Jackson Demonstration State Forest: Background, Issues, and Alternatives -- Draft

By Jeremiah Siem

Note: This paper was produced by Jeremiah Siem as part of a Dharma Cloud project to consider alternative futures for Jackson State Forest. Although not a finished paper, it contains a great deal of factual information about Jackson State, redwood forests, outdoor recreation demand and supply in Mendocino County, population trends in Northern California, and employment trends in Mendocino County. This information is relevant to the current discussions about Jackson State Forest. The opinions expressed in the paper are the author's and do not necessarily reflect those of Dharma Cloud Foundation. Note: Figures referenced herein are not included.

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The History Of Jackson State Forest, Redwood Country, and The Caspar Lumber Company

Jackson Demonstration State Forest

Jackson Demonstration State Forest (JDSF) encompasses 50,200 acres of Mendocino County east of the Mendocino Coast[1]. The forest is dominated by conifer species--primarily redwood and Douglas fir--and contains lesser amounts of hardwood species such as tanoak and madrone. The Jughandle Pygmy Forest Reserve is located in the western end of the forest.

The state purchased the land that became JDSF in 1947 from the Caspar Lumber Company. With supplies of virgin timber diminishing, the legislation of Pubic Resource Codes 4631-4658 authorized the acquisition of 'desirable cutover lands' to return the land to full productivity, as well as demonstrate economical forest management.

Early history

The first record of Europeans viewing the redwood come from 1769, when the Portola party visited Santa Cruz County[2]. By the 1820's, Russians were harvesting redwood at Fort Ross in Sonoma County for export to Hawaii. In 1850, when the gold rush began the great migration to California, the Coast Redwood covered 2 million acres in a strip 5 to 35 miles wide from the Oregon Border to Monterey County[3]. Redwood logging became an attractive alternative for immigrants frustrated by gold mining.

Caspar Lumber Company

Jacob Green Jackson first developed the land that became JDSF in 1861. He commenced harvesting the next year, and by 1881 had formed the Caspar Lumber Company. Starting in the Caspar Creek drainage, the company moved eastward, building 20 miles of railroads to move logs[4]. In 93 years of operation, it has been estimated that the Caspar mill processed close to 2 billion board feet of lumber, a yearly average of 20 million board feet[5].

The 1940's

The lumber industry was unsettled during the 1940's. The war had created aa shortage of manpower[6], which was followed by a redwood strike that shut down the North Coast lumber industry for six months[7]. Technology was rapidly advancing, as former Caspar Lumber Company employee Kelly B. McGuire wrote in a letter:

"1940-1950 great changes took place. Hand falling and Bucking gave way to Power Saws. Broad cast burning is no longer practiced. Steam yarder and skyline have all given way to tractor logging."

Despite these advances, virgin timber supplies were dwindling, and there was no market for second-growth redwood[8]. The book "Redwood Empire" states, "By the Second World War, lumbering in the Mendocino Forests was finished."[9]

In 1942 California was believed to have 5,000,000 acres of cutover land, nearly 2,000,000 of which was considered "practically loafing."[10] In response to the abundance of cutover forest, University of California forestry professor Dr. Emmanuel Fritz suggested that California should create a state forest system to return timberlands to full productivity and thereby ensure stable employment. The state Board of Forestry appointed Dr. Fritz to a committee that concluded the state should acquire as much cutover land as possible for "multiple use development, including the preservation of soil and watershed cover, production of future forest crops, protection of wildlife, and development of recreational facilities." State Senator and Covelo rancher Charlie Biggar proposed the establishment of the Senate Forest Study Committee, which determined that the state needed to acquire land due to overharvesting without sufficient replacement on the state's forestlands. Senator Biggar's Senate Bill 560 was signed into law in May 1945, authorizing the state to purchase land for state forests.[11]

The Caspar Lumber Company, headed by C.J. Wood, proposed selling the lands to the state in 1946 (after unsuccessful attempt to sell to Union Lumber CO???). W.S. Rosecrans, chairman of the state board of forestry at the time, said the lands were an ideal unit to develop "management plans to determine the practicability of harvesting timber on a continuous yield basis." The board spoke of "experimentation and demonstration of improved forest practices."[12] The state paid $1.5 million for 258,079 M BF (thousand board feet) of large old-growth, 90,342 M BF of small old-growth, and land at $15/acre.[13]

Aborigine Lumber Company

The Aborigine Lumber Company demonstrated the viability of harvesting second-growth redwood while operating at the site of the current Louisiana Pacific mill, located on Gibney Lane in Fort Bragg.[14] A 1957 edition of the Fort Bragg Advocate-News spoke of Aborigine's re-forestation plans:

"While 60 years will be needed before trees can be harvested, the experiments should indicate the worthiness of the overall plan to replenish logged over or open ranges with suitable timber."[15]

The mill was described in 1960 as, "a very versatile stud mill, able to saw small and low-grade logs and recover profitable studs from them."[16] The utilization of historically unprofitable logs allowed the Aborigine Lumber Company to expand the mill in 1960. The Advocate-News reported:

"Upon completion of this installation, the company will contribute to further utilization of forest resources in this area, and expects to establish a market for the pulp-type logs and timber."[17]

The Redwood Forest

Unique Forest

The Coastal Redwood forest, dominated by the tallest tree on the planet, is a survivor of an earlier time. Of the twelve species of redwood that once covered a more tropical Earth, nine are extinct.[18] The only species remaining are sequoia sempervirens (the coast redwood), sequoiadendron giganteum (the Sierra redwood), and metasequoia glypstroboides, China's deciduous dawn redwood.

The coast redwood is uniquely adapted to survive along the north coast of California. Redwood has fire resistant bark that helps it survive when other species are damaged; most trees greater than 6 to 8 inches d.b.h. (diameter at breast height) will survive the most severe fires.[19] Not only do the redwoods survive fire, but also they are unique in their ability to send new roots into the layer of silt that buries the trunk during a flood.[20] While other species are unable to survive flooding of the valleys, the largest groves of redwoods can be found in the silt-rich channels. In fact, the grove in the Bull Creek area of Humboldt Redwoods State Park is said to have the great bio-mass, or amount of living material, on Earth, far surpassing even the tropical rainforest.[21] Despite their impressive size, the redwoods are very vulnerable to change in their environment. Trees that are 300 feet tall may have roots that extend down for only 10 feet, but spread out for more than a hundred feet and become intertwined with neighboring trees for support. When soil is removed or compacted around the base of a tree during harvesting, susceptibility to windthrow is greatly increased.

Redwoods are long-lived, rapidly growing trees. The average life span of a redwood has been estimated at 500 years, with some trees dating back to before the birth of Christ.[22] Seedlings have to be known to grow 18 inches a year, and saplings less than a decade old can grow 6.5 feet a year. Even more impressive than seedling growth is the pace with which sprouts can shoot up. After logging, sprouts can grow 7 feet a year.[23] On a good site, redwoods can reach heights of 170 feet within 50 years.[24]

Wildlife of the Redwood Forest

The variety of wildlife in the redwood forest is astounding. Approximately 1,700 species of birds, animals, and invertebrates depend on live redwoods, while another 4,000 species live off of, or below, fallen trees. The stump from a broken redwood provides food and shelter for another 600 species.[25] The harvesting of one redwood can change the lifestyles of over 6,000 species.

Area of coast redwood

The natural range of the coast redwood encompasses 2.17 million acres in a narrow strip from Monterey County to southwestern Oregon. Virgin redwoods cover just 4% of this area, compared with 9.5% in 1986 and 16.8% in 1964.[26] In California, there are 80,000 acres of old-growth Coast Redwood in local, state, and federal parks, compared with 7,000 acres on private lands.[27] From 1984 to 1994, the area of redwood timberland decreased dramatically. The U.S. Forest Service reported:

"Timberland area (outside National Forests) occupied by softwood forest types was reduced by an estimated 106,000 acres, primarily in the redwood type. This type change was the result of harvesting and mortality of softwoods on plots previously classified as the softwood forest type. Standing volume within softwood types decreased by about 400 million cubic feet, and volume in hardwood types increased by an estimated 900 million cubic feet."[28]

Old-growth Forests

One visit to an old-growth redwood forest is an enlightening experience. A virgin forest often contains 300-foot tall trees with 20 foot diameters, spread across the landscape to produce a cathedral-like appearance. Old-growth inspires a sense of awe that can't be found in the early to mid-succession forests found throughout the county. Not only is old-growth redwood a scarce commodity, but old-growth Douglas-fir has also shrunk over the past 150 years. There are only 10,000 acres of virgin Douglas-fir left in the state—only 20% of the area of JDSF.[29]

Old-growth forest is rare in the vicinity of JDSF. Only 6% of the 72,190 acres of reserved old-growth forest in the North Coast are found in the Mendocino Sector State Parks (figure D).[30] *According to the US Forest Service, the majority of the volume in the North Coast Resource Area outside National Forests is found in even-aged stands between 30 and 70 years old.*

Redwood Preservation

The preservation of redwoods is more than simply the desire of the public; it is also part of the legislative process. Existing law recognizes the importance of protecting and preserving redwood forests[31], as well as the fact the "extreme beauty and economic value of coast redwoods requires special measures of protection for the use, enjoyment, and education of the public."[32] Bill No. SCR 18 introduced by State Senator Sher states:

"This resolution makes the following findings and declarations:

--Californians have expressed a high priority for protecting and preserving old-growth and other significant native forests, including coast redwood forestlands."[33]

While the sierra Sequoia has been protected from logging, the coast redwood has not been afforded the same protection, causing the legislature to introduce bills that would give coast redwood similar status. In the meantime, CDF harvests redwoods from JDSF, and the majority of the revenues from the harvests are used to pay for the review of THPs, 2/3 of which are on industrial land.

Mendocino County

The County's Forests

Timberland distribution

The majority of the land in Mendocino County is classified as forest land. Of the county's 2.2 million acres, 1.6 million are classified as forest land, of which 1.3 million is classified as timberland, defined as capable of growing 20 cubic feet or more per acre per year of industrial wood or not in reserved status.[34] The timberland is divided among industrial land (45%), other private holdings (37%), and public holdings (17%).[35] The timberland is distributed as follows:

Public	
National Forest	116,000 acres
BLM	58,000
State	51,000
County/municipal	2,000
Total	*227,000*

Private	
Forest industry	591,000
Farmer	99,000
Native American	18,000
Miscellaneous	368,000
Total	1,076,000

Reserved Forest

Reserved forest, which is forest withdrawn from timber production by statute, ordinance, or administrative order, makes up only a fraction of the forest of Mendocino County. The percent of forest in reserved status is 36.8% in Del Norte County, and 10.8% in Humboldt County, and 2.1% in Mendocino County (figure B). In terms of the actual area, both Del Norte and Humboldt Counties have more than six times the amount of reserved forest as Mendocino County (figure C).

Old-growth forest

In Mendocino County, old-growth is found in a few small patches, and the remainder of the forest is usually overstocked second, third, and sometimes fourth-growth. There has been no effort to promote late-seral succession conditions in the redwood forest through extended rotations by either industry or CDF, despite the fact that older trees produce higher-quality lumber, and species evolved over millions of years to survive in old-growth forests. The characteristics of an old-growth forest, such as a multi-layered canopy, numerous downed logs, low stocking of large trees in a cathedral-

like appearance, and diversity of habitat, are missing from the monoculture tree farms that have resulted from past silvicultural practices.

Endangered Species

There are 21 listed species in Mendocino County, including 8 animals and 13 plants.[36] The threat to species is widespread throughout the state. California trails only Hawaii and Alabama for greatest number of extinctions[37], and nearly 14% of the state's native flora is either exceedingly rare or seriously endangered.[38] JDSF is the home of several listed species such as the Coho salmon and the marbled murrelet. Coho salmon populations have plummeted in recent years, with some estimating that the half-million Coho who once swam in the coastal streams of California have dwindled to 5,000 survivors.[39] Researchers working in JDSF commented, "Both pools and Coho salmon were rare."[40] Similarly, the number of marbled murrelets has decreased from 60,000 to fewer than 7,000, and the population continues to decline at 7% per year.[41] These species are two of the more visible, but species such as the Roderick's Fritillary, the California Red-Legged Frog, and the Lotis Blue Butterfly are in the same state.

Timber Inventories

According to Maximizing Forest Productivity by Hans Burkhardt, Mendocino County had a standing inventory of over 70,000 BF/acre before European settlement, with some groves of redwoods having over 300,000 BF/acre. By the time JDSF was created in 1947 in response to concern over cut-over lands, the average county inventory had decreased 43% to 40,000 BF/acre, close to the current JDSF inventory of 44,000 BF/acre.[42]

Timber inventory on G.P.'s coastal timberlands is now about 10,500 BF/acre, approximately 10.5% of the original inventory.[43] G.P.'s proposed SYP calls for an increase in inventory to 15,000 BF/acre—after 100 years. Similarly, L.P.'s inventory has dropped to around 10,000 BF/acre. County forester Steve Smith has described the industrial timberlands owned by L.P. and G.P. as, "young forests."[44]

Timber harvests

Recent harvest levels in Mendocino County have been between 200,000 and 300,000 M BF. This is dramatically less than the peak for the past 50 years of 1,030,000 M BF that occurred in 1955 (figure F).[45] This high harvest level can be attributed to the convergence of tractors, chain saws, and trucks, all of which accelerated the resource extraction process. After this peak, harvest levels have generally declined, falling to a low of 211,000 M BF in 1995.

Despite the decline in harvest levels, Mendocino County is still one of the state's leading timber producers. In 1996, Mendocino County ranked second in the state with a net harvest of 275, 589 M BF, 12.12% of the state total, with a value of over $118 million. Only neighboring Humboldt County harvested more timber, 517,524 M BF, worth over $253 million.[46]

Although log production has declined over the last few decades (figure), the increase in both stumpage and log value in dollars/M BF (figure) has lead to a dramatic increase in total value at the mill and total stumpage value (figure). The liquidation of forest lands, as evidenced by diminished inventories, has placed a premium on lumber. Groves of old-growth now yield $100,000 to $400,000 an acre in standing timber, with single trees fetching as much as $50,000.[47]

Employment

Current Employment

1996 Mendocino County Employment data show that lumber and wood product employment is one small piece in the pie. The service industry is the number one employer, providing 18.8% of the jobs, followed by retail trade at 17.5%, government at 13.8%, and manufacturing at 13.0%. Lumber and wood product employment provides fewer than half the manufacturing jobs, and only 6.1% of all employment in the county (Figure I).[48]

Employment Trends

The work force has increased as the population of the county has continued to rise. Meanwhile, employment in the timber industry has decreased over the past 15 years. While the civilian labor force increased from 32,170 in 1983 to 42,780 in 1996, a 33% jump, lumber and wood product employment decreased from 2,825 to 2,390, or 16.7% (Figure L). As an example of the instability of forest resource employment, employment dropped from 3,200 to 2,370 from 1990 to 1992- a 25.9% decrease.[49]

Future Prospects

The California Employment Development Department forecasts that 300 jobs will be lost from the lumber and wood products industry between 1993 and 2000, with the layoffs attributable to a 34% decrease in sawmill employment, the largest decrease for any section of industry in the county. During the same period, logging employment is expected to remain stable at 500 persons. Other sectors of the economy are expected to more than take up the slack; retail trade employment is expected to increase 20.9% and hotel and lodging employment is predicted to rise 16.8%.[50]

Local Industry

JDSF is surrounded by industrial forest owned by the Louisiana Pacific Corporation, the Georgia Pacific Corporation, Coastal Forestland Ltd., Congaree, and Soper-Wheeler.[51]

Georgia-Pacific

Georgia-Pacific's holdings in redwood country are only a small portion of the company's forestland. Of G.P.'s 6 million acres of forest in U.S. and Canada, only 321,000 acres, or 5.35%, are located in California.[52] Of the 321,000 acres, less than 200,000 acres are located in Mendocino County.[53] The company produced nearly four times as much southern pine as western softwoods in 1996, while posting record cash

flows and earnings.[54] At the same time, 65 employees were laid-off with the closure of mill #1 in Fort Bragg. The mill was forced to close because it was designed to mill large old-growth trees, and was too inefficient at milling the smaller logs now being harvested.[55] Despite the structural changes in their Fort Bragg mill, the value of G.P.'s stock has risen from around $60 per share to $85 per share over the past 5 years, topping out at over $100 per share earlier this year.

Louisiana-Pacific

An anti-trust suit filed against Georgia-Pacific in 1973 forced the divestment which gave birth to Louisiana-Pacific.[56] L.P.'s assets in Mendocino County include 300,000 acres of timberland and the Fort Bragg sawmill on Gibney Lane. After reducing inventories to 10,000 BF/acre, L.P. Vice-President Richard Frost declared, "We're pulling out of the redwood business."[57] Unlike Georgia-Pacific, which is thriving despite depleted holdings in Mendocino County, L.P. stock has fallen like its inventory. In January of 1994, L.P. stock was worth $40 a share; today the stock has fallen to $20 a share.[58]

Population Increase

The population has increased dramatically in the 50 years since JDSF was created. In 1940, less than 28,000 people lived in Mendocino County, 2.3 million lived in Northern California, and 6.9 million lived in California. According to the 1990 census, the population of Mendocino County was over 80,000, the population of Northern California was 8.4 million, and the population of the state was almost 30 million.[59] The Department of Finance projects a 2040 population of 176,442 for the county, 14.6 million for Northern California, and 63.3 million for the state.[60] Historical and projected Mendocino County populations are depicted in Figure M, while Figure N details past, present, and future populations for the Bay Area and Northern California. Planning should prepare for the population to double over the next 50 years. The balance between the need for forest products and the need for living and recreation areas is a difficult issue that 21st century planners must tackle carefully.

(In 1991, the Mendocino County Board of Supervisors voted 4 to 1 to allow Louisiana Pacific to subdivide its holding into 160 acre parcels, with 5th district supervisor Norman deVall dissenting.)

Recreation

Local Parks

The Mendocino Sector of the California Department of Parks and Recreation consists of fifteen parks and reserves, and an outdoor center, stretching from the coast east to Montgomery Woods, and from Westport south to Schooner Gulch. The parks cover 16,380 acres, 32.6% the size of JDSF (Figure 0), and have 13.10 miles of river frontage.[61]

The Mendocino Sector received 2.75 million visitors in 1996, including 995,291 to the Mendocino Headlands State Park, the 14th highest attendance among

California State Parks.[62] As shown in Figure P, attendance has continued to increase over the last decade, but family camping has remained fairly steady, reflecting the capacity crowding of the summer at the 573 sites.[63]

Camping in the State Forest

There are two camping areas set aside in JDSF. Camp One has 32 sites spread out along the North Fork of the South Fork of the Noyo, while Camp 20 farther inland has 30 sites along Big River below Chamberlain Creek and James Creek.[64] CDF is mandated by PRC 4639 only to give, "consideration to values relating to recreation, watershed, wildlife, range and forage, fisheries, and aesthetic enjoyment," which is evidenced by the lack of a sign on Highway 20 alerting motorists as to the location of Camp One.

Economics

Contrary to popular belief, promoting recreation over logging doesn't necessarily have a negative economic impact. A United States Forest Service report claimed that recreation, hunting and fishing on national forests contributed 37 times more income to the national economy than timber harvesting.[65] According to the California Department of Parks and Recreation, the average family spends $73 a day, with a total of $2 billion spent by California campers. For 1992, California campers supported 26,500 jobs for a total of $333.5 million.[66] CDF claims that JDSF timber harvests generated $12 million in revenue and employed 230 people in 1996.[67] If the average family consists of 4 people, 657,534 visitor-days would be required to generate the same revenue as the 1996 timber harvest. This figure is 23.9% of the attendance for the Mendocino Sector State Parks. According to CDF, 50,000 people use the forest each year for hiking, camping, firewood cutting, mushroom picking, and other recreational activities.[68]

Jackson Demonstration State Forest

Inventory

Current inventory on JDSF is estimated at 2.3 billion board feet, or 4 times greater than the inventory in 1947.[69] The 1958 JDSF Management Plan estimated the inventory at 604,000 M BF, including 254,000 M BF in young-growth stands.[70] A starting inventory of 575,000 to 600,000 BF equates to an inventory of 11,500 to 12,000 BF/acre.[71]

I. Include Vince's table

II. Talk about CFI, IFI, Cryptos

III. Discuss stability of inventory for 25 years, then sudden increase with new program

IV. Highlight uncertainty and reflection on management success

Timber Harvests

CDF's timber harvesting policy for JDSF is to cut annual growth of "merchantable conifer sawtimber." The 1983 JDSF Management Plan determined that the annual allowable cut was 29.5 million board feet.[72] The size distribution of trees to be cut is not specified, allowing a forest with a variety of tree sizes to be replaced by a forest of even-aged trees. A harvesting model that could be used by CDF can be found in a few progressive Bay Area counties. Special rules that have been enacted by the Board of Forestry for Santa Cruz, San Francisco, and Santa Clara Counties permit only 60 percent of the trees larger than 18 inches in diameter to be cut once every 10 years.[73] CDF's approach from the beginning of state control was to remove old-growth that remained in the eastern portion of the forest in the Chamberlain Creek, James Creek, and North Fork of Big River Watersheds. At the time the last Management Plan was written, CDF claimed that the "final phase of liquidating the original old growth timber is in its final stages."[74]

The management of JDSF questioned this cutting level more than 20 years ago. Former State Forest Manager J.E. Sindel wrote to Deputy State Forester George Grogan in 1976:

"After reviewing the 1974 CFI information and comparing growth figures with those of 1969, we find a decrease in average annual growth. This, we believe, is due to increased cutting in our second growth stands.

With this in mind we believe our current annual cut should be held to about 26 million for the next few years."[75]

The average harvest from JDSF from 1956 (the first full year of production from the state forest) to 1996 was ….. JDSF contributed an average of ?% to the county harvest from 1956 to 1994, in accordance with the 50,000 acre forest being 3.8% of the county's timberland. However, the portion of the county timber harvest coming from

JDSF had increased dramatically in the last 15 years, reaching 10% in 1982, rising above 13% in 1991 and 1993, and finally (20%???) (figure E)

The 1983 Management Plan states that, "the normal goal will be to offer three sales, each of approximately 10 million board feet, each year, provided that the allowable annual cut does not change appreciably."[76] One possibility that should be explored is smaller sales aimed at local micromill operators, which not only helps the local economy, but also wastes less wood with the use of Woodmisers instead of industrial sawmill equipment.

Forest Resources Improvement Fund (FRIF)

Before 1979, the revenue from timber sales on JDSF went into the state's general fund. At that time the money was "ear-marked" for the California Forest Improvement Program[77], which "offers technical and financial assistance for practices that will improve the long-term quality of forested lands in terms of timber productivity, retention of soil cover and value for wildlife."[78] Today the money generated from the sale of timber on state forests goes into the Forest Resource Improvement Fund, governed by Public Resource Code 4799.13. The code lists eight areas where the money is to be appropriated, beginning with forest improvement programs. In reality, the majority of the funds from the FRIF account are spent on enforcement of the Forest Practice Act. FRIF expenditures for fiscal year 1996/97 were divided as follows:

Administration of Z'Berg-Nejedly Act	$8,181,000	54%
State Forest Management	2,686,000	18
Forestry Assistance Programs	1,452,000	10
Wildlife Habitat and Biological Diversity	1,003,000	7
Forest Pest Protection	636,000	4
State Nurseries	578,000	4
Forest and Rangeland Research	258,000	2
Urban Forestry	176,000	1

Caspar Creek Demonstrations

Caspar Creek has been the setting for the two primary demonstrations in JDSF's 50-year history. The Caspar Cutting Trials was a study of silvicultural techniques, while the ongoing Caspar Creek Watershed Study has investigated hydrology and geomorphology in the basin. The Caspar Creek experimental watersheds are a joint venture between CDF and the U.S. Forest Service's Pacific Southwest Research Redwood Science Lab in which CDF maintains road, trails, and structures while PSW designs and implements studies in addition to being responsible for instrumentation and data processing.[79]

Cutting Trials

The Caspar Cutting Trials began in 1959 with the establishment of five test blocks along the south side of Caspar Creek four miles from the coast.[80] Research was conducted to determine the best method for logging in 80 to 100-year-old second-growth redwood and Douglas-fir forests. The silvicultural methods used in the blocks were clearcutting, single tree light selection, single tree heavy selection, and group selection, with one block left uncut as a control.

Group selection silviculture was favored over tree selection by case study author James Lindquist. He seemed to prefer clearcutting, but suggested group selection as the best alternative when public pressure precludes clearcuts. According to Lindquist, "the small groups permit regeneration rates and maintain good overstory growth, while still fostering an uneven-aged regime."[81] Hans Burkhardt, in his analysis of Lindquist's report, goes even farther in his endorsement of group selection:

"Production through group selection did increase timber yield by 12.5% and most likely by 25% if it had had the same starting inventory as the uncut block for the 24 year period from 1960-1984. This result of the trials is the most important and far reaching one, yet this obvious conclusion has practically not been drawn: timber production can be *substantially increased if the group silvicultural method is used!"*[82]

The Caspar Cutting Trials are essentially over due to superimposition of logging practices. The light and heavy selection blocks were entered in the late 1980's and cut according to diameter distributions.[83] Inconsistency in harvesting regimes has ruined any chance to continue this long-term study.

Watershed Study

"From the standpoint of erosion, there's certainly going to be some price to be paid when one enters natural landscapes to take trees. The price may be reflected in terms of fisheries, water quality, or site degradation. It's just that that price should be appropriate when weighed against commercial benefits."- Raymond Rice, former lead hydrologist, Redwood Science Lab[84]

The Caspar Creek Watershed Study commenced in 1963 with a four year measurement of both streamflow and sediment for calibration in the North and South Forks of Caspar Creek. The main-haul logging road and main spurs were built in the South Fork in 1967, and logging commenced in 1971. During the next three years, between 59% and 69% of stand volume was removed from 405 ha of the South Fork, while the North Fork was left uncut as a control.[85]

Sediment delivery to the channel increased dramatically as roadbuilding and timber harvesting disturbed the landscape and exposed more soil area to the elements. Researchers determined that suspended loads in the South Fork increased by almost 400% following roadbuilding and from 100% to 500% in the five winters after logging commenced.[86] Researchers discovered that stream sediment increased 80% with roadbuilding and 275% with logging. They also found that most sediment was transported during rare high-flow events: 81% of suspended sediment was transported by flows that occur only 1% of the time. While the North Fork showed only a small increase in sediment load as stream power increased, sediment discharge in the South Fork rose

rapidly with stream power. The sediment discharge regime in the South Fork had switched from being dependent on the supply of sediment to being dependent on the stream's power to carry away the introduced sediment load.[87]

The quantity of water in the channel also increased as rain-intercepting trees were removed from the watershed. Annual runoff in the South Fork increased between 9% and 30% in the five years after harvest, and didn't return to pre-logging conditions for 15 years.[88] In addition, lag time, or the time required for 50% of the input to the watershed to produce 50% of the output, was decreased approximately 1.5 hours after roadbuilding and harvesting.[89] The decrease in lag time could contribute to cumulative effects, defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency…or person undertakes such other actions."[90] For example, legal harvesting of a tributary could change the hydrologic regime by decreasing lag time. The increased efficiency of water delivery to the channel could contribute to cumulative effects downstream by making previously asynchronous tributaries become synchronous, or vice versa. The result could be detrimental flooding or scouring, even though the harvesting activities were legal. Current research is exploring cumulative effects.

The watersheds switched roles for the next phase of the study in the late 1980's. Between 1989 and 1991, 48% of the area above the North Fork gauging station was clearcut, and 4% of the streamside protection zone was selectively cut, in an attempt to duplicate the volume of timber removed from the South Fork in the early 1970's.[91] Meanwhile, the South Fork was assumed to have returned to pre-logging conditions and was used as a control.

The increase in sediment load in the North Fork was smaller than increase found in the South Fork. In the six winters after clearcutting commenced in the North Fork, the greatest increase in suspended load was 56 m^3km^{-2}, closer to the South Fork's minimum increase of 30 m^3km^{-2} than the maximum increase of 460 m^3km^{-2}.[92] This lesser increase in sediment delivery to the channel can be attributed to the conversion from tractor logging to skyline cable yarding, and roads were built higher on the slope, decreasing the area of disturbed soil and increasing the distance from the disturbed soil to the river channel.

As mentioned previously, roads affect the delivery of sediment and water. Geologic mapping of the North and South Forks of Caspar Creek found 15 landslides that predated timber harvesting; seven were "associated with existing roads across the upper slopes."[93] In the H.J. Andrews Experimental Forest in Oregon, the effect of roads was demonstrated dramatically:

"Researchers Julia Hones and Gordon Grand found that peak flows, or flood size, increased 50 percent in a watershed in the five-year period following logging and road building. Only 25 percent of the forest had been cut, but the combined effects of roads and harvest equaled that found in a nearby watershed that had been entirely clearcut with no roads."[94]

CDF: Managers of our forest

The State and CDF have been criticized for their handling of resource programs and protection. The Legislative Analyst Office (LAO), a nonpartisan office that provides fiscal and policy analysis to the California Legislature, has stated that the state "lacks long-term plans to protect resources and acquire habitat."[95] In addition, the LAO criticizes both the Governor's office and CDF for their handling of the Governor's watershed initiative, stating the need for "better defined objectives and measurable goals."[96] With regard to CDF's role in the watershed initiative, the LAO states:

The department has not identified specific watersheds to be assessed, the amount of work to be accomplished in 1997-98, or how the results of these assessments will be used. This reduces the Legislature's ability to (1) evaluate the merits of the department's proposal and (2) hold the department accountable for specific results.[97]

CDF has been told that its timber regulations are failing to protect fisheries resources. The National Marine Fisheries Service wrote to CDF Director Richard Wilson concerning coho salmon and steelhead habitat stating their belief that "scientific literature indicates that the habitat requirements of coho salmon and steelhead in most watersheds are not being met" through the state's enforcement of timber harvest regulations.[98]

CDF enforcement is also failing to keep county timber inventories from plummeting. If CDF had upheld the maximum sustained production portion of the Forest Practice Act (PRC 4513(b)), industrial timberlands would not be depleted.

The Future Of Our Forest

The State acquired the land that became Jackson Demonstration State Forest at a time of instability in the lumber industry: war, resource depletion, and technological changes. During the past 50 years, JDSF has demonstrated the viability of second-growth timber—young growth redwood that was virtually worthless in 1947 is now worth $530/M BF. This was an appropriate act of the government to purchase the land and show that trees could be cultivated and introduced to the marketplace at reasonable prices. Now that second-growth timber has been shown to have value, the time has come for a new purpose in this special forest.

This Mendocino County jewel is the ideal spot for a demonstration of the multi-use potential of the redwood forest. Habitat and recreation values can be enhanced, while still allowing for timber harvesting, through state-of-the-art land management techniques incorporating reserve areas, buffer zones available for recreation, and areas set aside for innovative, demonstrative timber harvesting. We are stewards of the land for future generations; we should leave a legacy of sensible management that considers all the values of the forest. If habitat and recreation values are enhanced, the only loss will be monetary. However, the lumber will still exist in the forest, and should future generations decide it is in their best interest to harvest in areas set aside for wildlife or tourism, they will have that option.

CDF is in the process of writing the new management plan to replace the outdated 1983 version. Among the topics that should be addressed in the new plan are restoration

forestry, species conservation, and recreation potential. The new paradigm for Jackson State should include elements of the enabling legislation for Soquel Demonstration State Forest (PRC 4660-4664) as well as the Enhanced Conservation Alternative presented by CDF at the public scoping meeting for the JDSF HCP/SYP.[99]

CDF's policy of liquidating old-growth during their 50-year stewardship of the land has created a forest lacking in diversity. JDSF has only a few scattered patches of old-growth forest, and these isolated patches lack the connectivity that the fauna of the forest need. Increasing the rotation age to more than 100 years, and possibly as high as 180 years, would lead to the production of better wildlife habitat and higher-quality sawtimber.

Possible Changes in Silvicultural Prescriptions

I. Increase rotation age

II. Harvest POI in timber harvest areas

III. No clear cut; prefer thinning, allow group selection?

IV. No herbicides—manual removal of exotics such as broom (which won't go crazy without clearcutting)

V. Small sales aimed at local woodsmen

VI. ISF/SmartWood Eco-Certified Practices

Restoration Techniques

The young forests of JDSF are commonly overstocked with spindly trees attempting to survive the intense competition for light, water, and nutrients. For the forest to reach late-succession conditions in the shortest amount of time, restoration forestry will be essential. The most important tools of restoration are:

- Prescribed burning
- Understory thinning
- Pruning
- Revegetation
- Sub-soiling to treat compaction
- Biomass removal
- Road closures or obliterations
- Reintroduction of native species
- Inventories and data gathering
- Monitoring[100]

Species Conservation

Habitat Conservation Plans

CDF is currently creating a multi-species Sustained Yield Plan (SYP)/Habitat Conservation Plan (HCP) that will detail forest management and recreation activities, and conservation of state-listed species.[101] The SYP is scheduled for completion by December 31,1998, while a draft HCP is due in the first quarter of 1998.

The HCP is no guarantee that either habitat or species will be aided. A property owner who completes an HCP is given an incidental take permit, which "allow a landowner to legally proceed with an activity that would otherwise result in illegal take of a listed species."[102] A property owner is required to mitigate for take (harassing, harming, hunting, etc. of any threatened or endangered species) by preserving, enhancing, or creating habitat. If a mall developer would like to build on a wetland site, they can proceed if they create similar habitat elsewhere. Mitigation is more difficult in a forest; when an old-growth tree that is home to an endangered species is cut down in JDSF, it will take decades to create an analogous habitat elsewhere in the forest. In addition, as mitigation increases, the possible sites will decrease, until finally the era of the HCP will end.

Ecosystem Conservation

Instead of a species-by-species approach, ecosystem conservation should be practiced in JDSF as a model of progressive forestry. Dr. Reed Noss from the University of Idaho has estimated that 85-90% of species can be protected by conserving samples of natural communities, instead of preparing separate inventories and monitoring for each species.[103] JDSF, as a public forest owned by the people of the state of California, is the ideal site for flora and fauna rehabilitation through core reserves connected through wildlife corridors, and surrounded by buffer zones. JDSF is the prime spot in the county for such a reserve, as the land is publicly owned, and a change in management objective wouldn't cost taxpayers.

Outside the buffer zones, land-use can be primarily human-oriented, allowing the forest to be used for the extraction of natural resources such as timber and mushrooms, while still promoting wildlife habitat and biodiversity. The protection of large blocks of habitat would be beneficial for bird and mammal species for two important reasons:

"1. Large habitat blocks support a greater number of individuals or breeding pairs than smaller habitat blocks. This increase in population size helps to buffer species from the effects of genetic, demographic, and environmental fluctuations.

2. Large habitat blocks have a proportionately smaller amount of edge area, area that is affected by the surrounding landscape, than do small habitat blocks of equal shape. Adverse affects associated with forest edges have been well documented for a wide variety of forest interior species." [104]

Genetic diversity

There are many scientific reasons to conserve genetic diversity. The Fundamental Theorem of Natural Selection states that "the rate of increase in fitness of any organism at any time is equal to its additive genetic variance at that time."[105] Further, the adaptability of organism to environmental change is reduced as populations and genetic diversity decrease. Finally, biological processes that could benefit humans are lost forever when genetic diversity decreases and species survival becomes imperiled. Species should be conserved to the point that they not only exist but also persist in the presence of all the components of an ecosystem necessary for reproduction and survival. Preserving and enhancing habitat is the easiest available path for species survival. As one biologist noted, "trying to restore species whose populations are declining is more difficult and less beneficial than planning for species conservation before the crisis happens."[106]

Northwest Forest Plan

Two elements of the President's Northwest Forest Plan could greatly aid species conservation: the late-successional reserve system and the riparian reserve system. The late-successional reserves system is designed to protect endangered species dependent on old-growth conditions. The Riparian Reserve system is designed much like the late-successional reserves, targeting salmonid species, as well as providing corridors between old-growth reserves. The riparian corridor would have no logging, and outside a 100-foot buffer zone, the land could only be moderately logged, as long as nearby protected areas were unharmed.[107]

Mendocino County, with only a small fraction of its old-growth forest remaining, would make an ideal site for setting forest areas aside to let them mature. JDSF makes up 3.8% of the county's timberland (figure A); if half of JDSF were set aside as a wildlife reserve, this would remove only 2% of the county's timberlands. The county can absorb a 2% fluctuation easily; last year's timber harvest was 30.3% higher than the year before.

Recreation

Jackson Demonstration State Forest is the ideal site for recreation expansion along the Mendocino Coast. The local state parks are filled to capacity in the summer months as tourism continues to increase along the coast. The combined area of all the parks is a fraction of the size of JDSF, as well as being home to a lower percentage of redwood forest. Increasing camping and fishing opportunities in the state forest will provide alternatives for recreational enthusiasts as well as generate revenue for the local economy.

As mentioned previously, the population of Mendocino County is expected to double within 50 years. People will need jobs the timber industry can't provide, and tourism-related employment is the most realistic candidate to absorb this increased labor force.

Models for the future

Soquel Demonstration State Forest

Soquel Demonstration State Forest in Santa Cruz County could be used as a model for progress for JDSF. The legislation that created SDSF earlier this decade states:

The coast redwoods, as the dominant tree species in this area, are a valuable natural resource and are unique in North America for their beauty, abundance, diversity, and public accessibility, and their extreme beauty and economic value requires special measures for their protection for the use, enjoyment, and education of the public.[108]

The legislation also establishes an environment that will provide watershed protection and protect old-growth redwood trees. This is in contrast to JDSF, where the policy has been to harvest old-growth except in a few small patches such as the Chamberlain Creek Waterfall and Dresser Grove.

Enhanced conservation alternative

"most restrictive forest management practices in recognition of scientific uncertainty regarding potential impacts of timber management activities on sensitive species and their habitat:

"For example, no cut buffer along streams"

"timber management situation that is reduced to a low or custodial level and an enhanced or very high wildlife conservation management situation

Conclusions

I. Redwood forest is unique, shrinking relict

II. 2nd-growth redwood now has value—forests can be managed and harvested

III. Industrial methods aren't working, witnessed by the formation of TTC by G.P. and the sell off by L.P.

IV. Inventories have been depleted throughout the county, and harvests have declined accordingly

V. Scientific demonstrations have shown increased sediment and runoff from harvest

VI. CDF may be a competent manager, but they have noted deficiencies as a bureaucracy and they are not getting the full potential out of JDSF

VII. CDF Budget practices need to be changed to take burden off forest

VIII. The forest should be the site of more ecologically-sensitive, innovative silvicultural experiments

IX. Population is increasing—demand up for recreation and living area—therefore less wildlife habitat

X. More jobs will be needed in the county as population grows, lumber industry is declining in importance in the economy, tourism most likely source of jobs

Fragments not used in paper, but may be incorporated at a later time

With the population increasing, it is disturbing that the state has not come up with a long-range plan for conservation and management of land resources.

CDF, as the manager and regulator of JDSF, should have a state-of-the-art land management and monitoring plan, yet independent analysis demonstrates the lack of progress evident in the department.

Species Conservation

"An apt analogy for this problem is a man prying rivets out of the wing of an airplane so that he can sell the rivets—he sees no reason to worry about the consequences of his action since he has already removed numerous rivets from the wing with no ill effect."

-Walter Reid, Keeping Options Alive: The Scientific Basis for Conserving Biodiversity[109]

Redwood sprouts depend on high light intensity for growth; in a mature forest, group selection creates openings large enough for sprouts to grow vigorously while tree selection fails to allow enough light to reach the forest floor. This method may not be as advantageous in younger forests, where thinning of overstocked sites may promote the most vigorous growth. (Helms thinning trial??)

Harvest Facts

- When trees are harvested and removed from the woods, half the volume of timber is wasted through inefficient utilization and lack of recycling.[110]
- According to a 1990 Science Article, 15% of the wood fiber in a typical harvest is left in woods due to breaks or defects.
- After arriving in the sawmill, 35 to 45% of harvested wood is converted to sawdust or scrap during board and plywood production.[111]
- One Canadian Forestry Service study estimated that $1.5 billion dollars in timber revenue were lost to British Columbia due to pauperization of the soil. This figure would be even larger if costs for lost fisheries and tourist revenue were factored in.[112]

Lumber Employment Analyses

Studies have shown that sawmill employment increases with increasing harvest levels but decreases as logs get smaller. A 1993 University of California dissertation concluded, "even if harvest remains constant, employment will fall as the logs get smaller and higher cost sawmills close down." The report also found that structural changes in the timber industry are more important than harvest levels in shaping employment patterns.[113] An analysis of the Pacific Northwest and the spotted owl situation reached a similar conclusion: "Job losses are best understood in terms of changes in the forest-products industry and in the natural resource base that remains available for supporting the industry."[114]According to a report by Pacific Northwest economists, "new jobs and income that are vital to the region's economic future will depend more on the protection of those assets than on their degradation."[115]

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