6.3 Timber Resources

6.3.1 Setting

Jackson Demonstration State Forest, located in the coastal redwood belt, has vegetation typical of other young-growth coastal redwood forests in Mendocino County and other parts of coastal northern California. Redwood and Douglas-fir trees dominate the Forest, while hardwoods and other conifers are also present as components of redwood or Douglas-fir dominated stands. Vegetation patterns on JDSF are largely the result of previous timber harvesting activities. JDSF forest and vegetation characteristics also are discussed in Sections VII.6.2, Botanical Resources, and VII.6.6, Wildlife and Wildlife Habitat.

Timber operations within the region, and within the assessment area, generally began during the mid-1800s. The earliest operations occurred in areas closer to San Francisco, with milling facilities moving progressively northward into the vast tracts of old-growth forest. The historic progression of timber operations and forest management is similar throughout the region, except that operations tended to move northward over time, with more old growth remaining in Humboldt County than in Mendocino County during recent decades. Conversely, the most mature stands of second-growth redwood tend to be located in the southerly counties of the region.

Logging and timber production within the region reached a peak during the 1950s, in an era following World War II when the population of the country was expanding rapidly. At that time, the vast majority of the timber produced was from old growth stands. Many of the long-standing family-owned timber tracts within the region were purchased by large multi-national corporations during the 1960s and 1970s. At about this same time, timber management began to shift away from old growth and into second growth stands. In Mendocino County, local harvest intensified during this period, and there was a coincident movement away from selective cutting and towards even-aged management of young stands, although a significant amount of selective cutting still occurred. By 1990, the total forest inventory within the region had declined substantially, and vast acreage had been converted to very young, well stocked stands of redwood and Douglas-fir. By 2002, most of the corporate timberland owners within Mendocino County had divested themselves of their redwood holdings, and a new class of timberland owner became established in the area. Approximately half of the timberland within the county is held and managed by smaller non-industrial owners.

At the present time, forest growth within the region and the assessment area is on the increase, due to a reduction in harvesting and an increase in growth attributed to stands of young trees.

Forest Inventory, Growth, and Harvest

The standing inventory of tree biomass on JDSF has increased substantially since transfer of the property to the State in 1947. At the time of acquisition by the State, the

majority of the Forest area was dominated by young stands that had regenerated from logging during the prior 100 years. The Forest now contains a diverse mixture of forest types, from early to late seral, including representation of a broad range of structure conditions. This cross-section of forest types and structure classes is largely by design and a result of an ongoing effort to maintain as wide a range of forest conditions as possible for research and demonstration purposes.

In 1959, the inventory of standing timber volume on JDSF was approximately 10 thousand board feet per acre. In 2005, the standing inventory is more than four times that figure, over 40 thousand board feet per acre. Recent comprehensive estimates of standing inventory in the north coast region[1] indicates a range of 9 (McKillop and Krumland 1993) to 16 thousand board feet per acre (Waddell and Bassett 1994) on forest industry lands.

A conservative estimate of current growth on JDSF is approximately 900 board feet per acre per year. Growth on private forest lands in the north coast region is about 650 board feet per acre year on forest industry lands, and 550 board feet per acre year on all private lands (Waddell and Bassett 1994). A continuing challenge on JDSF is to manage forest stands so that the forest structure remains representative of JDSF's research and demonstration primary target group, small and medium-size forest landowners in California's north coast.

Recorded European timber management activities within the boundaries of JDSF began in 1862 with harvesting of the original stands in the Caspar Creek drainage by the Caspar Lumber Company. Initial methods involved hand labor and the use of splash dams constructed in the upper watercourse reaches to transport logs to the mill pond at the mouth of Caspar Creek. This type of logging harvested only the trees near the stream channel and was limited to the Caspar Creek drainage just above the mill site, and to the lower slopes of larger watercourses such as the South Fork of the Noyo River and the North Fork of Big River. As logging methods progressed to include the use of bull teams and steam donkeys, tributary watersheds and more remote areas were harvested. In 1876, the construction of a logging railroad began and gradually extended, until over 20 miles of mainline were in use by the time railroad logging was abandoned in 1946. At that time, operations were converted to the use of trucks for log hauling, requiring a truck road network, a system similar to that which remains in use today.

The very earliest logging tended to be selective in nature, largely due to the limitations of early logging equipment and the need to transport logs via the stream system. With the advent of the railroad and steam logging technology, early harvesting activities most closely resembled an intensive clearcut and burn silvicultural approach with no reforestation efforts and reliance on natural regeneration. This approach continued until the mid 1940s. After World War II, harvesting practices changed to partial cutting due to implementation of the California *ad valorem* timber property tax and the first forest practice rules in 1945, which contained post harvest stocking standards. In addition, the

[1] Sonoma, Mendocino, Humboldt and Del Norte counties.

advent of the bulldozer made it possible to maneuver within the forest and protect residual trees from extensive logging damage.

In 1947, the State of California purchased the property from the Caspar Lumber Company in five title transfers, with Caspar Lumber Company exercising its last harvesting rights in 1955. Clearcutting had progressed eastward to Three Chop Ridge on the divide between the Noyo and Big River drainages. The earliest stand management conducted by the state included selective logging of old stands in an eastward progression from Chamberlain Creek into James Creek, and the rest of the North Fork of Big River. Partial cutting to remove approximately 70 percent of the existing stand volume occurred until 1976, due to existing state tax policies. As regeneration became established in these partially cut areas, re-entries to remove the residual overstory began in 1963 and continued until approximately 1985. Overstory harvesting resulted in stands with irregular uneven-aged structure and a significant hardwood component. This type of stand structure is typical of current conditions on the east end of the Forest, which are significantly different from the west end.

As the partial cutting of old-growth stands was progressing in the eastern portion of JDSF, entries into the young-growth stands in the western portion of the Forest were being initiated. The first of these occurred in 1959, and continued as selective harvests conducted in the older stands first. Selective stand management began in the Caspar, Jughandle, and South Fork of Noyo watersheds. Most of the early entries were planned and implemented to remove approximately 50 percent of the standing timber volume. Later entries were generally planned to retain a specified residual stand density. As young-growth harvesting progressed, both even-aged and uneven-aged silvicultural methods were used, which provided for research and demonstration projects in conjunction with timber production.

Historically, harvest patterns in the assessment area have undergone change, from early large-scale clearcutting in old stand to a more diverse set of harvest prescriptions, reflecting an increasing use of uneven-aged silviculture. Available data indicate that timber resource depletion in the assessment area culminated in the last decade of the 20th century, and that inventories of standing biomass on most managed timberlands in the redwood region are now stable or increasing (CDF 2003).

Currently as in the recent past, the majority of acreage on JDSF is managed under uneven-aged silvicultural methods. The plan is for this trend to continue, as evidenced by Table five in the DFMP.

Figures VII.6.3.1 and VII.6.3.2 present timber harvest volume information for the timber-producing counties of the North Coast Region (Del Norte, Humboldt, Mendocino, and Sonoma counties), Mendocino county, and JDSF for 1949 through 2003.

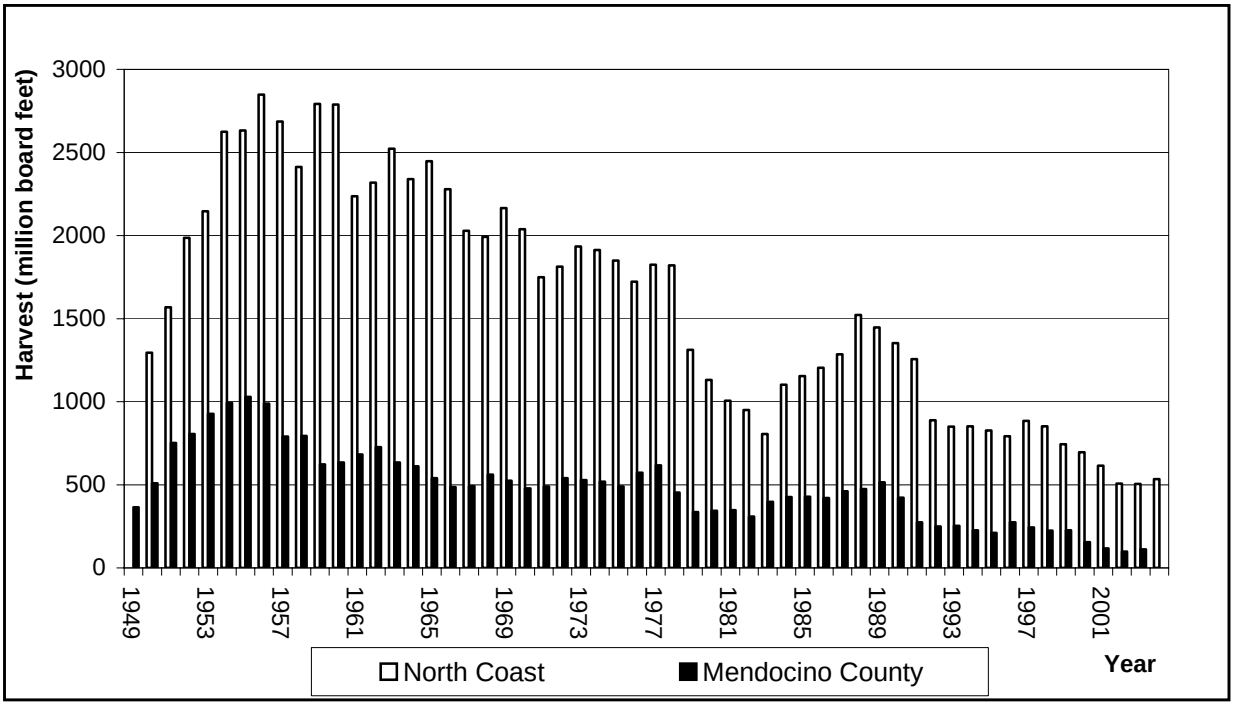

Figure 6.3.1. Historical Timber Harvests from 1949, North Coast (Del Norte, Humboldt, Mendocino, Sonoma counties) and Mendocino County.

JDSF has an ongoing forest inventory program that extends back four decades. Under this program, permanent plots and temporary plots are measured at periodic intervals to capture resource information, which allows the forest managers to assess harvest, growth, and mortality changes over time. Permanent plots have been measured every five years since 1959 under the Continuous Forest Inventory (CFI) program, to capture growth and development over time. The CFI program is aimed primarily at detecting large-scale change over time, for research and adaptive management purposes. An independent inventory effort, the Intensive Forest Inventory (IFI) is intended to capture more detailed resource information for supporting management decisions. This inventory is typically maintained and updated by applying growth projections over a 10-20 year period before being replaced. The most recent IFI on JDSF was completed in 1989 and updated in 1997. Both the CFI and IFI inventory systems were used for decision support in the Management Plan and EIR.

New inventory information will become available by the end of 2005, as a new Intensive Forest Inventory is completed. The Continuous Forest Inventory also is scheduled for completion by the end of this year.

Standard JDSF management practices are to monitor projections and inventory estimates for accuracy over time as new information becomes available. The criterion for revision of estimates and plans in light of new information will be a significant difference in overall forest wide volume estimates.

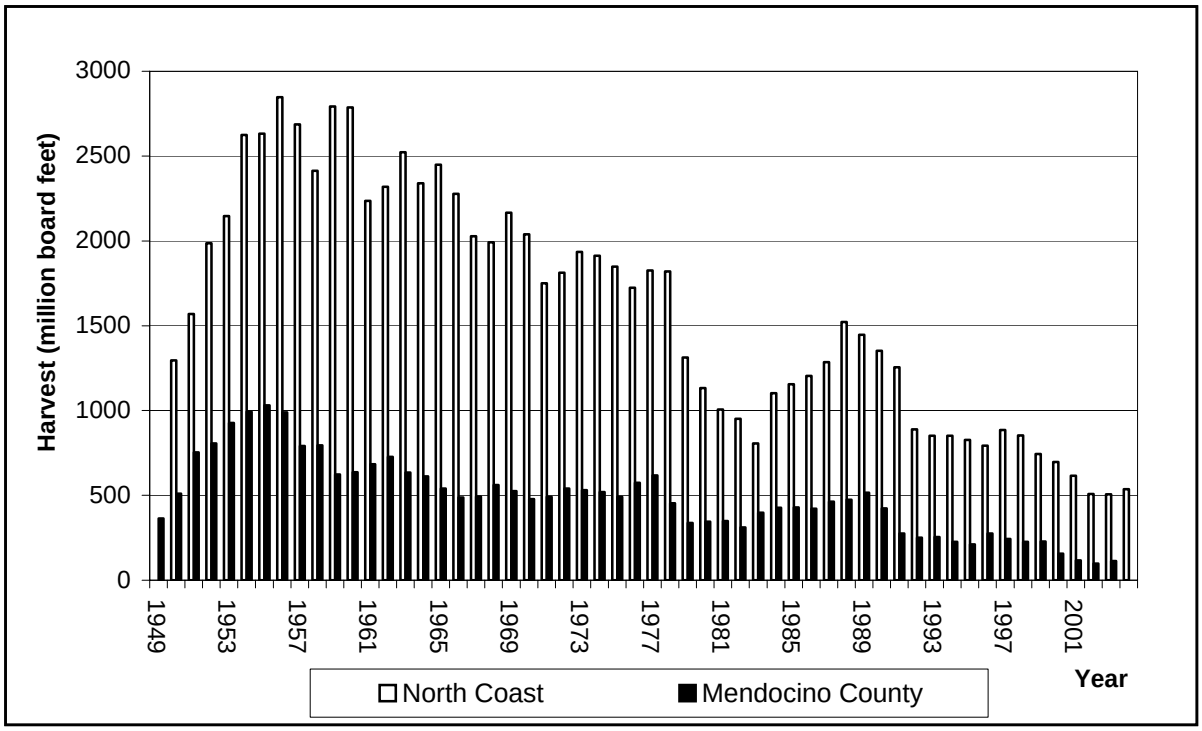

Figure 6.3.2. Historical Timber Harvests from 1949, JDSF.

Alternatives Simulations

A comparative analysis was conducted for each of the alternatives considered in this EIR. Inventory, growth, harvest and forest structure were simulated for a period of 100 years under the management regimes defined by the goal statements and management prescriptions of each alternative (Table VII.6.3.1, Figures VII.6.3.3 and VII.6.3.4). The 100-year planning interval is not intended as a projection of what will actually take place 100 years from now. Because forest stands can take 60-100 years to grow to maturity, a 100 years look-ahead is necessary to permit a comparative analysis of the long-term consequences of different management regimes.

Table VII.6.3.1. Inventory, Growth and Harvest Simulations for each Alternative Considered.

Alternative	Period 1 Inventory (MMBF)	Period 10 Inventory (MMBF)	Period 1 Annual Growth (MMBF)	Period 10 Annual Growth (LTSY) (MMBF)	Period 1 Annual Harvest (MMBF)	Period 10 Annual Harvest (MMBF)
A	2,343.0	6,119.8	47.0	64.2	0	0
B	2,148.4	2,374.9	43.6	50.5	35.6	50.5
C1	2,174.7	2,624.2	44.4	45.2	31.0	45.2
C2	2,174.3	2,701.3	44.3	45.5	31.0	44.1
D	2,211.3	3,757.5	45.6	53.2	24.9	35.5
E	2,298.8	5,800.8	46.2	62.1	8.1	11.7
F	2,240.4	4,145.5	45.8	55.4	19.3	27.5

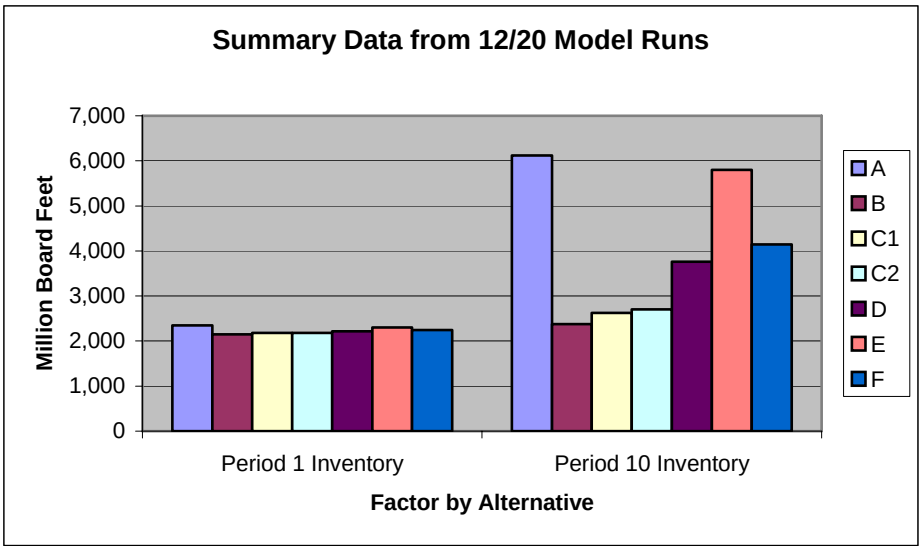

Figure 6.3.3. First and Last Period Inventory by Alternative.

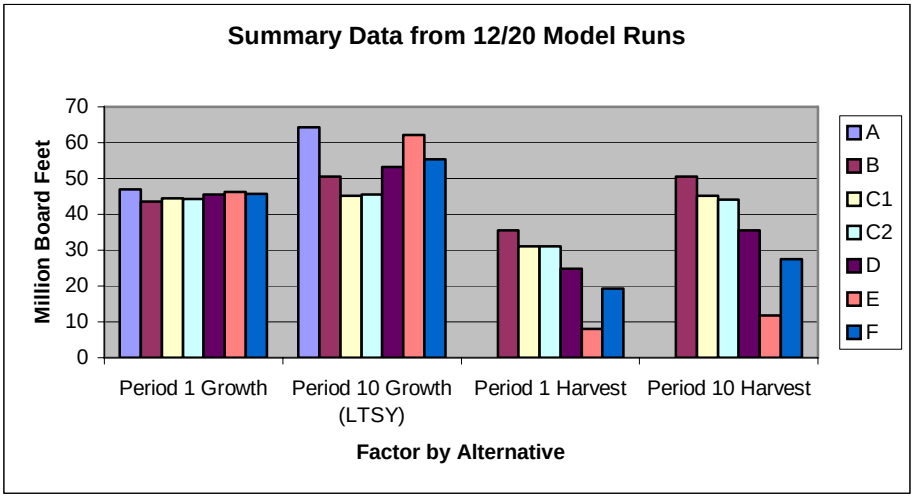

Figure 6.3.4. First and Last Period Harvest and Growth by Alternative.

The simulations indicate that for active management, the highest long-term sustained yield can be achieved under the conservative management alternatives D, E and F. Alternatives B, C1 and C2 achieve a somewhat lower LTSY but permit higher harvest levels throughout the planning interval.

Current Silvicultural Methods

Present silvicultural methods on JDSF reflect management objectives and constraints. Jackson Demonstration State Forest was acquired for the purpose of demonstration of economical forest management. Management is further defined by the legislature as "...the handling of forest crop and forest soil so as to achieve maximum sustained production of high quality forest products while giving consideration to values relating to recreation, watershed, wildlife, range and forage, fisheries, and aesthetic enjoyment" (PRC 4639).

During the 1990s, there was increased awareness of the impacts of forest management on wildlife species and their habitats. Northern spotted owl, marbled murrelet, coho salmon, and steelhead trout were listed under the federal Endangered Species Act, and the California Forest Practice Rules were amended to provide increased consideration and protection for these species and for ecosystem processes in general. These changes required elevating wildlife, watersheds, and ecosystem processes concerns to higher levels of importance in relation to the timber management and the research, demonstration and education programs on the Forest.

In response to this increasing awareness, silvicultural constraints were established in a number of special concern areas for the protection of wildlife, watersheds, and ecosystems. Constraints also have been identified for other areas with special concern or administrative status.

Silvicultural Methods in Special Concern Areas

Although not specifically addressed in the 1983 Management Plan, a number of Special Concern Areas have been developed across the Forest. Special concern areas (SCAs) are designated portions of the Forest with restrictions on forest management activities because of resource sensitivity or special administrative status. Although the timber stands that make up the special concern areas are capable of supporting a wide range of silvicultural prescriptions, the application of certain prescriptions in these areas has been limited to avoid unacceptable results relative to the resource protection required or to meet management objectives. Restricting possible silvicultural prescriptions helps to create or retain forest conditions in special concern areas that are consistent with the resource protection needs and management objectives.

The following special concern areas are considered because of their natural resource value and sensitivity to disturbance:

> *Cypress groups*—forest stands dominated by pygmy cypress that occurs on sites with generally unproductive soils (i.e., sites that are considered non-timberland), but not considered to be true pygmy forest. These areas are non-harvest SCAs. Note that conifer stands containing cypress that occur on more productive sites (i.e., site quality I-V according to the forest practice rules) are subject to harvesting and are not included in this special concern area.

Pygmy forest—a unique type of dwarf vegetation found on old marine terraces dominated by pygmy cypress and other species. This special concern area includes nearly all of the Jughandle Reserve special concern area, along with other pygmy forest stands on JDSF that occur outside of the Jughandle Reserve boundaries. These areas are non-harvest SCAs.

Jughandle Reserve—an administrative area designated to protect pygmy forest found on JDSF and to manage recreational access to these lands in a manner compatible with human use in the adjacent Jughandle State Reserve managed by the Department of Parks and Recreation. These special concern areas lie almost entirely within the pygmy forest special concern area. These areas are non-harvest SCAs.

Eucalyptus stand—this is a forest stand located in the Caspar Creek planning watershed that includes a high density of eucalyptus mixed in with Douglas-fir, redwood, and other species. The objective here is to control the spread of this invasive exotic species and promote regeneration of native species.

Old-growth grove reserves—includes the eleven existing old-growth grove reserves. These areas will not be harvested.

Northern spotted owl nest areas—buffers around known nest sites that are managed to minimize disturbance to these sites and enhance their value as nesting habitat for the northern spotted owl.

Osprey nest areas—buffers around known nest site locations that are managed to minimize disturbance to these sites and enhance their value as nesting habitat for osprey.

Watercourse and lake protection zones (WLPZ)—areas requiring special management considerations to protect aquatic and riparian resources and promote development of late seral forest stand conditions.

The following special concern areas are presently designated due to human use concerns and, in some cases, natural resource sensitivity:

Campground buffers—areas immediately adjacent to campgrounds that are managed for public safety and aesthetic enjoyment. Even-aged silviculture is not allowed within the campground buffers.

Conservation camps—areas occupied by the Parlin Fork and Chamberlain conservation camps.

Parlin Fork management area—an area adjacent to the Parlin Fork Conservation Camp that is used as a demonstration area for small woodland management.

Water supply areas—designated areas for domestic water supply on JDSF that are sensitive to disturbance. Only a limited range of silviculture is allowed in these areas.

Neighbor buffers—specified areas along the boundary of JDSF adjacent to non-industrial timberland owners where a buffer zone is designated to minimize impacts on neighbors. Only a limited range of uneven-aged silviculture is allowed in these areas.

Power line right-of-way—operated by PG&E. The power line right-of-way runs through the Forest, generally parallel to Highway 20. This area is not available for timber production.

Road and trail corridors—buffer areas along specified trails and roads to maintain aesthetic qualities desired by the public. Only a limited range of uneven-aged silviculture is allowed in these areas.

Woodlands special treatment area—a special management area adjacent to Mendocino Woodlands State Park. Harvesting is restricted within 200 feet of camp areas, cabins and main roads. With limited exceptions, silvicultural activities are focused on promoting late seral forest conditions, maintaining aesthetic qualities desired by the public, and minimizing impacts on the operation of Mendocino Woodlands.

State Park Special Treatment Areas–- areas along the boundary of JDSF adjacent to State Park boundaries where a buffer zone is designated to protect values associated with the purposes for which the park was created. Only a limited range of uneven-aged silviculture is allowed in these areas.

Research areas—areas throughout the Forest that are designated research areas or have current research projects that limit the range of silvicultural methods that may be applied.

Silvicultural methods used within the special concern areas cover a broad range of potential systems, but include a substantial area devoted to no harvest, late seral development, selection or group selection, research, demonstration, and experimental area.

Silvicultural Methods Outside Special Concern Areas

Presently, three broad categories of silvicultural are utilized on JDSF— uneven-aged silviculture consisting of single tree/cluster selection and group selection methods, even-aged silviculture, and intermediate and special treatments such as thinning and variable retention. These are further described below.

Uneven-aged Management
This is the dominant silvicultural system utilized by non-industrial forest landowners and others who wish to maintain forest cover on a site. Uneven-aged stands are generally defined as having three or more distinct age classes. There are two dominant uneven-aged silvicultural systems defined in the forest practice rules and practiced in this region: selection and group selection.

Selection Selection silviculture creates small openings ranging in size between single trees and one-quarter acre. Selection leads to stands with nearly continuous forest cover, small gaps between trees, and a diversity of tree sizes. Compartments managed under this silvicultural system will ultimately have the narrowest range of structure conditions. The typical approach is to enter each timber stand every 10 to 25 years to create a new age class. The residual growing stock level, largest tree to be managed for, and the ratio of large trees to smaller trees are usually adjusted on a site-specific basis. Larger or older trees may be kept to meet objectives other than silviculture, such as wildlife habitat or large woody debris recruitment.

Many selection harvest units have not yet had the kinds of repeated harvest entries that lead to multiple age classes and canopy layers, and only a very few have had more than two such entries. Many stands presently managed under the selection system are even-aged, single-canopy young-growth stands, or have had only one partial cut that may or may not have resulted in successful creation of a new age class. Within the region, the practice of selective harvest of young-growth stands began only 40 to 50 years ago. A complete transition to an uneven-aged structure is largely theoretical, and may take up to 80 years or more. Each potential selection harvest unit is evaluated to determine the most appropriate treatment to move its condition towards a stand with a balance of well-growing age classes. Evaluation characteristics and examples of potential treatment options include:

Existing regeneration—Where a number of age and size classes are already established, it will likely be sufficient to continue a series of partial harvests of the overstory. In an even-aged stand with no regeneration, it will be necessary to create openings in the canopy large enough to allow sunlight to reach regeneration, often considered in terms of an opening of a width equivalent to a specific percentage of the height of the tallest trees within the stand (typically 50% or more).

Stand density—A relatively open stand tends to receive more light at the level of the regeneration, so a light harvest of the overstory may be appropriate. A closed stand may require a more intensive harvest of overstory trees in order to obtain light for growth of regeneration.

Competing vegetation–Stands with large components of brush or low value trees may benefit from a more aggressive harvest and regeneration effort, depending upon management objectives.

Group Selection Group selection management creates stands with a large amount of structural diversity but little variability between stands. Group selection differs from clearcutting because the size and shape of group openings maintains significant influence from the surrounding stands (i.e., shade, seed, etc.), and by maintaining relatively continuous forest cover at the landscape level. Stands are considered to be larger than group openings. Stands managed under this system will eventually contain groups of trees at multiple stages of development, from recently regenerated to mature. The present cutting cycle for an area designated for group selection is 10 to 25 years with the goal to establish three or more separate age classes by the time the management compartment reaches a regulated condition.

The size of group selection openings ranges from ¼ acre to 2½ acres. Within stands, group sizes remain fairly constant to allow comparison between stand management options. The intent of this silvicultural method is to demonstrate and assess a range of harvest opening sizes, and maintain availability of diverse site conditions for research within the Forest.

An exception to the typical group opening size of ¼ to 2½ acres is the Fourteen Gulch compartment where openings will be as large as five acres. A five-acre opening roughly corresponds to the limit of influence from trees that are 180 feet tall. These larger openings are considered even-aged harvest areas under the forest practice rules.

Even-aged Management

Even-aged regeneration methods in use today include clearcutting, shelterwood, and seed tree methods. Even-aged harvests implemented in recent years within JDSF have involved treatment of areas between 2 ½ and 40 acres in size, although harvest units over 30 acres are uncommon. Over the past decade, even-aged management in JDSF has evolved to include retention of forest habitat structure elements in many stands, such as large green trees, snags, and hardwoods. There is considerable potential to vary the schedule and placement of even-aged units to maintain or create different habitat patch sizes and habitat connectivity.

Future implementation of even-aged management on JDSF may involve stands with habitat structure retention, stands with two distinct age classes present, and stands with a single age class, as well as stands that combine elements of multiple systems

One-aged stands (commonly created through clearcutting) are expected to be limited to research projects and for timber stands with very difficult conifer regeneration issues.

Some of the criteria used in evaluation of stands for even-aged harvesting include:

> *Stand growth*–Stands with a projected mean annual growth rate that is much less than that expected may be candidates for regeneration. Conversely, stands exhibiting rapidly increasing growth may be candidates for harvest deferral.

Cumulative effects–The amount of regeneration harvesting in an assessment area may need to be constrained in order to reduce the potential for adverse cumulative watershed, habitat, aesthetic, or other environmental impacts.

Habitat diversity, habitat availability, forest structural elements, patch size, and connectivity.

Diversity of age classes for research and demonstration needs–A research or demonstration project may require the acceleration or delay of an even-aged regeneration harvest. Even-aged structure conditions are created in harvest units from 2 ½ to 40 acres in size. Sufficient sunlight reaches the forest floor for newly established shade intolerant conifer species to grow vigorously, and influences from surrounding stands are minimized due to the size and configuration of the harvest unit. Even-aged regeneration harvests presently used in JDSF comply with the size, spacing and timing restrictions of the forest practice rules.

Stand age–This variable is frequently used as a surrogate for seral stage. The use of age as a management variable serves as a planning tool in the scheduling of harvests and planning the distribution of seral stages across the Forest.

Special Treatments

Thinning is used to control the structural attributes of a timber stand or compartment generally at intermediate points during an even-aged rotation period, but also may be used as a means of controlling stocking in an uneven-aged management area. Some considerations in deciding whether to thin a stand include:

Density and growth rate–The production of a heavily stocked stand whose growth is being limited by tree-to-tree competition can benefit from thinning.

Species mix–Different species reach maturity at different ages. In mixed stands, cutting species that mature more quickly may increase overall stand performance.

Age class balance–It may be undesirable from a compartment-wide or forest-wide standpoint to create additional stands in the youngest age class. In this case, thinning can extend the productivity of a stand nearing rotation age.

Variable retention is a silvicultural method that, as the name implies, involves leaving variable levels of residual trees in the harvest unit. The spatial configuration of the leave trees also can vary along a continuum from widely dispersed to clusters or groups of trees. This silvicultural method is relatively new, and has significant potential as an alternative to traditional even-aged methods. JDSF has implemented several variations of the variable retention method. Most of these have been classified as even-aged methods under the forest practice rules, due to the fact that variable retention only recently became a recognized silvicultural method under the forest practice rules.

Table VII.6.3.2 provides a summary of the silvicultural methods used by the Forest between 1980 and 1999. Additional information on JDSF harvest history can be found in Section VIII Cumulative Effects and Appendix 14. Review of Table VII.6.3.2 indicates a significant trend in the timber management practices of the Forest. The trend reflects a shift in forest research priorities during this period of time. Although total harvest acreage increased in the 1990s, the management shifted from shelterwood removal and clearcut to selection and commercial thinning. In the 1980s, uneven-aged management (selection and group selection) and commercial thinning accounted for approximately 25 percent of the harvested acres. In the 1990s, uneven-age management (selection and group selection) and commercial thinning accounted for more than 80 percent of the harvested acres.

Forest Vegetation Classification on JDSF

Three general vegetation classification systems have been used to describe and map the vegetation and habitat types on JDSF. The timber sections of this analysis use the JDSF Vegetation Classification System, the wildlife section (VII.6.6 Wildlife and Wildlife Habitat) uses the California Wildlife Habitat Relationship (CWHR) system and the botanical section (VII.6.2 Botanical Resources) uses a system based on the series and associations developed by Sawyer and Keeler-Wolf (1995) and Holland (1986). Each system has been used for a specific purpose based on the strengths of the system.

Old-Growth and Late Seral Development Areas

Old-growth forests are a unique vegetation community within the Forest. In addition to the biological functions of old-growth forests, a significant segment of the public believes that old-growth forests are a resource with significant values that should be preserved. There is currently no clear definition for “old-growth” in the forest practice rules or the 1983 Management Plan. For example, tree size in and of itself is not a reliable indicator of tree age due to the influence of site conditions on tree growth rates. Similarly, many of the suppressed or intermediate redwood trees retained after logging activity in the 1880s and early 1900s have been released from competition and now appear to be second-growth trees, but in reality possess an "old-growth" core.

There are 11 old-growth groves designated on JDSF, totaling 459 acres. Residual old-growth trees are also present as isolated individuals or in small aggregations across JDSF. The designated old-growth groves are currently managed as non-harvest areas. Aggregations of residual old-growth trees and isolated individual old-growth trees have also been retained during recent timber harvesting except where trees were removed for safety reasons or to allow road construction.

Table VII.6.3.2. Summary of the Silvicultural Methods Used by the Forest, 1980 through 1999 (acres).

Year	SEL	GS	CT	CC	SWR	SWP	SWSS	STRT	STSS	SS	PRW	Total
1980					618							618
1981	223		239	12	294							768
1982			246	7	1,123							1,376
1983	96	182	142	94	1,360							1,874
1984	35	247		167								449
1985	42			90	546							678
1986	64	290		324	544							1,222
1987	30		48	291								369
1988	306		77	404			42					829
1989			65	256	346				43			710
1990	367			41			217					625
1991	513		10	119		94		102			171	1,009
1992	242	272	236	8					30			788
1993	63	303		61				19				446
1994	286	112	277							22		697
1995	426		1,687					332	190			2,635
1996	1,589	730	6	39								2,364
1997	559	154						238				951
1998	306	261										567
1999	559											559
1980-1989	796	719	817	1,645	4,831	0	42	0	43	0	0	8,893
1990-1999	4,910	1,832	2,216	268	0	94	217	691	220	22	171	10,641
Total	5,706	2,551	3,033	1,913	4,831	94	469	691	263	22	171	19,534

SEL: Selection, GS: Group Selection, CT: Commercial Thin, CC: Clearcut, SWR: Shelterwood Removal including diameter limit harvesting, SWP: Shelterwood Prep Step, SWSS: Shelterwood Seed Step, STRT: Structure Tree Retention with Evenage cut, STSS: Seedtree Seed Step, SS - Sanitation/Salvage, PRW: Power line Right of Way

JDSF also contains young-growth forest that is beginning to develop late seral forest characteristics (the term “late seral” as used in this document is synonymous with “late successional”). Based on the definition of a late seral forest stand contained in the forest practice rules, functional characteristics of late seral forests include large decadent trees, snags and large down logs. Similarly, late seral forests are characterized in the forest practice rules as having large trees, multi-layered canopy and a large number of snags and downed logs that contribute to an increased level of stand decadence.

Approximately 60 percent of the Forest is classified as consisting of stands with trees larger than 24 inches DBH. Forest inventory data indicate that there are less than two

snags per acre across the Forest with an average diameter of approximately 18 inches. Approximately half of the snags are conifers. There are approximately eight pieces of LWD per acre larger than 16 inches diameter and 20 feet long. Most of the LWD is moderately to severely decayed. A multi-story canopy structure is developing in some of the managed stands. Inventory data indicate that as much as 19 percent of the Forest may be occupied by multi-storied stands.

Several areas across the Forest have been designated as late seral or late seral development areas including class I and II WLPZs, and most of the Mendocino Woodlands Special Treatment Area (MWSTA). Management practices in these areas have been modified to promote the development of late seral forest characteristics. There is an exception to promoting late seral forest conditions in the MWSTA, where the approximately 270 acres Railroad Gulch silvicultural study investigates the long term effects of single tree and group selection.

Species Diversity

Forest management activities have the potential to impact conifer species diversity and hardwood abundance. Presently, redwood and Douglas-fir are the favored conifer species for regeneration. Hemlock and grand fir are managed for no increase over current levels. Bishop pine is being controlled to remain a minor species where it occurs in commercial stands.

Where artificial regeneration is used following a timber harvest, both redwood and Douglas-fir seedlings are generally planted. The relative numbers of each species is determined after an assessment of the site to evaluate whether it is more suited for one species or the other.

Economically, the relative value of hardwoods remains low. Ecologically, they are important species; some of their many functions include forest structural diversity, wildlife food, and wildlife habitat. In the management of timber stands throughout the Forest, hardwoods are now considered individually, in a similar fashion as conifers. Individual hardwoods are retained in most stands in order to recruit hardwoods into larger size classes and to develop valuable wildlife habitat elements. In areas where hardwood abundance is high relative to historic conditions, or it is otherwise considered desirable to reduce hardwood stocking, hardwoods may be controlled. Control methods include mechanical cutting and chipping or burning, and ground based application of herbicides. Hardwoods are a minor component of stands on the west end of the Forest, averaging approximately 10 percent of the basal area. On the east end, hardwoods make up approximately 24 percent of the basal area on average.

Stand Improvement Practices

Timber stand improvement includes all activities other than commercial harvesting that are considered necessary to establish, grow, and achieve the desired species composition, spacing, and rate of growth of forest stands on Jackson Demonstration

State Forest. Timber stand improvement activities that have been used on JDSF include the following:

Tree Planting Tree planting involves the hand planting of seedlings. This method of regeneration is effective for achieving control of species mix, seedling type, and stocking levels. Regeneration by natural seed cast can also be quite effective, but is somewhat subject to chance. With the prevalent sprouting properties of redwood, the most common and effective site regeneration technique used in this region is interplanting conifer seedlings in the openings between redwood sprouts.

Control of Competing Vegetation To provide successful establishment and growth of desired tree species, it is occasionally necessary to control plant species that compete with desired species for water and sunlight. Control methods may include mechanical cutting and chipping and use of herbicides.

It is anticipated that a combination of control methods will occur, and the preferred methods of choice of brush control will be determined at the project level. Section VII.8, Hazards and Hazardous Materials, and Appendix 13, Brief Description of Herbicides Considered for use on Jackson Demonstration State Forest, provide additional information on expected use of herbicides under the DFMP.

Fertilization Soil fertilization may be used to increase the growth of desired forest tree species. Fertilization generally involves aerial or ground-based dispersal of granular fertilizers. Fertilization will not be used as a stand improvement practice on JDSF except in conjunction with a specific research project. One fertilization trial was completed in the 1970s with inconclusive results. No fertilization research projects are currently under consideration.

Precommercial Thinning and Pruning Precommercial thinning reduces the density of very young stands that have not yet reach a commercial age. Thinning may be conducted to increase tree growth by reducing stand density, and to alter the species composition of the stand. Precommercial thinning is generally conducted by mechanical means, including the use of chainsaws. The practice of pruning involves the mechanical removal of the lower limbs of selected trees species to produce more clear wood without knots in order to increase the eventual product value of the pruned trees. Limbs are generally pruned with a chain saw.

Prescribed Burning Prescribed burning is occasionally utilized to reduce slash concentrations or forest fuels, or to control species composition. Broadcast burning is generally used after regeneration harvesting to remove or reduce slash loading and improve access for tree planting. JDSF has not conducted any broadcast burning for the treatment of logging slash since 1993. Prescribed burning involves the introduction of fire under controlled conditions that reduce the risk of catastrophic fire damage. Prescribed burning can be utilized as a tool to alter fuel loading for wildfire prevention purposes, to help create wildlife habitat structural elements, to prune ladder fuels, and to imitate the role of natural wildfire in the management of some forest stands.

Cone Collection Cones are selected and taken from specific trees to acquire seed that will eventually be used for nursery production of desired tree species. Cones may be collected by climbing trees and cutting cone-bearing limbs, by falling individual cone-bearing trees, or by a cone rake suspended from a helicopter.

Site Preparation Mechanical site preparation involves the use of machinery to prepare a site for planting, seeding, or natural regeneration. The most common method is to use a crawler tractor and dozer blade with brush rakes for clearing vegetation and/or scarifying the soil. This may also involve burning the resulting slash piles. Other less intensive methods include clearing individual planting spots through use of a chainsaw and hand tools. Significant use of site preparation as a regeneration tool is not anticipated.

Slash Treatment In general, slash created by logging activity is retained on site without treatment. The California Forest Practice Rules require that accidental deposits of slash within Class I and Class II watercourses be removed. Slash deposited into Class III watercourses must be removed unless it is stable within the channel.

The California Forest Practice Rules also require that slash be treated within specified distances (200 feet or less) of public highways and residential structures. The treatment generally consists of removal and/or lopping to a specific height above the ground surface. Slash may be treated along specific JDSF roads or other areas as an aesthetic consideration; that treatment also tends to reduce the risk of fire.

Minor Forest Products

Minor forest products are available for sale to the public and private commercial interests, subject to specific rules and constraints. The following products are offered: salvage sawlogs, poles, split products, greenery (e.g., boughs, shrubs, and ferns), mushrooms, firewood, roots, stumps and curly (dead burl). The harvest of these products is limited and controlled through the issuance of permits and collection of fees. Forest management activities have the potential to impact the availability of this resource.

Salvage Sawlogs The term salvage refers to recovery of logs from trees that have been subjected to disease, windthrow, and other forms of mortality or decline. Logs may be purchased from the State Forest, subject to permit constraints and applicable state regulations. The removal of salvage sawlogs requires the purchaser to be in possession of a valid timber operator's license. All timber operations are limited by the Forest Practice Rules and constraints established by the State Forest manager. Typical State Forest constraints include provisions for clearance from watercourses, slope limitations, wet weather restrictions, and pre-location of yarding and hauling facilities. All log locations are pre-specified. Logs and wood products originating from standing snags or old-growth trees may be collected only when snags or old-growth trees are felled based

on a determination that, if left standing, they represent a hazard near campgrounds and road roads, or threaten CDF or neighboring structures and improvements.

Firewood Firewood may be purchased by holders of a valid permit, available from the State Forest. Firewood collection permits can be purchased for personal and commercial purposes. Firewood collection is limited to dead and down material, and does not include either old-growth material or potential conifer sawlogs. Firewood collection is limited to pre-designated areas, and is generally subject to constraints such as watercourse clearance, slope limitation, weather conditions, and access road designation.

Greenery Permits to collect greenery are available to the public. Very little of this activity occurs as a general rule, but a few permits are issued every year. In recent years, permits have been issued for the collection of Douglas-fir boughs, ferns, salal, and huckleberry brush.

Mushrooms Mushroom collection permits may be purchased for both personal use and commercial collection. Collection volume is limited, although areas of collection are not constrained.

Poles and Split Products Permits may be purchased for collection and manufacture of poles and split products. Old-growth material may not be collected. Typically, poles are derived from thinning of young redwood/Douglas-fir stands. Very little split product is manufactured, due primarily to the restriction against collection of old-growth material. Areas near watercourses are restricted in order to retain large woody debris with specific ecological value.

Harvesting Systems

The three primary logging systems used and anticipated on the State Forest are tractor, cable, and helicopter. Selection of the logging system for a harvest unit is based primarily on terrain and site sensitivity, with other factors such as noise and accessibility playing a role in some cases.

Tractor logging, referred to as “ground based” in the Forest Practice Rules, includes skidding with track-laying bulldozers, rubber tired skidders, and other machines which travel along the ground. Tractor logging is generally used on gentler slopes where ground disturbance and excavation can be controlled.

Cable logging involves use of a long cable suspended between a yarding machine and a pulley, or tail block, which is capable of lifting and moving logs up or down slope without the need for heavy machinery to move along the surface of the ground. Most of the cable logging done on the Forest is termed short span skyline, meaning that the cable can reach up to about two thousand feet from the yarder and can lift at least one end of the logs being skidded. Cable logging has the advantage of not requiring heavy equipment to travel throughout the harvest unit, thus reducing the amount of excavation

and ground disturbance. In some cases, it is possible to log not only the slope immediately below the yarder, but also the opposite slope, lifting the logs clear of any watercourse and riparian zone in the valley. This can have enormous benefits in reducing the need for truck roads and stream crossings. Communication between the yarder operator and the choker setters is by means of a horn, which can bother residents and recreational users near the logging operation (see Section VII.12, Noise). There is no practical limit to the steepness of slope that can be cable yarded. In terms of efficiency and economics, cable logging typically costs about 25 percent to 50 percent more than tractor logging, although there are situations of steep slopes where cable logging may be cheaper than tractor logging.

In helicopter logging, the helicopter lifts logs clear of the ground and carries them to a roadside landing. This system provides the most protection in sensitive areas, but it is significantly more expensive than cable and tractor systems. Because of the downdraft from the rotors, helicopters can cause damage to residual trees by breaking tops and branches if proper care is not exercised. Both downdraft and noise are potential impacts on nests and other wildlife elements, and noise can be a serious disturbance to residents and recreational users. For safe operation of loading equipment, helicopter operations usually require landings larger than for cable or tractor logging, due to the capability of many helicopter operations to move large numbers of logs in a short period of time.

Almost all future road construction on the Forest will be to access new landings to serve one of these three logging systems. Thus, the designs of logging and road systems go hand-in-hand. The most restrictive system for landing locations is cable. Yarders must be positioned so that the skyline cable can be rigged well above the terrain and lift logs clear of watercourses and other sensitive areas. Helicopter operations benefit from landings that are slightly lower in elevation than the harvest unit and with as short a flight distance as possible. Tractor operations can often use landings constructed for other systems, or build new landings along existing roads.

In general, helicopter logging is used in inaccessible and particularly sensitive areas. These include odd corners within the property lines, and long, steep or convex slopes where it is not feasible to place an access road and yarder landing above the harvest unit. Considerations of noise and disturbance impacts on nest sites and neighbors affect the decision to prescribe helicopter use. Cable systems are employed on steeper slopes (generally above 35 to 40 percent) and in other areas where sensitive resources require protection from ground disturbance. Ground based equipment is used on the gentler slopes, along ridgelines and on terraces in the western part of the Forest.

Table VII.6.3.3 indicates the acres of JDSF area harvested by yarding method between 1980 and 1999. Additional information on yarding methods can be found in Section VIII Cumulative Effects and Appendix 14. Review of Table VII.6.3.3 reveals a trend in the Forest management toward the increasing use of cable and helicopter yarding methods. In the period from 1980 to 1989, 65 percent of the harvested acres were tractor yarded

with 35 percent cable yarded. In the 1990 to 1999 period, 35 percent was tractor yarded with 60 percent cable and 5 percent helicopter yarded.

Table VII.6.3.3. JDSF Acres Harvested by Yarding Method between 1980 and 1999.

Year	Total Acres	Helicopter	Cable	Tractor	Percent Helicopter	Percent Cable	Percent Tractor
1980	618		108	510		17	83
1981	769		73	696		9	91
1982	1,378		434	944		33	67
1983	1,874		611	1,263		33	67
1984	449		149	300		33	67
1985	678		361	317		53	47
1986	1,222		449	773		36	64
1987	369		193	176		52	48
1988	828		366	462		44	56
1989	709		329	380		46	54
1990	625		518	107		83	17
1991	1,008		592	416		59	41
1992	788		213	576		27	62
1993	446		241	205		54	44
1994	696	106	435	155	15	63	22
1995	2,633	151	1,602	880	6	61	33
1996	2,364	240	1,189	935	10	50	40
1997	952		817	135		86	14
1998	567		400	167		70	30
1999	558		328	230		59	41
1980-1989	8,894		3,073	5,821		35	65
1990-1999	10,637	497	6,335	3,806	5	60	35
Total	19,531	497	9,408	9,627	3	48	49

Transportation of Forest Products

Legacy and Existing Road Network The Forest road network provides access for management and recreational purposes. The current road network reflects a history of various transportation technologies and forest practices. Beginning in the 1870s, railroads were used to transport logs in some watersheds and railroad grades were located along or adjacent to streambeds. Some railroad grades have been converted for use by logging trucks and other vehicles. Most of the roads on JDSF were constructed between 1950and 1980. Roads constructed during this period generally included an inboard ditch, drained by relief culverts. This drainage system requires maintenance of the ditches and pipes to avoid water diversion or concentration of runoff.

Two basic types of roads were constructed in this period: fire roads along ridge tops and timber access roads. By 1958, at least one-third of the currently existing roads in JDSF had been built, including the following main highways and logging roads:

- Caspar Logging Road (Rd 500)
- Willits- Mendocino County Road (Rd 408)
- West Chamberlain Creek Road (Rd 200)
- Main Chamberlain Creek Road (Rd 250)
- Road 800
- Road 361
- Road 300
- Highway 20
- Caspar-Little Lake Road (Rd 409)
- Road 700
- Road 730

Additionally, the following fire roads had been constructed:

- Indian Springs Road (Rd 330)
- Three Chop Road (Rd 1000)
- Chamberlain Ridge Road (Rd 230)
- Road 240
- Road 310
- Road 360

Young-growth harvest, nearly all of it in the western area of the Forest, began in the 1960s. Road work and young-growth harvesting were completed initially in the Hare Creek and Caspar Creek planning watersheds. Roads were generally built along the bottoms of these drainages, and in some cases along the mid-slope.

By 1980, the majority of the roads on the Forest had been constructed. The 1983 Jackson State Forest Management Plan stated that, at that time, about 360 miles of road existed and were concentrated in the east and west ends of the Forest (CDF 1983). The 1983 plan indicated a need for about 55 miles of new road, mainly in the Noyo drainage, North Fork of Caspar Creek, and Fourteen Gulch (CDF 1983). Most of these proposed new roads have now been built.

Construction standards for roads on the Forest have changed substantially over time.

Old roads continue to affect stream channels in many locations on the Forest, including some of those areas where JDSF roads use old railroad grades located along or adjacent to streambeds.

Road Planning, Design, and Construction/Reconstruction

The majority of the Forest area has now been roaded, although temporary and secondary roads will be constructed in the future. In addition, a substantial level of watershed restoration activity is anticipated in many watersheds as un-needed and environmentally unacceptable roadways are removed and replaced by newer systems located away from watercourses.

Road, landing, and stream crossing design and construction/reconstruction standards and procedures are described in the Road Management Plan (see below), as well as the forest practice rules.

Road Maintenance

Road maintenance commonly includes surface grading, clearing bank slumps, repairing slumping or sliding fills, clearing ditches, repairing or replacing culverts and bridges, adding surface material, dust abatement, and installing or replacing of surface drainage structures. Road maintenance for fire prevention, public access, and timber management may include mechanical, chemical, and biological control of roadside vegetation. The most commonly controlled species in JDSF include Scotch broom, French broom, pampas grass, Ceanothus, tanoak, coniferous species, and various grasses. Chemical control may include direct application of herbicides according to label directions and safety precautions. Mechanical control may include grading, hand cutting or pulling, use of a "brush buster"-type mechanical device, burning, steaming, and other experimental methods.

Road maintenance standards to be used on JDSF are described in the Road Management Plan and as contained in the forest practice rules.

Road Management Plan

The DFMP proposes a Road Management Plan. The Plan provides for an inventory of all roads, setting priorities for road improvement, abandonment, and new construction, and implementation of these actions using best current practices. Environmental benefits associated with implementation of the road plan will include a reduction in sedimentation, an increase in slope stability, an improvement in fish passage ,and an increase in cable yarding capacity.

Rock Pit Use

Rock pits, also referred to as borrow pits or quarries, are locations where rock is excavated, crushed, blasted, or otherwise produced for eventual use as a road surface or road fill material. Activities associated with the use of rock pits also include loading rock into trucks, hauling of mined rock, and the construction and maintenance of rock pit access roads.

There are approximately 23 rock pits that have been historically used on JDSF. There has been no active quarrying within the past five or more years, except for small amounts (<100 cubic yards) of loose material taken from a couple of locations. Road surface rock used on the Forest has been brought in from off-site in recent years. The extent of future rock pit use is not known, but some level of need is anticipated. Rock pits also are discussed in Section VII.4, Mineral Resources.

Water Drafting for Dust Abatement

Water drafting involves pumping of stream water into a water truck, which is then applied to road surfaces in order to minimize dust production and help maintain a hard, compact surface. Occasionally, specific locations within or adjacent to watercourses are excavated or dammed to increase in-channel storage area for drafting purposes. Drafting is controlled to limit stream flow reductions and prevent injury to juvenile salmonids. Water drafting activities are subject to review by CDFG. See section VII.6.10 Hydrology and Water Quality, for further discussion of water drafting.

Wet Weather Road Use Restrictions

Present road use restrictions are described in the Forest Practice Rules. Section 923.6 of 14 CCR directs that road use may not occur during generally wet conditions when equipment cannot operate under its own power or when sediment discharge from landings or roads will reach watercourses in amounts deleterious to beneficial uses of water. Section 895.1 of 14 CCR defines saturated soil conditions and Section 916.9(l) prohibits use of logging roads, tractor roads, or landings where saturated soil conditions exist. The Forest also imposes a seasonal road closure that generally starts the end of October and extends into the spring of the following year. Roads are re-opened based on road and weather conditions. Many of the main roads with rocked surfaces remain open during the winter for public access, but are closed if road or weather conditions are such that continued use would result in damage to the road or impact to other resources. The Forest also implements wet weather log hauling restrictions as an enforceable measure of individual THPs.

6.3.2 Regulatory Framework

Public Resources Code (PRC)

Jackson Demonstration State Forest was acquired for “demonstrating economical forest management” (PRC 4531). “It is further declared to be in the interest of the welfare of the people of this state, that the State do all of the following: retain the existing land base of state forests and timber production for research and demonstration purposes.” (PRC 4631.5)

The legislature further gave the authority for the management of the Forest to the California Department of Forest and Fire Protection with oversight from the Board of Forestry and Fire Protection. The enabling legislation states, “the Department in

accordance with plans approved by the Board, may engage in the management, protection, and reforestation of state forests" (PRC 4645), and goes on to state "the Director, acting in accordance with the policies adopted by the Board, shall administer this chapter. He can exercise all powers necessary to accomplish its purposes and intent." (PRC 4646) The legislature clarified the interaction between CDF and the BOF as follows "the management of state forests and the cutting and sale of timber and other forest products from state forests shall conform to regulations prepared by the director and approved by the Board. These regulations shall be in conformance with forest management practices designed to achieve maximum sustained production of high quality forest products while giving consideration to values relating to recreation, watershed, wildlife, range and forage, fisheries and aesthetic enjoyment." (PRC 4651)

Forest Practice Act and Forest Practice Rules

Forest management activities on the Forest are subject to the requirements of the Forest Practice Act (FPA, PRC § 4511 *et seq*.)) as administered through the Forest Practice Rules (FPR, 14 CCR § 895 *et seq.*). Registered Professional Foresters follow the provisions of the forest practice rules in preparation of timber harvesting plans (THPs). The THP preparation and review process substitutes for the EIR process under CEQA pursuant to PRC section 21080.5. THPs are designed to achieve maximum sustained production of high quality timber products while giving consideration to values relating to recreation, watershed, wildlife, range and forage, fisheries and aesthetic enjoyment, as directed by PRC 4651. Option A plans or sustained yield plans are also required under the Forest Practice Rules to provide a long-term, landscape-level assessment of the sustainability of planned management.

Compliance with Other Applicable State and Federal Laws

The forest practice rules require that activities on JDSF be in compliance with all other applicable state and federal regulations. This includes, but is not limited to the Federal Clean Water Act, the Federal Endangered Species Act, the State Endangered Species Act, and State Porter Cologne Act. The State and Federal Endangered Species Acts are addressed in the Wildlife and Wildlife Habitat an the Aquatic Resources sections of this EIR, and the Federal Clean Water Act and State Porter Cologne Act are addressed in the Geology and Soils and the Hydrology and Water Quality sections.

6.3.3 Proposed JDSF Management Measures for Protection of Timber Resources

The discussion below covers the goals and objectives relevant to timber resource management in the DFMP.

Old-Growth and Late Successional Characteristics

DFMP Standards/Requirements The DFMP objective for old-growth groves is to protect existing old-growth groves and improve their value as wildlife habitat. A related objective is to retain selected individual old-growth trees and small aggregations within

young-growth stands to maintain and enhance the ecological value of these stands for native species. Within the old-growth reserves, some actions such as understory burning or snag creation may be considered in order to simulate the kinds of natural disturbances that occur in and sustain old-growth forests. Old-growth trees and old-growth aggregations are defined below.

An old-growth conifer tree is any live conifer tree that was present prior to 1860, based on the professional judgment of JDSF staff. Old-growth conifer trees with one or more of the following structural characteristics will be retained as provided in the DFMP.

(a) DBH greater than 48 inches.
(b) goose-pen (an opening one-foot or more in diameter inside and above the top of the trunk opening)
(c) platform branches greater than 8 inches in diameter
(d) exfoliating flanged bark slabs
(e) chimney top (hollowed upper stem)
(f) dead top at least 16 inches in diameter and 16 feet long

The bark is more deeply furrowed and more weathered on old-growth trees than on young-growth trees, often having a plated appearance. Bark scorching may be heavier on old-growth trees, indicating that they were present during fires that occurred before the first logging in the Forest. A tree size that is larger than would be expected for the stand age, management history, and site quality may indicate an old-growth tree. Limbs that are significantly larger in diameter than expected for the stand age, site quality, and canopy closure may indicate an old-growth tree. Limbs often extend from the trunk at more of a downward angle than is common in younger trees.

Old-growth conifers with any of the attributes described in (a) through (f) above will be retained in any prescription unless the tree presents a public safety issue or retention would result in the potential for greater long-term environmental damage, including but not limited to issues related to road and landing siting, soil instability, damage to aquatic resources, or cable yarding requirements.

Old-Growth Aggregations An old-growth aggregation is defined as an obvious, intact, undisturbed remnant of the original stand, with an area of at least two acres. Delineating the boundary of an aggregation will be guided by the principle that a gap of 200 feet or more between trees breaks the continuity of a potential aggregation. No trees, young or old, shall be designated for harvesting in an old-growth aggregation, except as necessary for the construction or use of truck roads, landings, skid trails, cable corridors, tail holds and guy anchors needed for timber harvesting. All identified aggregations will be mapped.

Old-Growth Groves The DFMP has designated 11 reserved old-growth groves totaling 459 acres that are off limits to harvesting. Management of these areas will be passive in nature, and designed to retain the characteristics of the groves. By policy, these areas will not be subject to timber harvesting. Additionally, there are late seral

development areas totaling 780 acres adjacent to three old-growth grove reserves. These areas will be managed to promote development of late seral stand conditions to help buffer the adjacent old-growth groves and to enhance the value of these areas for wildlife species that are associated with late seral forests.

Hardwoods Since it is often difficult to visually distinguish between young-growth and old-growth hardwoods, size will serve as a surrogate for age. All hardwoods 36" DBH + will be considered for retention, as will other hardwoods that appear to be old-growth and possess characteristics similar to those in (a) through (f) above. Where forest stands appear to have greater hardwood site occupancy than in the past, hardwoods of any age may be removed to restore former species balance, favoring old-growth hardwoods for retention whenever appropriate.

Late Seral Forest In addition to preserving old-growth groves, aggregations and individual trees as discussed above, the DFMP will retain and develop late seral/successional forest characteristics. In order to develop a balance of seral stages across the Forest, existing old-growth forest and other specified areas of young-growth will be managed to expand the area of late seral forest. Large old-growth trees and old trees with specific structural habitat value will be retained within managed stands. The DFMP also includes areas in Class I and II stream riparian zones and the Woodlands Special Treatment Area in which recruitment of late seral stands will occur. These late seral forest structure conditions will occupy about 20 percent of the State Forest or approximately 9,700 acres.

Current Forest Practice Rule and THP Requirements FPR 14 CCR § 919.16 addresses Late Succession Forest Stands (LSFS) as defined in 14 CCR § 895.1, where if such stands are proposed for harvest and would significantly affect the amount and distribution of LSFS, information is required in the THP which would provide for avoidance, mitigation, or reasons for overriding concerns pursuant to 14 CCR § 898.1(g), including a discussion of the alternatives and mitigation considered. LSFS are WHR 5M, 5D, or 6 and at least 20 acres in size. FPR 14 CCR § 912.9 Technical Rule Addendum #2 under C. Biological Resources 4.f and 4.g), requires cumulative impacts evaluation and discussion of Late Seral Forest Characteristics (LSFC) and habitat continuity if such stands are present. LSFC stands are mature and over-mature stands exhibiting multi-layered canopies and decadence (snags, decay, down logs), and at least 80 acres in size. Stands that are of WHR 5 or 6 size will be checked in the field during THP preparation to determine if late seral/successional conditions are present.

Maximum Sustained Production (MSP) of High Quality Timber Products

JDSF Management Plan Standards/Requirements The DFMP provides for an increase in inventory over time by identifying that it is a high priority to maintain non-declining inventory levels and harvesting less than growth. Growth monitoring is accomplished by growth models and the continuous forest inventory system, measured since 1959, and periodic re-inventories of the entire forest. The DFMP identifies that through harvest and growth monitoring, adaptive management will provide for a

reduction or increase in future annual harvest levels tied to average growth levels to maintain constant or increasing inventory levels.

Current Forest Practice Rule and THP Requirements The forest practice rules require that timberland owners manage timberland to achieve maximum sustained productivity of high quality timber products (MSP). CDF operates eight Demonstration State Forests, totaling approximately 69,457 acres. Because the total acreage of state forest system exceeds 50,000 acres, and the ownership does not meet the definition of “scattered parcels” as contained in the forest practice rules, timber harvested from the state forest system must demonstrate maximum sustained productivity (MSP) pursuant to CCR 913.11(a) or 913.11(b). These two rule sections, respectively, are commonly referred to as an "Option A plan" and an "Option B sustained yield plan." This means that before harvesting can occur on THPs that were approved after December 31, 1999, either an Option B sustained yield plan or an Option A plan must be submitted to CDF for review and approval.

The current Option A plan for the Forest analyzes planned management regimes on the Forest and their effects on forest productivity and public trust resources. It is a part of, and is approved with, individual timber harvest plans. The current Option A plan for the Forest will be updated to bring it into conformance with the JDSF Management Plan as approved.

Application of Silvicultural Methods

Silvicultural Allocation Plan The DFMP contains a Silvicultural Allocation Plan that provides site-specific silvicultural direction for the life of the Management Plan (see Map Figure Z in the attached Map Figures section). The silvicultural allocation plan provides a strategy for assigning silvicultural methods across the Forest. The objectives of this silvicultural allocation plan are to (1) create diverse forest stand structures across a wide variety of environmental conditions in order to facilitate future research and demonstration opportunities, and (2) create a mosaic of diverse habitats at the landscape level in order to maintain functional forest ecosystems and support biological diversity.

The assignments of silvicultural systems to management compartments are arranged so that each management method occupies at least two compartments in both the eastern and western halves of the State Forest. The intent is to create opportunities for researchers to compare experimental results with control areas having similar environmental attributes, as well as providing an opportunity to assess silvicultural systems across a broad cross-section of growing conditions. Silvicultural systems and treatments will be designed and implemented to retain and create various structural conditions depending upon management objectives.

Under the DFMP, approximately 74 percent of the Forest will be managed for sustained high levels of timber production and will consist of a broadly diversified matrix of forest

structure conditions (Table VII.6.3.4). Of this high-timber-production area, 60 percent is designated for unevenaged management and 40 percent for evenaged management.

Table VII.6.3.4. Areas of JDSF Assigned to Sustained High Level Timber Production.

General Silvicultural System	Acres	% of JDSF Area	% of High Production Area
Unevenaged	21,614	44	60
Single tree/cluster selection	12,101	25	34
Group selection	9,513	20	27
Evenaged	14,256	29	40
Total High Production Area	35,870	74	100

Other areas of the Forest are available for less intensive timber management. Timber management on these areas is generally significantly circumscribed by other management goals, such as the development of late seral forest or the protection of riparian habitat and its ecological functions. State Forest staff will continue to conduct site specific assessments to determine the appropriateness of silvicultural prescriptions for any given area.

Short Term Harvest Schedule The DFMP includes a short-term harvest schedule that identifies the locations of proposed harvest units and the general silvicultural treatments to be applied in the next five years (See Map Figure Z). The short-term schedule identifies general areas that will be considered for harvest, and silvicultural methods that are consistent with the allocation plan discussed above. Actual harvest boundaries, yarding methods, road construction/reconstruction needs, etc. will be determined by a Registered Professional Forester (RPF) following site specific review of the area. The short term harvest schedule will not be rigid, but will be subject to modification through adaptive management. It will be reviewed and updated annually to maintain a five-year plan of future harvest activity.

Special Concern Areas (SCAs) The DFMP identifies 23 SCAs where forest management activities, including silvicultural practices, are limited to protect sensitive resources. No timber harvesting will occur in the old-growth reserves, the cypress groups, and Jughandle Reserve. In other special concern areas, limited operations may be allowed, such as thinning or single tree selection, so long as the aesthetic, habitat, or other resource value associated with the special concern area is protected. Although the timber stands that makeup the special concern areas are capable of supporting a wide range of silvicultural prescriptions, the application of certain prescriptions in these areas has been limited to avoid unacceptable results relative to the resource protection required or management objectives. Restricting possible silvicultural prescriptions helps to create or retain forest conditions in special concern areas that are consistent with the ecological and aesthetic goals.

Areas Not Covered by the Silvicultural Allocation Plan There are portions of the Forest not covered by the silvicultural spatial allocation plan that may have some limited timber harvesting. The three largest management compartments with no assigned silvicultural system are North Fork Caspar, South Fork Caspar, and the Mendocino Woodlands Special Treatment Area.

The two Caspar management compartments make up the CDF – USDA Forest Service Caspar Creek Watershed study that has been in existence since 1962. Timber harvesting in these compartments will be planned and conducted to facilitate watershed research. Timber harvesting is expected in the watershed study area during the next ten years.

Most of the Mendocino Woodlands Special Treatment Area will be managed as a late seral habitat recruitment area. A study to demonstrate and assess the accelerated development of late seral habitat will be considered for this area. Possible management options include selective timber harvesting and/or prescribed fire to accelerate the natural stand selection process and to accelerate creation of late seral structure with functional habitat elements (i.e., snags, logs, cavities, dead tops).

CDF-Mendocino Woodlands State Park and Outdoor Center [Memorandum of Understanding (MOU)]

In 2002, CDF and State Parks entered into a MOU related to forest management practices surrounding the Mendocino Woodlands. This MOU includes provisions for:

- protection of the Mendocino Woodlands water collection systems to insure the integrity and purpose of the systems
- consideration for managing a large portion of the Special Treatment Area in order to accelerate recruitment of late seral habitat
- maintenance of Roads 700, 720, and 730
- use of Mendocino Woodlands roads by CDF
- a 200-foot harvest exclusion buffer from camp areas, recreational cabins, or main roads located within the lands administered by State Parks (This buffer does not apply to the Railroad Gulch Silvicultural Study area.)

The MOU is to be reviewed during the first quarter of each year and can be terminated by either party upon 30 days notice.

Current Forest Practice Rule Requirements

In addition to the silvicultural allocation plan for JDSF, there are forest practice rule requirements for silvicultural applications to THPs:

- FPR 14 CCR § 913.1 contains measures for regeneration methods used in even-aged silviculture. Even-aged silvicultural methods include clearcutting, seed tree, and shelterwood.
- FPR 14 CCR § 913.2 contains measures for regeneration methods used in uneven-aged silviculture. Uneven-aged management is utilized to establish and maintain an uneven-aged stand structure. Uneven-aged silviculture methods include single tree and group selection, and transition.
- FPR 14 CCR § 913.3 contains measures for intermediate treatments performed in stands prior to a regeneration cut. Intermediate treatments include commercial thinning and sanitation-salvage.
- FPR 14 CCR § 913.4 contains measures for special prescriptions and includes Special Treatment Area Prescriptions, Rehabilitation of Understocked Areas, Fuelbreak/Defensible Space, and Variable Retention.
- FPR 14 CCR § 913.6 contains measures for Alternative Prescriptions.

The application of silvicultural methods described above under the current forest practice rules and THP requirements are applied on a THP basis.

Species Diversity

Conifer Species Diversity The DFMP identifies that redwood and Douglas-fir are the favored conifer species for regeneration. Hemlock and grand fir will be managed for no increase over current levels. Bishop pine is maintained as a minor species where it occurs in commercial stands.

In selection silvicultural prescriptions, commercial thinning, and other partial harvests, and in cases where there is no other reason to favor retaining one future crop tree over another (e.g., position, size, vigor, soundness, or potential wildlife habitat value), the decision about which tree to keep is based on the ranking of merchantable conifers as listed above.

Where artificial regeneration is used following a timber harvest, both redwood and Douglas-fir seedlings will be planted. The relative numbers of each species is determined after an assessment of the site to evaluate whether it is more suited for one species or the other.

Hardwoods Individual hardwoods are retained in most stands in order to recruit hardwoods into larger size classes, and to develop valuable wildlife habitat elements. In areas of the Forest with an abundance of hardwoods, the emphasis will be to restore the stands to a conifer-dominated condition. To provide successful establishment and continuing, rapid growth of desired tree species, it is sometimes necessary to control species that compete with desired species for water and sunlight. Control methods include mechanical cutting and chipping or burning, and use of herbicides.

In addition to native hardwood species control, within the eucalyptus infestation area identified above in the Special Concern Areas, silvicultural methods and treatments will be prescribed to control the spread of eucalyptus.

JDSF will maintain the naturally occurring hardwood components in riparian stands (WLPZs) and other special concern areas consistent with the objectives of that area. The goal is to maintain hardwood tree composition at approximately 10 percent (West End) to 15 percent (East End) of the stand basal area.

The strategy for management of the species mix on the Forest is intended to increase stand diversity of all species and promote a greater range of seral stages present on the Forest, with a goal of forest health and resilience.

Current forest practice rules and THP Requirements: FPRs 14 CCR §§ 913.1, 913.2, 913.3, 913.4, 913.5, 913.10, and 913.11 contain measures that affect conifer species diversity and hardwood management. These rules are in Silvicultural Methods and pertain to retention of desired conifer species mix, stocking levels, tree sizes, phenotype selection, and hardwood management provisions.

6.3.4 Thresholds of Significance

Based on the policy and guidance provided by CEQA and the CEQA guidelines, an impact of the proposed project would be considered significant if it causes one or more of the following:

- an adverse substantial effect on old-growth forest habitat (a unique habitat type)
- a conflict with the Forest Practice Rules, Public Resource Code or other applicable rules and regulations adopted for the purpose of avoiding or mitigating environmental effects relating to:
  - maximum sustained productivity of high quality forest products
  - application of silvicultural methods
  - protection of late seral/successional forest characteristics
  - forest health and species diversity

6.3.5 Impacts

Implementation of the DFMP was determined to have a potential direct or indirect impact on the following Timber Resource value areas:

Old-Growth Forest
Late Seral/Late Successional Forest Characteristics
Maximum Sustained Production of High Quality Forest Products (MSP)
Application of Silvicultural Methods and effects to other resource areas
Forest Health and Species Diversity

Discussions of impact levels to the above timber resource value areas are provided below.

Impact 1: *Old-Growth Forest.* (Beneficial)

Old-growth management and protection on Jackson Demonstration State Forest is a complex issue that includes both the biological function of old-growth trees and the values that society associates with older forests. "Old-growth" as a forest condition does not have a commonly agreed upon definition, primarily due to the variety of social and biological values assigned by the general public and resource management professionals. For this analysis, the Management Plan definition of old-growth is used: "a live tree, regardless of age, size, or species, that was present in the original stand before the first historic logging on JDSF (1860), (DFMP p. 112).[2] Refer to section VII.6.6 Wildlife and Wildlife Habitat in this document for discussions regarding the biological value of old-growth trees for specific species.

The analysis below is based on the assumption that old-growth trees and old-growth habitat are valued by society for characteristics beyond the biological values. It is the goal of this analysis to determine if the proposed management plan would significantly impact old-growth in the Forest.

The management objectives of the DFMP for old-growth groves and trees are to protect existing old-growth groves and improve their value as wildlife habitat, and to retain selected individual old-growth trees and small aggregations within larger young-growth stands to maintain and enhance the ecological value of these stands for native species.

Presently, there are 11 reserved old-growth groves totaling 459 acres. Management areas have been designated adjacent to three existing old-growth groves or complexes [Road 334 Grove (an additional 492 acres), Waterfall Grove complex (an additional 250 acres), and Upper James Creek Grove (an additional 38 acres)] to provide for the recruitment of additional late seral forest stands. These management areas will receive the same site-specific protection measures (i.e., special silvicultural management zones) as the old-growth grove reserves when THPs occur adjacent to these areas. These protection measures will buffer the groves from various types of disturbance.

Old-growth groves will be preserved, and additional forest adjacent to three groves will be managed to develop late seral characteristics. No harvesting will occur within the 11 reserved old-growth groves. There will be no reduction in old-growth forest. Large old-growth trees and old trees with specific structural habitat value will be largely retained within managed stands. The amount of late seral forest is expected to increase over time, due to dedication of additional area to recruitment of late seral conditions and a no-silvicultural treatment designation to specified areas of the Forest. Much of the area dedicated to the production of late seral forest conditions is in large, contiguous patches or stream zones. Impacts related to old-growth resource values are considered to be

[2] Page references to the DFMP refer to the electronic version (PDF) posted at the Board's website: http://www.bof.fire.ca.gov/pdfs/jdsf_mgtplan_master%203b.pdf.

less than significant, and over time, the management practices of the DFMP (alternative C1) are expected to be beneficial to old-growth resources.

The limited management that would occur under alternative A would have no impact on old growth stands, since no timber harvest or other significant vegetation management activity would occur.

Under alternative B, the provisions of the 1983 Management Plan establish no-harvest protections for 115 acres of old-growth groves in the Forest, however it has been the Forest's policy to protect 11 groves totaling 459 acres. Continued protection of the groves is a feasible mitigation to reduce the impact to less than significant.

Alternative C2 is similar to alternative C1, however it would establish additional late seral recruitment areas in Russian Gulch and Thompson Gulch. These areas would eventually grow into old growth forest. Thus, alternative C2 would have a beneficial effect on old growth habitat.

Alternatives D through F all emphasize old growth protection and late seral forest development. Thus, under any of these alternatives, there would be a beneficial effect on old growth forest.

Impact 2: *Protection of Late Seral/Successional Forest Characteristics.* (Less than Significant and Beneficial)

The DFMP provides for retention of late seral and late seral forest characteristics, as well as recruitment of these habitat components. Preservation of old-growth groves and old-growth trees as discussed above is one aspect of retaining late seral forest characteristics. The DFMP also includes measures to retain and recruit late seral characteristics. Late seral forest characteristics will be managed for in the Mendocino Woodlands Special Treatment Area (2,224 acres located in the Lower North Fork Big River planning watershed excluding the Railroad Gulch Research Area). Management in this area will involve silvicultural treatments designed to promote the development of late-seral forest conditions. Portions of other special management zones, such as WLPZs, will be managed to develop late seral characteristics. These areas managed for development of late seral structure conditions will occupy about 20 percent (9,680 acres) of the State Forest.

JDSF intends to recruit trees with late seral characteristics in areas that enhance the ecological effects of forests with these structural characteristics. Trees with late seral characteristics cannot be recruited during the life of the Management Plan. However, young-growth trees, over time, can be allowed to grow to develop late seral structural characteristics similar to old-growth trees. The JDSF Management Plan makes a commitment to manage identified forest areas to achieve that goal in as short a time frame as possible.

In the areas managed for late seral characteristics, timber harvesting and other stand treatments may be used in some instances to study and demonstrate methods to accelerate the development of late seral conditions. For example, thinning of understory trees might be prescribed to increase the growth rate of the larger trees or to stimulate the development of understory vegetation and multiple canopy layers. Single tree or group selection may be the appropriate silviculture system in certain stands to further the multi-storied effect, or to create openings sometimes found in late seral stand conditions. The determination of site specific silvicultural applications to achieve these goals will occur during THP preparation.

A qualitative analysis of late seral characteristic development was completed for the near term (15 years) and for the long term (out to 100-years). The following discussion is based on the conceptual changes that will occur following the selective harvest of an even-aged timber stand as found on JDSF.

Near Term Assessment Period, 15 Years

Expected Changes in Forest Stand Structure: After one or possibly two harvest entries during a 15 year period, the overstory canopy will have a more varied canopy structure, both vertically and horizontally. The crowns of the released redwoods will rapidly grow into the new canopy gaps and the lowest branches will not slow in growth or die back but will increase in growth making the tree crowns larger in depth and diameter. As the canopy closes this type of growth will slow. The other canopy conifers, Douglas-fir, grand fir and hemlock will increase in the same dimensions as redwood but not as rapidly.

A new age class of mixed conifer species in the lower canopy consisting of new seedlings and sprouts will slowly start after the selective timber harvests. These will have very slow growth in height because the rapid closure of the overstory canopy will quickly return shade to the lower levels of the forest.

The opening of the dense canopy may have some stand structural changes caused by wind storms. Some trees may have a portion of their upper crown broken off, followed by a branch taking over as the new top leader or, in the case of redwood, a sprout may take over as the new top leader. Some of the trees with broken tops may turn into snags. Some wind blowdown uproots may occur with varied root wads and holes. The blowdown trees or broken tops will increase the amount of large woody debris (down rotten logs) and wildlife habitat elements.

Over this 15 year time period, there will be tree deaths caused by the competition between the increasing size of the canopy dominants and the suppressed lower canopy trees. This process will still occur even though some trees are selectively removed from the overstory canopy. Depending on how these suppressed trees die, they will form either hard shelled snags or soft shelled snags. Some of these snags will fall and become woody debris.

Table VII.6.3.5 presents the development of near-term late seral forest conditions. The development of late seral forest conditions will be minimal in the near term.

Table VII.6.3.5. Late Seral Forest Conditions in the Near Term, 15 Years.

Important Attributes	Development In The 15-Year Near Term
Large diameter trees	Very minimal, very few with deep bark fissures
Large diameter branches	Very minimal, not enough time to develop
Lower canopy tree community	Just starting to develop
Forest floor community	Slowly increasing, minimal herbs, no shrubs
Snags	A minimal number, mostly smaller snags
Large woody debris	A minimal number, mostly small logs
Uproots	Minimal, if any
Forest floor humus layer	Very shallow, still developing
Vertical distribution of foliage/canopy	Slowly developing
Horizontal distribution of structure	Increasing because of irregular selection cuts
Canopy gaps	Minimal increase by selection cuts, decreased by crown growth. Minimal development
Anti-gaps	Developing on the lower canopy growth of the new seedlings and sprouts and the canopy closure in the un-thinned portion of the upper canopy
Biomass accumulation	The biomass is increasing slowly even with the irregular selection timber harvest
Achievement of maximum height and crown spread per tree	Slowly increasing, not near maximum
Canopy elaboration	Slowly developing
Live tree decadence	Very little of this on the upper canopy trees
Canopy epiphytic community	Not fully developed

Long Term--100 Year Term Projection of Future Forest Conditions

Selection areas are likely to have had four to eight harvest entries using an unevenaged system from single-tree to small group selection cuts. If any of the conifer species did not regenerate naturally, the absent species would be planted. Selectively harvested stands are expected to have an upper canopy with approximately 60 – 70 trees per acre.

New cohorts of understory trees from 15 to 100 years of age will form a multi-aged understory canopy.

Expected Changes In Forest Stand Structure After 100 years the overstory canopy will be a relatively even-aged uniform upper layer consisting of approximately 60 – 70

trees per acre, with an average age of over 150 years. The overstory trees will be primarily redwood and Douglas-fir. Grand fir and hemlock will have been harvested or died and have turned into snags or blown down. The new age classes of younger trees will be primarily redwood, hemlock and grand fir. These younger trees will be irregularly spaced from tight clumps with relatively small crowns to openly spaced trees from 15 to 100 years of age. Redwood is likely to dominate in the openings with hemlock and grand fir dominating under the older canopy. These trees will form a fairly dense sub-canopy level of trees.

Development of Late seral Forest Conditions The development of late seral forest conditions will be progressing toward the optimum conditions that are found in late seral forests, as presented in Table VII.6.3.6.

Table VII.6.3.6. Late Seral Forest Conditions in the Long-Term, 100 Years.

Important Attributes	Development In The 100-Year Long Term
Large diameter trees	A few trees per acre will be 5 – 6 ft. in diameter with deep bark fissures starting to develop
Large diameter branches	These are developing on some of the larger released trees, especially redwood, they will get larger as the stand gets older
Lower canopy tree community	Well developed, multi-age, multi-size up to 100 years old
Forest floor community	Fairly high cover of herbaceous except under the anti-gaps
Snags	A small number, of small to medium size
Large woody debris	A small number, mostly small to medium size logs
Uproots	A few per acre
Forest floor humus layer	3 – 4 inches in depth of well developed humus if not disturbed by timber harvest
Vertical distribution of foliage/canopy	Moderate development
Horizontal distribution of structure	Moderate because of irregular selection cuts
Canopy gaps	Varied size from small to fairly large
Anti – gaps	The 15 to 100 year old lower canopy layer will have some very dense areas of canopy
Biomass accumulation	Increasing, since less than the annual growth is cut at each entry
Achievement of maximum height and crown spread per tree	Increasing, not near maximum
Canopy elaboration	Even heights of the upper canopy with gaps and anti-gaps in the lower canopy, very complex
Live tree decadence	Some of this on the upper canopy trees
Canopy epiphytic community	Not fully developed, too much exposure to light in the upper canopy.

Given the various measures proposed in the DFMP to protect and enhance late seral forest, the DFMP's Impacts related to late seral timber resource values are considered to be less than significant and, over time, the DFMP is expected to provide a beneficial impact.

For alternative A, no timber harvesting, timber stand improvements or other forest management activities would be undertaken. Since no commercial harvest would occur, no direct impacts to late seral forest characteristics would occur. Lack of management activity also means there is no opportunity to manage stands to hasten development of late seral characteristics. Thus, late seral characteristics would develop over a longer time frame than if vegetation was managed to hasten the development of late seral characteristics. The alternative would have no impact on late seral forest.

Under alternative B, commercial timber harvesting would occur at an average rate of approximately 35 million board feet per year in the first decade. Individual THPs would continue to comply with forest practice rules pertaining to late seral/successional forest characteristics. The Mendocino Woodlands Special Treatment Area and WLPZs only would be managed to promote the development of these types of forest characteristics. Alternative B would have a less than significant impact on late seral forest.

Alternative C2 expands on alternative C1 by adding additional area for late seral development, i.e., the Russian Gulch and Thompson Gulch areas. This alternative would have a beneficial effect on late seral forest over time.

Alternative D would provide for retention of late seral forest characteristics, and set aside more areas where recruitment of these habitat components would be the management goal as compared to the proposed project. Harvest levels would be reduced across the Forest, rotation ages would be lengthened, and only limited even-aged harvests would be used. Selection and group selection would be the primary silvicultural methods used. As discussed in the project impacts section, use of the selection system may not produce the desired late seral characteristics as anticipated; specifically, multiple age classes and canopy layers may not develop as anticipated. Late seral characteristics would be most likely to develop in the areas managed under the group selection system. Overall, the alternative would have a beneficial effect on late seral forest area.

The emphasis of alternative E is the development of old growth forest and the restoration of a natural forest ecosystem. Timber harvesting would be very limited and used to develop late seral characteristics. The majority of the Forest would not be actively managed, but would be allowed to develop without intervention. The limited management could result in slower development of late seral characteristics than might occur with careful, more active management. The alternative will provide a beneficial impact to late seral habitat over time.

Alternative F would provide extensive areas of late seral forest and would use management tools to hasten the development of late seral forest characteristics. This alternative would result in beneficial impacts to late seral forest.

Impact 3: *Maximum Sustained Production of High Quality Timber Products (MSP).* (Less than Significant)

The JDSF allowable harvest level in the DFMP is predicated on the goal of non-declining inventory levels where it is the intent to harvest less than growth in any 10 year rolling planning period. During the DFMP period, the Forest proposes to harvest an average of 31 million board feet per year during the first 10-year planning period.

Within the 48,652 acre JDSF, there is an estimated present net conifer volume of approximately two billion board feet. This volume includes areas identified as no timber harvest and those with management constraints. After accounting for acres constrained for ecological goals and research and demonstration projects, CDF staff has calculated the Long Term Sustained Yield (LTSY) to be 45 to 65 million board feet (MMBF) per year, depending on management alternative. The present estimate of unconstrained annual conifer growth is approximately 65 MMBF per year.

Growth and yield estimates for the DFMP rely on predictions of future forest development for the next 100 years under different possible management strategies. The growth model CRYPTOS (Wensel et al. 1982) was used for these predictions.

As with any growth model, long term projections should be tempered with some professional discretion and experience. Basing allowable harvest levels solely on modeling results could result in significant environmental impact by virtue of balancing harvests with exaggerated growth estimates. This model has been used for projecting growth of trees in the redwood region under a variety of silvicultural methods for more than 25 years, and both the strengths and weaknesses of the model are well known. Evidence exists that long-term projections using the CRYPTOS growth model may be prone to overestimation. The growth of ingrowth trees under uneven-aged management methods may also be prone to overestimation. Finally, the database used to fit hardwood growth relationships in the model is less complete than the conifer database.

For the purposes of this project, the model was calibrated conservatively to reduce the unconstrained projections down to 80 percent of maximum Stand Density Index, based on local expert professional estimate and published yield tables. Independent peer review of the procedures JDSF staff used to calculate growth and yield was provided (Allen 2002, Thornburg 2002, Lindquist 2002).

In addition, the annual harvest level planned for the life of this Management Plan was set by professional discretion conservatively at 31 million board feet, well below the model's estimated productive capacity (long term sustained yield) of 44.4 million board feet/year for the Forest.

The Forest Practice Rule regarding maximum sustained high quality timber products incorporates an economic element of regional economic vitality and employment in addition to the physical timber production element and other resource considerations. Table VII.6.3.7 presents the basic timber and economic productivity measures for the seven EIR alternatives. The table shows that alternatives C1 and C2 would provide the greatest timber-related employment and economic benefits, while alternatives A and E would provide the least.

Table VII.6.3.7. Summary of Estimated Annual Economic Effects for EIR Alternative Harvest Levels.

	Alternative						
Economic Factor	A	B	C1	C2	D	E	F
LTSY (MMBF)	64	51	45	46	53	62	55
First Decade Annual Harvest Level (MMBF)	0	29	31	31	25	8	19
Number of Jobs Provided	0	484	516	516	416	140	324
Local Wages, $	0	12,564,092	13,386,828	13,386,828	10,798,181	3,649,291	8,415,217
Local Timber and Sales Taxes, $	0	534,051	570,335	570,335	458,677	150,916	356,090

Chapter five of the DFMP commits the Forest to a monitoring and adaptive management program that includes growth and yield.

Under the DFMP (alternative C1) the reduction of the average annual harvest level below the LTSY level and committing to a monitoring and adaptive management approach to future harvest levels will ensure that harvest does not exceed growth. At the same time, the alternative will still produce significant economic and employment benefits. On the whole, this alternative will have a less than significant impact on maximum sustained production of high quality timber products.

Alternative A, with its lack of timber harvest activity, fails to satisfy the economic component of maximum sustained production of high quality timber products. It also contains no measures to increase the timber growth of existing stands. The timber volume would continue to increase until decadence and senescence results in negative growth. Given the predominantly redwood composition of JDSF, decadence and senescence would take many years to occur. As a whole, this alternative would have a less than significant impact on maximum sustained production of high quality timber products.

Timber production levels under alternative B would be about 29 MMBF per year, well under the LTSY of 51 MMBF. While this conservative harvest level helps to ensure that harvest will not exceed growth due to potential inventory or modeling errors, it also means that near-term economic benefits will be less than they might be at a higher harvest rate. However, despite the conservative harvest rate, significant economic and employment benefits would still accrue. This alternative would have a less than significant impact on maximum sustained production of high quality timber products.

Alternative C2 is only marginally different from C1 with respect to MSP issues. It would have a less than significant impact on maximum sustained production of high quality timber products.

Alternatives D through F trade off potentially higher levels of timber harvest for greater protection of late seral forest values. Much of this potential forest productivity is captured in the building of inventory rather than harvest. Timber production continues, though at a lesser rate than might occur with more active management. Alternative E in particular has a low harvest rate of just 8 MMBF per year or 13 percent of the LTSY. This alternative results in a substantial loss of near-term economic benefits in exchange for long-term accrual of inventory and provision of late seral forest values. With their focus on cultivation of late seral forest, these alternatives will produce lower levels of biological diversity, resiliency and forest health than alternatives B, C1 and C2. Overall, these three alternatives would result in a less than significant impact on maximum sustained production of high quality timber products.

Impact 4: *Application of Silvicultural Methods* (Less than Significant)

Implementation of the silvicultural allocation plan and short-term harvest schedule will create a diverse mosaic of forest age-class structures at the landscape level that will contribute to habitat stability, research opportunities, maintenance of biodiversity, and functional forest ecosystems. The allocation of silvicultural systems addresses potential conflicts with State Forest recreational use and local public interest values. Practices similar to even-aged silviculture that would encompass five or more acres were minimized in management compartments adjacent to certain areas of special concern where management is constrained. Uneven-aged management, which tends to maintain a continuous forest canopy, has been incorporated within the management compartments with identified sensitive public interest values. State Forest staff will continue to conduct site-specific assessments to determine the appropriateness of silvicultural prescriptions for any given area. The silvicultural allocation plan provides for protecting the recognized areas of special concern. Impacts related to these timber resource values are considered to be less than significant.

The silvicultural allocation plan assigns even-aged practices to approximately one-third of the area available for harvest. Selection, group selection methods and other silvicultural methods would be used on the remainder of the unconstrained areas available for harvest. See TableVII.6.6.4, above, for more details.

During the life of the Management Plan, no significant impact to the timber resource is anticipated as a result of the silvicultural allocation plan. The Forest has committed to a monitoring and adaptive management approach that includes timber inventories and evaluation of forest stands.

Table VII.6.3.8 summarizes the special concern areas within the Forest, the management activities proposed and the forest practice rules standard. This table indicates that the FPR standards are met or exceeded for all areas. Impacts related to these timber resource values are considered to be less than significant for the DFMP (alternative C1).

Table VII.6.3.8. Special Concern Areas (SCA) Within JDSF.

SCA	Proposed Management	FPR Standard
Cypress groups	no harvesting	no current specific restrictions, but analysis likely needed that could lead to management restrictions
Pygmy forest	no harvesting	no current restrictions, but analysis likely needed that could lead to management restrictions
Jughandle Reserve	no harvesting within the Pygmy forest portion, limited silviculture in the remainder	no current restrictions
Eucalyptus infestation area	silviculture prescribed to control spread of Eucalyptus	no current restrictions
Inner gorges	THP specific, limited silviculture	THP specific, FPR 916.9 applies to impaired watersheds, limited silviculture
Northern spotted owl nest areas	nest buffers and limited harvest to enhance habitat	FPR 919.9 applies, nest buffers and limited silviculture to retain habitat.
Osprey nest areas	nest buffers and limited harvest to enhance habitat	FPR 919.3 applies, nest buffers to avoid disturbance
Watercourse and Lake Protection Zones (WLPZs)	no harvest or uneven-aged silviculture to promote late seral conditions	FPR 916 applies
Mendocino Woodlands special treatment area (MWSTA)	silviculture to promote late seral conditions except for the Railroad Gulch Study area	no current restrictions

Table VII.6.3.8. Special Concern Areas (SCA) Within JDSF.		
SCA	**Proposed Management**	**FPR Standard**
Domestic water supplies	silviculture limitations to minimize disturbance	FPR 916.5 and 916.10 applies, silviculture limitations to minimize disturbance
Buffers adjacent to non-timberland neighbors	silviculture limitations to minimize disturbance	FPR 913.1(a)(7) may apply within 200 feet of adjoining properties
Power line right-of-way	not available for timber production	not available for timber production
Mendocino Woodlands State Park buffer	silviculture limitations to minimize disturbance	FPR 913.4(a) applies to the portion of the MWSTA within 200 feet of the State Park.
Reserved old-growth groves	no harvesting	FPR 919.16 may apply, also 912.9 Technical Rule Addendum #2 (C)(4) requires consideration
Late seral development areas	silviculture to promote late seral conditions	FPR 919.16 may apply, also 912.9 Technical Rule Addendum #2 (C)(4) requires consideration.
Campground buffers	silviculture limitations to minimize disturbance, no even-aged silviculture	no current restrictions
Conservation camps	no harvesting	no silviculture restrictions, FPR 917.2 would apply for hazard reduction
Public Road and Recreation trail corridors	silviculture limitations to minimize disturbance	FPR 913.1(a) (6) and 917.2 would apply along public roads for aesthetic value consideration and fire hazard reduction
Parlin Fork management area	demonstration area for small woodland management	exempt from FPR requirements, not from CEQA or CESA
Research areas	areas set aside for various research studies	no current restrictions

No active forest management would be applied under alternative A; thus, this alternative would have no impact related to the application of silvicultural methods.

For alternatives B and C2 through F, the programmatic management plan measures for silvicultural methods are consistent with all FPRs, the PRC, and other rules and regulations. Individual THPs would be prepared, submitted, and operated at approximately the same rates as in the recent past (alternatives B and C2) or at

reduced rates (alternatives D through F). THPs would be reviewed for compliance to the FPRs and would be approved only if found to be in compliance with the forest practice rules including all applicable rules pertaining to silviculture. Further, these alternatives also apply various kinds of special concern areas where silvicultural prescriptions are limited to protect a wide range of values. For alternative E, for example, evenaged management would be prohibited throughout the Forest. Thus, all of these alternatives would have a less than significant impact.

Impact 5: *Species Diversity* (Less than Significant)

The DFMP (1) provides for retaining conifer species diversity as required by the forest practice rules, (2) requires managing hardwood species at levels which more closely resemble natural conditions, and (3) is conducive to attaining MSP for the Forest. Impacts related to these timber resource values through the DFMP period are considered to be less than significant.

A concern for long-term conifer species diversity could conceivably arise where selection silviculture is implemented over large areas for a long period of time. The understory growth of shade intolerant redwood and Douglas-fir could be restricted due to light conditions more favorable to shade tolerant species hemlock and grand fir, resulting in higher percentages of hemlock and grand fir in the composition of the under story of the future stand. Continuing forest inventory will allow JDSF staff to monitor species diversity and adopt management techniques to prevent a significant change in species diversity.

The DFMP (alternative C1) strategy of maintaining a natural native species mix, cultivating a wide range of forest conditions, and monitoring forest diversity over time will reduce the level of impact on forest health and species diversity to less than significant.

Under alternative B, individual THPs would comply with forest practice rules pertaining to species diversity. The full range of silvicultural prescriptions would be available to influence species diversity. However, the 1983 Plan has no goals or special provisions for providing or monitoring tree species diversity. Alternative B would result in a less than significant impact on tree species diversity.

Alternatives C2 through F all have measures to consider, provide, and monitor for tree species diversity that is similar to natural forest stands. The tools to attain this diversity would be more limited under some of these alternatives than others. For example, evenaged management is highly restricted under alternatives D and F, and prohibited completely under alternative E. Given their goals for natural species diversity and monitoring components to test for it, these alternatives would not have an adverse impact on species diversity.

6.3.6 Alternatives Impact Comparison

A comparison of timber resource impacts among the various alternatives is presented in Table VII.6.3.9.

Table VII.6.3.9. Comparison of Timber Resource impacts Across Alternatives.						
Alternatives						Discussion
Impact*	1	2	3	4	5	*Impact Levels: (1) Beneficial (2) No Impact (3) Less than Significant (4) Less than Significant with Mitigation (5) Significant–Mitigation Not Feasible
Impact 1. The project has the potential to have an adverse substantial effect on old-growth forest habitat (a unique habitat type).						
Alt. A						The primary management on JDSF lands would be limited road maintenance to allow continued public access. No timber harvesting would occur. Although this alternative does not include specific protection for old-growth forests, the anticipated level of public use is unlikely to result in impact to the old-growth groves
Alt. B						The 1983 Management Plan establishes no-harvest protections for 115 acres of old-growth groves in the Forest; however, it has been the Forest's policy to protect 11 groves totaling 459 acres. Continued protection of the groves is a feasible mitigation to reduce the impact to less than significant.
Alt. C1 May 2002 DFMP						The proposed project provides protection to old-growth groves, aggregations of old-growth trees and scattered single old-growth trees with some exceptions for management purposes. In addition, 3 of the protected groves will be buffered with late seral development areas. Retention of the groves and buffers as well as the other more scattered old-growth aggregations and trees will be a beneficial impact to this resource.
Alt. C2 Nov. 2002 Plan						In addition to the protections in C1, this alternative allocates the Russian Gulch and Thompson Gulch compartments to late seral recruitment areas. These areas eventually will develop into old-growth forest habitat.
Alt. D						These alternatives are similar to alternatives C1 and C2 in protection for old-growth forest habitat and would provide a similar beneficial impact. The main emphasis of alternative E is management to develop old growth characteristics across the Forest.
Alt. E						
Alt. F						

Table VII.6.3.9. Comparison of Timber Resource Impacts across Alternatives.						
Alternatives						Discussion
Impact*	1	2	3	4	5	*Impact Levels: (1) Beneficial (2) No Impact (3) Less than Significant (4) Less than Significant with Mitigation (5) Significant–Mitigation Not Feasible
Impact 2. The project would result in a conflict with the Forest Practice Rules, Public Resource Code or other applicable rules and regulations adopted for the purpose of avoiding or mitigating environmental effects relating to protection of late successional forest characteristics.						
Alt. A						No timber harvesting, timber stand improvements or other forest management activities would be undertaken. Since no commercial harvest would occur, no direct impacts to late seral forest characteristics would occur. Without management late seral characteristics would develop slower over a longer time frame.
Alt. B						Commercial timber harvesting would occur at a level of approximately 35 million board feet per year. Individual THPs would continue to comply with forest practice rules pertaining to late seral/successional forest characteristics. The Mendocino Woodlands Special Treatment Area and WLPZ only would be managed to promote the development of these types of forest characteristics.
Alt. C1 May 2002 DFMP						The DFMP provides for retention of late seral and late seral forest characteristics, as well as recruitment of these habitat components. The areas managed for development of late seral structure conditions will occupy about 20 percent of the State Forest. The Alternative will manage for recruitment of trees with late seral characteristics in areas that enhance the ecological effects of forests with these structural characteristics. In the near term there would be limited development of late seral characteristics, however in the long term there would be a beneficial impact. Late seral characteristics would be most likely to develop in the areas managed under the group selection system.
Alt. C2 Nov. 2002 Plan						In addition to the protections in C1, this alternative allocates the Russian Gulch and Thompson Gulch compartments to late seral recruitment areas.
Alt. D						This alternative would provide for retention of late seral forest characteristics, and set aside more areas where recruitment of these habitat components would be the management goal as compared to the proposed project. Harvest levels would be reduced across the Forest, rotation ages would be lengthened, and only limited even-aged harvests would be used. Selection and group selection would be the primary silvicultural methods used. As discussed in the project impacts section, use of the selection system may not produce the desired late seral characteristics as anticipated, specifically,

Table VII.6.3.9. Comparison of Timber Resource Impacts across Alternatives.						
Alternatives						Discussion
Impact*	1	2	3	4	5	*Impact Levels: (1) Beneficial (2) No Impact (3) Less than Significant (4) Less than Significant with Mitigation (5) Significant–Mitigation Not Feasible
						multiple age classes and canopy layers may not develop as anticipated. Late seral characteristics would be most likely to develop in the areas managed under the group selection system.
Alt. E						The emphasis of this alternative is the development of late seral forest and the restoration of a natural forest ecosystem. Timber harvesting would be very limited and used to develop late seral characteristics. The majority of the Forest would not be actively managed, but would be allowed to develop without intervention. Given that all of the Forest, with the exception of the remaining old-growth reserves, has developed as a result of timber harvest, the time span to develop late seral forest may be on the order of 100s of years (refer to the impact section). So there will likely be a beneficial impact to late seral habitat as a result of this alternative, but not for decades or centuries.
Alt F						Similar to E, but more emphasis on promoting late seral characteristics through management, so these would develop more quickly.

Table VII.6.3.9. Comparison of Timber Resource Impacts across Alternatives.						
Alternatives						Discussion
Impact*	1	2	3	4	5	*Impact Levels: (1) Beneficial (2) No Impact (3) Less than Significant (4) Less than Significant with Mitigation (5) Significant–Mitigation Not Feasible
Impact 3. The project would result in a conflict with the Forest Practice Rules, Public Resource Code or other applicable rules and regulations adopted for the purpose of avoiding or mitigating environmental effects relating to Maximum Sustained Productivity of high quality timber products.						
Alt. A						No timber harvesting, timber stand improvements or other forest management activities would be undertaken in this alternative. Since no commercial harvest would occur, the Department would not be required to demonstrate compliance with MSP rule standards. However, the timber stands would continue to develop undisturbed and the timber volume would continue to increase until decadence and senescence results in negative growth. Roads would be maintained to the degree necessary for protection of forest lands from wildfire. Lack of harvest would not satisfy the MSP component of regional economic vitality and employment, thus there would be some level of less than significant impact.
Alt. B						Refer to the projects impact section for a complete assessment of the potential impacts of the proposed project with regards to growth and yield. Commercial timber harvesting would continue well below annual growth accruals (see table VII.6.3.1 for harvest levels and growth estimates (LTSY) for each alternative). The Department would continue to demonstrate compliance with MSP rule standards on an individual THP basis using the option "A" document. During the life of the Management Plan, no short term significant impact to MSP or growth and yield are anticipated because the proposed project includes a monitoring program and adaptive management approach to ensure that average annual harvest levels do not exceed average annual growth. Harvest levels are set well below estimated growth in all these alternatives. These precautions will prevent a significant adverse impact from occurring.
Alt. C1 May 2002 DFMP						
Alt. C2 Nov. 2002 Plan						
Alt. D						Commercial timber harvesting levels would be much less than annual growth accruals [see Table VII.6.3.1 for harvest levels and growth estimates (LTSY) for each alternative]. The Department would continue to demonstrate compliance with MSP rule standards on an individual THP basis using the
Alt. E						

Table VII.6.3.9. Comparison of Timber Resource Impacts across Alternatives.						
Alternatives						Discussion
Impact*	1	2	3	4	5	*Impact Levels: (1) Beneficial (2) No Impact (3) Less than Significant (4) Less than Significant with Mitigation (5) Significant–Mitigation Not Feasible
Alt. F						option "A" document. Alternatives D and F strictly limit evenaged management. Alternative E limits silviculture to unevenaged methods only. Errors in growth and yield modeling could result in the same potential long term and cumulative impact discussed above in alternatives B, C1 and C2. However, harvest levels are so conservative under these alternatives that this possibility is extremely unlikely. A monitoring program and adaptive management approach that will be used to ensure that average annual harvest levels do not exceed average annual growth.
Impact 4. The project would result in a conflict with the Forest Practice Rules, Public Resource Code or other applicable rules and regulations adopted for the purpose of avoiding or mitigating environmental effects relating to application of silvicultural methods						
Alt. A						No silvicultural methods would be applied in this alternative.
Alt. B						Management plan measures for silvicultural methods are consistent with all FPRs, the PRC, and other rules and regulations. Individual THPs would be prepared and submitted at approximately the same rates as in the recent past (alternatives B, C1, and C2) or at reduced rates (alternatives D through F). THPs would be reviewed for compliance to the FPRs and would be approved only if found to be in compliance with the forest practice rules including all applicable rules pertaining to silviculture.
Alt. C1 May 2002 DFMP						
Alt. C2 Nov. 2002 Plan						
Alt. D						
Alt. E						
Alt. F						

Table VII.6.3.9. Comparison of Timber Resource Impacts across Alternatives.						
Alternatives						Discussion
Impact*	1	2	3	4	5	*Impact Levels: (1) Beneficial (2) No Impact (3) Less than Significant (4) Less than Significant with Mitigation (5) Significant–Mitigation Not Feasible
Impact 5. The project would result in a conflict with the Forest Practice Rules, Public Resource Code or other applicable rules and regulations adopted for the purpose of avoiding or mitigating environmental effects relating to maintenance of species diversity.						
Alt. A						No timber harvesting, timber stand improvements or other forest management activities would be undertaken. Since no commercial harvest would occur, only gradual changes in species diversity would occur, as the Forest would slowly gravitate towards a late successional species mix over a long period of time.
Alt. B						Individual THPs would comply with forest practice rules pertaining to species diversity. The full range of silvicultural prescriptions would be available to influence species diversity. However, the 1983 Plan has no goals or special provisions for providing or monitoring tree species diversity.
Alt. C1 May 2002 DFMP						Individual THPs would comply with forest practice rules pertaining to species diversity. The full range of silvicultural prescriptions would be available to influence species diversity. The ongoing inventories and monitoring plan will enable the detection and correction of any trends away from the desired species mix. Alternatives C1 and C2 address hardwood and conifer species mixes to favor historical natural stand composition.
Alt. C2 Nov. 2002 Plan						
Alt. D						Individual THPs would comply with forest practice rules pertaining to species diversity. Only selection prescriptions will be permitted under alternative E, and only selection and group selection prescriptions and severely limited evenaged management would be permitted under alternatives D and F. These measures could create a potential environmental impact by virtue of a shift toward shade tolerant species at the expense of the shade intolerant species redwood and Douglas-fir. However, alternatives E and F both call for maintaining a species mix similar to old growth forests. Alternative D calls for managing hardwoods as a significant stand component to demonstrate development of high quality hardwood trees, habitat, and product value. The ongoing inventories and monitoring plan will enable the detection and correction over time of any trends away from the desired natural species mix.
Alt. E						
Alt F						