

## Chapter 3 – Summary of the Analysis of the Management Situation

---

### Table of Contents

<b>Introduction</b>	<b>3 - 1</b>
<b>The Economic Environment</b>	<b>3 - 1</b>
<b>The Social Environment</b>	<b>3 - 2</b>
<b>The Resource Environment</b>	<b>3 - 5</b>
Air Quality	3 - 5
Cultural Resources	3 - 5
Diversity	3 - 6
Energy	3 - 7
Facilities	3 - 9
Fire and Fuels	3 - 10
Firewood	3 - 12
Geology	3 - 12
Lands	3 - 13
Law Enforcement	3 - 14
Minerals	3 - 14
Pests	3 - 17
Range	3 - 17
Recreation	3 - 20
Research Natural Areas	3 - 23
Riparian Areas	3 - 24
Sensitive Plants	3 - 25
Soils	3 - 26
Special Interest Areas	3 - 27
Timber	3 - 28
Visual Resources	3 - 32
Water	3 - 33
Wilderness and Roadless Areas	3 - 35
Wildlife and Fish	3 - 37
Wild and Scenic Rivers	3 - 38
Woodlands	3 - 38

## Chapter 3

### Summary of the Analysis of the Management Situation

---

#### Introduction

This chapter summarizes the Analysis of the Management Situation (AMS), a set of documents which examines the existing situation for each resource of the Forest. The AMS is part of the Planning records.

Chapter 3—*Affected Environment*—of the accompanying Environmental Impact Statement describes each resource in detail.

#### The Economic Environment

##### Introduction

National Forest land management and activities affect the social and economic well-being of communities close to and dependent on the Forest. The Forest's impact areas are Modoc, Lassen and portions of Siskiyou Counties. These impact areas are characterized by a rural setting, low population density, and limited job diversity centered around agriculture, the timber industry, and recreation. The impact counties are most affected by Forest Service employment, timber, range, wildlife, and recreation. The Forest's extended zone of influence includes urban centers throughout California, southern Oregon, and western Nevada. Users from this zone primarily include hunters, recreationists, and commercial firewood cutters.

The proportion of land area administered by the Forest in each county determines the extent to which the Forest affects those counties. The Forest administers 53% of the land in Modoc County, 5% of Lassen County, and 3% of Siskiyou County.

##### Population

The current population of Modoc, Lassen, and Siskiyou Counties is 82,275 people. From 1980 to 1990, the population increased 17%, higher than California's increase of 6%. In-migration accounts for 75-80% of the increase. This pattern is consistent with national trends showing movements from urban areas to more rural settings. Population growth rates varied among counties in the last decade, with Modoc County growing the least

(12%) and Lassen County the most (27%). Siskiyou County's population increased 13%.

##### Employment and Income

The principal economic resources of the affected counties are government employment, timber, agriculture, and recreation. Modoc County employment from these resources is dominated by the following sectors: government (36%), agriculture and forestry (12%), wholesale and retail trade (16%), services (23%), and manufacturing (6%). Federal, State, and local government employment, in concert with educational jobs, provide two times more employment than the Statewide average of 16%.

In rural areas, per capita income is usually lower than Statewide averages due to the lifestyles of the residents. People tend to grow more of their own food, cut their own firewood, barter, and work for nonreported cash such as family farm labor. These factors account for some of the differences between the counties and the State. Seasonal employment is another contributor to the difference. Construction, logging, and agriculture all have cyclical employment patterns.

##### Local Economic Impacts

The Forest contributes to the local economy by providing timber for wood products, forage for livestock operations, recreation and hunting opportunities, and revenue from the Receipts Act Payment Program and through the influx of the annual operating budget. The Forest employs approximately 154 permanent people (full- and part-time) as well as 76 temporary workers.

The Twenty-Five Percent Fund, an act created in 1908, requires the return to affected counties of 25% of monies received by the Forest from the sale of forest products. Receipts from timber sales and grazing fees are the primary source of monies. The percent of forest land area in each county is the basis for the distribution of 25% funds returned to each county: Modoc County receives 83% of the Fund, Lassen County 9%, and Siskiyou 8%. The money must be used to improve public schools and roads.

Annual receipts can fluctuate widely because of the variation in volumes of timber harvested which dominate the economic base from which the 25% returns are calculated. Although the Forest regulates the volume of timber offered for sale, the price paid and timing of the actual harvest is influenced by the market demand for wood products.

Another source of income to the counties is the possessory interest tax levied on individuals holding various permits in national forest lands. The primary source of possessory income tax from the Forest is livestock grazing. For example, Modoc County receives approximately \$29,000 in taxes annually from ranchers who graze their livestock on the Forest.

The State of California levies a timber yield tax, currently set at 2.9% of the timber harvest value, which is returned to the county of origin where the volume is harvested.

Rents from geothermal, oil and gas leasing are recent additional sources of income to Modoc and Siskiyou Counties.

## **The Social Environment**

### **Introduction**

In order to determine the effects of Forest management on the quality of peoples' lives and their well-being, the population of the assessment area was grouped into several social categories: ranching-farming, timber operators-wood products manufacturing, retail trade-services, retirees, government employees, non-local recreationists and Native American Indians. The categories are simplified, stereotypic groups, but individuals may belong to several groups because the categories are not mutually exclusive.

### **Social Groups**

Forest management activities can influence individuals and groups on a local, regional, and national basis. People living within and adjacent to the Forest are most influenced; they are described in detail below. Various groups may overlap at the local, regional, or national level. For example, recreationists visiting the Forest come from the local area as well as from areas outside the zone of influence. Similarly, national and regional groups interested in commodity outputs, such as timber or grazing, share many beliefs held by local commodity-oriented groups.

Descriptions of the various groups and their value systems which follow are in general categories developed for analytical purposes; individuals may not perfectly fit a unique group. Many cross ties exist between the social groups because of such factors as religious affiliations, family relations, social organizations, recreational preferences, and the desire for open space, rural environmental equality and a slower pace of life.

### **Ranching-Farming Group (Ranchers, Farmers)**

This group is comprised of individuals involved in livestock production and the growing of grain crops, hay and pasture, and vegetable crops. Many of the members of this group are long-time residents of the assessment area with ranches and farms having been passed to successive generations. This group is also made up of ethnic minorities, usually Hispanics, who provide manual labor to the ranchers and farmers. The group's lifestyles and job dependencies are based on using the land to sustain their livelihoods. Currently, economic instabilities in ranching and farming create uncertainty in the ability to sustain these lifestyles.

Grazing on public lands is an integral part of many ranch operations. Currently, local ranchers depend on approximately 15% of their cattle forage requirement from Forest land. While livestock graze on public lands during the summer months, those private lands not used for summer grazing are devoted to alfalfa and grass hay production for winter feeding. Reductions in public land grazing could increase the use of private lands for grazing livestock during the summer months. To compensate for the loss of acreage in production, ranchers would have to decrease the number of livestock their ranches could support.

The Ranch-Farming Group is generally opposed to changes that would rapidly alter their lives and communities. As a group they benefit from Forest commodities, especially forage and water for agricultural use. They have a strong feeling of ownership in public lands and believe that their historical uses of the Forest should not be altered. In fact, the Forest was established largely because of the work and recommendations of local ranchers in the last century.

Important population variables for the group are land ownership and use patterns. Believing that agricultural land should be used for agricultural purposes and not broken up for other uses under a variety of ownerships, this group is concerned about the effects of subdivision, including the effects of carving up the agricultural land base, and the limited supply of water. Because water is scarce in high desert country, its availability for agricul-

tural uses has been and will continue to be a major source of concern.

### **Timber Operators-Wood Product Manufacturing Group (Timber Industry Workers)**

This group includes individuals involved in logging, the manufacturing of wood products, and commercial firewood cutting. Members are generally long-time residents of the assessment area with some minorities employed primarily in wood products manufacturing. The group's employment opportunities are totally dependent on the availability of wood fiber, a major source of which is located on federal lands.

Like those in the ranching-farming group, these peoples' lifestyles are dependent on the land for basic subsistence. For those involved with commercial timber, maintaining their way of life is a major concern due to the economic uncertainties of the wood products market and the policies of the Forest concerning availability and quality of wood fiber.

The values of the group are similar to the ranching-farming group. They have a traditionally strong community orientation. This group believes that the Forest should be managed to provide wood fiber and has strong feelings of ownership regarding Forest lands. Timber operators and wood products manufacturers within the Big Valley Federal Sustained-Yield Unit feel that the Unit is an important part of their community and that it should be managed for the benefit of the Big Valley area. In general, the group values the Forest for its ability to supply their sustenance. Of all the groups considered, this one is most affected by land use patterns on the federal lands.

### **Retail Trade-Service Group (Retail and Service Personnel)**

This group sells merchandise, provides lodging, amusement and professional services, and works in finance, insurance, and real estate. They include long-time residents and newcomers. Although the employment opportunities for this group are not directly dependent on commodity outputs from the Forest, they are dependent on the economic stability and growth of the area. The group uses the Forest primarily for leisure activities. The certainty of this group to maintain its lifestyle is directly related to the certainty or uncertainty of the other groups. For example, members of this group from the Big Valley area generally feel that their lifestyles and jobs are dependent on the maintenance of the Big Valley Federal Sustained-Yield Unit because timber industry is a major employer in Big Valley. A loss of jobs in the wood prod-

ucts sector would reduce local income, resulting in loss of trade and services.

Although the beliefs, values and attitudes of this group are varied, they generally believe that the Forest should be managed for a mixture of commodity and non-commodity outputs. While the commodity outputs provide much of the existing economic stability of the area, the non-commodity outputs provide for their personal recreational activities, as well as some economic benefits to certain segments of the group from the attraction of tourists to the area for hunting, fishing, and other recreational activities. Similar to all of the local groups, there is a strong community spirit which is generally found in rural areas.

This group would be affected by a change in land use and ownership patterns if there were a general loss of open space. As a whole the group favors subdivisions which usually result in increased economic activity. Business people recognize that population growth and resulting expansion in business depend largely on increasing commodity production or visitors to the area. Therefore, those alternatives which promote production and use of forage, timber, big game, and recreation opportunities would benefit the business community.

### **Retirees and Second Homeowners Group**

For the most part, members of this small but growing group have come to the area to escape large population centers, to retire, or to purchase second homes or parcels of land for vacations or investment. They are attracted to the area by its rural character, and their use of the Forest is recreational. Their source of income is primarily from retirement funds or from employment outside the area.

This group believes the Forest should be managed for amenities and that convenient access should be provided. Primary concerns of the retirees on fixed income are taxes and the ability of the local communities to provide adequate social services.

The group favors a land use pattern which allows ownership of rural property. A major concern is loss of open space and the natural setting, an amenity that attracted many individuals into moving to the area. Ironically, their arrival generally has resulted in subdivisions of open spaces and new development.

### **Government Employees Group (Federal, State, and Local Employees)**

This group is composed of individuals employed by State agencies (such as the Department of Fish and Game), county agencies (such as the schools and county

road maintenance), and federal agencies (such as the Forest Service). This group, like the retail trade-services group, is a mixture of long-time residents and newcomers. Individuals in this group have jobs that are more directly affected by Forest management.

Forest employees are especially dependent on the scale of programs that the Forest undertakes. In the last five years, the Forest Service has been operating under reduced budgets which has required reductions in the work force and the number of non-commodity programs undertaken, such as wildlife habitat and recreation development improvements. Decreased habitat improvement funds could reduce timber and range activities if damage to certain fish and wildlife habitats cannot be mitigated. Curtailed activities could then result in diminishing county receipts received from the sale of timber and forage. In other words, Forest programs directly affect some members of this group (Forest Service employees) and indirectly affect other (county programs).

In general, this group believes in a mixture of outputs, uses and services to provide for commodities and amenities. The group's values are varied because government agencies tend to employ people from many areas. Many members of this group tend to favor community improvement.

### **Recreationist Group (Recreationists)**

This group primarily includes local residents and individuals from California to the south and west of the assessment area, and from southern Oregon. They use the Forest seasonally for recreation such as mule deer and pronghorn hunting, fishing, camping and rock-hounding.

With more interest in amenity values on the Forest than in resource developments, recreationists benefit from alternatives which enhance the natural environment and recreation opportunities. They benefit from conservation and development of wildlife populations, maintenance of access roads and trails, preservation of traditional hunting camps, and maintenance of developed recreation sites.

### **Native American Groups (Traditionalists and Non-traditionalists)**

The members of this group primarily include Upper Pit River, Paiute, and Modoc/Klamath Indians. Most of the Upper Pit River Indians are located in the Alturas area, while the Paiute are generally found in the Ft. Bidwell area. Modoc/Klamath Indians are primarily non-residents. The group experiences high unemployment

(approximately 75%), and those who are employed work seasonally in ranching and construction off the reservation.

Native Americans have traditional and non-traditional (economic) ties to the land. That is, religious/heritage sites are located on the Forest; and many individuals are employed by the timber products industry (logging, thinning, planting, mill work, etc.). Traditional Native Americans hold nature in high regard and believe that all land, plants, animals, and water are sacred.

The major influence of Forest management on this group is the disturbance of Native American cultural and religious resources. Traditionalists believe in retaining a natural landscape and using resources necessary to sustain their lifestyle. They consider major land alterations (clearcuts, road building, etc.) disrespectful to nature. Thus, protection and preservation of hunting, gathering and spiritual places is only part of their concerns in the way the Forest is managed. Major prehistoric sites, such as villages, seasonal base camps, cemeteries, rock art, and prayer seats, are also of concern and should similarly be preserved out of respect for ancestors and to preserve examples of past lifestyles.

The certainty and uncertainty of maintaining the group's way of life and their traditional uses of the land is directly related to the amount of environmental disturbance caused by Forest activities: the greater the disturbance, the more likely an area of religious or cultural significance will be changed. Consequently, traditional Native Americans prefer alternatives which stress maintaining the Forest in a natural setting.

Traditionalists may include tribal elders who are not involved in the current job market. They may also include younger individuals interested in reviving some aspects of past lifestyles, beliefs, and traditions. These revivalists may be involved in the current local job market.

Non-traditional Native Americans are generally younger to middle-aged individuals involved in the current job market. While they may lean toward the traditionalist point of view, they are also concerned with the economic necessity of employment. Because of their need to work, non-traditionalists accept more intensive management of the Forest, including disturbance of some cultural heritage sites. Generally, increased opportunities for local employment, especially in the timber products industry, is a benefit to this group.

## The Resource Environment

---

### 1. Air Quality

Crisp, clean mountain air is a hallmark of the Forest, which is geographically within the Northeast Plateau Air Basin under the jurisdiction of County Air Pollution Control (CAPC) officers in Lassen, Siskiyou and Modoc counties. Air quality over all the Forest is excellent, as acknowledged under standards set by the Federal Clean Air Act. The South Warner Wilderness within the Forest, and the Lava Beds Wilderness in the Lava Beds National Monument in the northwest corner of the Forest, are rated as Class I areas. The rest of the Forest is designated Class II. In Class I areas, even a minimal change in air quality is considered significant, while Class II areas can have changes in air quality if they are the result of moderate, well-controlled growth.

### Current Management

State of California regulations<sup>1</sup> for pollution control and air quality standards affect this Forest. Authority to regulate and monitor state air quality requirements are delegated through the State Air Resources Board to local Air Pollution Control Districts. The Forest follows agricultural burning guidelines and reporting requirements together with Forest Service Manual guidelines when using prescribed fire. To meet these regulations, the Forest maintains records for the amount of forest fuels burned and submits records to the CAPC quarterly.

Burning vegetation, the principal source of air pollution on the Forest, is the traditional method for disposal of logging slash, site preparation for reforestation, and range improvement projects. Suspended particulate matter is the only pollutant of concern when burning on the Forest. Disposing of slash by prescribed burning degrades the air quality less than if the slash were to burn by wildfire. During prescribed burns, fuel volume and fire area are managed under weather conditions which dissipate smoke.

---

<sup>1</sup>

California Health and Safety Code Part 4; and California Administrative Code Title 17.

## Opportunities

---

The Forest is working toward better utilization of logging debris in ways that will solve disposal problems as well as reduce air pollution. Through the personal use firewood program, the Forest encourages firewood users to gather dead and down logging slash by offering it free of charge. Other alternatives to slash burning include chipping small material, pulverizing by heavy equipment, and burying road slash.

### 2. Cultural Resources

Cultural resources provide information on the Forest's unique prehistoric and historic ethnic heritage, including evidence of several Native American groups (Achumawi, Atsugewi, Modoc-Klamath, and Northern Paiute) and their predecessors. In addition to providing archaeological evidence of past lifeways and adaptation to the environment, cultural resources also lend a historic perspective on today's technological and sociological change.

### Current Management

The Forest Service inventories, describes, and evaluates the prehistoric and historic cultural resources on the Forest. Direction for these activities is outlined in the National Historic Preservation Act (NHPA) of 1966 and Executive Order 11593. The Forest consults with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation, and reviews State and federal registers when applicable.

Cultural resource sites are managed in several ways. The level or intensity of management has the following range:

- **Preservation**—sites are protected by excluding incompatible land activities.
- **Conservation**—when preservation is not feasible, scientific information is recovered from sites so that other land use activities can occur.

- **Interpretation**—sites are developed for public enjoyment and education through signs, trails, and public information kiosks.
- **No Management**—sites are not preserved in any way. (These sites are not of the quality suitable for nomination to the National Register. They contain little scientific information or Native American cultural heritage value.)

As part of the Forest's normal compliance procedures, and in accordance with the American Indian Religious Freedom Act (AIRFA), the Native American Heritage Council and local Native American groups are consulted on most large-scale projects, such as timber sales. If Native American groups determine that a project area has cultural or heritage value when the area is surveyed, particular attention is given to identifying these culturally sensitive areas on the ground. Heritage values are considered when designing project alternatives and site protection measures.

Groups routinely contacted are the California Native American Heritage Commission, the Klamath Tribal Council, the Ft. Bidwell Indian Community Council, the Pit River Tribal Council, the Pit River Home and Agricultural Cooperative Association, the Alturas Rancheria, and the Lookout Rancheria.

## Opportunities

Because most cultural resource inventories are conducted on a project-by-project basis, several areas are underrepresented or not represented in the cultural resource data base. The Forest could conduct non-project inventories to correct deficiencies in the data base and improve the overall cultural resource picture on the Forest.

Better coordination with interpretive services and recreation is needed to fulfill the goal of interpreting cultural heritage for the public. The Forest could encourage local groups, such as the Modoc County Historical Society or the Modoc County Chamber of Commerce, in cooperative ventures such as interpretive locations on the Forest and oral history programs. Cultural resources appropriate for interpretation include rock art (petroglyphs and pictographs), the Glass Mountain obsidian quarry, Modoc War fortifications, remnants of emigrant trails or roads, homesteads, and sites associated with historic mining activities.

## 3. Diversity

### Introduction

The regulations written to implement NFMA define diversity as "the distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan" (36 CFR 219.3). Results come from managing other resources such as vegetation and animals, which are elements of diversity. We can evaluate or project diversity by measuring or quantifying vegetation types, seral stages, and animal species inhabiting a particular area. By maintaining vegetative diversity in a natural dispersion pattern and in sufficient amounts, the Forest can meet another regulatory obligation: to maintain viable populations of the Forest's animal species by providing suitable habitat conditions. The relationship between plants and animals is the basis for the California Wildlife Habitat Relationships (WHR) Program (Laudenslayer 1982).

Diversity is evaluated by richness, evenness, and pattern. Richness is the number of species, communities, or special habitat elements found in the planning area. Evenness is the relative abundance of animals, habitat types, successional stages, and cover classes within the planning area. Evenness describes the extent to which these elements are uniform. Pattern reflects the sizes and structural complexity of vegetation stands and the spatial distribution of plants and animals within the planning area.

The presence of 17 major vegetation types indicates that the Modoc NF is a diverse forest spanning a wide range of environmental conditions. Vegetative richness is also reflected in the richness of animal species. The Forest supports more than 354 vertebrate species (EIS Appendix K). They include 25 species of amphibians and reptiles, 218 species of birds, 81 species of mammals, and 30 species of fish. Species richness has remained stable over the last 100 years, as a few species have been locally extirpated and a few others have been introduced.

All successional stages of trees are found on the Forest. On > 20 timberlands, over half the land has small- to medium-sized timber (successional stages 2 and 3). Only one-third of the forested lands has old, large-diameter trees (successional stage 4a, 4b/c, and 4b/c-older). Animals that favor young, small-diameter timber stands, therefore, are more abundant than species that prefer older stands. Similarly, animals that favor open-canopied stands are more abundant overall than animals favoring

closed-canopied stands. On < 20 timberlands, open-canopied timber stands provide additional habitat in successional stages 3A and 4A.

## **Current Management**

NFMA states that national forests will "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives...." Furthermore, Forests should provide, where appropriate, "...for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan" (Section 6(g)(3)(B)).

In response to NFMA and subsequent regulations, diversity requirements were issued as Regional policy in 1980 to "...maintain a minimum of 5% of the land area occupied in each forest type in older mature stands exclusive of wilderness...."

Managing forest successional stages complements managing for a regulated forest under even-aged timber management. Maintaining 5% of the area in the old-growth stage, however, is difficult and controversial. Particularly in the eastside pine type, remaining old-growth stands supply the only significant harvestable volume.

Since 1980, addressing diversity in timber sale environmental assessments has become more common. But the decision to fully provide for vegetative diversity is still difficult. In some cases, existing old-growth habitat is retained, while in other cases, recruitment acres in the next lower successional stage is used as a substitute. Efforts are improving.

Providing old-growth habitat in eastside pine is the Forest's most serious problem. Of the suitable timberlands producing > 20 cubic feet per acre growth, only 6% of eastside pine remains in old growth. The amount of old growth is low in the eastside pine for several reasons. In the mid-to-late 1970's pine sold at high prices; \$400 per MBF was common. In combination with easy access to pine stands, harvest was heavily concentrated in this type. Inappropriate use of overstory removal and sanitation/salvage treatments understocked many stands to where old-growth habitat was no longer present. Large fires also destroyed many eastside pine acres.

Mixed conifer and red fir still contain sufficient old growth, although distribution is inadequate in some parts of the Forest.

---

## **4. Energy**

### **Firewood**

#### **Introduction**

This resource includes logging slash, sawmill and thinning residue, and non-industrial species of timber. Firewood is used primarily for home heating. It is typically harvested by commercial or private woodcutters, or removed from logging slash and cull decks, and is regulated through the issue of woodcutting permits.

#### **Current Management**

The Forest sells woodcutting permits to the highest bidders on sales of more than 25 cords. For sales of 10-25 cords, the Forest average for commercial sales of similar species is charged. Personal woodcutting permits are available for \$5/cord, and are sold in 2-10 cord lots. Free-use permits are offered to encourage woodcutters to use downed culls and limbs from logging and thinning operations. All permits specify the species of wood to be cut and permissible cutting areas. Permits require woodcutters to check weather conditions (available on 24-hr recorded telephone messages) and to prevent fires and road damage. The Forest also uses permits to monitor firewood use. (See Firewood AMS.)

#### **Supply**

In total, 56,000 cords of firewood are available per year. Western juniper is the preferred species for firewood, easily accessible, and produces the most firewood in the area. Juniper reproduction is estimated at 18,000 cords per year. People who burn firewood also use ponderosa pine, red fir, white fir, lodgepole, and incense cedar. About 38,000 cords are available annually from logging slash and commercial thinning operations. This material will decay on the ground, however, and is worthless if not harvested within three years.

#### **Demand**

As the population increases, demand for firewood is also expected to increase. In 1980, the population of Modoc County was 8,600 people, and woodcutting permits were issued for 23,000 cords of firewood. By 2020, the population is expected to reach 13,000, and the demand for firewood could increase to 34,700 cords.

### **Biomass**

#### **Introduction**

Biomass is residue from logging and thinning operations. When biomass use is more economically attractive



than purchasing an outside power source, the timber purchaser will usually chip it at the site and transport it to the sawmill. There it is burned with sawmill residue for power generation.

#### **Current Management**

The use of biomass has been left to the discretion of timber purchasers or thinning contractors. Where economically advantageous, biomass has been processed on the site and transported to cogeneration plants, presently located in Beiber, Burney, Wendell and Westwood. Biomass haul trucks are subject to the same restrictions as log or water trucks during timber sales.

#### **Supply**

While the future demand of biomass is not known, the present supply will meet anticipated demand through the planning period.

#### **Demand**

The cogeneration plants have a combined capacity to burn 435,000 tons of biomass per year. While this is roughly equivalent to 400,000 cords, it also includes material not suitable for firewood.

### **Geothermal**

#### **Introduction**

Geothermal energy is harnessed by tapping superheated ground water. This water provides steam which drives turbines, thus generating electrical power for transmission. This resource is found in some areas where volcanic activity exists. Two potential geothermal areas have been identified on the Modoc: Glass Mountain in the Medicine Lake Highlands, and Lake City on the east side of the north Warner Mountains. (See Minerals AMS and Minerals discussion below for detail.)

#### **Current Management**

The Glass Mountain and Surprise Valley Lake City known geothermal resource areas (KGRAs) cover 151,000 acres. Surface effects of geothermal development are presently the responsibility of the Forest Service. Subsurface management falls under the jurisdiction of the Bureau of Land Management (BLM). As with hydroelectric projects, the Forest Service cooperates in mitigating surface disturbance of site development.

#### **Supply**

The Glass Mountain site has had extensive exploration performed. As a result of this exploration, the Glass Mountain KGRA has been declared suitable for geothermal development. Duration and volume of production is

currently being determined. Little exploratory work has been done on Forest lands in the Lake City KGRA. (See Minerals AMS and Minerals discussion below for detail.).

#### **Demand**

With the recent drop in oil prices, the search for alternative energy sources has slowed. However, as future energy demands and environmental concerns rise, geothermal energy undoubtedly will become a very attractive alternative.

### **Oil and Gas**

Oil and gas development means extracting hydrocarbons (liquid or gas form) beneath the earth's surface. This energy source is developed in a manner similar to geothermal energy.

#### **Current Management**

Currently, one 7,700-acre oil and gas lease exists on the Forest. The Forest is currently supplementing the existing environmental assessment for oil and gas leasing to include cumulative effects of commodity production. Five oil and gas leases totally approximately 28,000 acres are pending.

#### **Supply**

Information estimating the volume of hydrocarbon reserves within Forest boundaries is not currently available.

#### **Demand**

The Forest anticipates little or no demand for oil and gas.

### **Hydroelectric**

#### **Introduction**

Hydroelectricity is produced by falling water. Typically, water is stored in a reservoir or transmitted in a canal to a location where the water drives a turbine generator.

#### **Current Management**

No hydroelectric plants are currently in operation on the Forest. Applications for hydroelectric development are processed by the Federal Energy Regulatory Commission (FERC). The Forest Service provides FERC with measures to alleviate potential negative effects, issues use permits and rights-of-way for transmission lines, and conducts environmental analyses.

## Supply

Feasibility studies indicate potential for future development on Pine Creek, Parsnip Creek, and South Fork Pit River (West Valley Reservoir). Powerhouses could be developed at these locations which could produce energy totalling 31.1 million kw per year. Energy consulting firms suggested two powerhouses for the Pine Creek location: a 1,000 kw plant capable of 8.6 million kw per year, and a 900 kw plant for 7.7 million kw per year. A 2,100 kw powerhouse at Parsnip Creek would yield 8.3 million kw per year. Powerhouses of 360 kw and 620 kw each at South Fork Pit River (West Valley Reservoir) together would produce 6.5 million kw per year.

## Demand

With the recent drop in oil prices, the search for alternative energy sources has decreased. However, demand for small hydroelectric projects are expected to increase as the State's population increases and the price of energy rises.

---

## 5. Facilities

Facilities support Forest management activities such as timber production and harvest, wildlife and range management, fire protection, recreation, and administration. Forest facilities include roads, trails, major stream crossings, utility transmission lines, buildings, dams, electronic sites, and a military defense installation. Each type is discussed separately.

### Roads

Access to the Modoc National Forest is provided by a system of federal, state and county highways. Forest Development Roads (FDR) are extensions of these highways, and provide access to and mobility within the Forest. Roads allow protection, management, use, and development of Forest resources on which local communities are dependent.

The FDR System consists of 3,178.4 miles. Integrated with the system are 270.8 miles of private roads.

The Forest maintains roads at the minimum level necessary for recreation, timber, administration, and adjacent area protection. Roads are assigned a management objective so they can be maintained at levels commensurate with these goals.

In the past, the Forest attempted to seasonally close some roads by signing, but with marginal success. By

using seasonal road closures and traffic control, road maintenance has improved. While the Forest recognizes the importance of keeping areas open to firewood gatherers and dispersed recreation users, it is also concerned about road and resource damage, as well as wildlife issues. A road closure and off-highway vehicle plan will be initiated.

### Trails

The 118 miles of developed inventoried trails include 7 miles of National Recreation Trails, 79 miles of South Warner Wilderness Area trails, and 32 miles of other trails. In general, trails are maintained, but not all meet desired standards. Trails are discussed in the Recreation section of this chapter.

### Major Stream Crossings

The Forest has 14 road bridges, 5 trail bridges, and 63 other major structures consisting of culverts (>35 sq. ft. end area), and low water crossings. All of the structures require maintenance to protect the investment, provide safe crossings, and protect fisheries.

Additionally, Modoc County has 9 bridges, 3 culverts, and 1 low-water crossing. The Forest has cooperative agreements with the County to upgrade or maintain these structures as needed for timber hauling. Two bridges under the jurisdiction of the Bureau of Reclamation are closed and beyond repair.

Most structures crossing major streams are in place and are maintained or replaced for traffic safety and protection of the stream environment. Construction of additional stream crossings depends primarily on locations of future resource activities and their access needs.

### Utility Corridors

A north-south utility corridor on the Big Valley and Doublehead Ranger Districts contains 500-kv overhead power transmission lines and a buried natural gas transmission line. In November 1984, the Bonneville Power Administration constructed an additional 230-kv transmission line from Malin, Oregon, to Alturas, California. Designed to meet increased electrical demands from agricultural pumping, the transmission line is approximately 68 miles long, 50 miles of which are within the Forest boundary. In 1990, an additional 500-kv transmission line will be constructed on the Big Valley and Doublehead Ranger Districts parallel to the existing corridor.

## **Buildings**

On the Forest's 16 administrative sites are 156 structures. The government leases four administrative sites from private parties: Supervisor's Office, Warner Mountain District Office, Doublehead District Office, and Highway 299 Compound (2 buildings). Leasing requires less initial capital investment, but significantly increases annual costs. Constructing Forest-owned buildings or purchasing leased buildings would offer long-term savings. To minimize costs, the Forest will move from leased to government-owned buildings by the end of the 1st decade.

## **Dams**

One hundred forty-nine dams on the Forest were constructed for livestock, irrigation, and wildlife habitat reservoirs. One hundred twenty of these dams are owned by the Forest — 11 are covered by special use permits, and 18 are considered USDI easements. The Forest inspects and maintains 127 dams; the State inspects 19; and the U.S. Dept. of Interior inspects the remaining 3.

Dam maintenance prevents damage to streams and downstream structures such as culverts and other dams. The risk to life is very low, but moderate environmental damage could result if a dam failed. However, existing dams must be routinely inspected and maintained to protect investments and the stream environment.

## **Electronic Sites**

Electronic sites serve the Forest's telecommunications needs and those of commercial users in the area. Of the 35 existing electronic sites on or adjacent to the Forest, 31 are service-type low power sites (150 watts or less), and 4 are future electronic sites (AM, FM, microwave, TV, or radar stations). The Forest currently uses 28 sites for its telecommunication system while sharing 9 sites with commercial users under special-use permits.

Demand for service-type and broadcast station sites (AM, FM, TV, and radar stations) will increase. Because telecommunications companies, such as AT&T, MCI and SPRINT, are expanding their services, the Forest anticipates an increased demand for microwave electronic sites.

## **Military Defense Installation**

Under a special use permit, the U.S. Air Force constructed an Over-the-Horizon-Backscatter (OTHB/S)

defense radar site on the Doublehead Ranger District near Rimrock Lake which is south of Clear Lake. The radar system detects missiles and aircraft 1,500 miles from the site.

---

## **6. Fire and Fuels**

### **Fire History**

The average number of annual recorded fires on the Forest has not changed significantly. From 1910 to 1979, more than 6,094 fires burned 705,334 acres of Forest. Twenty-three percent of these fires were caused by people, and 77% were started by lightning. In the last 25 years, the number of human-caused fires has decreased dramatically as a result of intensive public education programs, especially the Smokey Bear prevention effort.

Acreage burned has varied widely. From 1910 through 1969, an average of 9,607 acres burned annually. From 1970 through 1979, the average number of acres burned rose to 12,890, while the average annual acres burned decreased to 1,393 from 1980 to 1985. Cooler, moister weather than normal, as well as fewer lightning-caused fires, account for the dramatic drop in burned acres.

In 1977, a severe drought in the western United States set the stage for many holocausts which raged out of control in several areas of California. At this time, dry lightning bombarded the Modoc National Forest, starting numerous small fires which burned together causing large fires, notably the Gerig and Scarface Fires. Over 100,000 acres burned that year. Unusually large fires in 1973 and 1978 added many acres to the Forest's annual average number of acres burned.

The value of resources lost to fire during the 1970's averaged \$2.1 million per year. Since 1975, timber volumes requiring salvage because of fire totalled 159 MMBF. Of this total, approximately 128 MMBF resulted from the Gerig and Scarface fires. Fire salvage volume from those fires represent about 25% of the programmed allowable harvest for the past decade.

### **Current Management**

The objective of fire management is to administer a program that is cost efficient commensurate with the values at risk.

The elements of fire management are prevention, detection, suppression, and fuels management.

**Prevention**—Prevention includes public contacts, law enforcement, building inspection, and patrols. Prevention has a low priority because the Forest averages 100 lightning fires and 15 person-caused fires annually.

**Detection**—Lookouts from the Forest Service and other agencies provide detection coverage. After lightning storms, Forest personnel conduct reconnaissance flights over areas which lookouts are unable to see.

**Suppression**—Suppression includes the customary firefighting activities with hand crews, engines, helitack, and retardant aircraft. With its own suppression forces, the Forest cooperates with the California Department of Forestry (CDF), Bureau of Land Management (BLM), Lava Beds National Monument (LBNM), and the Fish and Wildlife Service (FWS) to protect mutual boundaries for cost efficient fire suppression. In addition, local rural fire departments protect structures on some federal and State lands. Altogether, the Forest is responsible for protecting 1,805,069 acres.

**Big Sage Fire Management Unit (BSFMU)**—In 1980, the Forest developed the BSFMU. This 430,000-acre area on the Devil's Garden and Doublehead Ranger Districts is designed to save suppression costs and personnel for fires which threaten higher resource values.

Vegetation in the BSFMU is so sparse and the ground so rocky that fire does not easily spread, even under dry, windy conditions. Most fires in the BSFMU involve single juniper trees. The fire plan for the Unit allows lightning-caused fires to burn under a *confine, contain or control* strategy.

**Wilderness Fire Suppression**—Terrain, elevation, open vegetation patterns, and natural barriers are generally favorable to fire control. Currently, Forest policy requires immediate and aggressive suppression of all fires, regardless of location or cause. Where used, firelines are constructed without the use of mechanized equipment, unless the fire crosses firelines. At that time the Forest Supervisor may authorize the use of helicopters, chainsaws, and air tankers (retardant). The Regional Forester can approve the use of tractors. A recent amendment to fire management permits lightning-caused fires to play, as nearly as possible, their natural ecological role in wilderness. This direction may be included in the Wilderness Fire Management Plan which will be prepared after the Forest Plan is approved.

**Fuels Management**—Because of an aggressive suppression policy to extinguish all fires, much fuel has accumulated on the Forest floor. Activity fuels are cre-

ated primarily from timber harvest or precommercial thinning. Natural fuels include grass, brush, downed dead limbs, needles, and leaves. Prescribed fire is an important fuels management tool for reducing hazards from fuel accumulations, improving wildlife habitat and range conditions, controlling undesirable vegetation, and improving seedbeds for natural regeneration.

## Future Fire Conditions and Opportunities

Only a slight increase in human-caused fires is expected because of increased public awareness and an historically low incidence of person-caused fires on the Forest. The historical trend of lightning-caused fires will probably continue with implications for future management problems if the current fire program is not maintained. Plantations established after large fires in the late 1970's represent a significant investment in dollars and future supply of timber. Fires in plantations burn through the crowns of young trees, producing fast-moving, high-intensity fires which are difficult to control. Even low-intensity fire causes significant damage to young trees. Combined with greater emphasis on even-aged timber management in the future, more acres of fire-susceptible plantations will pose serious protection problems for the Forest.

As stands on steeper terrain are harvested and more short-span cable loggings is undertaken, block burning will be a common fuel treatment. Block burning is technically and logistically demanding, and suitable burning days are limited. Yarding small fuels is an alternative to burning. As industry's demand for forest fuels as an energy source increases, use of timber slash for energy production would offer a significant cost savings for fuel treatment.

To better use fire as a resource tool, fire suppression strategies could be based on the objectives of each management area. Permitting unplanned ignitions to burn in the South Warner Wilderness above 8,000 feet could allow fire to fulfill its role in perpetuating natural ecosystems. Other management areas can also be evaluated for use of unplanned ignitions.

Forest managers could encourage firewood users to remove logging slash which would reduce the fire hazard from accumulated fuels. Prescribed burning could also be used more often to reduce fuels as well as to remove encroaching species from rangelands and limit competition for grasses and forbs. In this way, range ecologic condition would improve.

---

## 7. Firewood

Firewood is discussed in the *Energy* section of this chapter.

---

## 8. Geology

### Seismic Hazards

Although the Modoc National Forest is not situated in an area of high seismicity, numerous active and inactive faults lie within the boundaries of the Forest. Surprise Valley Fault, a normal fault, is one of two major faults which have affected the geomorphology of the Forest. There has been an estimated 5,000 feet of vertical displacement along this fault which is located on the eastern slopes of the Warner Mountain Range. The Likely Fault, the second major fault, is also a dip-slip movement fault from Howard's Gulch southeastward toward the Madeline Plains (Potter, 1988).

To minimize hazards associated with seismic activity, the Forest constructs permanent facilities away from active fault traces. During the planning phase of a project, the Forest can use the following opportunities summarized from Guidelines to Geologic/Seismic Reports No. 37 by the California Division of Mines and Geology:

- Establish the proximity of the site to known faults and epicenters.
- Review geologic conditions at or near the site that might indicate recent fault or seismic activity.
- After accumulating all data, determine potential hazards relative to the intended land use or development.

### Volcanic Hazards

Geologically, the Forest is composed predominantly of volcanic and associated sedimentary formations. Some volcanic material is less than 500 years old. In particular, the Medicine Lake Highlands in the northwest portion of the Forest has had at least three eruptive cycles in the last 1,500 years. The Highlands is a very broad shield cone in which the main vent has collapsed to form the present caldera. On the flanks of the volcano there are numerous parasitic cones and recent lava flows. The United States Geological Survey (USGS) has identified the Highlands

as one of the four most probable sites in California where a volcanic eruption may occur.

The USGS indicates that an eruption of the Highlands would be similar to previous eruptions—comparatively non-catastrophic. Based on that assumption, some general hazards associated with such an eruption can be predicted. From a geologic perspective, the eruption would not be violent, but accompanied by gases and deposits of ash, pumice and cinders. Because of prevailing southwest winds, the deposits would probably fall near the Lava Beds National Monument. The amount of deposit could be 20-50 feet deep, depending on the distance from the source. Surface flows of hot molten lava and mud would not be extensive. As mud flows are ejected from a volcano, they pick up more water as they melt snow, slide through lakes, and eventually flow down existing drainages. Mud flows occurring as a result of an eruption in the Highlands would not be extensive because few drainages exist in the area.

### Landslide Hazards

Eighty-five percent of the Forest has a low-risk of slope movement, because of gentle slopes (less than 30%), stable parent material (volcanic bedrock), and a preponderance of cohesive soils. The remaining 15% has high risk slope movement. Areas of high risk are located on the eastern slopes of the Warner Mountain Range. The Forest Geologic Resource Inventory (GRI), scheduled for completion in FY 1992, will precisely identify these high-risk areas.

Because the risk of a landslide is low for most of the land, little monitoring is done. When slope failures do occur, prudent ground operations can virtually eliminate all adverse effects of slope movement.

If mass land movement occurred, associated resource damage would be expected. A landslide would degrade the water quality of adjacent streams, and timberland would be lost. The most costly effect would be loss of roads, which would temporarily prevent access to the slide area.

### Special Interest Areas

Modoc National Forest has set aside Burnt Lava Flow, Medicine Lake Glass Flow, and Glass Mountain Glass Flow as three Geological Special Interest Areas to preserve their undisturbed condition while providing educational, scientific, and recreational opportunities.

## Groundwater

The Forest includes or directly affects at least 20 groundwater basins or recharge areas, or both, most of which are areas composed primarily of flat volcanic rocks. Aquifers (underground areas saturated with water) are generally more than 300 feet deep. Each groundwatershed has its own recharge area and basin. The Forest has 53 groundwater withdrawal sites comprised of 36 deep-water vertical wells and 17 horizontal, gravity wells. Water from these wells supports logging activities, road construction, and livestock. The Forest is developing a management scheme for well sites which will address user cost, unit responsibilities and future needs.

The Forest currently uses about 30 acre-feet of water per year for human needs, fire suppression, livestock, and road construction. As interest in geothermal development increases, so does the use of groundwater for exploratory activities.

Forest Service activities that could effect groundwater quality and quantity include removing large volumes of timber, withdrawing groundwater in the recharge areas, and using chemical pollutants.

If geothermal exploratory work continues at its present pace, current water sources within these areas will not adequately supply the needs for exploration. The Forest will require monitoring new sources of groundwater.

## Rock and Earth Construction Materials

The Forest's road aggregate program locates and develops new quarries within its boundaries, and monitors and re-evaluates existing quarries. Seventeen active rock quarries totalling over three million tons exist on the Forest. In addition to these sites, the Forest uses pit run materials such as gravel and cinders. While they do not have the durability of crushed aggregate, there is generally no crushing cost. Twelve cinder sites and one gravel site, totalling an additional one million tons of rock material, are available to the Forest. Tonnage available at each site varies because of quality and resource mitigating measures, such as visual and wildlife considerations.

Each year the Forest extracts an average of 15,000 tons of fill for road construction, and another 200-500 tons of rip-rap material for erosion protection on waterfowl nesting islands. Total annual use is less than 0.4% of the current supply of rock and pit run materials. Because of budget restrictions on road surface aggregate, and because the arterial-collector road system is near comple-

tion, the Forest will not require as much aggregate in the future. However, the Forest continues to surface and maintain roads, and protect resources in unstable land areas with aggregate materials.

As additional needs for rock and earth construction materials arise, the Forest has the opportunity to examine the economic benefits of using materials found in one source over another and to develop various methods of road surface replacement. The Forest can also analyze the effects of developing new sources of construction materials.

---

## 9. Lands

### Land Ownership

The Modoc National Forest is situated in the extreme northeastern portion of California. It encompasses 1,979,407 acres (Land Status 6/89) — 1,654,392 acres National Forest System lands and 325,015 acres private lands. Of the Forest lands, 2,762 acres are administered by other public agencies. The Lava Beds National Monument (administered by the National Park Service (NPS) but on national forest land) totals an additional 46,238 acres. The Forest lies within three counties: Siskiyou (8%), Lassen (9%), and Modoc (83%).

Land ownership adjustments on the Forest are guided by a Land Ownership Adjustment Plan which gives broad direction on the types of land acquired and the areas in which land should be acquired. The emphasis is on acquisition, with only general direction on disposal. The 1988 Plan assumes that exchange will be the method of adjustment. Future land adjustments will be guided by direction in the Forest Plan.

### Special Uses

The Forest has issued approximately 218 special use permits (affecting 26,082 acres) primarily for utilities, communications, water, transportation, and agriculture.

### Withdrawals

Various acts of Congress and Executive Orders authorize the Forest Service to withdraw land from mineral entry. Currently, 22,211 acres of Forest land are withdrawn for administrative or recreation sites, scenic road-

ways, special interest areas, research natural areas, and water development (Bureau of Reclamation projects).

The California Wilderness Act of 1984 increased the total South Warner Wilderness to approximately 70,385 acres. These areas are also withdrawn from mineral entry.

Forest lands could be withdrawn in the future to protect five electronic sites, nine recreation sites, and three special interest areas (EIS Appendix H).

## Landline Surveys

As of 1983, 122 miles of Forest property lines have been surveyed and marked; 1,755 miles still must be located. Of these, 658 miles of lines are not cost effective to survey; or lie adjacent to lands administered by other government agencies, along wilderness boundaries, or in areas where trespass is unlikely. This leaves 1,097 miles of line to survey.

## Rights-of-Way

The transportation system for the Forest is essentially complete. No major new routes are known or planned. Right-of-way acquisitions will be programmed for individual timber sales or other projects as needed. As of 1989, the Forest needed an additional 100 miles of rights-of-way so that the existing transportation system would fall under Forest Service jurisdiction. No public concerns have been identified, and none are anticipated.

---

## 10. Law Enforcement

### Introduction

The Forest is a land management agency with law enforcement responsibility authorized by the United States Code (USC) Title 16. The emphasis of law enforcement is preventing violations and protecting Forest users, employees, resources, and facilities. If employees or the general public do not comply with laws and regulations, lives may be threatened, resources damaged, or Forest work targets not completed. For example, human-caused or arson fires threaten all these values.

The Forest's major law enforcement problems are theft of timber, primarily firewood; cultural resource depredation; clandestine drug manufacturing; wildlife violations; vandalism to and theft of property; and

human-caused and arson fires.<sup>1</sup> located after 1955 (except block pumice) is considered a common variety and administered as a salable mineral material.

---

## 11. Minerals

### Introduction

The geology of a forest contributes significantly to the amount of mineral activity that will occur within its boundaries. The Modoc National Forest is primarily composed of volcanic material which has low potential for most mineral occurrences except for geothermal and mineral materials used in construction trades.

### Current Management

Generally, mineral management depends on the types of mineral commodities present on the Forest. Minerals are classified into three categories:

- **Mineral Materials** – common minerals such as stone, gravel, cinders, and decorative rock.
- **Leasable** – oil, gas, geothermal, and other minerals on acquired lands without public domain status.
- **Locatable** – all metallic and non-metallic minerals, except common mineral material and leasable minerals.

Originally, the authority to manage the federal minerals estate belonged to the Secretary of the Interior. However, following various memoranda of understanding between the Secretaries of the Interior and Agriculture, and recent legislative acts, the Forest Service was given responsibility to manage minerals commodities and to regulate mineral prospecting and development on, and removal from, national forest lands.

Managing each category of mineral varies slightly. The Forest authorizes removing *mineral material* by issuing mineral material permits. However, mining activities associated with *locatable minerals* are authorized through an approved plan of operation which is originally submitted by a mining operator. Regarding *leasable minerals*, the Forest Service must identify lands which are available for leasing and prescribe resource protection measures for each lease. The Bureau of Land Management is responsible for issuing leases.

## Supply

### Minerals Materials

Cinders, aggregate, and decorative rock are the principal common variety minerals on the Forest. Seventeen active aggregate sources and twelve cinder pits are currently available for saleable minerals.

Most of the Forest is covered by basaltic lava flows. Some basalt is used as decorative stone. The most popular decorative stone is a thin-layered basalt, lightly covered with moss, which occurs nearly everywhere. The Forest does not have an accurate estimate of the volume of mineral material within the Forest boundaries. However, we anticipate that it is sufficient to meet project demands for both short- and long-term needs.

Regarding the geologic nature of volcanic rocks, the Forest provides opportunities for novices and experienced rock collecting enthusiasts. Items collected include obsidian needles, quartz crystals, petrified wood, and assorted gemstones. The Forest does not have an adequate inventory of the quantity of material available for rock collecting. However, we anticipate developing a management plan for rock hounding which may include estimates of available material.

The northern and eastern flanks of the Medicine Lake Highlands have deposits of pumice material that range from a few feet to more than 60 feet deep. Pumice is a common variety material, so classified as a result of the Common Varieties of Mineral Materials Act of 1947. Prior to the Act, pumice was considered a locatable mineral. The Act also provided a "grandfather clause" which allowed all valid existing pumice claims to be subject to the Mining Law of 1872, and would not become authorized under the Mineral Materials Act. Currently, all pumice activities operate under the 1872 General Mining Law.

### Leasable Minerals

#### *Geothermal*

The United States Geologic Survey (USGS) has identified most of the Forest as prospectively valuable for geothermal resources. Within the Forest boundary, two known geothermal resource areas exist. The Lake City-Surprise Valley KGRA is located on the eastern edge and includes approximately 1,880 acres on the Forest. No data of the total geothermal development within the KGRA has been published. In 1981, the Regional Forester signed a Decision Notice which allowed geothermal exploration activities within the KGRA. That Notice authorized the issuance of federal leases with certain lease stipulations. Those stipulations are less restrictive than

the lease stipulations proposed in Appendix I of the Forest Plan. In addition to recommending leasing in the Lake City-Surprise Valley KGRA, the Decision Notice authorized similar geothermal activities within the Carey Reservoir area of the Big Valley Ranger District.

The Glass Mountain KGRA is located on the western edge of the Forest and covers approximately 161,000 acres, of which 69,300 are within the jurisdictional boundary of this Forest. The remaining acres are located on the Shasta-Trinity and Klamath National Forests. In 1981, the three forests recommended that the BLM issue competitive geothermal leases in the KGRA. The recommendation was based on an environmental assessment which analyzed impacts associated with geothermal exploration. In 1984, the three forests recommended issuing additional leases within an expanded KGRA. That recommendation was based on a supplementary environmental analysis of the original EA. The supplement analyzed impacts within the total KGRA for exploration and development. Mitigation measures and lease stipulations identified in the supplementary EA have been incorporated into the more comprehensive Forest Plan. Appendix I of the Forest Plan lists special stipulations for geothermal, oil and gas leasing.

After preliminary drillings, the potential for geothermal development at the Glass Mountain KGRA was estimated at more than 500 megawatts. However, subsequent drilling exploration reduced the estimate; but the exact potential has not yet been determined.

#### *Oil and Gas*

In 1982, the Regional Forester signed a Decision Notice recommending oil and gas leasing on approximately 876,000 acres within the Forest boundary. The recommendation was based on an environmental analysis which analyzed the impacts of only oil and gas exploration. The EA identified certain resource protection measures (i.e., stipulations) which should be included in any leases. Any future oil and gas leases will require additional analysis of impacts associated with oil and gas development.

### Locatable Minerals

The primary locatable mineral activity on the Forest is mining for lode gold, silver, copper, mercury, perlite, block pumice and gemstones. Prospecting for these commodities is based on past mining activities and the geologic setting of the Forest. We do not anticipate that any new minerals will be found in large quantities within the Forest boundary.

The known deposits of gold on the Forest are epithermal (shallow) (Cox, et al., 1986). Most mining activity has been confined to the Hayden Hill, Winters and High



Grade mining districts. Periodic drilling has been done in other areas of the Forest. However, as a result of these activities, the areas have generally been classified as having low potential for mineralization. No estimates of the quantity of available ore deposits within any of the three mining districts have been made. Currently, an open pit mine is proposed in the Hayden Hill area. The project, which includes removing approximately 43 million tons of ore, is located on BLM land adjacent to Forest Service land. At this time, no one has proposed expanding the project onto Forest Service lands.

Pumice and block pumice are mined on the northern flanks of the Medicine Lake Highlands. The pumice operation has been active for many years. The block pumice operation is currently under a mineral patent application to the BLM. No known estimates of reserves of either block pumice or pumice in the Medicine Lake Highlands are available.

## **Demand**

### **Mineral Materials**

The greatest increase in demand for mineral materials will be for road surfacing cinders and decorative rock. Federal, State, and county agencies are the primary users of these minerals. From 1981 to 1985, about 67,000 tons of cinders were removed annually. Demand for road surfacing material will probably increase 10-20% over the next five years, because (1) other mineral development will require access; (2) new road surfacing will be required to accommodate a growing population in the rural areas of Modoc, Lassen and Siskiyou Counties; (3) existing roads will continually require maintenance; and (4) in-service access needs will continue.

Demand for decorative rock will also increase as the population grows. Because the Forest has large amounts of basaltic material, it should easily meet the increased demand for this commodity. As demand for this commodity warrants, locations will be analyzed on a case-by-case basis.

### **Leasable Minerals**

Of the leasable minerals, geothermal energy will command the greatest interest in the next ten years. Currently, 31 geothermal leases encompass 49,410 acres. During the last few years, exploration activities (both in type and amount) have significantly increased in the Glass Mountain KGRA. As a result, one of the exploration wells has been declared a production well. We anticipate that development will occur within the next five years. Further exploration drilling and testing will establish the extent and intensity of the development.

In addition to the leases at the Glass Mountain KGRA, there is a lease at the Lake City-Surprise Valley KGRA. No exploration activity has been associated with this lease within the last five years.

Besides geothermal interest, the Forest has one oil and gas lease encompassing approximately 7,700 acres. Five oil and gas lease applications have been filed with the BLM. Applicants are requesting oil and gas leases on approximately 28,000 acres of Modoc National Forest lands.

### **Locatable Minerals**

As of March 1990, approximately 530 active mining claims had been filed. Demand for gold, the primary locatable mineral, will probably increase over the next five years, depending on national and local demand.

In 1989, Lassen Gold Mining, Incorporated, a subsidiary of Amax Corporation, Incorporated, submitted a plan of operation for an open pit gold/silver mine in the Hayden Hill area. The site is located primarily on BLM lands which are adjacent to Forest Service lands. At this time, we have no indication that expansion of the pit will adversely impact Forest Service lands.

Pumice has been mined periodically from the Medicine Lake area. In conjunction with the pumice mine, block pumice has been mined for the last six years. In addition to pumice mining, operators have removed perlite from the area. While the volume of perlite being mined is currently small, if perlite is used as a substitute for asbestos, the volume of material removed may significantly increase.

### **Critical Minerals**

Critical minerals are those needed to supply military, industrial, and essential civilian needs of the United States during a national emergency. Copper is the only critical mineral on the Forest in this category; demand for it from this Forest is insignificant.

### **Potential for Development**

Forest managers are dependent on the private sector for information regarding locatable and leasable minerals. Most conclusions are based on environmental or geologic setting, and input from industry. Areas were rated from high to low according to their potential for mineral development. If no information was available, the area's potential was rated as unknown.

The Medicine Lake Highlands have a high potential for geothermal development. Withdrawal of the South Warner Wilderness has little effect on the mineral industry. In a recent USGS inventory of potential mineral

development in the Wilderness, the agency found few occurrences of mineral resources (Duffield and Weldin 1984).

---

## 12. Pests

### Introduction

Pests are diseases, insects, animals, and noxious weeds which adversely affect vegetation, land productivity, structures, and occasionally human health. Diseases, insects, and animal damage can cause tree mortality, or reduced growth, wood quality, and seed production. Rodent populations in developed recreational areas can cause significant structural damage. They also endanger human health if they carry diseases such as bubonic plague or rabies. Predation by animals, such as coyotes, result in livestock losses, while noxious weeds can reduce productivity of rangelands and pastures. By defoliating large acreages of bitterbrush, tent caterpillars can reduce available forage and eliminate bitterbrush from the area.

The effects of pests and diseases in an ecosystem are usually the result of a pest complex rather than the action of a single organism. As an example, common complexes in forests include dwarf mistletoe/bark beetles and root disease/bark beetles. Complexes also involve the host and stand conditions, environmental influences, pest population, and effects of management activities.

### Integrated Pest Management (IPM)

While no forest or rangeland pest can be fully controlled, their effects can be prevented or reduced. The overall approach is called Integrated Pest Management (IPM), which recognizes interrelationships of the pest-host system. IPM also recognizes that insects, diseases, and destructive animals are important elements of forest and rangeland ecosystems, and are considered pests only when they interfere with the attainment of management goals and objectives.

The IPM approach emphasizes the integration of pest management activities (prevention, surveillance, detection, evaluation, suppression and monitoring) with resource management planning and decision making. Pest information is considered, for example, in developing and implementing silvicultural prescriptions.

The goal of IPM is to prevent or reduce pest-related damage considered unacceptable because of its negative

impact on resource management objectives. In selecting pest management methods, all techniques, including chemical, biological, mechanical, manual and cultural, are considered on a case-by-case, project level basis. Methods are selected according to site-specific analyses of biological effectiveness, cost, and effects on human health and the environment.

### Noxious Weeds

Noxious weeds include species which have been inadvertently introduced and grow out of their natural habitat. Since they have little or no food value for wild or domestic animals they can reduce site productivity of rangelands, farmland, and pastures. Many are allelopathic, that is, they can inhibit growth of other plants in their area of influence through a build-up of toxins in the soil. In the past the Forest and counties have cooperated in treating noxious weeds, generally herbicide applications. Noxious weeds which occur on the Forest are puncture vines, Mediterranean sage, dyer's woad, dalmatian toadflax, Scotch thistle, sweet clover, Klamath weed, squarrose knapweed, plumeless thistle, poison hemlock, yellow star thistle, and Russian knapweed.

---

## 13. Range

### Introduction

The range management program on the Forest is important to local and adjacent livestock industries because of forage provided for their animals. This Forest provides 122,500 animal unit months (AUMs) for livestock, which is 23% of the permitted livestock forage produced in the Region, and ranks first among 18 national forests in California.

Wild horses depend on rangelands for forage and habitat. Under the Wild Horses and Burros Act, the Forest is legally obligated to manage horses within a 258,000-acre wild horse territory. The Forest's rangelands also provide forage for wildlife, primarily deer and pronghorn. Eight deer herds and five pronghorn herds use part or all of the Forest for habitat.

Approximately 1.0 million acres (63%) of the Forest's 1.6 million acres is rangeland, of which 90% is suitable for grazing. Ten percent is unsuitable for grazing because of steep slopes, inaccessible dense timber, and lack of forage. An additional 200,000 acres of timberland growing less than 20 cubic feet per acre per year (less than 20

timberlands) is also discussed as part of the permanent rangeland. Less than 20 timberlands provide long-term forage production because the timber stands have open canopies.

The Forest is broadly divided into permanent rangeland and transitory rangeland. Under proper livestock management, permanent rangeland can perpetually produce forage. Transitory rangeland produces palatable forage for a limited time following timber harvests and fires.

## **Current Management**

### **Livestock Management**

To manage rangeland vegetation, the Forest is divided into 84 grazing allotments. Allotment boundaries are determined by natural features, land ownership, and historic use. Sixty-six allotments are permitted for cattle, 15 for sheep, and three for dual use by cattle and sheep. Over 119 term permittees depend on using the allotments to graze their livestock primarily from late spring to early fall. Consequently, permittees can grow and cut hay on their home ranches for winter feeding.

To achieve vegetation management objectives through livestock grazing, allotments are managed at various levels of intensity (Appendix O).

### **Rangeland Condition**

Rangelands in satisfactory ecological condition provide a diversity of herbaceous, shrub, and forest vegetation; and produce forage for livestock, wildlife, and wild horse herds. The vegetation management objective is to produce desired expressions of these vegetative components according to site potential and resource needs.

Ecological condition is satisfactory if current range condition is good to excellent with static trend, or fair with static or upward trend. Ranges are in unsatisfactory ecological condition if current range conditions are poor or very poor with static or downward trend. Most of the Forest's permanent rangelands are in satisfactory ecological condition: 120,000 acres are in good to excellent range condition, while 462,000 acres are in fair range condition. About 342,000 acres are in unsatisfactory eco-

logical condition. The amount of forage available on these areas is limited. Generally, less forage is produced from rangelands in unsatisfactory range condition. However, trend is generally static to upward.

Unsatisfactory ecological conditions have resulted from improper grazing practices, including overstocking livestock, wildlife, and wild horses; lack of uniform livestock distribution and forage utilization; and extensive encroachment by juniper stands due to historic grazing practices and suppression of natural fires<sup>1</sup>. All factors combined to reduce forage production on these sites.

To achieve vegetation management objectives through livestock grazing, the Forest develops and implements allotment management plans (AMPs). The AMP planning process identifies resource concerns, establishes vegetation management objectives, and designs strategies to correct concerns and accomplish objectives. Management tools include:

- implementing improved grazing strategies;
- fencing to prevent livestock drifting from adjacent allotments or to create pasture systems;
- developing stock watering areas to disperse livestock more evenly and provide better forage utilization.
- rejuvenating decadent brush, or removing juniper with prescribed fire or herbicides;
- cutting firewood to remove juniper; and
- adjusting permitted livestock numbers and grazing seasons as appropriate.

### **Wild and Free-Roaming Horses**

Wild horses have freely roamed the Forest since settlement days. For many people, they are living symbols of the Old West. With the passage of the Wild Horses and Burros Act, forests are directed to ensure the animals' well-being. More specifically, the Forest is charged with maintaining ecologically balanced habitat in areas on national forest land which wild and free-roaming horses inhabit.

The Forest has one wild horse territory of about 258,000 acres located on portions of the Doublehead and Devil's Garden Ranger Districts. Fulfilling requirements of the Act, the Forest prepared the Wild Horse Manage-

---

<sup>1</sup> In the young stage of growth, juniper is not fire tolerant and thins out during natural fires. However, when fires are suppressed and juniper is allowed to grow, fire has little chance of destroying it. Juniper spreads over an area, closes the canopy, and eventually prevents forage growth. The greatest loss of forage production occurs where juniper has encroached on better sites.

ment Plan in 1985, which identifies a population objective of 275-335 animals to manage. To determine population objectives, the Forest considered the animals' forage and habitat requirements, wildlife and other multiple-use needs, and range conditions. Many areas within the wild horse territory are in unsatisfactory ecological condition (poor range condition). These areas are being analyzed for improvement opportunities through the allotment management planning process.

### Cooperative Approaches to Grazing Management

The Forest uses several cooperative approaches to grazing management:

- cooperative management agreements with the Bureau of Land Management;
- coordinated resource management planning process (CRMP); and
- the Modoc/Washoe Experimental Stewardship Program.

A cooperative management agreement with BLM provides administration authority for specific allotments whose logical geographic boundaries are not reflected in administrative boundary lines. The agreement facilitates allotment management where minor portions of BLM or national forest land are included within either agencies' allotment boundaries.

The coordinated resource management planning process (CRMP) involves all parties interested in a particular allotment's management. Recent examples of allotment management planning using the CRMP process involved the Ash Valley and Oxendine Allotments on the Big Valley Ranger District. Parties who were interested in resource management or potentially affected by a change in grazing management came together to identify resource issues, develop alternatives, and recommend management strategy to resolve their concerns.

Another cooperative approach to grazing management is the Modoc/Washoe Experimental Stewardship Program (ESP). Established on the Forest in April 1980, the ESP is administered jointly by the Susanville District of BLM and the Modoc NF. The objectives of the program, as mandated in Section 12 of the Public Rangelands Improvement Act of October 25, 1978, are to "...develop and implement, on an experimental basis..., a program which provides incentives to, or rewards for, the holders of grazing permits whose Stewardship results in an improved range condition...cooperation and coordination between Federal and State agencies and with local private range users." The ESP area totals 2.25 million acres of private and federal lands in California and Nevada, including all 350,000 acres of the Warner Mountain Ranger

District. Like CRMP, ESP is a cooperative process for resolving on-the-ground resource problems.

### Supply

Forage available within allotments is about 149,000 AUMs. An AUM is 1,000 pounds of air-dried forage needed to support one cow for one month. Of this estimate, 122,500 AUMs are available to livestock, 4,400 AUMs to wild horses, and the remaining 22,100 AUMs to wildlife. Forage needs for wildlife (primarily deer and pronghorn) were not considered in the original stocking assessments and the 22,100 AUMs remaining for wildlife represent only 67% of the current forage needs.

The Forest issues permits allowing livestock to graze on allotments. Numbers of livestock permitted on each allotment is determined in allotment management plans. In 1984, 26,632 cattle, 20 domestic horses, 305 wild horses, and 24,913 sheep were permitted to graze the Forest, for a total of 122,500 AUMs. This figure differs from the permitted value of 153,975 AUMs reported by the Forest in 1984, because term and temporary permitted numbers were counted twice.

Actual use differs from permitted use on an annual basis depending on economics, weather conditions, marketing conditions, etc. In 1984, actual use was 115,204 AUMs.

### Demand

Although President Theodore Roosevelt created the Warner Mountain and Modoc Forest Reserves in 1904, demand for livestock forage began in the early 1860's and continues today. Demand for forage comes from the local livestock industry in communities surrounding the Forest.

Livestock grazing has been a primary use of the Forest since its inception. Forest grazing records show an increase in permitted numbers from 1910 to the early 1920's. The numbers then remained relatively constant into the mid-1930's when they began to drop. Even as late as 1939, the Forest permitted 270,000 AUMs, more than double the current permitted use. Grazing remained heavy throughout the Depression and World War II with a 5-year average high of 168,000 permitted AUMs in 1945. After the war, livestock numbers were reduced, and reduced further in the 1960's when cheatgrass invasion on rangelands became extensive.

Actual use has been less than permitted use over the past decade largely because the demand for beef has

decreased. Normally, one would expect demand to increase as the population increases. However, demand for beef has decreased since the mid-1970's, because of consumer preferences, substitutes, etc. Lower real (inflation-adjusted) beef prices are the result of increased beef supplies and decreased demand. Lower beef prices have forced many ranchers to scale down their operations or go out of business altogether. Consequently, demand for forage on the Forest has declined.

The demand analysis for livestock grazing on the Forest involves three important factors: forage consumption, forage value, and the dependency of livestock growers on national forest lands. The historical livestock forage consumption pattern provides a way to estimate upper limits for future forage consumption. The price of forage helps reveal the economic value of forage to the local livestock growers and establishes a range investment level that is economically justifiable for the Forest. Dependency shows the importance of the forage to the local livestock growers by estimating how much of the total livestock feed is obtained on the Forest.

## Opportunities

Opportunities exist to improve rangeland vegetation and its management. This will depend primarily on four factors: 1) cost-effectiveness of implementing allotment management practices; 2) coordination with other resources such as timber, wildlife, watershed, and fire management; 3) coordination with the livestock permittees; and 4) stability of the livestock industry.

Opportunities exist for increasing forage production on the Forest, primarily on permanent rangelands. Although shallow soils and low precipitation produce low forage yields, better livestock distribution combined with improved grazing strategies, and structural and non-structural improvements could increase forage production available for use.

To achieve vegetation management objectives through livestock grazing, the Forest encourages developing and implementing allotment management plans. In addition to applying appropriate grazing strategies, developing water sources to disperse livestock, and fencing to protect sensitive areas will improve forage production over time.

Non-structural improvements can rapidly increase forage production. Prescribed fires and herbicides remove competing juniper, rejuvenate some species of decadent brush, and stimulate growth of herbaceous material. Firewood cutting projects also reduce juniper competition and boost forage production. Type conver-

sions or seeding projects on more productive sites can yield abundant forage.

Transitory range contributes 18% (or 38% when <20 timberlands are included) of the forage base. In the future, poorly stocked stands now providing 100-200 pounds per acre will be clearcut and planted to well-stocked stands. In addition, site preparation prior to tree planting and release treatments will reduce the amount of palatable shrubs, forbs and grasses. In those allotments heavily dependent on transitory range, modified site preparation methods could be tested. Those methods include single-pass disking, masticating and broadcast burning, light brushraking and burning, windrow piling and burning, and light herbicide applications. Using intermediate harvests to maintain an open stand condition would also maintain production of palatable forage although timber volumes could be reduced over time.

---

## 14. Recreation

### Introduction

The Modoc National Forest is best known for its remote location and uncrowded recreation opportunities. Most visitors enjoy hunting, fishing, and camping, while others delight in touring, hiking, horseback riding, swimming, picnicking, and gathering firewood. These activities are enhanced by the abundance of wildlife, variety of landscape settings, and uncrowded conditions. National Forest recreation is divided into three categories: developed, dispersed, and wilderness. This section discusses developed and dispersed recreation. The Wilderness section of this chapter discusses wilderness recreation.

In 1981, total recreation use on the Forest was 377,400 recreation visitor days (RVDs) and wildlife and fish user days (WFUDs).

### Developed Recreation

Developed recreation sites are managed by the Forest Service or the private sector, and amounts to less than 20% of the total recreation use. The average for other forests in the region is 42%. Use on the Modoc is lower because of less private development, and the popularity of dispersed activities such as hunting and fishing.

**Public:** The Forest has 20 developed campgrounds, two picnic sites, two boat ramps, and a swimming beach.

Camping is the major activity, representing more than 80% of the developed use. Most of the use is concentrated at Blue Lake, Mill Creek, and Medicine Lake, which are large camping areas on the Forest. Blue Lake Campground and the 3 campgrounds at Medicine Lake are fee sites, all others have no charge. A total of 198 acres are developed.

Since 1983, all sites have been managed at the low standard level. At the low standard level, Forest personnel maintain campgrounds and provide signing, but generally do not collect trash, and may not furnish potable drinking water. While some campgrounds are well kept, most could be improved by increased maintenance, or reconstruction. Most structures, such as toilets, are in good condition due to little vandalism, compared to other forests in the Region. However, few are accessible to the handicapped.

Recreation supply is affected by the number of people developed sites can accommodate. The Forest provides a practical capacity of 165,000 RVDs. Practical capacity is 40% of theoretical capacity (all sites occupied for 100% of the time, all season long). Use levels between 50% and 100% of practical capacity are considered ideal (83,000-165,000 RVDs). Use at less than 50% is inefficient, while use of 100% will not maintain a quality recreation experience, prevent resource damage, and allow for peak use periods. Although use on the Forest as a whole is within this optimum range, sites at Lily Lake, Cave Lake, and Plum Valley receive well over 100% use.

The demand factors of population growth, past recreation use trends, disposable income, leisure time, and available energy supplies were considered in predicting future recreation use. Overall developed recreation use is projected to rise from the current 50% of practical capacity (86,000 RVDs) to 80% (131,000 RVDs) by the year 2010. At this level, use at many popular campgrounds will exceed capacity. Expansion of these sites prior to overuse is desirable. Use at Medicine Lake is expected to increase faster because of recent road improvements, unique opportunities, and displaced use from the Shasta-Trinity National Forest. If less popular, small campgrounds are closed to improve overall efficiency, demand at remaining sites will increase proportionately, while overall capacity is reduced. This will hasten the need for expansion. Additional recreational opportunities are available at reservoir sites on the Devil's Garden District as the need and demand arise.

**Private:** Recreation use at privately managed sites accounted for about 5% of the developed recreation use in 1981. The private sector manages three developments for public use: a youth camp at Blue Lake, a pack station

at Pepperdine, and a ski hill at Cedar Pass. Three recreation residences are located at Medicine Lake and four at Blue Lake. All privately managed sites are managed by special use permit. Cedar Pass Ski Hill is currently being upgraded from a single rope tow to a T-bar.

The practical capacity of all private facilities is 11,800 RVDs. Blue Lake Youth Camp receives the most use of the private facilities, at 72% of its capacity (2500 RVDs). Cedar Pass Ski Hill has the largest seasonal capacity at 4,240 RVDs, but has only used about 25% of it in the past. At 42 acres, it can accommodate 100 skiers at one time.

During the next few decades, use at these private facilities is not expected to increase significantly. Current improvements at Cedar Pass Ski Area should adequately accommodate local demand into the next century.

## Dispersed Recreation

More than 80% of the recreation use on the Forest occurs in dispersed areas (areas that are not developed for intensive recreation use). Big game hunting and driving for pleasure are the major dispersed recreation activities. From 1977 to 1981, an average of 17,000 deer hunters per year visited the Forest. Visitors who enjoy "getting away from it all" have ample opportunity to do so. Primitive roads access vast areas where it is possible to experience nature for days without seeing other humans. However, one may see wild horses, bald eagles, osprey, antelope (pronghorn), redband trout, and other more common varieties of wildlife. The Forest has no designated wild and scenic rivers (Appendix T).

Dispersed area management has always been at or below the low standard level, except during deer hunting season. At that time, visitor contacts increase and trash is collected. The Forest often gives popular dispersed recreation sites special consideration to retain their values during other resource management activities such as timber sales.

**Trails:** The current trail inventory for the Forest includes 118 miles of trails, 79 miles of which are in the South Warner Wilderness.

The Forest has two National Recreation Trails (NRT). The Highgrade Trail traverses an historical gold mining area in the North Warner Mountains. Use is light, but plans to interpret its historical values may increase use. The Blue Lake Trail circles Blue Lake in the South Warners. It receives moderate use which is generated by the nearby developed sites.

**Off-highway Vehicles (OHVs):** This Forest has more land available to OHVs than any forest in the Region.

Ninety-four percent of the land is open to OHV use, and flat to gently sloped topography allows easy access. In addition to cross-country travel, more than 1,000 miles of primitive roads provide challenging routes. Gathering firewood and hunting are the primary activities associated with OHV use. People are creating additional trails to access firewood areas. Although past use has not been significant, some resource damage is occurring. Even if large areas of the Forest are closed to OHV use in the future, outstanding OHV opportunities will still be available. In developing its OHV plan, the Forest will coordinate with the State OHV plan.

**Demand:** Consumptive recreation activities such as big game hunting, fishing, and firewood gathering are affected by availability of the resource. Availability is dependent on how the resources are managed. Competition among users for a limited resource will probably increase as use increases in the future. Some opportunities that are taken for granted now, will not be readily available in the future. Demand for most dispersed recreation activities can easily be met for the next fifty years, although some popular locations will experience overuse. To prevent resource damage, the Forest can develop the sites or apply restrictions for use. New opportunities can be made available by constructing trails or roads. Information services can inform the public of opportunities and distribute use, thereby preventing overuse at specific places.

## Recreation Opportunity Spectrum

In 1980, the Forest conducted a Recreation Opportunity Spectrum (ROS) inventory to identify recreation opportunities on the Forest. The ROS inventory evaluated all land and water areas by their physical, social, and managerial settings. The six main ROS classes are: primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban (Appendix K of the Forest Plan).

Sixty-one percent of the Forest land base is classified as roaded natural (RN), and 27% is classified as semi-primitive non-motorized (SPNM). SPNM land is characterized by a predominantly natural environment and no roaded access. Many of these areas have primitive roads or vehicle trails. They were included in the SPNM category because the roads are not Forest system roads and were not actually constructed. They are wheel tracks worn by repeated use. Eleven percent of the Forest is classified as semi-primitive motorized (SPM). These areas are accessible by more permanent primitive roads. Several isolated areas (1%) meet the small size criterion for rural ROS class. No areas, including the South

Warner Wilderness, are categorized as primitive (P), because such areas must be at least three miles from roads and a minimum of 5,000 acres.

Roaded natural areas receive 79% and semi-primitive motorized areas receive 12% of the recreation use because the most popular activities are associated with vehicles (camping, hunting, fishing, driving for pleasure, picnicking and gathering forest products). The main activities in semi-primitive non-motorized areas are hunting, fishing and picnicking, which account for 9% of the total dispersed recreation use.

**Demand:** Each of the three main ROS classes currently receives less than 12% of its recreation capacity. If acres within each of these ROS classes remain the same throughout the planning period, by 2030 use will not exceed 18% of capacity (568,000 RVDs). If the acreage is significantly reduced, then projected use could exceed capacity. This is more likely to occur in SPNM areas outside the Wilderness than in any other ROS class. Activities that will cause a shift from SPNM toward SPM and RN include timber harvest, road building, utility developments, mining, etc.

Since no primitive class exists on the Forest, future demand for this setting must be met elsewhere. However, the South Warner Wilderness (which is SPNM) can be managed to provide primitive opportunities satisfying some of the demand. Future demand for rural and urban recreation settings can be met by opportunities outside the National Forest.

## Opportunities

The Forest has opportunities to improve many areas of recreation, including management, interpretive programs, developed sites, winter sports, trail networks, and off-highway vehicle use. The unique resources, low use, and relatively undeveloped state of the Forest create an opportunity to avoid many of the problems that exist elsewhere.

**Management:** The Forest can develop a cooperative program for northeastern California which would provide the public outstanding recreation experiences. This corner of the State is dominated by the Modoc National Forest, but has lands managed by many federal and State agencies. The Bureau of Land Management (BLM), Lava Beds National Monument, Lower Klamath/Tule Lake/Modoc National Wildlife Refuges, the State of California, Bureau of Reclamation, and other agencies are all involved in recreation management. A cooperative effort could improve efficiency, increase the quality and

quantity of recreation opportunities, and provide for scenic byway development.

Maintaining semi-primitive environments will insure that many existing unique opportunities are available in the future. Future overuse of the Wilderness can be reduced by sustaining the semi-primitive character of other lands, and encouraging visitors to use them.

**Interpretive Services:** Maps, publications, signs, and programs could be used more extensively. These services are important tools for the management of dispersed recreation, and they increase visitor satisfaction. Self-guided tours and opportunity guides are very cost effective.

**Developed Sites:** Many campgrounds could be rehabilitated to accommodate new types of recreation vehicles, correct or prevent resource damage, and replace worn out facilities. Operation and maintenance costs would decrease as visitor satisfaction would increase. Heavily used sites could be expanded and new sites could be developed where increased capacity is needed. To reduce expenses, less popular sites could be maintained by volunteers or closed. Larger campgrounds could be run by private concession operators.

**Winter Sports:** The Medicine Lake Highlands and Cedar Pass area could be developed to increase opportunities for winter sports. Parking areas, signed snowmobile and cross-country ski trails, and sanitation facilities would be needed.

**Trail Network:** Unique geologic features of the Medicine Lake area and the difficulty of cross-country travel offer opportunities for interpretation and trail development. The Highgrade area offers similar potential for a trail system which interprets the historic mining activities that occurred in the North Warners. Linking the Highgrade NRT with the South Warner Wilderness trail system would increase opportunities on the Forest for long-distance trail users, and would provide an extension and destination point for the Oregon trail network.

**Off-highway Vehicle Use:** The existing primitive road system provides an opportunity to identify and sign special routes. Self-guided tours with interpretation of resources along these routes will attract users who might otherwise cause resource damage by driving cross-country.

---

## 15. Research Natural Areas

### Introduction

Research Natural Areas (RNAs) are typical and distinctive natural ecosystems and habitats that are generally retained in an unmodified condition. They provide unique opportunities for scientific research on plant and animal communities and associations in environments free of human intervention. RNAs provide a baseline for comparison with ecosystems that have been disturbed. They also serve as gene pools and preserve endangered natural components of our environment.

To contribute to the national network of RNAs, the Pacific Southwest Region developed a system to preserve representative botanical types in California. The Devil's Garden RNA meets the requirements for a representative western juniper stand in the Modoc Plateau Physiographic Province.

The Forest nominated a potential RNA in the Warner Mountains which is within the North Basin Range Province. The Regional RNA Committee studies the nomination and subsequently approves the RNA as either a candidate or recommended area, or drops the RNA from further consideration. Before a candidate area is recommended, it is evaluated with other candidates to determine the best RNA. After the Regional Forester's concurrence, an ecological survey report and an establishment report/environmental assessment is completed before classification as an RNA can be recommended to and approved by the Chief.

### Devil's Garden Research Natural Area

#### Description

The Devil's Garden RNA consists of open stands of western juniper in association with sagebrush, bitterbrush, rabbitbrush, bunchgrasses, and annuals on an expansive plateau littered with volcanic rock. This dry, rocky woodland provides forage for pronghorn, deer and wild horses. Because the RNA is not fenced, cattle are not excluded; but grazing by wildlife and livestock is limited by water shortage.

*Polygonum polygaloides* spp. *esotericum*, a Regional Forest designated sensitive plant, is known to grow in the Devil's Garden RNA (Keeler-Wolf 1983; Wheeler 1936).

#### Opportunities

The Devil's Garden RNA could be fenced to exclude livestock and wild horses, and signed to warn firewood



users not to damage the natural ecosystem set aside for study. The RNA has been proposed as a National Natural Landmark by the NPS. More information is needed to determine NNL status.

## Raider Basin

Raider Basin, nominated by the Forest as a potential RNA, lies within the North Basin Range Ecological Province. Approximately 25% of this 6,481-acre basin in the South Warner Wilderness is composed of pristine white fir forest. Ranging from 5,000 to 8,800 feet, the area is largely undisturbed by fire, grazing, or logging. California bighorn sheep were reintroduced into the Basin in 1980. Wilderness campsites and trails are used by backpackers and hunters in the summer and fall. Sensitive plant populations have been observed in adjacent areas, but not in the Basin itself. Opportunities exist for research studies of old-growth white fir, forest succession, forest structure, and wildlife habitat.

---

## 16. Riparian Areas

### Current Conditions

Riparian areas are found on almost 19,000 acres (1.2%) of the Forest, adjacent to streams (13,473 acres), springs and seeps (2,803 acres), lakes (122 acres), and in wet meadows (2,583 acres). There are 552 miles of streams containing riparian habitat.

In the past, logging practices, road construction, and improper grazing practices contributed to riparian area degradation. Forest riparian areas generally lack desired vegetation expressions to achieve overall management objectives.

### Current Management

Riparian area policy directs forests:

- to recognize the value of riparian areas during planning and when implementing management activities;
- to give preferential consideration to riparian area dependent resources over other resources in cases of unresolvable conflict; and
- to manage riparian areas under the principles of multiple use and sustained yield while emphasizing protection of soil, water, vegetation, and fish and wildlife resources.

The Forest riparian inventory was based on a 100-foot zone, but is actually managed by variable width Streamside Management Zones (SMZs). The widths of SMZs, which include an upslope distance of 50-250 feet plus channel width, depend on stream class and slide slope gradient. The variable width SMZ is always increased by several feet to exceed the actual width of riparian vegetation to protect it with additional filtering. When the table SMZ width does not encompass the riparian vegetation, the width is increased during project planning (Appendix M of the Forest Plan).

Adverse affects to riparian areas from recreation use and fire suppression on the Forest are few. Management of riparian areas relative to these activities is minimal. Past logging practices and improper grazing strategies have had the most impact on riparian areas. Managing riparian areas to prevent or decrease degradation by these activities is more extensive now than in the past.

**Wetlands:** Currently, 233 wetlands cover 35,000 acres of the Forest. They provide important nesting, resting and holding areas for migrating waterfowl and shorebirds; habitat for fish; and forage for wildlife and domestic livestock.

**Timber:** On-the-ground implementation of Best Management Practices (BMPs) and Forest-wide Standards and Guidelines (S&Gs) is ensured by timber sale administrators with the assistance of a watershed specialist when necessary. Timber sale contracts are the instruments through which sale administrators implement BMPs and S&Gs. Past timber harvesting within streamside management zones removed shade vegetation which increased thermal radiation and, in turn, raised water temperatures. As funding becomes available, these problems are corrected. Efforts are also made to correct careless road maintenance and blading which causes sedimentation in adjacent streams.

**Grazing:** With improper management, livestock often graze riparian areas heavily, especially in late summer and fall when little green forage exists elsewhere. Consequently, some uplands are underutilized. Two methods are used extensively on the Forest to improve riparian condition by controlling grazing: creating riparian pastures to which specific management systems have been applied; and excluding cattle through fencing. To properly manage these areas, additional opportunities include: implementing improved grazing strategies, installing fences to create pasture systems, and adjusting timing and duration of livestock use. While excluding cattle from riparian areas may result in the most rapid riparian improvement, it is the most costly. Riparian areas generally respond quickly to improved manage-

ment, particularly if timing and duration of use are carefully controlled.

## Concerns

Riparian areas and associated vegetation are essential for dependent resources and water quality. Healthy vegetation along stream banks helps maintain low water temperatures, reduces suspended sediment levels and buffers the effects of animal wastes. If vegetation is removed, the ecological balance of riparian areas is threatened. When streambanks fail because protective riparian vegetation is removed, sediment levels in the streams can increase. As riparian vegetation is removed, water quality and fisheries have suffered, water tables have dropped, and hardwoods have completely disappeared.

Poor livestock distribution and overgrazing in riparian areas is a greater problem than general overstocking of rangelands. Riparian conditions have not improved in areas where livestock graze season-long and few or no structural improvements have been made.

## Opportunities

Grazing strategies and structural improvements offer opportunities to improve riparian condition. Grazing strategies which would relieve livestock pressure on riparian areas include (1) grazing livestock in spring or early summer when upland grasses are green and palatable (Ruyle 1977; Salwasser and Shimamoto 1981); (2) rest-rotation or deferred-rotation grazing, which moves livestock from one pasture to another; (3) double-rest rotation, which rests a pasture for two years; (4) substituting sheep for cattle (Platts 1981); (5) short-duration, high-intensity grazing; and (6) exclusion (Ames 1977). Generally, strategies which sustain grazing are more cost effective in the long term. However, the Forest will use exclusion where necessary.

Structural improvements include (1) fencing to control grazing; (2) streambank stabilization (Sheeter and Claire 1981); (3) log weir and boulder placement (Claire 1980, Alvarado 1978); (4) constructing check dams; and (5) planting hardwoods. Any structural improvements should be implemented in concert with a suitable grazing strategy. The effects of grazing strategies and structural improvements should be monitored.

---

## 17. Sensitive Plants

### Introduction

No known federally listed threatened or endangered plants are found on the Forest. As of August 1990, ten sensitive plant species are known or suspected to occur on the Modoc National Forest. The habitat of each sensitive plant species is unique, both geographically and ecologically. Detailed descriptions, population densities and distribution maps for each species are located in the planning records.

### Current Management

Where known populations or sensitive plant habitats exist on the Forest, a botanical survey is conducted prior to any land disturbing or land exchange activity. Survey procedures and findings are documented in project environmental analysis records. Projects are modified to maintain the integrity of the habitat.

Many Forest activities modify the land or vegetation: recreation site development, land exchanges, timber sales, reforestation, mineral exploration, water impoundments, road and trail construction, livestock grazing, and utility line construction. All potentially disturbing activities are subject to current management policy protecting sensitive plants.

### Opportunities

The Forest will conserve sensitive plant populations by identifying and protecting their specific habitats. The first step is to complete a comprehensive survey of all suitable and potential habitats. Care can then be taken not to adversely affect their habitats and thereby ensure species viability.

The Forest can maintain or increase sensitive plant populations by assessing all planned timber sales and other projects for sensitive plants. The Forest may also need to modify existing grazing uses, change proposed road locations, alter planned timber harvest units, relocate burning unit boundaries, or modify other habitat disturbances. The need for such action is likely only in occasional, isolated situations.

---

---

## 18. Soils

### Introduction

Soil directly or indirectly supports all other resources. It serves as a growth medium for plants, filters biological and chemical substances and regulates water transmission. Long-term productivity of most Forest resources is dependent upon the soil resource.

Soils on this Forest are of volcanic origin consisting of basalt, andesite, tuff, pyroclastic pumice, cinders, and ash of various geologic ages. About two-thirds of the Forest is situated on the Modoc Plateau Geomorphic Province which is primarily composed of basalt-capped plateaus with nearly level to gently sloping topography. The remaining third is on mountain uplands.

### Current Management

A major goal for soil resource management is long-term maintenance of soil productivity and watershed protection. This requires avoiding management actions that would irreversibly impair soil productivity, and monitoring soil productivity to detect significant changes caused by management actions. Maintaining soil productivity also requires restoring or improving soils in areas where they have been degraded.

Current management includes providing input into environmental analysis, normally through a field-verified Soil Resource Inventory (SRI) Order 3, and recommending proper Best Management Practices (BMPs) and other project-specific mitigation measures for soil and watershed protection. Controlling soil erosion and compaction and maintaining nutrient balance during timber harvest, reforestation, range grazing, vegetative manipulation, and post-fire rehabilitation is vital to long-term timber and range productivity and protection of downstream water quality. The field-verified SRI 3 provides enough soil resource information to adequately document soil characteristics, their capabilities and limitations for most proposed work on the Forest.

Current management focuses on reducing soil erosion and compaction and maintaining nutrient balance. Practices include maintaining ground cover to reduce soil loss, limiting heavy equipment use on moisture sensitive soils during wet weather, prescribing low- to moderate-intensity fires to reduce loss of nutrients and soil structure, and applying fertilizer to timbered soils with low nutrients.

## Productivity

### Soil Concerns and Opportunities

Primary concerns for sustained soil productivity on the Forest include:

**Erosion**—About 350,000 acres have a high or very high Erosion Hazard Rating (EHR). Most of this acreage is located on the Warner Mountain and Big Valley Ranger Districts. Currently, almost 10,000 acres are experiencing various kinds of accelerated erosion (see WIN Inventory in the Soils Analysis of the Management Situation, Planning records).

Many opportunities exist to minimize soil erosion, such as tractor yarding only on slopes less than 40%; yarding unutilized material; logging and scattering; broadcast burning slash on soils with high EHR; limiting livestock grazing; and restricting OHV use.

**Demand**—The demands for those yields directly dependent on soil productivity are discussed in the Wildlife, Range and Timber Sections of this chapter. Soil erosion also affects water quality and, therefore, recreation demand. Degraded water quality lowers recreational experiences associated with water such as boating, fishing, camping and swimming.

**Cumulative Watershed Impacts**—About 290,000 acres have a high potential for cumulative watershed impacts. This represents 28 third or fourth order watersheds, mostly on the Warner Mountain Ranger District.

To correct the condition the Forest could obliterate unnecessary roads and landings, rehabilitate areas experiencing active soil degradation, and limit further soil disturbance.

**Mass Movement**—About 16,000 acres have been rated as having a high potential for mass movement.

To protect these areas from mass movement the Forest could prohibit new road construction, retain 50% of normal basal area to maintain slope stability, and use full suspension and lateral yarding.

**Compaction**—When wet, nearly all soils are subject to compaction by heavy equipment operation or livestock use. Many pine plantations and some rangelands have serious compaction problems.

Compacted soil could be improved by disking, ripping, or scarifying. Opportunities to reduce soil compaction or mitigate its effects include using low bearing pressure equipment when compaction hazard rating is moderate or high; and prohibiting equipment operation when the soil is wet.

**Fertility**—Recent timber stand soil and foliar analysis data suggests that perhaps 150,000 acres of timber land may have low amounts of plant available nitrogen, phosphorus or sulfur, or a combination of these in low amounts. Current Regional guidelines predict a 30% to more than 100% increased growth response to nitrogen fertilization. Over the past two years about 3,500 acres of timber lands have been fertilized.

To improve soil productivity and maintain nutrients at or above their natural levels, the Forest can use disking or other less ground-disturbing methods on soils where nutrients are concentrated in the top 2-5 inches. Logging slash could be lopped and scattered with or without a light broadcast burn on soils with low fertility. Fertilization can be combined with chemical or mechanical release on plantations to speed crown closure.

**Conifer Seedling Survival**—Over 150,000 acres of timberland has been rated with a low or very low chance of conifer seedling survival. Most of these acres are on lower elevation soils in areas of low precipitation and long, hot and dry summers.

Opportunities to improve seedling survival include disking or brush rake site preparation; patch or strip cutting; using artificial mulch; planting in excavated depressions; and redistributing topsoil if it is in windrows or old burn piles.

**Soil Displacement**—Two to eight inches of topsoil is displaced on about 6,500 acres in 10- to 30-year-old ponderosa pine plantations. That means the topsoil has been removed from planting sites and windrowed nearby. Soil chemical analysis and direct tree growth measurements indicate a 20-50% loss in productivity. The more topsoil that is displaced, the greater the loss in soil productivity. Recently over 500 acres of these plantations have had windrowed topsoil redistributed to regain productivity.

The Forest can recapture lost soil productivity by integrating topsoil redistribution with other resource projects, and by redistributing old burn piles which contain large amounts of topsoil.

areas are set aside and protected for their scenic, historical, geological, botanical, zoological, paleontological or other special characteristics with an emphasis on public use, study, and enjoyment.

Officially designating an SIA begins with the Forest Supervisor's recommendation. The Regional Forester's approval of the Forest Land Management Plan signifies approval of recommended SIAs. Each formally designated area is managed with its own set of standards and guidelines which may range from no special management to seasonal restrictions on certain activities to year-round prohibitions on all activities.

## Cultural Resource Special Interest Areas

The Modoc National Forest has areas with potential for designation as Cultural Resource SIAs. The goals of the Cultural Resource SIA program are to prevent loss or damage to cultural resources, to integrate the cultural resource program with multiple use management, to facilitate scientific study in an effort to gain knowledge of past human behavior, and to provide interpretation so the public can gain understanding and perspective of our heritage.

Currently, the Modoc National Forest has no designated Cultural Resource SIAs. However, seven cultural resource sites are listed in the National Register of Historic Places (NRHP). Eight additional areas of cultural resource value qualify for nomination to the NRHP. All 15 sites could be considered for designation as Cultural Resource SIAs. Numerous other areas have been inventoried for cultural resource values, and may qualify as candidates for SIAs. As future inventories or studies are completed, they may reveal more candidates.

## Geological Special Interest Areas

Three designated Geological Special Interest Areas exist on the Modoc National Forest for their unique geologic features: Burnt Lava Flow, Medicine Lake Glass Flow and Glass Mountain Glass Flow. All are located within the Medicine Lake Highlands geomorphic province.

### Burnt Lava Flow

The Burnt Lava Flow, encompassing 8,760 acres, is situated in Siskiyou County. The Burnt Lava Flow is an excellent example of very recent vulcanism (less than 200 years old) appearing as chaotic jumbles of basaltic blocks. Geologically, the Burnt Lava Flow is composed of three separate flows. One is a highly oxidized lava,

---

## 19. Special Interest Areas

### Introduction

Special Interest Areas (SIAs) are those recognized by the Forest Service as having special significance for recreational, scientific, cultural, or educational use. These

another is a fairly smooth pahoehoe, and the third is a broken pahoehoe flow. The flows were very viscous at the time of eruption and merged together without forming discernable boundaries. As the lava flowed onto the surface, it surrounded three older cinder cones.

These cinder cones are now islands in the flow area, covered with conifer vegetation. High Hole crater is a semi-barren cinder cone rising 386 feet above the lava flow. The crater itself is approximately 150 feet deep. These islands of timber, undisturbed by human activities and protected from outside fires by the lava flow, should become valuable for future study of the mixed conifer type.

#### Medicine Lake Glass Flow

The Medicine Lake Glass Flow, encompassing 570 acres, is also located in Siskiyou County. The Medicine Lake Glass Flow is a recent stony to glassy black dacite flow that is located on the floor of the Medicine Lake caldera. The thickness of the flow varies from 50 to 150 feet. Although the exact source of the flow is not known, it exhibits the dynamics of low-viscosity lava. The margin of the flow is very blocky and gives a talus slope appearance.

#### Glass Mountain Glass Flow

The Glass Mountain Flow, encompassing 4,210 acres, is primarily situated in Siskiyou County with a small portion in Modoc County. The Glass Mountain Glass Flow is geologically unique for North American geology. It exhibits the results of multi-stage volcanic activity so recent that there has been no modification by weathering, erosion, or vegetative cover.

The first eruption was along fissures that run north and northwest which ejected pumiceous material in the lapilli and ash sizes. This eruption produced steep-sided cones followed by pumice eruption lava extrusions. The first was a stoney to blocky dacite succeeded by glassy dacite and rhyolite, followed by a rhyolite obsidian. Volcanic lava extruded from the walls of the pumice cones, destroying the cones except those located at the extreme southern edge of the flow.

All three Geologic Special Interest Areas could have interpretive facilities such as information stations and self-guided tours. Access to the areas should be visible to visitors from Medicine Lake, as well as surrounding highways. In addition, pamphlets and maps could be prepared by the Forest for public distribution at all Forest offices.

The Forest will maintain an open file for any future Geologic Special Interest Area. The source of informa-

tion may be from Forest personnel, the general public, special interest groups, or the scientific community.

The National Natural Landmark (NNL) program and Research Natural Area (RNA) obligations for geologic elements are two other programs which affect the Forest's three Geologic Areas. Administered by the National Park Service (NPS), the NNL program accepts areas possessing national geologic or ecologic significance (Appendix F). All three areas were identified through NPS Theme Studies as potential NNLs.

The Forest will recommend Burnt Lava Flow and Medicine Lake Glass Flow for nomination as NNLs. Because of existing mining claims on Glass Mountain Glass Flow, which conflict with NNL objectives, the Forest will not recommend this area as an NNL. However, Glass Mountain Glass Flow and Medicine Lake Glass Flow share similar geologic features; the latter represents this type of geologic value.

#### Botanical Special Interest Areas

Areas on the Modoc NF with potential for designation as Botanical Special Interest Areas include Dismal Swamp in the north Warner Mountains. This meadow/marsh/riparian forest complex boasts an assemblage of riparian plant communities unique to California. The most notable plant community is the birch (*Betula glandulosa*) riparian shrub community. Bog birch is common in northerly habitats, but unknown in the rest of California.

---

## 20. Timber

### Introduction

Commercial conifer types are found on 40% of the Forest (639,942 acres). Eastside pine, mixed conifer, red fir and lodgepole pine comprise the four major types.

The *eastside* pine type, growing at 4300-5500 feet, contains ponderosa pine and Jeffrey pine. Associates are incense cedar, white fir, western white pine and sugar pine with occasional California black oak. Eastside pine occupies 64% (405,422 acres) of the Forest's timberlands, with about half of the stands averaging 70-90 years old and mostly poorly stocked. Another third of the stands are older, averaging 120-130 years old, also poorly stocked. The remaining lands (14%) are either plantations or two-storied older stands.

The *mixed conifer* type occupies 31% (200,401 acres) of the timberlands. This type consists of white fir, red fir, ponderosa pine, Jeffrey pine, incense cedar, sugar pine, and western white pine. Black oak and aspen are found in association with these conifers. Mixed conifer grows at 5500-7500 feet. Stands are composed primarily of ponderosa or Jeffrey pine and white fir, although species composition varies throughout the Forest. Mixed conifer in the Warner Mountains contains much western white pine, but has no sugar pine or red fir. Mixed conifer in the Medicine Lake Highlands, however, contains sugar pine, incense cedar and red fir.

The mixed conifer type is older than the eastside pine type with a narrower age class distribution. Over 75% of mixed conifer is 120-130 years. Poorly stocked stands make up about half of the type.

*Red fir* type occurs exclusively in the Medicine Lake Highlands on the Doublehead Ranger District higher than 5500 feet. Red fir comprises the smallest component of the timber types (2%, 13,425 acres). Most red fir stands are heavily stocked.

*Lodgepole pine* type, occurs mostly in pure stands starting at 6000 feet, but sometimes is associated with true firs and western white pine. The lodgepole pine type occupies only 3% (20,694 acres) of Forest timberlands. Size classes are not differentiated for this type.

Tentatively suitable timberlands are:

- forested and currently producing or capable of producing crops for industrial wood;
- not withdrawn from timber production by Congress, the Secretary of Agriculture, or the Chief of the Forest Service;
- not prone to irreversible soil, productivity, or watershed damage when the appropriate technology is used; and
- capable of being adequately restocked within 5 years after final harvest.

Of the Forest's 639,942 acres of timberland, 611,396 acres plus 7,862 acres of nonstocked land (97%) are tentatively suitable for timber production.

Of the suitable acres, 7,862 acres are non-stocked. Approximately 5,800 acres of non-stocked timberland are in soil types which are capable of producing commercial trees, but are dominated by other vegetation. Currently, the land is economically unsuitable for producing timber. Land managers will monitor non-stocked lands to determine their suitability for regeneration.

The remaining 2,000 acres are unstocked to provide diversity, wildlife forage, and fuel breaks in the Scarface and Gerig wildfire areas which burned in 1977. Habitat conditions in these areas will be monitored for change to determine an appropriate time for regeneration.

On suitable timberlands capable of producing greater than 20 cubic feet per acre per year (> 20 lands), full, (Regulation Class I), modified (Regulation Class II), and limited (Regulation Class III) timber management can be practiced. Full or modified management can be used on 435,103 acres (70%) of the suitable timberlands where natural or artificial regeneration is used to achieve stocked stands. Even-aged regeneration cutting methods are appropriate here, including clearcutting, seed tree, and shelterwood cutting. Intermediate cutting methods are also used, primarily for commercial thinning. Uneven-aged management may also be appropriate — either group selection (preferred) or single-tree.

Suitable timberlands also include 184,155 acres (30%) of land producing less than 20 cubic feet per acre per year (< 20 lands). These lands were included as suitable because past experiences shows that it is possible to manage less productive lands on a sustained yield basis. Timber management on < 20 lands is basically opportunistic. Trees are harvested only when sufficient understory trees are present, and when snag numbers and minimum management requirements (MMRs) are met. These areas are treated as separate non-interchangeable components of the allowable sale quantity, where outputs and allocations are not comingled with > 20 land outputs.

## Current Management

Current direction for timber management was established in the Modoc National Forest Timber Management Plan and the accompanying Final Environmental Statement (1975).

With improved forest management and analytical methods over the last decade, the Forest identified several shortcomings with the 1975 Timber Management Plan:

- It overestimated yield on lands which actually produced < 20 cu. ft. per acre per year, an error which was carried into targets for the 1980 Resources Planning Act (RPA) Program.
- It had no soil inventory to identify soils with low productivity. Therefore, low productivity soils were included in standard and special and marginal component lands.

- Potential yields for special and marginal components were not modeled. Rather, potential yield from the standard component (which was modeled in TIMBER RAM) was used for special component lands. Marginal component yields from the programmed allowable harvest were reduced to historic harvest levels.
- Because minimum management requirements (MMRs) were instituted after the 1975 Timber Management Plan, the Plan did not include them.

### **Silvicultural Practices**

**Harvest Practices**—Harvest practices under the timber management plan are based on even-aged management. Regeneration cuts (shelterwood and clearcutting methods), intermediate cuts, and overstory removal are used in the standard component. Selection cutting is used in other components.

Between 1976 and 1984, harvested acres and volume were very similar to the acres and volume planned in the 1975 timber management plan. Timber volume harvested exceeded planned volume by 4%, while acres treated were 10% fewer than planned. However, acres and volume harvested by component and treatment varied widely from the original plan based on four factors.

First, the Scarface and Gerig fires of 1977 created many acres requiring salvage logging (47,000 acres). These salvage acres are part of the 60,700 acres of regeneration harvest that occurred from the standard component between 1976 and 1984. Only 17,000 acres were planned for regeneration. The volume, however, was 10% less than planned (191.2 MMBF vs. 211.8 MMBF) because of lower merchantable volumes per acre in salvage logging.

A second factor was the large acreages of overstory removal harvest. Overstory removal was used on 62,100 acres, which was 48,200 acres more than planned. This harvest contributed nearly half the volume harvested from standard component lands and was 142% higher than planned for that treatment type. In many cases, the overstory removal treatment was applied incorrectly; residual stands were left understocked.

Another factor was the scheduled treatments for intermediate thinnings which produced much less volume than anticipated. While 33% more acres were treated than planned for, only 42% of the volume was generated.

The final factor was the scheduled treatments in the special and marginal component. Only 28% of the planned acres were actually harvested, but 89% of the volume was produced.

The cumulative effect of all these factors resulted in harvesting nearly three times more acres in the standard component than planned, while only treating 28% of the special and marginal components. The residual effect left many acres of the standard component in an understocked condition, which will make future timber sales less economical.

**Site Preparation**—After regeneration harvest or brush conversion, the land must be cleared to provide mineral soil for natural seeding when using the shelterwood system. Clearing also removes competing vegetation from planted seedlings. Site preparation is done mechanically, chemically, with prescribed fire, or by combining these techniques. Mechanical site preparation (typically tractor piling or brushraking) in combination with chemical treatments is most common. The Forest has not used herbicides since 1984.

**Reforestation**—One- or two-year-old ponderosa and Jeffrey pine seedlings are usually planted after clearcutting. Incense cedar, sugar pine, and white fir are planted less often. Planted seedlings are grown from seeds collected on the Forest according to zone and elevation.

Overall, establishing timber stands through planting has been successful. The only shortcomings have been high mortality of one-year-old stock and the infrequent occurrence of optimum weather conditions. Using two-year-old stock has reduced seedling mortality, and better planning and preparation has improved timing for planting.

Natural seeding can be used on lands managed under the shelterwood system. Successfully establishing a stand using natural regeneration depends on a well-prepared site, a good seed crop, and favorable weather conditions. To date, these conditions have been infrequent and the effectiveness of natural seeding poor. On this Forest shelterwood cutting in combination with planted seedlings would be successful. However, clearcutting in combination with planted seedlings would be at least as successful and more cost-effective.

**Timber Stand Improvement**—Timber stand improvement (TSI) includes suppressing competing vegetation (release), thinning young stands (precommercial thinning), protecting seedlings from animal damage, and fertilization. TSI benefits include increased vigor, growth, and reduced susceptibility to insect damage and disease.

**Salvage**—Salvage sales resulting from insect damage, drought and fire totalled 224 MMBF from 1976 to 1985.

**Big Valley Federal Sustained-Yield Unit (BVFSYU)** – Unique to Region 5, the BVFSYU was established on January 27, 1950 under the authority of the Sustained-Yield Act of 1944. The intent of the Act was to maintain stability in communities dependent on the sale of timber or other forest products from federal lands. In a sustained-yield unit, timber bidding is restricted to operators who manufacture lumber within a designated manufacturing zone. The BVFSYU lends support to Big Valley communities (Adin, Bieber, and Lookout) dependent on the timber industry.

The last formal review of the BVFSYU was held in March 1976. Based on the 1970 timber inventory, the annual allowable sale quantity was 13.3 MMBF for the period 1975-1985. According to Unit policy, this volume may change 20% without instituting special hearings or analysis.

## Supply

National forests in Region 5 produced an average of 1.9 billion board feet over the past 10 years. During this time, the Modoc's contribution to the Regional average was 3%. While this volume is small from a regional perspective, to local mills it is a resource of economic significance.

Of the timber harvested from the Forest, 84% is processed in Modoc and Lassen counties. This volume is 34% of all timber processed in the two counties.

Today, 435,100 acres are classed as suitable for full or modified timber management (lands capable of growing > 20 cubic feet per acre per year), and 184,200 acres are classed as suitable for limited timber management (i.e., lands growing < 20 cubic feet per acre per year). Standing volume amounts to 4.95 billion board feet and growth averages 24 cubic feet per acre per year. The Forest will base its new allowable sale quantity and 10-year timber sale schedule primarily on this information. Other factors which will influence timber supply are legal requirements for timber and other resources, economic efficiency, management intensity, and desired land use patterns.

## Demand

Demand for timber from the Forest is determined by regional and national markets for wood products. Markets are primarily influenced by population and income levels, interest rates, number of housing starts, and the level of imports and exports in wood products.

Between 1975 and 1982, 25 mills bought timber sales from the Forest. Because of large fire salvage sales, new purchasers were attracted to the market. About 12 mills, mostly from Klamath Falls, Adin, Alturas, Bieber, Burney, Susanville and Weed, are the consistent bidders. By 1982, two of these mills had closed. The remaining mills have a combined annual mill capacity of about 291 MMBF. The combined mill capacity of primary local mills is about 48 MMBF annually on a single shift; this could increase to 75-80 MMBF on a double shift.

Local mills usually buy large-diameter ponderosa, sugar, and Jeffrey pine. Most local mills do not have equipment to efficiently manufacture many small-diameter logs (less than 14-inch dbh). This lack of mill capability is important because most of the available large old-growth trees will be cut in the next 30 years. Mills must convert to small log manufacturing if current harvest volumes on the Forest are to be maintained. Trees with long rotations necessary to produce large diameter logs have lower average annual growth rates than trees with shorter rotations. Also, commercial thinning harvests of timber stands, which contribute to the annual sale volume, will be of small diameter trees.

## Big Valley Federal Sustained-Yield Unit

Agriculture and lumbering supports the present economic base in the Big Valley area. New industries are deterred from the area because of its isolation from large population centers. The present composition of industries in the area will likely remain unchanged.

At present, three sawmills operate within the Unit. All process National Forest timber under the terms of the BVFSYU Policy Statement. Big Valley mills rely heavily on timber outside the Unit to maintain full single-shift operations; the allowable sale quantity of 13.3 MMBF, established for 1975-1981, accounts for 46% of the mill's capacity. Cutting records of these mills during this time indicate sawmill production averaged 22 MMBF annually.

The economic impact of the Unit cannot be measured directly. Whether the sawmills would continue to operate if the Unit were abolished is not known. The installed capacity of the Unit's sawmills is approximately twice the potential yield of 13.3 MMBF. Obviously, other sources of logs are essential for the continued operation of the mills. However, production has been 73% of the stated capacity. Testimony presented at a 1980 public hearing on the status of the Unit indicated that the timber base supplied by the Unit was essential to the mills in the Unit.



---

---

## 21. Visual Resources

### Introduction

The Modoc National Forest offers a wide range of scenic landscapes. The Medicine Lake Highlands in the northwest portion of the Forest provides the beauty of mixed conifer stands intermixed with geologic evidence of past volcanic action.

The Modoc Plateau, covering most of the Forest, is a combination of lava outcroppings with a diverse mixture of ponderosa pine stands, juniper, bitterbrush, sagebrush and mountain mahogany. The variety of vegetative color and texture and the distant views to mountain backdrops provide a unique scenic experience.

The Warner Mountains rise above the surrounding plateau on the east side of the Forest with peaks up to 9,800 feet. The Warners offer all the scenic amenities of the Sierra Nevada mountain range, and are covered by broken and diverse patterns of coniferous forests, aspen stands, open shrub-covered patches, rock outcrops and numerous streams.

### Current Management and Future Opportunities

The Forest's capability to provide scenic quality is measured by the current condition and variety of the visual resource. In the future, maintaining scenic quality will be more difficult because of increased regeneration harvesting.

Opportunities exist to mitigate the effects of Forest management activities on visual quality:

- Shape timber harvest units to blend with existing openings.
- Schedule timber sales to avoid cumulative visual effects.
- Use foreground vegetation to screen background disturbances.
- Design structures (roads, utility towers and buildings) to blend with or complement the natural landscape.
- Emphasize visual resource management in areas where visual quality is important to recreation activities. In areas where enjoyment of recreation activity is not dependent on visual quality, management may be less intense.

- Coordinate visual management with other resource planning.
- Use vegetative manipulation to enhance and maintain visual quality for the long term.
- Rehabilitate areas which currently do not meet visual quality objectives through specific visual resource rehabilitation projects or other resource projects.

### Initial Visual Quality Objectives

Variety class, sensitivity level, and viewing distance are three inventories used to initially determine suitable visual quality objectives (VQOs). Landscapes with high scenic values have the greatest variety of vegetation, landforms and waterforms. Three variety classes characterize the Forest:

- A (9%): a distinctive landscape with varied water and landforms and vegetation;
- B (38%): a common landscape, less varied with moderate slopes, rounded ridges and broad valleys; and
- C (53%): a minimal landscape of one-species vegetation and little variation in size, texture or color.

The South Warner Wilderness, SIAs, and the RNA are the only areas on the Forest assigned a Preservation VQO. Retention or Partial Retention VQOs were assigned to all variety class A lands. Variety class B lands (those areas viewed from a sensitivity level one travel route, or within the foreground viewing distance of a sensitivity level two travel route) were assigned a Retention or Partial Retention VQO. Only those variety class C lands within the foreground or middleground distance zones (viewed from a sensitivity level one travel route) were assigned a Partial Retention VQO. All other areas on the Forest were assigned a Modification or Maximum Modification VQO which allows management activities to visually dominate the landscape with differing considerations.

Retention or Partial Retention IVQOs were assigned to 33% of the Forest. Most lands (63%) were assigned a Modification or Maximum Modification IVQO because most of the Forest is variety class C or unseen.

### Existing Visual Condition

The current condition of the visual resource on the Forest was determined through an inventory of the existing visual condition (EVC). This inventory was done by aerial mapping and field verification. Eighty-four percent

of the Forest has few noticeable changes in the landscape; 14% is noticeably disturbed, but changes do not attract attention.

Activities that have caused visual disturbances include site conversions in geometric shapes, mostly where the planted vegetation failed to establish itself, rock and cinder pit developments, high density roading, major transmission lines, electronic sites, and large-scale fire suppression.

## Visual Quality Index

Visual Quality Index (VQI) quantifies the overall visual quality of the Forest. It reflects both the inherent scenic value of the Forest landscape and the amount of human modification to it. A VQI can be calculated for the existing visual condition as well as for the future visual condition that would result from implementing each alternative.

The VQI for the Forest's existing visual condition is 62.56. Assuming that in 1900 the entire Forest was in visual condition class I (appeared essentially untouched), the VQI would have been 68.80. This figure then provides a benchmark from which to compare the VQI since the turn of the century.

The VQI of 68.80 is not the maximum visual quality the Forest can achieve. Variety class C lands have little variation in size, color or texture. In an untouched condition (VC I) they offer little visual distraction. By minor changes to the characteristic landscape, the overall visual quality in variety class C lands can improve. Because 53% of the Forest is class C lands, managing these lands to the VQO of partial retention (VC III) will maximize the VQI at 103.65. This significant increase over untouched conditions is an anomaly based solely on the high percentage of class C lands.

## Demand

Although demand for the visual resource is difficult to measure, it can be inferred from: (1) increased participation in recreation activities associated with viewing scenery; (2) increased population; and (3) enactment of laws and policies addressing visual quality.

---

## 22. Water

Proper management and use of water resources, combined with care for the watershed lands from which they originate, are fundamental to managing all other resources on the Forest. The goals are to maintain the soil mantle and to provide water for human, wildlife, fish and vegetative needs. Water is used on the Forest for livestock, dust abatement on roads during timber hauling, human consumption, maintenance of instream flows, and wildlife needs, including wetland habitat. Outside Forest boundaries, water is used primarily for agricultural irrigation, hydroelectric power generation, livestock, recreation and wildlife.

An analysis of the water resource requires separating the topic into its major parts: water quantity, water quality, and cumulative watershed effects. The following sections address each topic and its role in water resource management.

## Water Quantity

### Supply

Twenty watersheds on the Forest produce a cumulative annual yield of 565,800 acre-feet of water per year, not including water yield on private lands within the Forest boundary.

### Current Management

#### Water Rights

The Forest manages distribution and use of water through the Forest water rights program. Currently water is used and managed under reservation rights, riparian rights, and State appropriated water rights.

#### Demand

Since the area was settled in the late 1800's, water use has steadily increased so that present demand exceeds the supply of natural surface runoff.

Much effort is expended to ensure that downstream water users with superior water rights are protected while removing water from streams for roads. Full use of range-land forage by livestock is limited by shortages in water and by downstream appropriations which make water rights difficult to obtain for stockpounds. Insufficient stockwater in some allotments has created livestock distribution problems. Dam construction for wetland development is nearly impossible with water supplies fully appropriated by downstream users.

Instream water needs within the Forest boundary for wildlife, fish and maintenance of riparian vegetation are basically intact because most water diversions to other users occur outside the Forest boundary.

### **Opportunities**

The Forest has few opportunities to add to existing water supplies. Increases from vegetative manipulation will be undetectable because yearly climatic variations will mask them.

Other opportunities exist, however, to help alleviate Forest and downstream shortages through continued negotiations with other users like the Bureau of Reclamation and Pacific Gas and Electric Company, and through drilling additional wells to tap groundwater sources. Additional stockponds could be developed on many grazing allotments to improve livestock distribution and forage utilization.

### **Water Quality**

Water use on and off the Forest has many beneficial uses. Although no municipal watersheds or whole communities use this water, several individual domestic uses are scattered throughout or downstream from the Forest on many streams. Wilderness travelers use surface water from lakes and streams in the South Warner Wilderness for drinking or cooking.

Water in streams, lakes, and reservoirs provide habitat for cold- and warmwater fisheries, endangered species, and waterfowl. Numerous stockponds and reservoirs provide water during the summer months for livestock.

Water leaving the Forest is put to beneficial use by irrigating fields in the Pit River, and Surprise, Goose Lake, Langell and Big Valleys. Much of this water is reused for hydroelectric power generation at reservoirs. Water quality also affects downstream riparian-dependent species. Water is also used downstream by recreationists.

### **Current Management**

Water quality is currently 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 (USDA Forest Service 1983). Methods and techniques for applying appropriate BMPs are identified during on-site investigation of Forest projects that have the potential to degrade surface water quality.

BMPs have been developed for timber, road construction, mining, recreation, vegetative manipulation, fire

suppression, fuels management, and grazing strategies. Implementing BMPs has resulted in protecting water quality in some areas, depending on the resource. Sometimes water quality problems occurred when BMPs were not implemented. The following assessment of water quality relates to various Forest resource management activities.

#### **Timber**

Accelerated surface erosion from historic logging is pronounced in several Forest watersheds. Probable causes are inadequate or no streamside management zone designation and protection; poor skid trail and landing locations; and lack of erosion control on skid trails. Under old logging practices, some wet meadows were used for skidding and landing logs, which gullied and scoured perennial streams and converted wet meadows to dry uplands. These erosion problems are now reduced or avoided on current timber sales through the use of BMPs.

Opportunities to improve management include leaving natural debris in channels; introducing a minimum of additional logging-related debris; and leaving large volumes of mature timber within the streamside management zone.

#### **Road Construction**

Roads are a primary source of accelerated erosion and sedimentation (Gibbons and Salo 1973). Sediment from roads reaches streams through mass soil movement and surface erosion. Downstream sedimentation results from improper road location, inadequate road drainage, lack of energy dissipators at culvert outlets, road use during wet weather, and poor culvert alignment. Fisheries are probably the most adversely affected Forest resource. Many of these problems still exist because funds are insufficient to correct past problems. Construction within the past ten years has followed BMPs and has not significantly degraded water quality.

Opportunities exist to obliterate roads that are no longer needed or are causing water quality degradation, and to abandon old roads which were constructed in or adjacent to stream channels.

#### **Grazing**

Improper grazing management practices degrade water quality by accelerating erosion and sedimentation within stream channels. Stable stream banks; narrow, deep channels; and diverse and productive vegetation are hallmarks of properly managed streams. Stream systems in satisfactory condition provide vegetative cover for fish habitat, sustain water flows into the summer season, and

offer low water temperatures. In contrast, improperly managed streams exhibit altered stream banks, wide and shallow channels, and less productive and diverse vegetation than its properly managed counterparts. Improperly managed streams suffer reduced flows into the summer season and higher water temperatures. Gravels important for fish spawning are often embedded with fine sediment from soil erosion and silting.

Improper grazing management practices have affected, to some extent, nearly all riparian areas on the Forest. Approximately 208,700 acre-feet produced on the Forest does not meet State water quality objectives, and may be adversely affecting beneficial uses.

Properly managed streams have improved rapidly; practices have included fencing to exclude livestock or to establish riparian pastures and early season growth. Timing and duration of grazing—particularly early-season and short-duration grazing—is important for ensuring proper riparian management. One of the best opportunities to improve water quality is implementing improved grazing strategies. In some cases, protective fencing, restoring riparian vegetation, gully repair, rip-rapping and juniper revetment may be needed. Water quality monitoring is an integral part of a program which ensures that water quality objectives are attained.

### **Cumulative Watershed Impacts**

Cumulative watershed impacts are the additive effects of land disturbing activities. They include all impacts to water quality and soil productivity occurring away from sites of primary development. Cumulative watershed impacts are transmitted from primary development sites to the impact site through water. The most common evidence of cumulative impacts is alteration of sedimentation and erosional processes within stream channels. These include channel scour, deposition, stream bank failure, mass wasting, or other undesirable occurrences such as flooding. Within-channel effects are caused by increases in peak flows due to compaction in the watershed.

Threshold of concern is the level of disturbance beyond which off-site watershed degradation is very likely to occur. When management activities cause the watershed threshold to be exceeded, accelerated channel problems are likely and downstream beneficial uses, such as fisheries and reservoir life expectancy, are threatened.

#### **Current Management**

The potential for cumulative watershed impacts to occur is within second and third order watersheds, and

not within larger watersheds (Chatoian 1983). A method to assess cumulative watershed impacts was developed to determine the off-site impacts caused by timber harvesting, road construction, and livestock grazing. All impacts are reported in percent of equivalent roaded acres (ERA), a measure of the relative amount of disturbance in the watershed.

Watershed thresholds were estimated from soil sensitivity information that includes soil depth, slope stability, erosion hazard rating, and water runoff potential. Three watersheds are estimated to have exceeded their threshold: 032—Cottonwood Creek; 071—Dutch Flat Creek; and 072—Rush Creek. Opportunities to improve these sensitive watersheds include designing activities so impacts to the channel are minimal; increasing buffer and filter strip width; installing erosion control structures; and ripping or scarifying disturbed areas to reduce soil compaction.

In the future, the Forest should not experience an increase in problems from cumulative impacts. Even with intensive timber management, the overall condition of watersheds should remain stable. In the past, the problem of cumulative impacts was never seriously considered; timber and grazing activities were planned without considering overall offsite potential impacts to stream channels. Now that the problem has been recognized, prudently scheduling activities and implementing watershed improvement or mitigation projects will help bring or maintain all watersheds under threshold.

---

## **23. Wilderness And Roadless Areas**

### **Introduction**

Encompassing 70,385 acres of relatively undeveloped land on the Warner Mountain Ranger District, the South Warner Wilderness contains rugged topography, expansive vistas, rolling hills, mountain meadows, clear streams, and the highest peaks in northeastern California. The South Warner Wilderness appears as a pristine island surrounded by rural human development, which offers excellent opportunities for solitude. Eagle Peak at 9,892 feet, Warren Peak at 9,710 feet and Squaw Peak at 8,646 feet are the conspicuous landmarks within the Wilderness. Vegetation on the precipitous eastern slope is generally sparse. The western slope is characterized by gentle, rolling topography. Vegetation includes ponderosa, Jeffrey, western white, whitebark, and lodgepole pines, white fir, western juniper, aspen, bitterbrush,

mountain mahogany, sagebrush, grasses, and riparian species.

Of the seven lakes in the South Warner Wilderness, Clear Lake, Patterson Lake, and Emerson Lake are the most well known. They provide recreational fishing for rainbow, eastern brook, redband and brown trout.

Wildlife abounds in the Wilderness, affording recreationists opportunities to observe many interesting species in their natural surroundings. In addition to fish and mammals, the Wilderness provides splendid bird-watching for the casual or most seasoned observer.

After the 1978 Roadless Area Review and Evaluation, the Forest Service recommended five areas for incorporation into the Wilderness: Granger (400 acres), Jess (300 acres), Mill (670 acres), Parker (200 acres), and Pepperdine (370 acres). On September 28, 1984, the California Wilderness Act (Public Law 98-425) added these areas (1,940 acres) to the South Warner Wilderness.

All other roadless areas were released from wilderness consideration for this planning period. No other wilderness planning areas exist on the Forest.

## Current Management

### Recreation

During the peak recreation use season, rangers periodically travel the Wilderness to help visitors comply with regulations while providing information or assistance to those who need it. Because Forest involvement and interaction with visitors has decreased over the last five years, user compliance with regulations regarding permits, litter, and recreational stock has declined.

Far from major population centers, the South Warner Wilderness has a low level of visitor use. Visitor use in 1981 was estimated at 12,100 recreation visitor days (RVDs), of which 40% were local users. Two main areas of concentrated use are the Clear Lake and Patterson Lake areas. While Clear Lake is used almost exclusively by day, Patterson Lake is used for both day and overnight activities.

### Trails

The Wilderness trail system consists of 79 miles of maintained trails. An additional 23 miles exist in the Wilderness but are neither maintained nor considered system trails.

Trail density and locations adequately provide access to most of the Wilderness. Developing additional trails into primitive areas could detract from the Wilderness

character and preclude a primitive experience for those users seeking solitude and remoteness.

### Fire

Upon detection, all fires are evaluated by the District Ranger for appropriate initial attack by suppression forces. Non-mechanized means of suppression are used if the fire does not threaten resources outside the Wilderness. If fire behavior warrants immediate suppression measures to prevent an escape, then authorization to use mechanical measures (e.g., helicopters, air tankers, chain saws) is requested from the Forest Supervisor. Formerly, fire management policy required immediate and aggressive suppression of all fires regardless of location or cause. Currently, the policy emphasizes cost-effective suppression.

### Grazing

The South Warner Wilderness was grazed long before it was classified as a Wilderness. Grazing in Wilderness areas was legally established under the 1964 Wilderness Act (P.L. 88-577). Approximately 1,655 cattle and 3,000 sheep graze these allotments, generally from July 1 to September 30.

### Visual Quality

Current direction for managing the visual resource in the Wilderness comes from the Wilderness Act. Only ecological changes are permitted, except for very low visual impact facilities, such as trails. Changes can be made to existing visual impacts, however, to make them appear more natural. The Forest Service Visual Resource Management System's initial visual quality objective (IVQO) is Preservation which conforms with the above direction.

### Fish and Wildlife

Stocking of lakes and streams began early this century. Because natural reproduction does not occur in these lakes, fish are brought in by backpack, horse-packing, and aerial drops to maintain the fishery resource. Patterson and Clear Lakes provide the best, most consistent fishing in the Wilderness and also attract the most visitors.

In 1980, fourteen bighorn sheep were transferred from the Lava Beds National Monument to the Raider Canyon area (see Wildlife section of this Chapter). By 1984, herd numbers increased to approximately 31 animals. However, in late 1987 and early 1988, the entire bighorn population died from a pneumonia bacteria (*Pasteurella haemolytica*), probably transmitted from domestic sheep or goats.

## Supply

The average use for the South Warner Wilderness during the early 1980's was 15,060 recreation visitor days (RVDs) with the lowest being 12,100 RVDs in 1981. Comparing this average use to the maximum practical carrying capacity (34,561 RVDs) indicates that the South Warner Wilderness capacity is approximately 2-1/2 times greater than its current use.

## Demand

Projections by California Statewide Recreation Plan (State of CA 1980a) and the Statewide Recreation Needs Analysis (State of CA 1982) for increases in backcountry activities indicate that recreation use in the South Warner Wilderness could increase over 60% by the year 2000. These documents predict that the three main activities enjoyed in the Wilderness—backpacking, hunting, and fishing—will increase at a rate higher than the projected population growth. However, those increases may not occur because of long distances between the Wilderness and major population centers.

Although use may not exceed the capacity of the entire Wilderness prior to the year 2030, use of preferred areas may exceed the capacity much sooner. Popular areas such as Patterson Lake are currently used beyond capacity during peak periods.

## Opportunities

Many opportunities to improve the Wilderness involve management of trails, visual quality, public information, recreation, fire, grazing, wildlife, and fish. Maintenance of existing trails and trailheads could be improved. New trails and trailheads, bridges, and signs could be designed to blend with the Wilderness environment. The Forest could provide Wilderness information at entry points. Wilderness carrying capacity could be broadened by encouraging recreationists to seek a more primitive wilderness experience.

Through standards and guidelines in the Plan, the Forest could allow lightning-caused fire to play its natural role in restoring vegetative succession in the Wilderness. Prescribed burning would reduce hazardous accumulated fuels.

Wilderness water quality and riparian vegetation could improve by implementing better grazing practices. Instream structures and riparian grazing management could improve fisheries. Bighorn sheep herds could be reintroduced into the Wilderness and protected from

domestic livestock diseases if livestock were not permitted to graze in Wilderness areas adjacent to bighorn territories.

---

## 24. Wildlife and Fish

### Introduction

The Forest is home to more than 350 species of wildlife which live in a wide variety of habitats. Each requires a particular combination of food, water, and shelter to exist. Some wildlife species occur in all vegetation types on the Forest, while others are very limited in their habitat needs. Each species plays a role in the balance, persistence, and evolution of the ecosystem of which it is a part.

### Management Indicator Species

Three categories of MIS have been developed, covering 32 species of wildlife and fish.

#### Threatened and Endangered (T&E)

T&E species are federally designated because low population levels and loss of habitat may eventually render them extinct. The Forest Service must manage habitat to achieve recovery levels of T&E species. The Forest is required to consult with the U.S. Fish and Wildlife Service (USFWS) whenever the Forest initiates any activity which may affect a federal T&E species. The Forest has six T&E species.

#### Sensitive Species

The Forest Service lists as sensitive those species needing special management to prevent federal listing as T&E. The Forest has four MIS that are sensitive.

#### Other MIS

Other MIS include harvest species (game and fish), ecological indicator species, and special interest species. *Harvest species* are important because of their contribution to local economies, and hunting opportunities. *Ecological indicator species* are used as barometers to assess the effects of Forest activities on their habitats and other wildlife species requiring similar habitats. *Special interest species* are those that were identified as important because of Resource Planning Act (RPA) goals, state or local concerns, or because of their limited distribution.

## Special Habitats

Special habitats on the Forest include black oak woodlands, dead and down wood, snags, and wetlands. Black oaks provide nesting cavities for various birds and mammals, particularly the western gray squirrel on this Forest. Wildlife species dependent on dead and down material for habitat include marten, pileated woodpeckers, blue grouse, and quail. Nearly 55 species of birds and mammals depend on snags for roosting, nesting, and feeding. Approximately 60% of the Forest land suitable for managing snags is currently snag deficient.

## Demand

Demand for wildlife and fish is determined by commercial, ecological, and social or recreational uses. Furbearing animals are the only wildlife on the Forest with commercial value. Demand for them is expected to continue. The Forest applies minimum management requirements to meet the minimum level of demand. Projections indicate an overall 60% increase in participation in hunting, fishing, and nonconsumptive use during the next 50 years.

---

## 25. Wild and Scenic Rivers

The Modoc NF inventoried and evaluated all the streams on the Forest, and determined that 17 have high resource values meriting detailed review. The Forest interdisciplinary team evaluated these 17 streams and determined that two, Willow and Boles Creeks, are eligible for wild and scenic river designation because they possess one or more outstandingly remarkable values. Further, the team tentatively identified the highest eligible classification as scenic. This evaluation and a detailed description of Willow and Boles Creeks is presented in EIS Appendix T.

---

## 26. Woodlands

### Introduction

In addition to the commercial conifer forest discussed under the *Timber* section, the Forest contains another vegetation type broadly classed as woodlands. Woodlands on the Modoc are primarily composed of aspen,

black oak, and juniper. These forested lands are not suitable for timber production, but they are valuable for wildlife habitat, firewood, forage, and recreation. Woodlands add aesthetic value to and enhance the visual quality of streams, reservoirs, and lakes.

### Aspen

Aspen are found on 13,400 acres in large contiguous stands in the Warner Mountains, and throughout the Forest in association with riparian areas. However, large stands occur so infrequently that they receive little management emphasis, except for a few rejuvenation projects. Aspen provide variation in the overall diversity of the Forest. It is valuable for deer forage and habitat, and aesthetically pleasing to view, particularly in autumn.

### Black Oak

Black oak woodlands occur in the southwest portion of the Forest below the coniferous zone. Black oak also occurs with eastside pine forests in the southwest portion of the Forest in the transition zone between brush and conifer species. Pure black oak and black oak-pine stands cover about 9,600 acres on the Forest.

Black oak woodlands provide nesting cavities for various birds and mammals, and enhance habitat diversity. Oak are a source of acorns and forage. The young leaders on small trees are forage for deer. The value of black oak to wildlife is discussed in detail in the Special Habitats section of Wildlife in Chapter 3 of the EIS.

Black oak is not managed as commercial timber. Because oak provides acorns for wildlife and regeneration, the Forest usually prohibits cutting these trees. Occasionally a commercial thinning sale is offered to promote oak regeneration or improve growth and mast production for wildlife habitat. Because black oak can stump-sprout after harvest or fire, management of this woodland type is easier than for other vegetation lacking this attribute.

In the past, oaks were often removed with the commercial softwoods in mixed stands, or cleared during site preparation. Their removal reduced visual quality and the diversity of the woodlands and the wildlife dependent on them. It also eliminated acorn producers for regeneration. Today, if oak is found within a timber sale boundary, they are retained to protect diversity, ensure acorn production, and provide wildlife habitat. Removing overstory pine and thinning small pine helps oak by reducing competition.

Oak woodlands are very susceptible to fire damage. While fire kills mature acorn-producing trees, it promotes sprouting. Most oak on the Forest are in thickets of small trees, probably less than 80 years old.

Little forage is produced in black oak or black oak-pine types. However, livestock browse on oak leaders in late summer. Some brush and very little grass grow in these stands.

### **Western Juniper**

Western juniper woodlands clearly dominate (28%) all other vegetation types on the Forest, and cover nearly 470,000 acres. Juniper grows throughout the Forest below 7,500 feet, primarily on shallow soils. It also grows with eastside pine.

Juniper provides thermal cover as well as escape and hiding cover for wintering deer herds. Large clearcuts in juniper woodlands on deer winter ranges can harm the herd by contributing to thermal stress during severe weather or very cold temperatures. However, small clearcuts (twenty acres or less), provide excellent forage while still providing cover. Cavity species nest in juniper, even when green. Judicious juniper removal generally benefits wildlife diversity.

Some juniper woodlands are also important as forage areas. When all fires are suppressed, juniper encroachment is unchecked and renders grasslands unusable for forage. When juniper woodlands are allowed to burn, the invading species is removed and soil nutrients are recycled for grass and shrub species. The Big Sage Fire Management Unit (BSFMU) is a special area on the Devil's Garden and Doublehead Districts. The fire plan for this area allows lightning-caused fires to burn with minimal suppression efforts (see Fire and Fuels section). In addition to savings in suppression costs, fires in the BSFMU have reduced juniper trees in about 215 acres. More forage is available for livestock and wildlife.

If the Forest allowed fires to burn in other juniper areas, some acres would convert to bunchgrass ranges. Fire could assume its natural role in restoring ecosystems. All fires are suppressed in recreation areas to preserve recreation values.

Managing juniper for firewood is important because of local demand. The Firewood section discusses supply and demand for juniper. Removing juniper also benefits grasses and shrubs by eliminating encroaching trees and leaving nutrients for grass and brush species important to wildlife and domestic livestock.

In most cases, woodcutters remove large trees which provide the best wildlife habitat, and leave small ones

which compete with grasses and shrubs. Another disadvantage of woodcutting is the resulting slash piles which have to be treated to make grass available. However, some wildlife species use slash piles for cover, nesting, and feeding.

Since 1980, the Doublehead Ranger District has removed juniper from about 150 acres per year through firewood sales in the Dry Lake and Clear Lake areas to promote grass and shrub growth. The problem of encroaching juniper can be alleviated by a planned firewood program resembling that on Doublehead Ranger District. Juniper firewood management will accommodate local demand and a growing market in Reno and Lake Tahoe, and enhance grass production for wildlife and livestock forage.

Historically, natural wildfire kept grasslands nearly free of juniper by burning off trees and leaving soil nutrients for grass species. Juniper woodlands have increased in the past 100 years because natural fires were not allowed to burn. The Forest Service fire suppression policy has resulted in juniper encroachment in grassland ecosystems. Historic livestock grazing further aided juniper invasion by removing grass species and providing an excellent seedbed for junipers. Currently, old juniper trees are thriving, and young trees continue to invade new areas.

As juniper woodlands expand, the crown cover closes, depriving grass and shrubs of sunlight and reducing available soil moisture. Areas that produced range forage fifty years ago are almost unusable today. Generally, attempts to eliminate juniper from rangelands have been unsuccessful.

### **Opportunities**

Opportunities exist to enhance seral stage diversity of both black oak and juniper woodlands. The Forest could maintain existing representations of black oak and juniper within each management area. It could allow land not managed for timber production to cycle naturally, unless management were necessary for other resources.

The Forest lacks consistent data on black oak and juniper. Updated vegetation maps would improve the data base and assist in woodlands management and planning.