will be as follows

- N o impoundments or diversions will be allowed,
- No mineral entry will be allowed, other than existing valid rights,
- No scheduled timber harvesting will occur,
- Access will be limited to trails, no road access will be allowed,
- River corridors, including npanan **areas,** will be semi-primitive in nature

Within the one-quarter-mile corridor along the 17 3 miles of Scenic River the consequences will be

- No impoundments or diversions will be allowed,
- Mineral exploration and extraction will be allowed consistent with the law,
- Only minimal timber harvesting, primarily salvage, can occur on suitable timber lands,
- Road access will be limited,

Within the one-quarter-mile corridor along the 13 9 miles of Recreation River segments restrictions will be less, resulting in relatively few consequences Impoundments will still not be permitted Modified timber harvesting will be allowed on sultable timber lands and road access can occur in more places.

Overall, there will be relatively minor effects on timber harvests and allowable sale quantlties within the river

Table IV-19
Recommended Wild and Scenic Rivers
(National Forest Miles)

NAME	ALTERNATIVE PRF	RPA	CUR	CBF
Beegum Creek				
Wild Rver	25	-		2.5
Canyon Creek				
Wild Rver	65	-	-	65
Recreation hver	110	-	-	11.0
Hayfork Creek				
Wild River		-		10.0
Scene Rver	115	-		10
Recreation hver		-		.5
McCloud River (Lower)				
Wild Rver				43
Scenic Rver				18
McCloud River (Upper)				
Recreation River				14.7
Scenic River				
North Fork Trinity River				
Wild Rver	117			117
South Fork Trinity River				
Wild Rver	161			16.1
Scenic Rver	58			**58**
Recreation Rver	**29**			29
Sacramento River				
Recreation River				**61**
Squaw Valley Creek				
Wild Rver				40
Scenic River				60
Virgin Creek				
Wild Rver	117			117
Total - Wild	485			568
Total - Scenic	173			251
Total - Recreation	139			34.7
Total Miles	**797**			**1166**

* An extension of BLM designation north of the forest boundanes, which is segment #2 of the main fork

corridon Most of the proposed river corndon are on lands classified as unsurtable for timber management or on lands which will be assigned prescnptions where no chargeable volumes are scheduled (e g , Prescription IX - kparian Management) Dispened recreation will be affected because of limted access

Alternatives RPA *(1990* RPA Program Emphasis), and CUR (No Action/No Change). These alternatives do not propose any addtions to the existing 106 4 miles of Wild and Scenic Riven System. Not having the addrtional river corndors will, however, eliminate the additional protection to the watershed and fishenes

Alternative CBF (Citizens for Better Forestry). This alternative recommends the same additions to the Wild and Scenic kvers System as Alternative PRF In addition, Alternative CBF recommends Canyon Creek, Upper and Lower McCloud kver, Sacramento kver, and Squaw Valley Creek These sections of river contain an addtional 54 4 miles of proposed rivers

Of the 1 16 6 miles of National Forest land involved, 56 8 miles are recommended for Wild River, 25 1 miles for Scenic River, and 34 7 miles for Recreation River The consequences on those recommended segments will be the same as descnbed for Alternative PRF

23. Wilderness and Roadless Areas

This assessment encompasses the probable environmental consequences on wilderness and roadless areas resulting from adoption of any one of the four alternatives described in detail in this Final EIS

The analysis focuses on the primitive recreation opportunrties that will be retained or foregone regardless of whether these areas will be recommended for additions to the National Wilderness Preservation System

Consequences Common to All Alternatives

There are five Wildernesses on the Shasta-Trinity National Forests totaling 498,776 acres There is one further planning area, Mt Eddy, which totals 7,720 acres At issue is whether the Mt Eddy area should be recommended for wilderness designation Wilderness designation of Mt Eddy will preclude some management activities such as timber harvesting and downhill ski development Conversely, development of Mt Eddy may permanently impair potential wilderness values

Wilderness attributes used in this analysis to determine the quality of a specific undeveloped area are identical to the elements used in the previous Roadless Area Review and Evaluation (RARE II) study The definition of the Wilderness Attributes Rating System can be found in the glossary

This section focuses on the general nature or type of impact of management practices and activities on wilderness attnbutes Viewed in this generic context, management practices and activities do not vary from one alternative to another. However, it is obvious that there are identifiable differences between alternatives The major variations between alternatives are due to the mix of management prescriptions under each alternative

Table IV-20 summarizes the effect of management prescriptions on each of the above wilderness attributes The table indicates the degree to which the attribute is retained from its current inventoried condrtion Both short-term (10 years) and long-term (50 years) effects are considered

The table indicates that Prescriptions I (Unroaded Non-Motorized Recreation), II (Limited Roaded Motorized Recreation), V (Wilderness Management), VII (Threatened, Endangered, and Selected Sensitive Species), and X (Special Area Management) will generally retain and slightly enhance inventoried intrinsic wilderness attributes Prescriptions III (Roaded Recreation), IV (Roaded, High Density Recreation), VI (Wildlife Habitat Management), VIII (Commercial Wood Products Emphasis/Timber Management) and IX (Riparian Management) may effect these wilderness attributes By comparing **Table IV-20** descriptions of the effects of each prescription on wilderness attributes wlth the maps of each alternative the effects of each alternative within and adjacent to the area can be assessed

The Mt Eddy area, the only further planning area to be analyzed for wilderness consideration under this round of Forest planning, is assigned to several prescriptions depending on the alternative themes and objectives (See **Table C-I** in Appendix C). Therefore, the overall quality of this area for wilderness is the product of the combined effects of each of the prescriptions used within that area

For example, if only 10 percent of the Mt Eddy area were distributed to development-oriented prescriptions (e g , Prescriptions III [Roaded Recreation], VI [Wildlife Habitat Management], and/or VIII [Commercial Wood Products Emphasis/Timber Management]) and 90 percent were distributed to a non-development prescription, the overall wilderness attributes for the entire Mt Eddy area will not be substantially impaired Also, if the 10 percent that was distnbuted to development-oriented prescriptions were separated from the Mt Eddy area boundary, the remaining *90* percent will be totally unimpaired

The important consideration is the amount of area allocated by prescription and the location and distribution of those prescriptions Since the varies by alternative, the impacts on wilderness attributes are discussed in the sections which follow

Under the 1984 California Wilderness **Ad,** all areas not designated by Congress for Wilderness or further planning were "released' for multiple-use resource management, exclusive of wilderness use Twenty-nine areas on the Shasta-Trinty National Forests, totalling about 306,000 acres (net) fell under this category These areas will be subject to review for possible wilderness classification when the Forest Plan is revised in 10 to 15 yean. Therefore, the amount of primitive recreation opportunities that are retained or foregone in the meantime is an important consideration

Figure IV-5 summarizes the future disposition of the 29 "released" roadless and undeveloped areas on the Shasta-Trinty The figure indicates that the amount of land subject to development (i e , activrties which will impact the primitive recreation characteristics of these areas) varies from *29* percent of the approximately 306,000 acres under

Alternative RPA to 12 percent under Alternative CBF Further analysis of the released areas also appears in Appendix C

Consequences Specific to An Alternative

Alternative PRF (Preferred Alternative). Wilderness attnbutes will be retained on about *90* percent of the Mt Eddy area through allocations to Unroaded Non-Motorized Recreation (Prescription I) and Research Natural Area (Prescription X) About 81 percent of the *29* released roadless area's acreage will remain undeveloped

Alternative RPA *(1990* RPA Program Emphasis). This alternative will eventually diminish most of the inventoried wilderness attributes in the Mt Eddy area This is due to emphasis on resource management activties which require roaded access and vegetation modification, and will result in higher densities of people About 71 percent of the *29* released roadless area's acreage will remain undeveloped

Alternative CUR (No Action/No Change). Wilderness attributes will be retained on about 70 percent of the Mt Eddy area through allocations to Limited Roaded Motonzed Recreation (Prescription II) About *72* percent of the *29* released roadless area's acreage will remain undeveloped

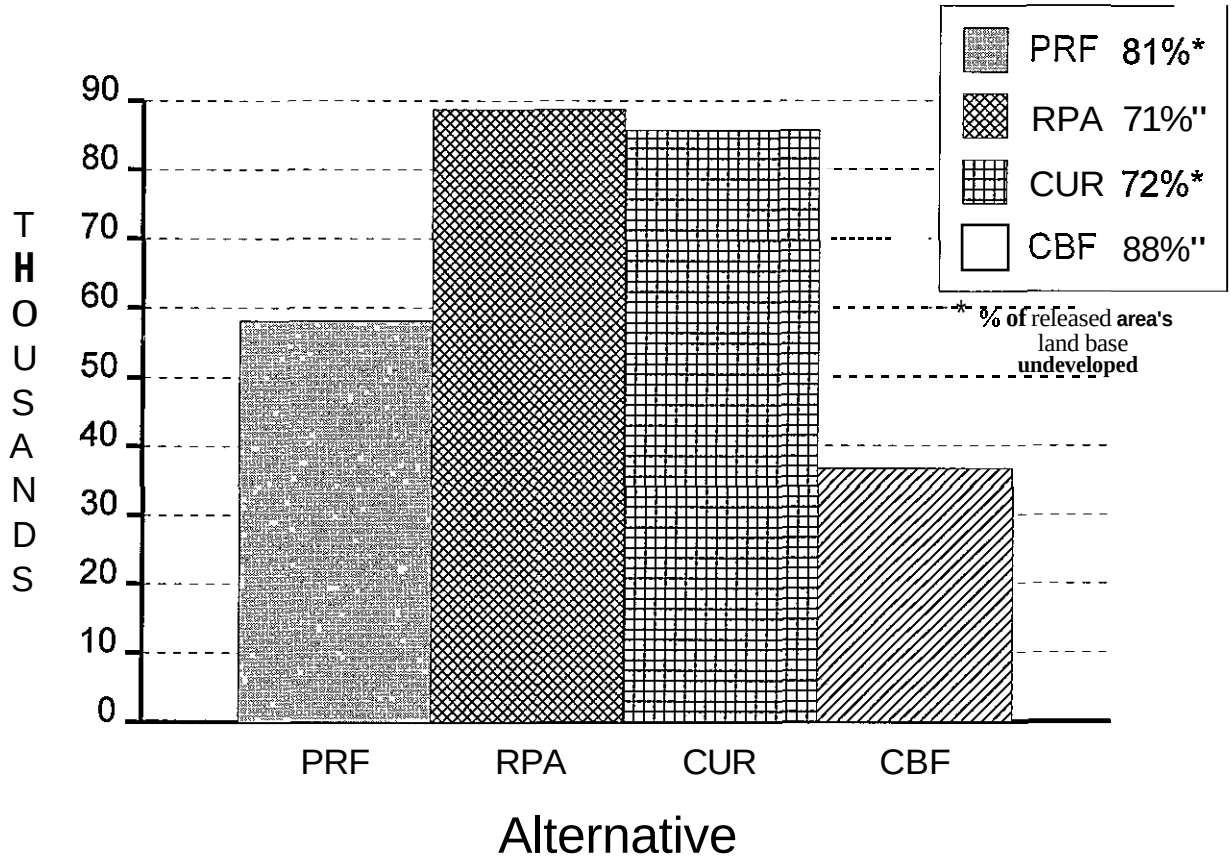
Alternative CBF (Citizens for Better Forestry). This alternative will recommend the entire Mt Eddy further planning area for wilderness designation About 88 percent *of* the *29* released roadless area's acreage will remain undeveloped

Table IV-20
Effects of Management Prescriptions on Inventoried Wilderness Attributes

Management Prescription	Degree to Which Inventoried Attribute is Retained (Short and long-term)				
	Natural Integrity	Apparent Naturalness	Solitude Opportunity	Primitive Recreation Opportunity	Supplementary Attributes
I Unroaded Non-motorized Recreabon	Retained	Retained	Retained	Retained	Retained
II Limited Roaded Motonzed Recreabon	Retained	Retained	Reduced	Reduced	Retained
III Roaded Recreation	Reduced	Reduced	Reduced	Reduced	Reduced
IV Roaded. High Density Recreabon	Eliminated	Eliminated	Eliminated	Eliminated	Reduced
V Wilderness Management	Retained	Retained	Retained	Retained	Retained
VI Wildlife Habitat Management	Reduced	Reduced	Reduced	Reduced	Reduced
VII Threatened, Endangered and Selected Sensitive Species	Retained	Retained	Retained	Retained	Retained
VIII Commercial Wood Products Emphasis/ Timber Management	Eliminated	Eliminated	Eliminated	Eliminated	Eliminated
IX Riparian Management	Reduced	Reduced	Reduced	Reduced	Reduced
X Special Area Management	Retained	Retained	Retained	Retained	Retained
XI Heritage Resource Management	Reduced	Reduced	Reduced	Reduced	Reduced

Figure IV-5
Future Disposition of Released Roadless Areas to be Managed for Non-wilderness Uses Under the 1984 California Wilderness Act
(acre [thousands])

Total Acres: 306,060
Net Acres Subject to Development



24. Wildlife (General)

Overview of Analysis. Land management activities and natural events can affect wildlife populations by altering the food, water, cover, or spatial components of habitat Some of these activities and events are beneficial, while others are adverse or neutral depending on species life history requirements and management prescriptions A project that benefits one species may adversely affect another For example, when late seral stage forests are converted to early sera stage openings, there can be adverse effects to northern spotted owl and golden-crowned kinglet There can be beneficial effects to the California quail and white-crowned sparrow, but there will be little or no effect to yellow warbler and acorn woodpecker

The management indicator approach is used, along with Standards and Guidelines, to insure that all species on the Forests will be maintained at viable levels Management indicators are categorized into wildlife assemblages or groups of wildlife

Wildlife Assemblages as Management Indicators

1 Late Seral Stage

2 Openings and Early Seral Stage

3 Multi-habitat

4 Snag and Down Log

5 Rpanan

6 Aquatic

7 Hardwood

8 Chaparral

9 Cliffs, Caves, Talus and Rock Outcrop

See Chapter III, Wildlife for more wildlife assemblage information

Wildlife assemblages *are* influenced by the overall acreage in each management prescription because the objectives and emphasis varies Management prescnption acreage differs by alternative (see **Table IV-21** and management prescnption descriptions in Chapter 4 of the Forest Plan) Therefore, alternatives are compared to the historical situation and among each other by analyzing prescnption acreage, along with contrasting timber harvest method and quantities

Consequences Common to All Alternatives

Compared to the historical and existing situation, wildlife habitats will continue to have direct enhancement and rehabilitation activities varying by each alternative's emphasis or quantity of Prescription VI (Wildlife Habtat Management) land Water, forage, cover, and spatial weds for featured, hunted species will occur (deer, bear, elk, turkey) along with other wildlife such as neotropical migratoty birds A wildlife viewing program will continue to increase people's awareness and appreciation of the Forest and its wildlife resource

Table IV-21
Degree of Habitat Manipulation Resulting from Application of Management Prescriptions by Alternative (M Acres* and % of Land Base)

Management Prescription (and Degree of Habitat Manipulation	ALTERNATIVE PRF		RPA		OUR		CBF	
IV, VIII (High)	291	(14%)	543	(26%)	551	(26%)	348	(16%)
III, VI (Moderate)	372	(17%)	473	(22%)	473	(22%)	450	(22%)
II, VII, IX (Minimal)	865	(41%)	569	(27%)	572	(27%)	661	(31%)
I, V, X, XI (Insignificant)	593	(28%)	533	(25%)	525	(25%)	662	(31%)

* M Acres = thousand acres

Partnerships and programs for emphasis areas will continue to grow Elk Country, A Million Bucks, Taking Wing, Answer the Call, Eyes on Wildlife, Partners in Flight, and Animal Inn

The historical timber harvest level had a much higher effect upon wildlife assemblages compared to the existing situation and the alternatives considered Timber harvest volume was more than twice the amount than is currently proposed in any of the alternatives Historically, standards were less protective, resulting in greater habitat manipulation Adverse impacts occurred for the following assemblages. Late Seral Stage, Snag and Down Log, Riparian, Hardwood, and Aquatic The larger timber harvest level benefited Multi-habitat, Openings and Early Seral Stage, and Chaparral wildlife assemblages The number of acres of late seral stage assemblages increases in all alternatives, historically they had been decreasing

For the alternatives being analyzed, Prescription VIII (Commercial Wood Products Emphasis/Timber Management) will have the highest degree of indirect habitat manipulation Prescriptions III (Roaded Recreation) and VI (Wildlife Habitat Management) have a lesser degree of indirect habrtat manipulation These prescriptions affect about 25 percent of the Forests' land base These three prescriptions allow timber harvest and road construction which can modify seral stage progression, species composition, and increased access However, these affects are mitigated by Standards and Guidelines such as seral stage requirements, down log and snag requirements, and the ripanan standards Assemblages that may benefit within these prescnption areas are the Openings and Early Seral Stage, Multi-Habrtat, and Chaparral Assemblages that may be adversely effected are the Late Seral Stage, Snag and Down Log, and Hardwoods Across the Forest, chaparral will remain fairly constant at about 149,300 acres The amount of hardwoods will remain moderately constant at about 189,000 acres Seral stages within chaparral and hardwood lands will vary by alternative

The remainder of the prescriptions (about 75 percent of the land base) has a minimal degree of indirect habitat manipulation which is beneficial to Late Seral Stage, Multi-habitat, Snag and Down Log, Rparian. Aquatic, and Hardwood assemblages. The Cliffs, Caves, Talus and Rock Outcrop assemblage will not be affected by any of the prescriptions or alternatives

Prescriptions I (Unroaded Non-Motorized Recreation), IV (Roaded, High Density Recreation), V (Wilderness Management), VII (Threatened, Endangered, and Selected Sensitive Species), X (Special Area Management), and XI (Heritage Resource Management) do not allow for timber management activities

For all alternatives, diversity of wildlife habitat will be sufficient to meet population viability for wildlife by implementing and monitoring management requirements and standards and guidelines

The following short-term consequences of timber management activities can occur on lands under all alternatives

beneficial effects:

- openings provide forage, edges and patches provide local diversity
- green tree retention sites provide vertical/structural diversity to early seral stages, trees provide substrate for nests, cover, roosts, and snags and down logs, forage is provided

adverse effects:

- alteration of forested habrtat diversity such as conversion of successional stages, decreased snag and down log size and density, decreased large hardwoods, fragmentation, and loss of interior forest conditions,
- temporary disturbance, decreased thermal protection, displacement of animals and decreased reproductive success
- mortality of animals during implementation of projects due to crushing, site preparation and burning

Compared to histoncal level condltions, the following long-term or cumulative environmental consequences may occur under all alternatives

beneficial effects:

- late seral stage forests acreage will increase, interior forest areas will increase, thermal cover will increase
- increased wildlife associated with late seral stage forests and riparian areas, associated or dependent TE&S species populations will stabilize or increase:
- vertical diversity within forest stands will increase

adverse effects:

- openings and early seral stage forests will decrease, less open forage areas,
- small change as compared to histoncal levels in the amount of public access and human disturbance as a result of access management,
- small loss when compared wlth historical levels of habltat associated wlth surface area occupied by permanent roads and facilities,
- a decrease in wildlife dependent on early successional vegetation

Consequences Specific to An Alternative

Environmental impacts, as well as opportunlties to improve wildlrfe habitats, will vary by alternative These differences were assessed in the following ways

- Effects of management prescriptions (specifically commercial wood products prescriptions) on wildlife habitats.
- Effects of alternatives on habitats for wildlife assemblages, differences are primarily a function of the number of acres in each prescription or harvest goals by alternative,
- Amount of direct wildlife habitat enhancement and restoration

Late **Seral Stage Wildlife Assemblage.** The amount *of* late seral forests (seral stage 4b, 4c, and greater) is expected to increase from the historical levels and the current stuation in all alternatives by the end of the 5th decade This is a result of less timber harvested Minimally disturbed forested areas are beneficial for those species which are dependent on or associated wlth older, complex forests

Alternative PRF (Preferred Alternative). This alternative provides a high degree of maintenance of habitat for the late seral stage wildlrfe assemblage Alternative PRF places the second highest amount of land into Prescriptions I (Unroaded Non-Motorized Recreation), IV (Roaded. High Density Recreation), V (Wilderness Management), VII (Threatened, Endangered, and Selected Sensitive Species), X (Special Area Management), and XI (Heritage Resource Management) These prescriptions allow 54 percent of the land base to cycle naturally After 5 decades, 6 18,000 acres of late seral stage forest will exist This will give the second largest increase at 73,000 acres more than current levels

Alternative RPA *(1990* RPA Program Emphasis). Alternative RPA provides a high degree of maintenance of habitat late seral wildlrfe species Species dependent on mature forest areas will receive reduced benefts from this alternative. compared to Alternatives CBF and PRF Alternative RPA places the second lowest amount of land into Prescriptions I, IV, V, VII, X, and XI These prescriptions will allow 50 percent of the land base to cycle naturally After 5 decades, 6 10,000 acres will exist in late seral stage forest This will be the lowest increase at 65,000 acres more than current levels

RIternative CUR (No Action/No Change). This alternative provides a high degree of maintenance of habltat for these 'ate sera wildlife species Alternative CUR places the least mount of land into Prescnptions I, IV, V, VII, X, and XI These prescriptions will allow 50 percent of the land base :o cycle naturally After 5 decades, 6 14,000 acres of late seral stage forest will exist This will be the second largest ncrease at 69,000 acres more than present levels

Alternative CBF (Citizens for Better Forestry). Alternative CBF provides a high degree of maintenance of habitat for wildlife species dependent or associated with late seral stages Alternative CBF places the highest amount of land nto Prescriptions I, IV, V, VII, X, and XI These prescrip:ions will allow 61 percent of the land base to cycle iaturally After 5 decades, 62 I ,000 acres of late seral stage forest will exist This will provide the greatest increase at 76,000 acres more than present levels

Dpenings and Early Seral Stage Wildlife Assemblage. There are about 10,600 acres of naturally occurring grasslands and meadows on the Forests Openings created through timber management activlties are transitional, but they greatly contribute habitat to the early seral stage wildlrfe Compared to historical levels, there will be ess openings created wlth each alternative There will be ess regeneration harvesting and less acres and harvest volume by all methods

With the Alternatives, Prescription VIII will have a high degree of habltat manipulation because commercial wood products development is emphasized Minimal and uneven-aged timber management is also a permrtted practice Prescriptions III and VI have a moderate degree of habitat manipulation Prescriptions VIII, III, and VI reduce the existing amount of middle to late seral stage forest

stands, hardwoods, and dead-down material They also increase the potential for wildlife disturbances associated with increased access and fragmentation

This wildlfe assemblage will beneft by the increase in open habitat, such as plantations Some benefits will be moderated because of increased road density and its increased disturbance The amount of early seral habitat is expected to increase from the current situation in all altematives by the end of the 5th decade

Alternative PRF (Preferred Alternative). Alternative PRF places 13 percent of the land base (lowest) into Prescnption VIII. PRF will have almost no acreage scheduled for the clearcut timber harvest method After 5 decades, 177,000 acres of seral stages I and 2 will be present This is the second lowest at 71,000 acres more than current levels

Alternative RPA *(1990* RPA Program Emphasis). Alternative RPA places 26 percent of the land base (highest amount) into Prescription VIII RPA will schedule the highest acreage of clearcut timber harvest methods After 5 decades, 185,000 acres of seral stages I and 2 will be present. which is the most at 79.000 acres more than current levels This altemative will be the most beneficial to wildlfe of the early seral stage assemblage

Alternative CUR (No Action/No Change). Alternative CUR places 26 percent of the land base (second highest) into Prescription VIII. CUR will schedule the second highest acreage to clearcut harvest methods After 5 decades, 181,000 acres of seral stages I and 2 will be present This is the second highest at 75,000 acres more than current levels.

Alternative CBF (Citizens for Better Forestry). Altemative CBF places 16 percent of the land base (second lowest) into Prescription VIII CBF will have no clearcut timber harvest After 5 decades, 173,000 acres of seral stages I and 2 will be present This is the lowest at 57,000 acres more than current levels This alternative is likely to be the least beneficial to wildlife of the early seral stage assemblage

Multi-Habitat Wildlife Assemblage. Both open habitats (e g Chaparral or Openings and Early Seral Stage) and cover habitats (e g Hardwood or Late Seral Stage) are important for bear. elk, turkey and deer Therefore, these species benefit from landscape diversity and mosaic patchwork of openings and cover Acreage of chaparral will remain fairly constant at about 149,300 acres Acreage of hardwoods will remain moderately constant at about 189,000 acres Seral stages will vary for chaparral and hardwoods will vary by Alternative and direct habltat manipulation

Alternative PRF (Preferred Alternative). Alternative PRF, after 5 decades, will provide for the lowest amount of created openings and the second highest amount of late seral stage forests.

Alternative RPA (1990 RPA Program Emphasis). Alternative RPA, after 5 decades, will provide for the highest amount of created openings and the lowest amount of late seral stage forests RPA will have a higher intensity of direct open habtat manipulation to maintain or increase deer populations

Alternative CUR (No Action/No Change). Alternative CUR, after 5 decades, will provide for the second highest amount of created openings and the second lowest amount of late seral stage forests

Alternative CBF (Citizens for Better Forestry). Alternative CBF, after 5 decades, will provide for the least amount of created openings and the highest amount of late seral stage forests

Snag and Down log Wildlife Assemblage. Compared to historic levels, all alternatives will retain a higher density of dead-down material for these wildlife species Timber management will be much less than historical levels, thus more acres will retain natural levels of snag and log densities For each alternative, standards and guidelines for retaining snags and down logs will remain constant There can be varying densities between alternatives because timber management treatments (such as regeneration cutting) and acreage will vary, however, compliance with standards and guidelines should provide for acceptable levels of snags and log densities Green tree retention treatments will moderate adverse impacts to this wildlife group because the large green trees will become future snags and down logs

Alternative PRF (Preferred Alternative). Under Alternative PRF 3,500 acres will be scheduled for regeneration harvest as compared to historic levels This alternative will have the second lowest amount of timber harvest acreage Alternative PRF, therefore, will be the second most beneficial to wildlife requiring snags and down logs

Alternative RPA (1990 RPA Program Emphasis). Alternative RPA will have the highest amount of acreage scheduled for the regeneration harvest method, but it will still be below historic levels This alternative will have the second highest amount of timber harvest acreage Alter-

natives RPA and CUR will be the least beneficial to the Snag and Down Log Wildlife Assemblage

Alternative CUR (No Action/No Change). Alternative CUR will schedule the second highest acreage to regeneration harvesting, but it will still be below historic levels Alternative CUR will have the highest acreage predicted for stand maintenance (salvage) treatment This alternative will have the highest amount of timber harvest acreage Alternatives RPA and CUR will be the least beneficial to this assemblage

Alternative CBF (Citizens for Better Forestry). Alternative CBF will also have a relatively low amount of regeneration harvesting when compared to historic levels Alternative CBF will have the lowest amount of timber harvest acreage This alternative will be the most beneficial to this assemblage

The Hardwood Wildlife Assemblage will be less adversely impacted compared to the historical situation, because timber harvest acres and volume will be much less In all alternatives approximately 75 aercent of the Forests will not be subject to any harvest that will impact hardwoods The standards and guidelines for the hardwood community will be the same for all alternatives Specific levels will be managed for to meet desired future conditions developed dunng watershed (landscape) analysis Alternatives with higher acreages of Prescription VIII will have more adverse impacts to wildlife that require hardwood for habitat needs This will apply only on those acres available for timber harvest

Alternative PRF (Preferred Alternative). Alternative PRF will have the least acres assigned to Prescription VIII It will also have the least adverse impact on wildlife requiring hardwoods

Alternative RPA (1990 RPA Program Emphasis). Alternative RPA will have the second most acres assigned to Prescription VIII It will also have the second most adverse impact on wildlife requiring hardwoods

Alternative CUR (No Action/No Change). Alternative CUR will have the most acres assigned to Prescription VIII It will have the most adverse impact on wildlife requiring hardwoods

Alternative CBF (Citizens for Better Forestry). Alternative CBF will have the second least acres assigned to Prescription VIII It will have the second least adverse impact on wildlife requiring hardwoods

The Chaparral Wildlife Assemblage will benefit from timber harvest activities that will create a mosaic of age classes and plant species Wildlife associated with the chaparral community will also benefit from direct habitat enhancement that will create a mosaic of age classes and plant species The standard and guidelines for the chaparral community will be the same for any alternative But timber management regimes vary by alternative This will create more open, transitory shrub-like areas (e g plantations), Therefore, alternatives that have more acres assigned to Prescription VIII and regeneration timber harvest methods, will benefit chapanal wildlife because of more openings being created

Alternative PRF (Preferred Alternative). Alternative PRF will place 13 percent of the land base (lowest) into Prescription VIII PRF will have almost no acreage scheduled for the clearcut timber harvest method Alternative PRF will be second least beneficial to chaparral wildlife, because it will create a small amount of openings and some direct chaparral treatments will occur PRF will be more beneficial than CBF to chaparral wildlife because of the higher ASQ

Alternative RPA (1990 RPA Program Emphasis). Alternative RPA will place 26 percent of the land base (second highest) into Prescription VIII This alternative will schedule the high acreage of clearcut timber harvest methods Alternative RPA will have a higher intensity of direct open habitat manipulation (e g prescribed fire in chaparral to maintain or increase deer populations Alternative RPA will be the most beneficial for chaparral wildlife because of the combined effect of direct and indirect management

Alternative CUR (No Action/No Change). Alternative CUR will place 26 percent of the land base (highest amount) into Prescription VIII Alternative CUR will have the most acreage scheduled for timber harvest, but the second most acres scheduled for the clearcut harvest method There will be minor direct habitat treatment

Alternative CBF (Citizens for Better Forestry). Alternative CBF will place 16 percent of the land base (second lowest) into Prescription VIII Alternative CBF will have no clearcut timber harvest This alternative will be the least beneficial to chaparral wildlife. because it will create the lowest amount of openings Some direct chaparral treatments will occur

Riparian and Aquatic Wildlife Assemblages will have better conditions compared to the historical situation because of protective standards and guidelines. Best Management Practices, land allocations, and supplemental

ManagementArea direction Aquatic wildlife will be cared for through application of fish management standards and guidelines. kparian Management Zones (RMZs) are the same for most alternatives. PRF has generally wider corridors along npanan areas than the other alternatives No timber harvest will be allowed along Class I and 2 RMZs and limited harvest activity will be allowed along Class 3 and 4 RMZs (see Management Prescnption IX) Ripanan and aquatic wildlife will not be adversely affected in perennial stream RMZs (class I and 2 streams) RMZs are smaller at lakes, wetlands, springs, ephemeral streams and intermrttentstreams Habtat components, such as future down logs and microclimate, can be modfied, but only if riparian values will be protected Thus, wildlife requiring these areas will be provided for

The nparian standards and guidelines adequately provide for riparian values at the same level in all alternatives except in PRF where intermittents and ephemerals are treated the same as perennial streams

WILDLIFE (Threatened, Endangered, and Sensitive Species)

Consequences Common to All Alternatives

All known or future srtes of Federally listed threatened or endangered (T&E) species will be fully protected by the Shasta-Trinity National Forests and managed according to Prescription VII All alternatives will meet the intent of the respective recovery plans for these species

Threatened At present, there are two known Federally listed threatened wildlife species on the Forests northern spotted owl and marbled murrelet

Endangered At present, there are two known Federally listed endangered wildlife species on the Forests bald eagle and peregrine falcon

Sensitive: All known or future sites necessary to provide for viable populations of sensitive wildlife species will be fully managed and/or protected as necessary Overall, the amount of Prescription VII habitat will fluctuate by not more than five percent between all the alternatives

Threatened

Spotted Owls. All alternatives except PRF will be managed according to the Final Northern Spotted Owl EIS, Interagency Scientific Commrttee (ISC) Report and the Final Fish and Wildlife Service Recovery Plan. PRF will be managed by providing Late-Successional Reserves, Riparian Reserves and standards and guidelines specific to late seral stage habitat and species

Marbled Murrelet. There are no known occurrences or nesting of this species on the Forests

Endangered

Bald Eagle. All alternatives will exceed the recovery target of 20 pairs of bald eagles Habrtat exists for continued Expansion of this species on the Forests

Peregrine Falcon. All alternatives will exceed the recovery target of 6 pairs of peregrine falcons Habitat exists for the continued expansion of this species on the Forests

Consequences Specific to an Alternative

Sensitive

There is a difference between alternatives for furbearers Alternative CBF will have more lands in Prescription VII specifically for fisher and marten when compared to the other alternatives Alternative PRF provides for furbears through the system of Late-Successional Reserves and wide Riparian Reserve corridors and specfic standards and guidelines related to late seral stage habrtat and species

Fisher and Pine Marten. Prescriptions that allow no scheduled timber harvest and streamside corridors will provide sufficient mature and older over-mature habitats of appropriate size and pattern to maintain viability of fisher and pine marten in all alternatives

Goshawk. All alternatives except PRF will provide a minimum of 150 habitat areas for goshawks in a matnx system of 18 square mile block per pair of goshawks Each alternative except PRF will provide for at least 150 acres of suitable habitat within each territory at any one point in time The above criteria will maintain the viability of goshawks in those alternatives Goshawks are provided for in PRF though the system of Late-SuccessionalReserves, Rparian Reserves and protection of sites and birds during project implementation All alternatives will consider goshawks during development of watershed analysis landscape analysis)

Willow Flycatcher. Application of the special riparian management zone standards will provide for maintaining viability in all altematives

Means to Mitigate Adverse Impacts

Forest Standards and Guidelines were developed by the interdisciplinary team to provide guidance and direction to the land manager and to provide a system by which adverse impacts can be mtigated Specific direction is included in these standards and guidelines to assure that long-term productivity is not impaired by the application of short-term management practices

As noted earlier, standards and guidelines. along with laws, regulations, policies, and Pacfic Southwest Region Minimum Management Requirements and Minimum Implementation Requirements apply to all alternatives

The list of standards and guidelines which serve as mitigation measures is lengthy A summary of the management direction for the Shasta-Trinity National Forests is described in Chapter II A description of Forest Standards and Guidelines is contained in Chapter 4 of the Forest Plan

Adverse Environmental Effects Which Cannot Be Avoided

Implementation of the action or any of the alternatives will result in some adverse environmental effects that cannot be avoided The application of the standards and guidelines is intended to limt the extent and duration of these effects

However, some adverse effects that cannot be avoided are included in the action and alternatives to it These effects include

- Short term increases in erosion and sedimentation resulting from soil disturbing vegetative management activities will occur despte application of erosion and water quality control measures and avoidance of highly erosive and/or unstable land areas In all alternatives road construction will result in increased erosion and permanent loss of productive land

- Short-term adverse effects will take place on scenic quality because of vegetation management and road construction

- Timber volumes will be foregone because of the inaccessibility and inoperability of steep landforms and by prescribing management prescriptions that do not allow harvesting

- Short-term reduction in air qualty will occur because of dust, smoke, and automobile emissions resulting from increased recreation use and vegetative management practices

Mitigation measures are included in the standards and guidelines and in the management prescriptions in the Forest Plan They are intended to mitigate the adverse effects that cannot be avoided

Relationship Between Short-Term Uses and long-Term Productivity

The National Environmental Policy Act of 1969 (NEPA) requires consideration of short-term uses and long-term productivity in environmental analyses, but it does not define the terms The relationship between the two is very complex Forest management of public lands is a long-term venture, but one that must serve the year-to-year needs of society The thrust of consideration appears to be toward maintenance of productivty over the very long term Short-term uses might be considered as annual activities such as recreation. timber harvest or grazing, but these occur on a continuing basis and are probably acceptable so long as productivity is not significantly impaired

The inherent ability for long-term productivity is lost if soil productivity and hydrologic characteristics are impaired permanently by short-term uses Such things as compaction, soil erosion, and nutrient losses can result in a gradual decrease in timber and range productivity thus adversely affecting sustained yields for future generations

The Multiple-Use Act defines sustained yield as the "achievement and maintenance in perpetuty of high annual or periodic output of the various renewable resources of the National Forests without impairment of the productivity of the land"

While short-term uses can adversely affect long-term productivity, they can also enhance long-term productivty as in the case of a managed forest Short-term activities such as timber harvest, when applied properly, can increase growth and, therefore, increase long-term productivity over that of an unmanaged forest condition In fact, an unmanaged forest will, over time, decline in growth and, therefore, lower long-term productivity

Much of the specific direction and mtigation requirements of management standards and guidelines is directed toward maintaining long-term productivity The interdisciplinary team developed management standards and guidelines for two basic purposes: first, to ensure or

protect long-term productivrty: and, secondly, and equally important, to assure coordination and/or mitigation between resource uses and activities The intent. ultimately, is that long-term productivity and values of all resources be maintained at acceptable levels These standards and guidelines have the potential to maintain long-term productivity

The National Forest Management Act of 1976 (NFMA) Planning Regulations require that the Forest Plan specify monrtoring and evaluation requirements The purpose is twofold On the one hand, monitoring is *to* assure that the goals and objectives of the Forest Plan are, in fact, being met On the other hand, monitoring is instituted in order to determine that long-term productivity is maintained Monitoring requirements are displayed in the accompanying Forest Plan The requirements will be similar for all alternatives More intensive and costly monitoring activities and frequencies will be expected under high production Alternatives CUR (No Action/No Change), and RPA (1990 RPA Program Emphasis) Slight relaxations will be anticipated under Alternatives PRF (Preferred *A*·ternative) and CBF (Citizens for Better Forestry)

In summary, through policy implementation, improvement *of* practices, and monitoring it is expected that long-term productivrty of the Forests can be maintained while still receiving the benefits of short-term uses

Irreversible or Irretrievable Commitment of Resources

Irreversible commitment of resources refers to resources that are renewable only over a long period of time, such as soil productivrty, or to nonrenewable resources, such as cultural resources or minerals Alternatives were formulated with the understanding that maintenance *of* future options was an important consideration Measures to protect those resources that can be irreversibly affected by other resource uses were incorporated in the Forest standards and guidelines

The construction of arterial and collector roads to provide future access to the Forests is considered an irreversible action because of the time needed for a road to revert back to natural condrtions Also, the extraction of gravel and rock used for road construction and reconstruction is an irreversible action Mining and dam construction are also examples of activities that represent irreversible commitment of resources Alternatives RPA and CUR, with the highest resource output levels, have the greatest irreversible commitment of resources based on associated construction of roads Alternatives PRF and CBF have the fewest irreversible actions and protect future options the most All alternatives are at levels below historical averages, however.

Site-specific environmental analyses will further explore the impacts of any dam construction proposed on the National Forests relative to the irreversible commitment of resources This Final EIS and the Forest Plan do not include decisions on major dam construction projects (e g proposed enlargement of Shasta Dam, etc) They lie outside the scope of forest planning

Irretrievable commitment of resources is the production or use of renewable resources that are lost because of allocation decisions made This represents opportunities foregone for the period *of* time that the resource cannot be used Timber on steep slopes, that is not economically accessible, may represent an irretrievable commitment of resources since mortality is not salvageable The commitment is irretrievable rather than irreversible because future technological advances can make harvest of these areas possible and feasible Another example of irretrievable commitment of resources is wilderness designation

The difference between alternative-output levels and the higher levels that can be produced also represents an irretrievable commitment of resources For example, a low level of forage use for domestic livestock grazing or a low level of water yield can be increased in the future based on the application of different management prescriptions, but the outputs between now and then will be "lost" or not available for use Therefore, the maintenance of future options and the current utilization of the resources to the fullest extent possible tend to conflict with one another The purpose of Forest planning is to provide a mix of uses now and for future time periods that balance the needs of both the current population and future generations

Possible Conflicts with Federal, Regional, State, and local land-Use Plans

There are no known conflicts with plans of cooperating or affected agencies Early in the Forests' planning process (1980), interested and affected Federal, State, and local agencies and jurisdictions enumerated their concerns relative to the management of the Shasta-Tnnrty National Forests Information provided by the various agencies helped the interdisciplinary team establish the issues to be addressed in the Forest Plan and the Final EIS Coordination with these agencies has continued throughout this planning process and is expected to continue into the future This Final EIS and the Forest Plan provide a vehicle to resolve any problems with other public agencies should

a conflict result from any of the direction contained in the various alternatives including the Forest Plan

To avoid future conflicts, close coordination and cooperation will need to continue between affected agencies in implementing the selected alternative These agencies include

U.S. Department of Interior-Bureau of land Management (BLM). The areas within which continued cooperation is expected are development of joint chaparral management plans, off-highway vehicle management, range administrahon. cadastral survey programs, and minerals management Active coordination in the above programs will mitigate any future conflicts between the two agencies

U.S. Fish and Wildlife Service (USFWS). The Shasta-Trinity National Forests will continue to coordinate their efforts in the management of the bald eagle, peregrine falcon, northern spotted owl, marbled murrelet, and other T&E territories through the USFWS consultation process Coordination will continue with the Calrfornia Department of Fish and Game (DFG), and Recovery Plans

California Department of Fish and Game (DFG). Because of the divergent missions of the National Forests and the DFG. there will always be some dfierence of opinion on how certain areas of land should be managed The planning objectives of the DFG provide a good perspective and position on the resolution of land use conflicts involving fish and wildlife management Close coordination of planning *efforts* in the development and implementation of the vanous State game herd and special fishery plans and the implementation of the eventual alternative selected in this Final EIS will need to continue This effort, along with a coordinated monitoring action plan, will mitigate differences that arise between the agencies

State Water Agencies. Water qualty standards will continue to be met using Best Management Practices (BMPs) Critical watersheds will be maintained as part of project management implementation These measures will minimize future conflicts in watershed management between the Shasta-Tnnity National forests and State water agencies

California State Parks. Some potential visual resource conflicts, due to timber management activties. are possible with the California State Park agency in the area surrounding Castle Crags State Park It is evident that the viewshed from Castle Crags is sensitive enough that these values should be considered in the design of area projects

State Energy Agencies. Possible conflicts may anse from both direct impacts on the land and indirect impacts because of regional energy needs

As the growing population of California scrambles for relatively cheaper sources of dependable energy from inside and outside the State, there will be an ever-increasing need to develop new facilities and upgrade existing power inter-ties This emphasis will result in new needs for power transmission corridors across the Forests Again, the State Energy Commission is at the forefront of this renewed emphasis

County Governments. Continued close cooperation with County Boards of Supervisors and Planning Departments will need to take place dunng the implementation of the selected alternatives to avoid future conflicts This cooperation is particularily important in the areas of land uses and road development and use

Energy Requirements and Conservation Potentials of Alternatives

Energy Consumption. Estimates of energy consumption by alternative include energy used for administration, road construction/reconstruction, timber harvest. recreation, fire management, watershed management, and grazing These estimates were measured in terms of gallons of gasoline and diesel fuel used and converted to British thermal units (BTUs) Worksheets used in these calculations are included in the planning records available at the Forest Supervisor's Office, 2400 Washington Avenue, Redding, Calrfornia

Energy consumption related to timber management activities accounts for about 80 percent of the average annual use under each alternative The calculation for timber energy consumption was based on the amount of petroleum products used in timber harvesting operations and associated road building activities

Energy Produced. Estimates of energy produced by alternative used the same categories shown above for energy consumption Water yield accounted for *94* percent of the total energy produced on the Shasta-Trinity National Forests

Energy Requirements. The following conclusions can be made on the effect of alternatives on the energy resources of the Shasta-Tnnity National Forests

- The inclusion of energy produced by water yields is misleading and tends to skew the overall energy ef-

ficiency of the alternatives The presence of the Central Valley Project involving the Sacramento and Trinity River Basins, plus the Shasta Dam, further exaggerates this situation,

- By excluding water yields (most of which are beyond the administrative control of the National Forests), it is obvious that, as one intensifies commodrty outputs, less efficient use of energy occurs However, differences between alternatives are predictable;
- Differences between alternatives from the standpoint of net energy requirements (budget) are insignificant, and
- The increased energy consumption in the high-output altematives indicated by this analysis is balanced by the increased opportunties for addtional biomass utilization Some of this can be converted to energy production as technology and economic conditions permit

Chapter V

List of Preparers

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List of Preparers

Primary responsibility for the preparation of the Forest Plan and Final EIS was held by the Land Management Planning Group and Interdisciplinary (ID) Team In addition, the Forests' Line Officers, consisting of the Forest Supervisor, Deputy Forest Supervisor, and the District Rangers, provided additional input to the planning process from a managerial viewpoint

Throughout the preparation of these documents, many individuals assisted in a variety of ways Without their expertise, ideas, and opinions, the writing of these documents would not have been possible

land Management Planning Group

Core Team Members

Steven Clauson — Land Management Planner

Experience: Land Management Planning/Information Systems Staff Officer and ID Team Leader, District Ranger Shasta-Trinty National Forests (NF) 2 years, 7 years, respectively District Ranger, LMP Staff, Cleveland NF, 5 years, I year respectively Forest Service 24 years

Education: B S Mechanical Engineering

John Kruse — Physical Sciences

Experience: Physical Sciences Staff Officer (water, soils, geology, minerals), Land Management Planning Staff Officer and ID Team Leader Shasta-Trinity NF 6 years, Forest Service 27 years (retired)

Education: B S Forestry

Ralph Phipps — Environmental Coordinator/EIS Writer/Asst Planner

Experience: Staff Silviculturist, 3 years, Silviculture, Resource Planning, Timber Management, 12 years Shasta-Tnnrty NF 16 years

Education: B S Forest Management

Arlene Kallis — Forest Planning Analyst/Asst Planner

Experience: Planning and Database Management Staff, Shasta-Trinity NF 7 years FORPLAN Analyst, GIS Coordinator Ranger Distnctexpenence. 9 years. Silviculture, Small Sales, Sales Preparation and Layout

Education: B S Forest Management

Jim Zander — Timber Planner

Experience: Timber Management Planning and Silviculture Shasta-Tnnty NF· 13 years, Forest Service 30 years

Education: B S Forestry

Technical Support

Janet Buzzini — Wrrter-Editor-Retired 1994

Experience: Writer-Editor, Public Affairs Officer Shasta-Trinity NF 12 years: Forest Service. 30 years (retired)

Education: A A Degree

Stepha Arnaud — Environmental Publications

Experience: Deskop Publishing, Computer Graphics, Database Audrting Shasta-Trinity NF 7 5 years, USFS 7 5 years

Education: College coursework, certificates in computer software and repair

Mary Cavalleri — Editorial Assistant

Experience: Editorial Assistant, Desktop Publishing, Computer Graphics Shasta-Trinity N.F 2 years, 5 years, respectively, Forest Service. 10 years

Education: College coursework

Ken DeCamp — Illustrator

Experience: Illustrator Shasta-Trinrty NF 12 years Teaching, Botany, Mycology, Art, 10 years, Design and Illustration (private studio), 7 years: Fine Arts, 23 years, Forest Service 13 years

Education BA Geography. MA Geography and Education, Equivalent AA, English, Certificate, Graphics and Mapping

Gail Tanaka Editonal Assistant

Experience Computer Specialist, Planning Forester, Forestry Technician - Timber, Fuels Shasta-Tnnity NF 15 yean, USFS 15 yean

Education BS Entomology, College coursework in forestry

Gary Chase Hydrologic Technician

Experience Forestry Technician, Hydrologic Technician, Desktop publishing, Computer graphics, Spreadsheet and data base, Shasta-Trinity NF 19 yean, USFS 20 yean

Education AA in Forestry

Scott Vaughn Fire Planner

Experience Fire Planner, Assistant Fire Management Officer, Fire/Fuels Forester, Shasta-Trinity NF 10 years, USFS 17 yean

Education BS Forest Resource Management

Jeff Paulo Silviculturist

Experience District Silviculturist, Reforestation/TSI Forester, Shasta-Trinity NF 13 years, USFS 19 years

Education BS Forest Management

Line Officers

Steve Fitch Forest Supervisor

Experience Forest Supervisor, Shasta-Tnnity NF, Forest Supervisor, National Forests in Florida, Deputy Forest Supervisor, North Carolina, Chief's Planning Staff, Washington, DC, Assistant to US Senator, Washington, DC, Distrid Ranger, Shasta-Trinity NF, Recreatior Staff Officer. Inyo NF Forest Service 3C years

Education BS Forest Management Science

Robert Tyrrel Forest Supervisor - retired 1992

Expenence Forest Supervisor (3 National Forests), District Ranger (2 National Forests), Staff Officer - Public Affairs, Fire, Soils & Water, Staff Director Program, Planning and Budgeting (PP&B) Shasta-Trinity NF 8 yean, Forest Service 35 years (retired)

Education BS Forest Management

William Carpenter Deputy Forest Supervisor

Experience Deputy Forest Supervisor, Program officer, District Ranger, Timber Management Assistant Shasta-Trinity NF 10 years, Forest Service 33 yean (retired)

Education BS Forest Management

Charley Fitch District Ranger, Big Bar Ranger District

Experience Distnct Ranger, Distnct Resource officer, Forest Management, Silviculturist Shasta-Trinity NF 15 yean, Forest Service 28 years

Education BS Forest Management

Karyn Wood District Ranger, Hayfork Ranger District

Experience Distnct Ranger, Distnct Fire Management Officer, Recreation Staff Assistant, Assistant Fire Management Officer, Fuels Forester, Timber Sale Administrator, Sale Preparation Officer Shasta-Trinity NF 3 years, Forest Service 19 years

Education BS Forest Management

Robert Hammond District Ranger, McCloud Ranger Distnct

Experience District Ranger (2 National Forests). Resource Officer, Timber Management Officer, Administration Forester Shasta-Trinity NF 2 years, Forest Service 27 yean

Education BS Forest Management

Kathy Hammond District Ranger, Mt Shasta Ranger Distnct

Expenence — District Ranger *(2* National Forests); Public Affairs Officer, Resource Officer; LMP ID Team Leader, Dispersed Recreation/Wilderness Area Manager Shasta-Trinity NF' *2* years, Forest Service. 17 years; BLM. 3 years

Education — B S. Natural Resource Management

Shawne Mohoric — District Ranger, Shasta Lake Ranger District

Experience — District Ranger, Wildlife Biologist, 3 districts, Multi-disciplinary Resource Officer, *2* districts Shasta-Tnnity NF *2* years, Forest Service. 15 years

Education — B S Biology, B S Wildlife Science

Irl Everest — Distnct Ranger, Weaverville Ranger District

Expenence — District Ranger (2 National Forests), Resource Officer, Lands and Resource Officer, Forester Rights-of-way and Timber Management Shasta-Trinity NF *9* years, Forest Service *28* years

Education — B S Entomology, B S Forest Management

Robert Ramirez — District Ranger, Yolla Bolla Ranger Distnd

Experience — District Ranger, Planning Forester; District Silviculturist, Forester, Silvicultural Assistant Shasta-Trinity NF 5 years, Forest Service 20 years

Education — B S Forest Management

Supervisor's Office Staff

Jerry Brogan — Timber Management

Experience — Timber Management Officer (TMO), District Ranger, Deputy TMO, District TMO Shasta-Tnnity NF *9* years, Forest Service 33 years

Education — B S Forestry

Ken Coop — Range, Ecology, Wildlife, Fisheries, Botany

Expenence — Biological Sciences Staff Officer, Fish/Wildlife Staff Officer, Botany Range, Ecology Staff Officer. Shasta-Trinity N.F: 12 years, *9* years, respectively Regional Area Game Management Biologist, Montana Fish & Game Department 6 yean, Dixie & Fishlake National Forests Zone Wildlife Biologist, 2 yean; Klamath National Forest Wildlife Biologist, 2 years Shasta-Trinity NF 14 years; Forest Service 18 years

Education — AS Science/Biology, B.S Wildlife Conservation & Ecology, M S. Fishenes & Wildlife Management

Duane Lyon — Rural Development, Bio Region Coordinator, Cultural Resources, and Tribal Government Liaison ***of-*** ficer

Expenence — Forest Recreation Officer, Forest Land Management Planning Officer, Recreation Planning at Regional Level, Recreation and Visual Resource Managementat Forest, Regional, and Washington Office levels Shasta-Trinity NF 14 years, Forest Service. *28* years

Education — B S Landscape Architecture

Royal Mannion — Public Information

Experience — Public Affairs Officer, Distnd Ranger, Timber Sale Planning, Resource Officer, Recreation Officer, Forester Shasta-Tnnity NF 13 years, Forest Service 30 years (retired)

Education — B S Forest Management

Frank Packwood — Special Agent

Experience — Supervisory Criminal Investigator, Shasta-Trinity NF 11 years, Forest Service *29* years

Education — Federal Law Enforcement Training Center-Criminal Investigator School, College coursework

Jim Stoll — Forest Engineer

Expenence — Assistant Forest engineer, Shasta-Trinity National Forest, 4 years, Forest Engineer, *2* years, Forest Service: 16 years

Education — B S Civil Engineering

Kenneth Showalter Recreation/Lands

Experience: Forest Recreation/Lands Staff Officer, District Ranger, Timber Management Officer. Recreation Officer. Program Planning and Budget Ofticer, Land Management Planning Team Shasta-Trinity N F 17 years, Forest Service 30 years

Education: B S Forest Management

Other Specialists

Paula Crumpton Wildlfe Biologist

Expenence: Wildlfe Biologist, Shasta-Tnnky National Forests 5 years, Wildlife Biologist, Gifford Pinchot N F 6 years, Wildlife Biologist, Cibola N F· 3 years, Seasonal Biologist, Six Rivers N.F 1 year Forest Service 15 years

Educabon: B S Wildlife Management

Gregg DeNitto Pest Management

Experience: Plant Pathologist Northern Callfomia Forest Pest Management Service Area Shasta-Trinity N F 6 years, Forest Service 15 years

Education: Ph D Forest Pathology

Don Haskins Geology

Experience: Forest Geologist, Geologist-Watershed Management Shasta-Tnnky N F 14 years, Forest Service 18 years

Education: B S Geology. M A Geology

Winfield Henn Cultural Resources

Experience: Forest Archaeologist. City Planning Commissioner, City General Planning Committee Shasta-Tnnity N F 18 years, Forest Service 18 years

Education: B A Anthropology, M S Anthropology, Ph D Anthropology

Kristy Hern Recreation

Expenence: Assistant Recreation and Lands Staff Officer Shasta-Trinity N F 4 years Distnct Special Uses Specialist. 6 years, Recreation Supervisor. 4 years Forest Service. 17 years

Education: B A. Outdoor Recreation

Nancy Hutchins Wildlfe Management

Experience: Distnct Wildlrfe Biologist, Shasta-Tnnity N F 10 years, Ochoco N F 3 years Forest Service 13 years

Education: B S Forestry and Wildlfe Management

Richard Irizarry Fisheries

Experience: Fishenes Biologist, Research Biologist, Fish Culturist Shasta-Tnnty N F 13 years; Forest Service 17 years

Education: B S Fisheries Management, Graduate coursework

Patrick Kennedy Recreation-Visual Management

Expenence: Forest Landscape Architect, Recreabon-Visual Management/Planning Supervisory Forest Landscape Archtect (3 National Forests) Shasta-Tnnity N F 20 years, Forest Service 32 years

Education: B A Landscape Architecture

Sheila logan Ecology

Expenence: Zone 3 Ecologist, Ecological Classification and Ecological Unit Inventory, Shasta-Tnnity and Mendocino N F 6 years, Forest Service 16 years

Education: B S. Plant Ecology, M S Forest Ecology

V i a n Long Botany

Experience: Botanist, Shasta-Trinity N F, 2 years, Seasonal Sensitive Plant Technician, 2 years

Education: B S Biology with emphasis in Botany

Julie Nelson Botany

Expenence: Forest Botanist. Shasta-Tnnty N F 6 years, Forest Service 6 years. Berry Botanic Garden Conservation Director, 6 years, Consulting Botanist, 4 years

Education: B S Botany, M.S. Biology

Darrel Ranken Soils and Water

Experience: Forest Hydrologist; Water Quality Management, Watershed and BMP Monitoring; Watershed Restoration; Water Resource Inventory, Fluvial Processes and Channel Dynamics. Shasta-Trinity N F 17 years, Forest Service. 20 years

Education: B S. Forest Management: M S Forest Hydrology

Kenneth Lanspa Soils

Experience: Forest Soils Scientist, Soil Quality Management, Soil Quality Standard Monitoring, Watershed Restoration, Soil Resource Inventory Shasta-Trinity N.F 19 years, Forest Service. 33 years

Education: B.S Geology, M.S Soils Reg Geologists 838

David Schultz Pest Management

Experience: Entomologist. Forest Pest Management Northern California Shared Service Area Shasta-Trinity N F.. 7 years, Forest Service I8 years

Education: B S Forestry, Ph D. Forest Entomology

Jim Turner Program Analysis Officer

Experience: Financial Planning, economics, operations research Shasta-Trinity N F I5 years, Forest Service 25 yean

Education: B.S Colorado State University, Economics, Physical Sciences, M.S Colorado State University, Economics, Operations Research

Chapter V

Distribution List