

The Redwoods

The Redwoods

A National Opportunity for Conservation and Alternatives for Action





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Foreword

In April of 1963, the National Geographic Society made a grant to the National Park Service to finance a special study of the Coast Redwoods (*Sequoia sempervirens*) of California. The study is concerned with an analysis of the remaining Redwoods forest, the preservation already accomplished, and what, if any, additional preservation is needed. The report which follows presents a professional analysis of the original distribution of the Coast Redwoods, the remaining forests, and the preservation already accomplished. The report also suggests certain alternate possibilities for additional preservation.

This professional report is being distributed now to solicit the comments and suggestions of interested parties. The additional information will be utilized by the National Park Service to complete its study and to formulate recommendations to the Secretary of the Interior.

During the study period, on June 25, 1964, a meeting was held with President Johnson to brief him on the progress of the study. The President, as reported in the press, expressed interest in the preservation of additional redwoods and requested the Secretary of the Interior to formulate recommendations.

The study on which the National Park Service is now engaged will provide basic information for the Secretary's report. It is for this additional reason that the National Park Service is especially anxious to have the widest possible review of its professional report.

It is requested that comments and suggestions on this report be sent to the Regional Director, National Park Service, Federal Office Building, 450 Golden Gate Avenue, San Francisco 36063, California. Materials should be submitted in time to reach the Regional Director on or before ~~September 18, 1964.~~

NOV 15 1964



George B. Hartzog, Jr.
Director



The Study



For many years the National Geographic Society has had an active interest in the coast redwoods, dating in fact from the founding of the Save-the-Redwoods League in 1919.

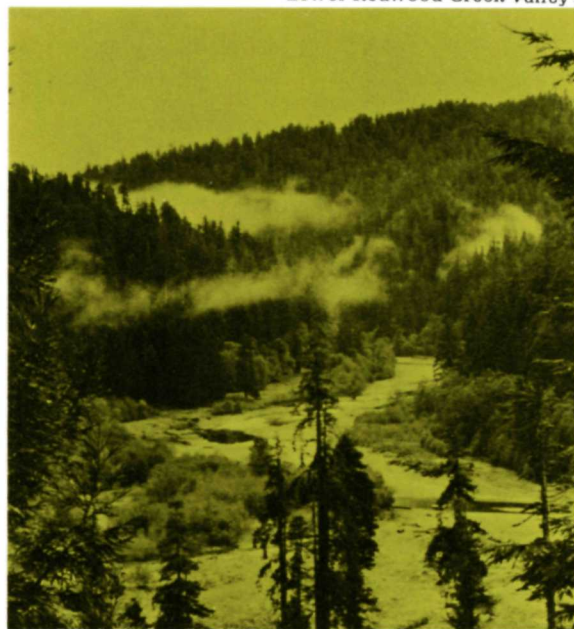
In April of 1963 the Society made a grant to the National Park Service for a comprehensive study of the coast redwoods (*Sequoia sempervirens*) as differentiated from the Big Trees (*Sequoia gigantea*) found in the Sierra.

This study is organized to accomplish basic fact gathering and field work through National Park Service personnel. Specialized phases are being handled through contracts: **1** an economic background and impact study carried out by John Kenneth Decker, Economist, of Berkeley, **2** a concentrated study of redwood ecology as it relates particularly to preservation and public enjoyment, by Humboldt State College; and **3** an analysis of commercial lumber operations and management practices as they relate to the future of the redwood forest, by John Miles, Consulting Forester of Eureka.

Geographically the study is concerned with the total redwood belt, running along the coast from somewhat south of Monterey to and slightly into Oregon. It was soon clear, however, that the best of the remaining potentials lay largely in the northern three coast counties of California; Del Norte, Humboldt and Mendocino. The study is concentrated accordingly.

Throughout, fine cooperation has been provided by State and local agencies directly concerned, and a very helpful attitude evidenced by the lumber industry and private property owners. This, and the keen interest of many individuals is acknowledged with gratitude. Special thanks are accorded the Save-the-Redwoods League and the Sierra Club for major assistance.

Lower Redwood Creek valley.



SEQUOIA SEMPERVIRENS
ORIGINAL REDWOOD BELT



The Redwoods



THE FOREST

The original redwood forest covered almost two million acres give or take a bit. Stretching in a narrow band along the north coast of California it comprised an almost continuous belt little more than 25 miles wide.

There it stood when white man first discovered and explored it—there and nowhere else on earth. There it had stood for many thousands of years, perhaps as outstanding a climax forest as could be found.

Earlier still in geologic time, when the climate was much different, the redwoods probably extended over vast areas of the country and on other continents as well. At least paleontology tells us that the *Sequoia* genus was widespread indeed, with fossil remains showing up in this country from such widely scattered sites as Montana, the Dakotas, Wyoming and the southwest. Yes, the redwoods are remnants of an ancient race which knew the dinosaur and which one might expect to have long since become extinct. Yet here they are today, hardy, adaptable, persistent giants, magnificent and wonderful to boot.

Geographically they still occupy the original belt except where actually displaced by man's "handiwork" or arduously eliminated over many years for farming or grassland. But now the virgin stands are largely gone, replaced by stubborn second growth at times almost in spite of man.



"The Redwood Forest".





Morning fog below—sunshine above.

THE CLIMATE

The climate of the redwood country is, per se, closely associated with that of California's north coast. As with most of the State it has a wet season and a dry season. It is characterized by moderate temperatures, heavy rainfall during the winter months, and dry summers with considerable fog.

Average temperatures vary between 44-48° in January, and 56-64° in July. Extremes rarely exceed 100° or drop below 20°. Precipitation, mostly in the form of winter rain between November and March averages 40 to 60 inches annually. However it reaches nearly 100 inches in the northernmost sections, while the southern extremity averages only 20 inches. The higher ridges north of the Bay Region occasionally experience light snowfall but this seldom remains long on the ground.

Fog is a predominant feature of north coast weather, generally occurring almost daily during the summer and not infrequently during the remainder of the year. It is, however, quite variable and specific areas along the coast are known as notably foggy or fog-free. This characteristic of variability applies to the weather as a whole. Micro-climates, as it were, with striking differences frequently co-exist in close proximity. Anywhere along the coast, for example, one can be cool at any time of

year. Yet inland just a few minutes by car, the redwood valleys are normally warmer throughout much of the year.

The climate in fact has a number of interesting aspects as related to redwood ecology, and interesting potential so far as tourist use and human enjoyment are concerned.

Fog and redwoods come jointly to mind for many people. Geographically there is a close parallel between the two, though scientifically no causative relationship has been confirmed. What may be more significant as a limiting factor in the redwood's range is the precipitation to evaporation ratio.

The north coast has not experienced the extreme population growth which Southern California or the Bay Region have felt. Climate undoubtedly has been a factor. However, with continually increasing mobility it can expect to receive more and more attention as a vacation or travel target. Relief from heat is always available; yet sunshine and warmth are also readily at hand.

The equable year-round climate will tend to lengthen the tourist season, and fog need be no deterrent. It is in fact part of the redwood picture, not infrequently adding to the quality of the experience.



Redwoods, fog, sunshine—a picture to remember.



In virgin groves there is a wide range of understory—mixed hardwoods, ferns, a carpet of Oxalis.



Small clear streams were a feature of the original forest.

THE ECOLOGY

Thirty or 40 million years ago, the climate in western America was suited to the presence of redwood over an area extending eastward at least to Yellowstone National Park where petrified trunks are still standing, and northward to British Columbia. Earlier still, it appears redwoods were scattered widely around the world. Today, as we know, they are limited to a narrow belt along the northern coast of California. The retreat apparently was largely a matter of climatic change.

The climate, soil, plant and animal life of a forest stand plays an interacting role in its survival and regeneration. This concept is no less important in the case of the redwoods.

The nature of the hydrologic cycle and how it influences (or is influenced by) behavior of precipitation, temperature, parent rock and soil properties, and stream and ground water behavior appears to be unusual in the redwoods. The difference apparently involves conservation practices of the specie itself with regard to soil moisture and the important role of fog and ground water in minimizing soil moisture depletion.

Expanding this concept, it is evident that



the watershed is an important ecological unit for redwoods. Consideration of flood flows, watershed orientation, storm movement and the texture, nutrient and moisture relations and upland and alluvial soils indicate that the species depends not only on its immediate environment, but on the entire land unit which lends its characteristics to those of the stand.

The geology and soils of the region are varied. The area is experiencing uplift and often its soils are unstable and subject to erosion. The separation of soils into upland and alluvial categories reveals potential management problems. The Yorkville (grassland) and Atwell (timber) soils, for example, are both highly unstable.

The relationship between the natural range of the redwood and the coastal "fog belt" is often stated, and still not fully understood. It quite probably results from the species requirement for an extremely favorable precipitation to evaporation ratio.

Redwood seed is generally of low viability and limited natural dispersal. It is highly susceptible to heat injury, certain insects and

fungi, and still undetermined root rot. Few, if any, survive the first year in undisturbed redwood soil.

The more important method of regenerating second-growth is the unusual and highly developed ability and tendency of redwood to sprout whether old growth, young growth or seedlings.

Redwoods are tolerant and generally respond to release after considerable suppression. The thick bark of old-growth provides a high degree of fire protection, but repeated or hot fires are responsible for much defect.

"Spike-topped" trees (dead-topped) are an interesting phenomenon in older stands. The cause is not fully understood, but the consensus points to stress for moisture as the key. This, in turn, could result from a variety of climatic or physiological factors.

Typical virgin redwood stands are of the climax type and contain a wide representation of age and size classes. Barring man's activities or major natural changes, such stands could be maintained indefinitely in relatively small well-protected areas. This, of course, is

not to imply that virgin stands in their natural ecological setting could be maintained on such small areas.

Second-growth stands are generally even aged and many of the trees are sprout-growth. Large clear cut and burned areas may be dominated by brush species for extended periods except for patches of sprout-growth.

Streams and their related fish and wildlife habitat are an attractive and significant feature of the north coast redwood forests. Although abundantly endowed with large and small streams originally, few indeed have so far escaped disturbance. This results from a variety of man's activities, but in this prime commercial forest area, largely from timber harvests and related fires. Increased turbidity, siltation, flooding and creation of barriers to fish migration are some of the main adverse effects of logging.

Actually, the variety of fish is relatively limited. One common species, the Humboldt Sucker and two uncommon species, the Navarro Roach and the Gualala Roach are peculiar to the region. In California, the coast cutthroat trout and the eulachon are found only in this region, and a type of small steelhead, the "half-pounder", occurs here in large numbers. In fact, some of the "purest" populations of cutthroat in California are resident in redwood forest waters.

Resident rainbow trout, steelhead, and salmon along with the cutthroat provide the more popular sport fishery. They use nearly all streams in the redwood forests as spawning and nursery areas. Additional logging, in general, may be expected to further reduce the numbers of these fish.

Water control projects have so far disturbed the streams and rivers of this part of California but little. Based on known plans at this time, proposed projects in almost all cases are located well upstream from the redwood forest zone. Major exceptions to this are the Brandscomb project on the south fork of the Eel River and the Humboldt Dam and Reservoir project on the Klamath River.

The fauna of the redwood forests, particularly old-growth, is often thought to be sparse. In some respects, this is the case. The relatively dark, humid and sparsely speciated ground cover and tall limbless trunks offer little shelter

or food for many animals. Even the small invertebrates are not broadly represented. Certain of the interesting and more unusual species, however, are abundant. The banana slug, for example, known to attain length up to 10 inches, is common as are the salamanders. Fifteen of the 22 species found in western North America have been reported from this region including the Pacific Giant Salamander, which is relatively abundant, and may reach a length of 12 inches. Although 75 species of mammals are known in the redwood belt, the greater number of these usually live in adjacent habitats rather than in the redwood forests. The Townsend chipmunk and the western Douglas squirrel may be abundant as are certain of the mice and shrews. Mountain beaver, raccoon and bobcat often occupy margins of the old-growth stands.

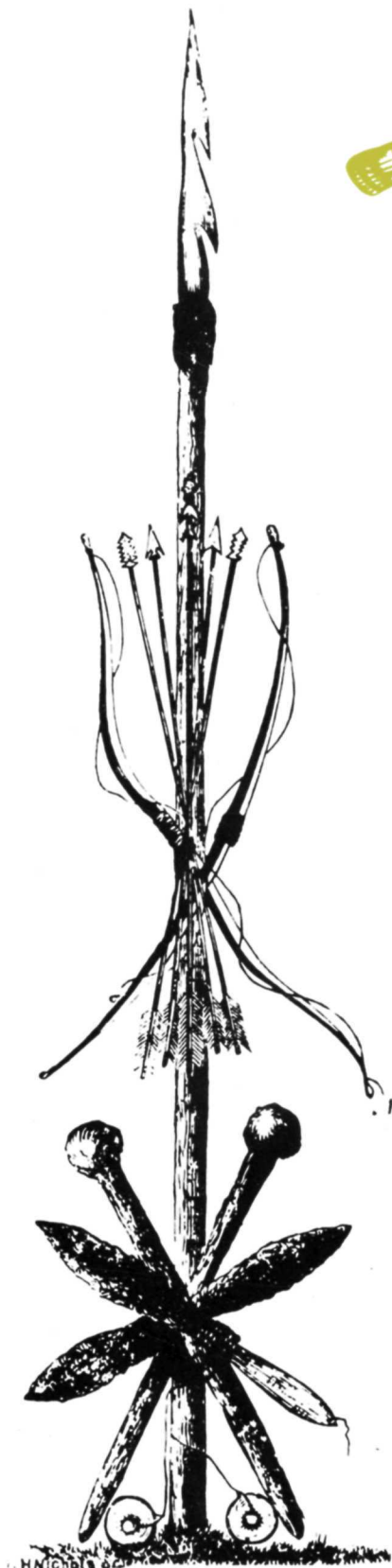
Of the so-called big game animals, Columbian black-tailed deer, black bear, and mountain lion are widely distributed, and Roosevelt elk are restricted to the northern counties. Deer are numerous, but the others are only locally abundant. Elk and deer of the redwood region are, for the most part, resident rather than migratory.

None are seriously endangered at the present time and with the possible exception of the mountain lion, none appear to need protection from legal hunting. Thus, the big game animals do not necessarily need further park areas for protection but conversely can enhance the value of existing parks or those which might be created.

The scarcity of birds in old-growth redwood forests may be more apparent than real. At least 141 species have been reported. Sixty-five of these are known to breed in the coastal forest type, at least 20 in the redwood forest itself where bird density compares favorably with that in other types of coniferous forests. At the same time, this is not ideal habitat in which to study birds since many live and spend their time largely in the crowns of trees 200, 300 or more feet above the ground.

Many visitors to the redwoods will be glad to know that snakes, in general, are scarce. Rattlesnakes, the only poisonous variety, are rare, probably being visitors only by chance. Pests such as mosquitoes, flies, and ticks are seldom bothersome in mature stands.





MAN AND THE FOREST

The Earliest Inhabitants

At one time the narrow strip of Pacific coast from Oregon to Monterey was "home" to perhaps as many as 40,000 people, yet—almost without exception—the dense, dark redwood forests were avoided for permanent homesites. Instead, the earliest inhabitants took advantage of the open grassy coasts and bald hills, the elk prairies, the sheltered bays and coves and the salmon-teeming rivers to locate their villages.

Archeological excavations reveal that—as early as 2000 B.C.—there were people living on the fringes of the redwood groves about San Francisco Bay and in present Marin County. On the far northern coast—at Trinidad Bay—there are further evidences of early cultures dating back to at least 1000 A.D.

From analysis of burial remains and recovered artifacts, it has been determined that the earliest known sites in the San Francisco Bay region were inhabited by a people who possessed a culture belonging to the Middle



Horizon in Central California archeology. These people were not too different in their customs and technology from the later—historic—Indians of the same area, but their culture was simpler.

After an undetermined interval of time, the Middle Horizon residents evolved into—or were replaced by—a people who continued many of the same cultural traits but displayed greater specialization and a perfected workmanship. The small, pointed arrow appeared; mortars became numerous and larger; long tubular steatite pipes were introduced; the use and variety of shell ornaments increased; and acorn-gathering patterns were more thoroughly consolidated.

By introduction or development of such traits, these Late Horizon people developed steadily into the Indians who were first seen by Europeans when Francis Drake encountered them on the Pacific coast of what is now Marin County in 1579.

Two tribes stand out as being of unusual

interest, the Yurok of the lower Klamath River and the nearby coast, and the Pomo of the Navarro, Gualala and Russian Rivers.

The Yurok reached the highest cultural level of any Indians in California, being a representative of the distinctive totem culture that flourished from central Oregon to Alaska.

Living in dwellings fashioned of redwood planks, skimming the rivers in redwood dug-outs, reclining on redwood headrests, and sitting on redwood stools, they took full advantage of the redwood growing at their doorsteps.

Their white deerskin dances and their large ceremonial flints, some 30 inches in length, early attracted attention, as well as the pride they took in the perfection of their arts and crafts. Their great concern for wealth and private property gave them a distinctively modern outlook.

In contrast to the Yurok, the Pomos, living from Fort Bragg to Fort Ross, were a central California people culturally, with their

dependence on acorn-gathering, their large ceremonial dance houses and their rounded clam-shell disc money.

They were famous for the variety and workmanship of their basketry being considered by many the finest basketmakers in the world. Their magnificent feather baskets were especially striking, and lucky indeed is the museum that can boast of one in its pristine condition. Although they dwelt in lean-tos made of redwood bark, the redwood as a source of material did not play an important part in their culture.

The tendency of all these coastal tribes to live in the open lands led to their undoing, as their villages were athwart the only natural openings through dense and almost impenetrable stands of coast redwood. The explosive force of the gold seekers and later settlers engulfed and overwhelmed them and in a very short time left few traces of their old way of life.

The First Europeans

The first Europeans to encounter the redwood forests of the California coast were no more attracted to them than were the native Indians. Because of the discontinuous nature of this forest belt—with large gaps such as San Francisco—most of the early explorers and settlers penetrated this region through bays and rivers without any direct confrontation with the dense and almost impenetrable stands of coast redwoods.

While early explorers entered the redwood region by sea in search of suitable harbors and settlement sites, the Mission Fathers entered it by land in its southern extremity to link up with the sea explorations. Later the fur traders penetrated the redwood forests in their search for pelts and still later the gold miners crossed through it from the sea in their search for gold.

Thus, the redwoods were too remote from the centers of world population to invite exploitation by the explorers and traders—and the rather simple pastoral economy of Spanish and Mexican California made few demands on timber resources.

As the rule of Spain gave way to that of Mexico, there was an increasing tendency on

the part of the Spanish speaking inhabitants to advance settlement into the redwood region and to utilize this potentially rich timber resource.

However, not until the coming of the Americans, with their technological skills capable of handling such large logs—and not until the Gold Rush built up the population and created a strong local demand for lumber—did the invasion of the redwood belt really begin. It can be said with some justice that prior to the Gold Rush, several decades of lumbering had succeeded in doing no more than nibble at the edges of California's vast redwood forests.

Then the redwood lumbering industry quickly became the overwhelmingly dominant factor in the economy of the northern California coast—a position it held for decades. As the attractiveness and rot-resistant qualities of redwood became appreciated, lumber flowed also from California to the markets of the world.

Through the 1850's the redwood logging industry expanded rapidly on the northwest coast until by the end of the decade nearly every river valley and every harbor and landing place, except in the extreme north, had one or more mills. In 1860 there were about 300 saw mills operating among the redwoods, the largest being in Mendocino and Humboldt Counties.

The earliest settlers and loggers in the northern redwoods were invariably ahead of the public surveys. Under the circumstances, they simply helped themselves to the timber.

As years went by and competition for timber stands became keener, farseeing lumbermen recognized the need to acquire ownership of timberlands, either for long-range use or for temporary exploitation of the standing trees. Much of this *laissez-faire* attitude on the part of the general public and their legal representatives was due to the belief frequently expressed at the time that the redwood resources of the States were inexhaustible.

Yet, even in the early 1850's there were a few who decried the unchecked and wasteful erosion of the redwood forests. Noting the intensive logging in the Contra Costa redwoods behind Oakland, the San Francisco California Daily Chronicle editorialized on April 13, 1884:

"Soon the whole neighborhood will be cleared of growing timber.

Already the fairest and largest trees have fallen before fire,

axe and saw. Those magnificent pillars which form so strange

a crown to the mountains, when seen from San Francisco and

the bay are slowly disappearing."

Beginning to fell a huge redwood.



An abortive attempt to preserve the coast redwoods by legislation was made in 1852, but in the end it failed. The time was still too early for such a measure.

During the last two decades of the nineteenth century a series of changes came to the redwood belt of California and to the redwood lumbering industry — changes which altered the attitude of both the public and the lumbermen toward logging practices and toward conservation. Perhaps the most important of these changes were generated within the industry itself.

In the first place, the harvesting of redwood timber was greatly speeded—even revolutionized—by inventions made during the latter half of the 19th century. The effects of these inventions were soon sufficiently obvious to attract public attention. The early hand logging methods cut into the redwood groves at a reasonably slow rate and the effects of the logging were not so conspicuous as to arouse general apprehension. Seed from adjacent timber and the vigorous resprouting of the redwood stumps usually brought rapid regeneration and resulted in dense stands of even-aged second growth.

While the new inventions made it practicable to log the highest and most conspicuous slopes, the new methods left almost no seed trees. As the new methods increased production, the rapid inroads being made into the nation's redwood resources were becoming obvious to all.

A second industry development of importance was the growing concentration of timber ownership. This trend which had started during the 1860's was apparent two decades later. Some of this accumulation was accompanied by abuse of the Federal land laws.

The trend toward concentration, as well as the rate of production, was accelerated by the interest of the railroads in the lumber resources of northwest California. After a titanic series of railroad contests during 1903 and 1904 the Santa Fe was persuaded that it should operate its lines in harmony with the Southern Pacific and give up its northern ambitions. In 1906 the controlling interests of both firms organized the Northwestern Pacific Railway as an instrument of compromise to open the northern redwoods to rail traffic. The completion of the line to Eureka and Arcata in 1914 provided the first direct railroad transportation from the redwood empire to eastern markets.

Jacking over a log preparatory to splitting it with dynamite.



Such changes as these within the industry itself stirred up increased public and governmental interest in what was happening to the redwoods; and this reaction, in turn, altered the conditions under which the redwood industry operated.

Evidence of this changed environment was the increased activity of the California State Government in forestry matters. In 1885 the Legislature created a State Board of Forestry and that Board, in 1887, passed a resolution advocating that the Federal Government discontinue sale of all public timberland and henceforth sell only the timber. In 1901, the Legislature authorized establishment of the first public park preserving coast redwoods, the California Redwood Park at Big Basin.

In 1899, Gifford Pinchot, Department of Agriculture, initiated a study of redwoods to provide a basis for Federal action but protection was not immediately forthcoming. However, on June 25, 1906, President Theodore Roosevelt established the Monterey Forest Reserve and on January 9, 1908, he established Muir Woods National Monument, thereby placing coast redwoods in national reserves.

Survival of redwoods may be based in part on recognition by industry of the importance of improved logging practices and of forestry management and protection. Smaller and more speculative owners have been generally replaced by large owners who are increasingly moving toward a sustained yield management.

Integration of lumber production with the ownership of timber resources appears to be the future pattern of the redwood industry. Blocking-up of redwood lands into major ownerships continues in northern Mendocino, Humboldt and Del Norte Counties, but the southern end of the belt is experiencing an increasing flow of forest lands from timber production to recreation and residential uses. However the timber industry still produces more than 70 percent of the payrolls and tax revenues in parts of the major redwood region.

Public and governmental reaction to accelerated redwood logging which began during the 1880's has resulted in preservation of major stands of coast redwoods for park and recreation purposes, even though meeting with only modest success prior to 1910. In the following

decade new conservation efforts were spurred by a State of California proposal to construct a highway through the redwood belt. This plan aroused fears that easier access would lead to immediate cutting of vast new tracts in areas where impressive remaining stands were located.

A concept of saving a part of the virgin redwood forests for future generations resulted in establishment of the Save-the-Redwoods League in 1918 by a group of far-seeing conservationists. This renewed conservation effort resulted in Congress authorizing the Secretary of the Interior to study the feasibility of acquiring a typical stand of redwoods as a national park. Although this study resulted in no tangible Federal action the State of California renewed its interest in redwoods parks by authorizing appropriations to acquire timberland on a basis of matching funds promoted by the Save-the-Redwoods League. State Park bond funds became available in 1928 and acquisition has progressed steadily until in 1963 old growth redwood is preserved in 28 State Parks or park units.

The high trestle crossing Jug Handle Creek.





The Situation



THE TIMBER INDUSTRY

Since its very discovery, the settlement and development of the redwood region has had terrific impact on these magnificent forests.

Commercial operations of the timber industry naturally have had the greatest effect, particularly as related to the public's interest in their preservation for enjoyment. Such inroads have been so drastic even from the standpoint of timber harvest, that the industry is now in most cases converting management policies and practices to a sustained yield basis.

A study of "The Effect of Commercial Operations on the Future of the Coast Redwood Forest" carried out for the National Park Service, by Consulting Forester John Miles, develops the following summary information:

Since the start of logging in appreciable quantity, about the middle of the last century, the effects on the forest have varied with the technology and the state of the economy at the time.

Bull-team logging in the early days left dense stands of even-aged second growth. The extensive cable-logging systems of the 1930's, coupled with attempts to convert redwood lands to pasture, left poorly stocked stands. The more recent tractor logging, combined with the California Forest Practice Act which required the leaving of seed trees, resulted in extensive areas of satisfactorily stocked stands.



Timber cutting started in the redwoods about 1820. By the turn of the century and until 1929, annual production averaged about 520 MM bm (million board feet). It dropped sharply during the Depression and World War II years to 350 MM; and rose rapidly during the post war boom to a peak of 1,085 MM in 1958. Since then it has decreased to about 850 MM and is expected to reach a sustained yield level of 900 MM per year at 1983.

The rapid rise in production after the War is attributed to the parallel boom in construction, the availability of large volumes of cheap standing timber, the depletion of nearby white-woods (fir, spruce, etc.), the development of machines and techniques to log any topography, and rising taxes on standing timber.

The heavy liquidation during the past two decades has eliminated nearly all old-growth timber in small, speculative, or short term ownership. The production rate hereafter will be determined largely by the calculations of allowable cut on major properties.

The harvest of intermingled whitewoods since the war has resulted in an even greater reduction in the whitewood timber inventory. While the redwood industry now produces a considerable volume of whitewood products, redwood is still the mainstay of the region. It will be increasingly so during the next 40 years, as the whitewood growing stock is re-building.

The percentage composition of redwood type stands will remain about as at present—roughly $\frac{2}{3}$ redwood and $\frac{1}{3}$ whitewood—largely as a result of the sprouting characteristics of redwood stumps.

The forest economy of the region has been lumber-based entirely until recent years; but redwood is beginning to be used for plywood and pulp in appreciable quantities. These and other more efficient and complex processes will from now on take an increasing proportion of the timber. Lumber production will continue to be important but the integration of manufacturing processes, under large ownerships, will become a general industry characteristic.

This will result in the continuation—and probable acceleration—of the trends by which the large owners are becoming larger (and the smaller more numerous, but with fewer acres), both to finance heavy plant investments and to

assure long-term supplies of raw material. For example, the largest five owners in 1948 held 406,000 acres of redwood. Now the largest five hold 711,000 acres.

At the same time, there is a steady flow of redwood type lands from timber-growing to recreation, residential and other uses. At present the rate of acquisition of lands into major ownerships is proceeding at about twice the rate of loss to non-forest uses. It is most rapid in Mendocino, Humboldt, and Del Norte Counties. In contrast the flow into non-forest use is most pronounced in Santa Cruz (where more than 60% of the redwood lands are held for non-timber use), San Mateo, Sonoma, and southern Mendocino Counties. In the next 50 years it is probable that Santa Cruz, San Mateo and Marin Counties will be eliminated from timber production. Northern Mendocino, Humboldt, and Del Norte Counties will lose about 4% of their redwood growth land to other uses. Southern Mendocino and Sonoma Counties will lose about 35% of theirs. This total would represent a reduction of 327,000 acres from the 1,918,000 acres of commercial forests recorded in 1953. Loss of acreage is expected to continue beyond the year 2023 at about the same rate as before, or 6,500 acres annually. Increases in forest land productivity, through the use of fertilizers, genetically improved trees, thinning, etc., should be adequate to offset these further losses in area up to the year 2063.

Early estimates of the redwood timber supply were grossly inaccurate due to inadequate field data. Predictions as to how long the supply would last likewise reflected inadequate data and did not take into account changing technologies which utilized more of the tree.

The first complete or "total volume" inventory was made for the redwood belt in 1948 and brought up to date for 1953 by the U.S. Forest Service. This survey showed that redwood type forest occupied 1,971,000 acres, of which 53,000 acres were reserved in state parks, leaving a balance of 1,918,000 acres of commercial forest. Of the latter, 128,000 were in government ownership and 1,790,000 in private ownership.

Changes in ownership and use will combine to reduce this to approximately 1,594,000

acres by the year 2023.

The total volume of redwood on commercial forest lands in 1963 is estimated at 30,981 MM bm. Of this 16,844 MM is old-growth, and of this in turn some 14,500 MM is in conservatively managed private "forestry" ownership; 1,500 MM is on unreserved public lands. The balance is in small or unstable private ownership.

Projections of the ratio of redwood growth to loss or drain from cutting, natural causes, etc., indicate that total growth will equal the drain by 1975 and that saw timber growth will equal drain by 1985. (This assumes the cutting rate stays constant.)

The volume of old-growth redwood timber on commercial forest lands, public and private, will decline to about 2,500 MM bm by the year 2000. Under the selection system (under which about $\frac{1}{3}$ of the major owners plan to operate) it will continue at that level indefinitely.

In 30 years all of the virgin old growth,

except that preserved in public ownership, will be gone.

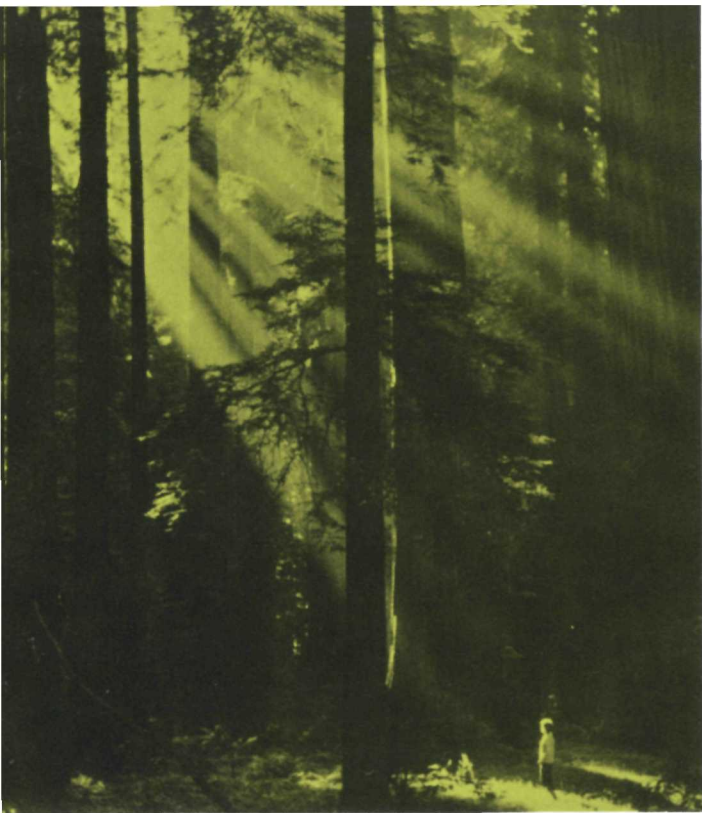
The volume of second-growth in 1963 was estimated at 14,137 MM bm, and is expected to rise steadily to about 27,500 MM by the year 2000.

The total volume of growing stock (old-growth plus second-growth) is now estimated at 30,981 MM bm. This will decline to a low of 27,771 MM by 1983, and at that time the ratio of growth to cut will be 1:1. Subsequently it may rise somewhat. By the year 2023 the total volume of growing stock will be approximately 31,137 MM.

The national demand for forest products is expected to rise steadily; and demand in California even more sharply. The excess of demand over supply will be greater in the case of redwood than for wood generally, because of the restraint of sustained yield operation, and the limited area of commercial forest land available.



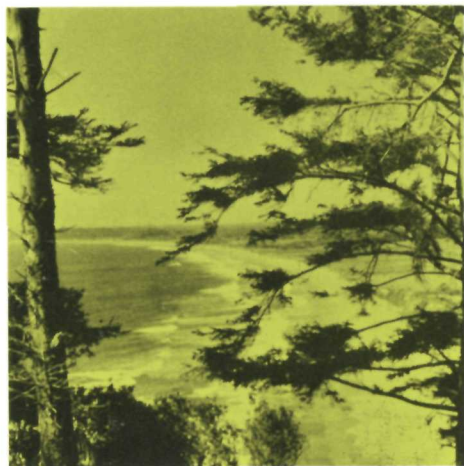
A new forest starts in selective cutting.



Sunlight filtered by a virgin forest.



Forest valley and stream—Redwood Creek.



*An unspoiled beach adjoins Del Norte Coast
Redwoods State Park.*



*Redwood giants, a clear stream, a wild and
peaceful setting.*

SIGNIFICANCE FOR PRESERVATION

Fundamental to this study, and of course to all previous redwood studies and conservation efforts, is the question of significance.

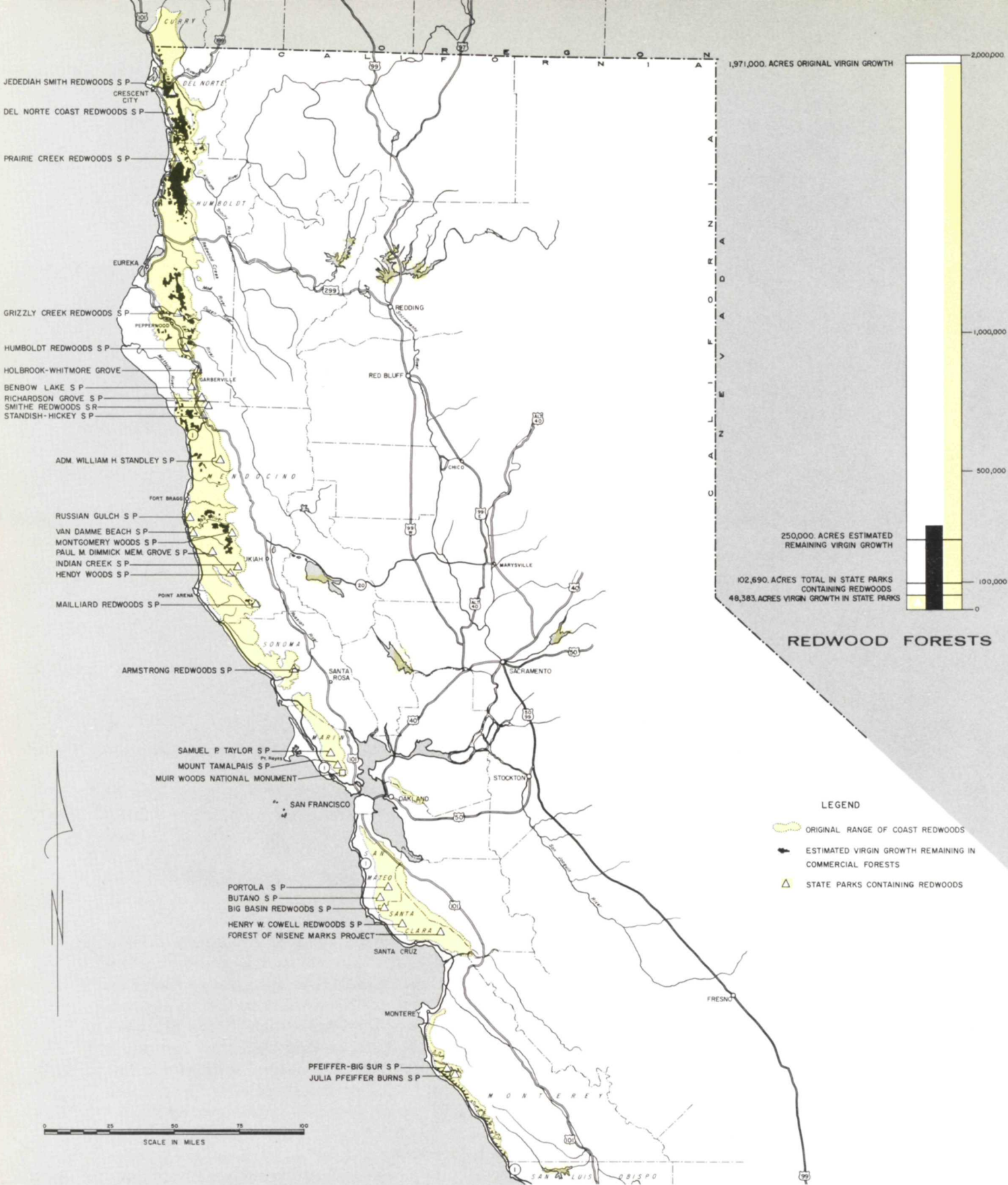
It can be said without fear of serious question that the redwoods are nationally significant, in fact of international interest and appeal. Interestingly this is a position so thoroughly accepted as to constitute in itself a measure of significance. As a logical corollary, there is no question that outstanding examples should be preserved for future generations—just a question of how much is justifiable and feasible.

At the same time we find striking inherent conflict between its value for harvest and for preservation. Here is a tree with singular market demand as lumber, growing in what is perhaps the most productive forest land in the world. Here too, this same tree is one of the most unique and outstanding in the world in justifying preservation.

For many years now, public interest has been evidenced by visitation from all over the Nation and the world, and by the willingness

of many to contribute substantial sums for the purchase and preservation of dedicated groves. This stems from many things—their size of course as the tallest living trees, but also many of their unique characteristics. Their age and stubborn indestructible qualities in the face of fire, disease, and insects, the fact that they grow nowhere else on earth and are, in a sense, a remnant specie dating from the age of dinosaurs—these are some of the characteristics which attract interest and admiration. More important, however, is their very special inspirational qualities which so greatly impress the visitor—qualities which derive not from individual trees or cold statistics, but rather from virgin groves in natural settings. For this reason, from a park point of view, the concern is with virgin stands in situations where the ecology still has integrity and where it can be preserved.

It takes a thousand years or more to grow mature trees, and, once cut, much longer still to establish a climax forest, if now that is possible at all.



THE REDWOOD REGION
ORIGINAL AND REMAINING VIRGIN FORESTS

PRESERVATION—GAINS AND LOSSES

PARKS TO DATE

It is interesting to note that the first effort to preserve some of the redwoods came in 1852, even before the move to set aside Yosemite Valley and the Mariposa Grove of Big Trees. It took the form of a joint resolution to the State Assembly, cited the rapidly increasing demand for redwood timber, and urged passage of a law to prohibit settlement and occupation of public lands on which redwood grew, and to make such timber common property of the citizens of the state, not subject to trade and traffic. As it turned out the resolution was not adopted.

The first successful move came in 1902 with establishment of Big Basin Redwoods State Park. It was largely the work of the Sempervirens Club of San Jose. This reserve contained some of the largest remaining redwoods in the southern redwood belt near Santa Cruz.

Muir Woods, just north of San Francisco, followed in 1908. This was the gift of William Kent to the Federal Government. As a National Monument, it preserves and interprets a typi-

cal example of the relatively small isolated groves found in sheltered valleys or canyons in the drier portions of the redwood region.

These two initial actions were the work of private conservation interests—an interesting point, for that has been an important part of the pattern ever since.

A most significant event in this preservation movement occurred in 1918, with formation of the Save-the-Redwoods League. This organization was destined to play a major and continuing role in the movement. In addition to direct action in land acquisition, one of its most important attributes has been as a catalyst in developing support for matching State funds. For that matter it played a significant role during the middle twenties, in the establishment of a Central State Park Commission in California.

A closing paragraph from John C. Merriam's report in 1922, as the then President of the League, is indicative of their contribution, and could have been stated as pertinently many times since:

The Save-the-Redwoods League has done excellent work, not alone in the purchase of redwood areas and in the development of the park project in Northern California, but in furnishing evidence that an organization of this character can secure the widest cooperation of the agencies of the state and nation, including both the nature lovers and the men of business concerned with lumber operations. I am sure that the Save-the-Redwoods League has the respect and confidence of the people.

The first unit of Humboldt Redwoods State Park, containing 2,000 acres, was established through League efforts in 1921. Here, the south fork of the Eel River and its Bull Creek tributary were to become the site of a major League project.

With this beginning other groups were inspired to save redwoods. Both Humboldt and Del Norte counties appropriated money for this purpose, and four lumber companies gave land. The California State Park Act of 1927 provided an agency to look after the redwoods that were preserved, and the passage of the Park Bond Act at the same time made matching funds available to acquire lands for State parks.

With the stimulus provided by State matching funds, the core of the Del Norte Coast project was completed by the League in 1930. The first grove for this park had been purchased in 1924 and afforded striking views through the redwoods of the Pacific along this rugged coast.

The year 1931 was the banner year for redwood preservation. A total of 19,562 acres were set aside, mainly through contributions to the League by John D. Rockefeller, Jr., the California Federation of Women's Clubs and the Garden Club of America which matched funds from the State Bond Act of 1927. Rockefeller Forest, located along Bull Creek flat was acquired and added to the Humboldt Redwoods State Park at this time, one of the most magnificent timber stands in the world.

Prairie Creek Redwoods State Park, another major project of the League and the State, had expanded by the early thirties to some 5,930 acres along existing Highway 101. Options were held on additional land there

which would almost double the size of redwood holdings in this region near Orick, California. Prairie Creek contained magnificent stands of timber with almost tropical luxuriance of undergrowth. Its setting next to the ocean included a wonderful stretch of wild bluff and beach. With the inclusion of Boyes Prairie it also presented a fine display of the Roosevelt elk as the remnant herds came back under State protection.

With the purchase of 6,772 acres of the Mill Creek redwoods in 1939, half of the money being donated by the League, Mill Creek Redwoods State Park was established. The first grove of redwoods acquired here was the Stout grove in 1929. This park, later to be called Jedediah Smith, combined a dense outstanding forest of redwoods intermingled with other splendid trees and with scenic and recreational features along the beautiful Smith River.

As the preservation movement continued the counties acquired redwood groves to be later incorporated in the State Park system and the State did likewise, establishing such smaller units as Pfeiffer-Big Sur in 1933, Armstrong Redwoods in 1934, Grizzly Creek Redwoods in 1943 and Montgomery Woods in 1947.

In its earliest years, one of the major objectives of the Save-the-Redwoods League was establishment of a Redwood National Park. During the 1920's and 30's various studies were made by the Federal Government. While some of these recommended establishment of a Redwood National Park, the necessary legislative action did not materialize.

A new approach was envisioned by the Douglas bill of 1946 which proposed the establishment of a Memorial National Forest of 2.5 million acres with about 180,000 acres in the redwood belt to be preserved according to park principles. Although this bill was introduced several times in Congress it never passed.

While the rounding out of existing redwood State parks and the addition of new redwood groves continued, the disastrous Bull Creek flood of 1955 shifted the emphasis to preservation of watersheds to protect downstream groves. The Save-the-Redwoods League again took the lead in this endeavor and with

the State added some 13,558 acres (almost entirely cut-over lands) in the upper Bull Creek watershed to Humboldt Redwoods State Park by 1963.

And so, starting with Big Basin in 1902, this unique cooperative conservation program has resulted in establishment of 28 Redwood State Parks (including a few not so named but nonetheless including redwoods). The follow-

ing table, as of January 1964, shows a combined total of 102,689 acres, of which an estimated 48,383 acres are virgin redwood stands.

This program has represented, over the years, approximately \$19,472,000 in land acquisition funds, of which close to \$10,000,000 were funds donated through the Save-the-Redwoods League. At present market prices this would represent several times this amount.

Redwoods State Parks as of January 1964

Name of Park	County	Total Acreage	Estimated Acreage of Virgin Growth
Adm. William H. Standley SP	Mendocino	45.2	40
Armstrong Redwoods SP	Sonoma	440.0	120
Benbow Lake SP	Humboldt	222.9	—
Big Basin Redwoods SP	Santa Cruz	11,521.4	2,000
Butano SP	San Mateo	2,176.8	1,500
Del Norte Coast Redwoods SP	Del Norte	5,932.0	2,600
Forest of Nisene Marks Project	Santa Cruz	7,278.6	—
Grizzly Creek Redwoods SP	Humboldt	149.5	120
Hendy Woods SP	Mendocino	604.7	60
Henry W. Cowell Redwoods SP	Santa Cruz	1,736.8	600
Humboldt Redwoods SP and Holbrook-Whitmore Grove	Humboldt	37,762.8	20,333
Indian Creek SP	Mendocino	15.1	15
Jedediah Smith Redwoods SP	Del Norte	9,539.5	9,450
Julia Pfeiffer Burns SP	Monterey	1,700.0	100
Mailliard Redwoods SP	Mendocino	242.0	200
Montgomery Woods SP	Mendocino	647.1	400
Mount Tamalpais SP	Marin	2,404.3	300
Paul M. Dimmick Mem. Grove SP	Mendocino	11.8	—
Pfeiffer-Big Sur SP	Monterey	820.5	30
Portola SP	San Mateo	1,740.3	1,400
Prairie Creek Redwoods SP	Humboldt	10,288.7	8,240
Richardson Grove SP	Humboldt	790.5	250
Russian Gulch SP	Mendocino	1,122.3	—
Samuel P. Taylor SP	Marin	2,576.3	600
Smithe Redwoods SP	Mendocino	459.0	15
Standish-Hickey SP	Mendocino	635.2	10
Van Damme Beach SP	Mendocino	1,826.5	—
		102,689.8	48,383

CONTINUING ATTRITION

As of now, putting together the results of timber harvest over the last century, and the conservation movement in the last half century, what do we find?

Of the original 1,971,000 acres of redwood forests, approximately 750,000 still support old growth redwoods, in whole or in part. The untouched or virgin forest stands have been reduced to approximately 300,000 acres, of which an estimated 48,383 acres are in State Parks.

Conservation interests from the park standpoint are concerned with trying to preserve for generations to come, outstanding examples of these unique world famous forests in situations where their setting and total ecology is essentially undisturbed, and where the visitor can have the best possible opportunity to see and experience the redwoods to the fullest. Virgin forest stands and particularly outstanding virgin groves are key to this objective.

As noted above, the State Parks contain some 48,383 acres of virgin redwoods nominally "preserved." But the facts show that in part this is delusion.

Continuously, relentlessly and without full realization of what is happening, a number of programs and other factors are intruding, wearing away and otherwise reducing the size and effectiveness of these "preserved" areas.

Some of this is concretely destructive or erosive. Some of it intrudes more subtly by sight and sound or even smell, but nonetheless disruptively. These infringements include: roads and freeways, timber cutting, erosion, mineral entry, water control projects, air pollution, even park development itself.

Let's see, for example, what is happening in the four major Redwood State Parks north of San Francisco—Humboldt, Prairie Creek, Del Norte, and Jedediah Smith. These four contain probably the finest stands of virgin growth preserved, about 40,000 acres out of the 48,383 of virgin growth in the State Parks.

Humboldt Redwoods State Park is the largest of the four, and contains what are generally recognized as outstanding forests, perhaps the finest from the standpoint of pure climax stands and concentration of dense timber.

The heart of the area lies in the magnificent groves and flats along the South Fork of the Eel River and Bull Creek, a main tributary.

Here just a few years ago U.S. Highway 101 was re-routed and upgraded to freeway standards. While a compromise solution avoided the world famous Avenue of the Giants, it did slice a wide swath through this most important heart of the Park along its east edge, and generally paralleling the Avenue and the River. This results in serious damage to park values and a shocking scar, not only in the loss of thousands of trees but also in the sight and sound intrusions which extend well beyond the actual cutting.

Furthermore this freeway location isolated a strip of redwood forested lands along the east boundary so effectively that it ceases almost to make a contribution to the Park either for public use or as needed background or buffer zone. In addition, for some miles the freeway has destroyed the beautiful forest edge along the river replacing it with rip-rap and cut and fill slopes.

Bull Creek and its adjoining flats, the Rockefeller Forest, were dealt a severe blow in 1955 by a record flood, which though perhaps not completely caused by, were certainly more damaging because of heavy cutting in the upper watershed, subsequent fires in heavy slash and resulting erosion. Not only were more than 500 giant trees undercut and topped, but the stream, its natural forest edge, and its ecology were essentially lost for miles.

The secondary road serving as public access to this part of the park and its outstanding features, serves also practically constant, daily use by heavy logging trucks and apparently will for years to come. Potentially it may be used by even more trucks hauling rock and gravel since it represents the only egress from a valuable quarry site still privately owned in the upper watershed. Such competing use also represents a serious intrusion detracting greatly from the quiet inspirational enjoyment of these outstanding groves—not to mention adding a serious road hazard.

Over-all damage to the Park in terms of acres lost or made ineffective cannot be precisely measured. Certainly it is severe. In terms of the accumulative effect on quality of

Freeways and redwoods don't mix.



Jedediah Smith Redwoods State Park— magnificent trees, a delightful trail.





Camping in Prairie Creek Redwoods State Park.

experience it is even more serious.

At Prairie Creek Redwoods State Park there are similar problems and a few variations—some of them threatening rather than accomplished fact.

A freeway routing, for example, involves four alternatives and has received public attention and concern this past year literally from across the state and the nation. All except one route would severely intrude on the Park as it now stands. They would be even more damaging to the area as rounded out under plans and programs of the State Park Commission and the Save-the-Redwoods League.

The beach route would irreparably damage a beautiful wild stretch of ocean frontage. This is an important and unique part of the Park here where it is one of the two remaining places virgin redwoods sweep down in natural ecological setting to bluff and beach. In addition it would cut through an important dedicated grove of redwoods.

This stretch of beach and bluff as it happens also, is the year round natural range for one of the remnant herds of Roosevelt elk. The freeway, running lengthwise through it, would effectively eliminate this fine park feature.

Across the Park, on the east side, private timber companies have clear cut precisely to the boundary along some ten miles of it. While this is quite within their rights, it does nevertheless intrude on adjoining park values and reduce the effective quality and usefulness of a considerable strip along these ten miles.

In Del Norte Coast Redwoods State Park, next to the north a variation of the freeway problem faces the Park. Plans for building the freeway are still some distance in the future. In the interim, however, Highway 101, which runs through the length of the Park, has been widened to 3 lanes, for passing, in a number of stretches. The Highway Commission plans to widen the balance to 3 lanes in the near future, straightening the alignment somewhat in the process. While this would be done within the right-of-way which the Commission controls, it would apparently remove some additional redwoods, widen the pavement, speed up traffic and, in the process, increase the road scar and the intrusion on park values.

Further, this develops the situation where, later, the freeway either follows this route or, if routed elsewhere, leaves the main park road at a size and standard much larger than



A cooperative watershed management plan is needed.

is desirable.

Along the eastern boundary, as with Prairie Creek, private timber cutting crowds right to the boundary for much of its length. It can be expected along the balance.

These several types of intrusion are the more serious in their intrusive effects since the Park is long and relatively narrow to begin with.

At Jedediah Smith Redwoods State Park the outstanding northern anchor of the redwoods, a freeway relocation now approved by the county, will cut a wide swath and deep scar through one mile of the Park and the important National Tribute grove. It will be close enough to State Route 199 along this length, which will be left as a primary park road, to intrude sharply on visitor use and enjoyment.

Cutting on adjoining forest lands has already affected stretches of the boundary. It can be expected along most of the balance. But of more significance is the potential threat of very serious damage to Mill Creek in the very heart of the Park. This is the central drainage and still a relatively natural and delightful stream. Unless forest management practices on the upstream watershed give the hazard care-

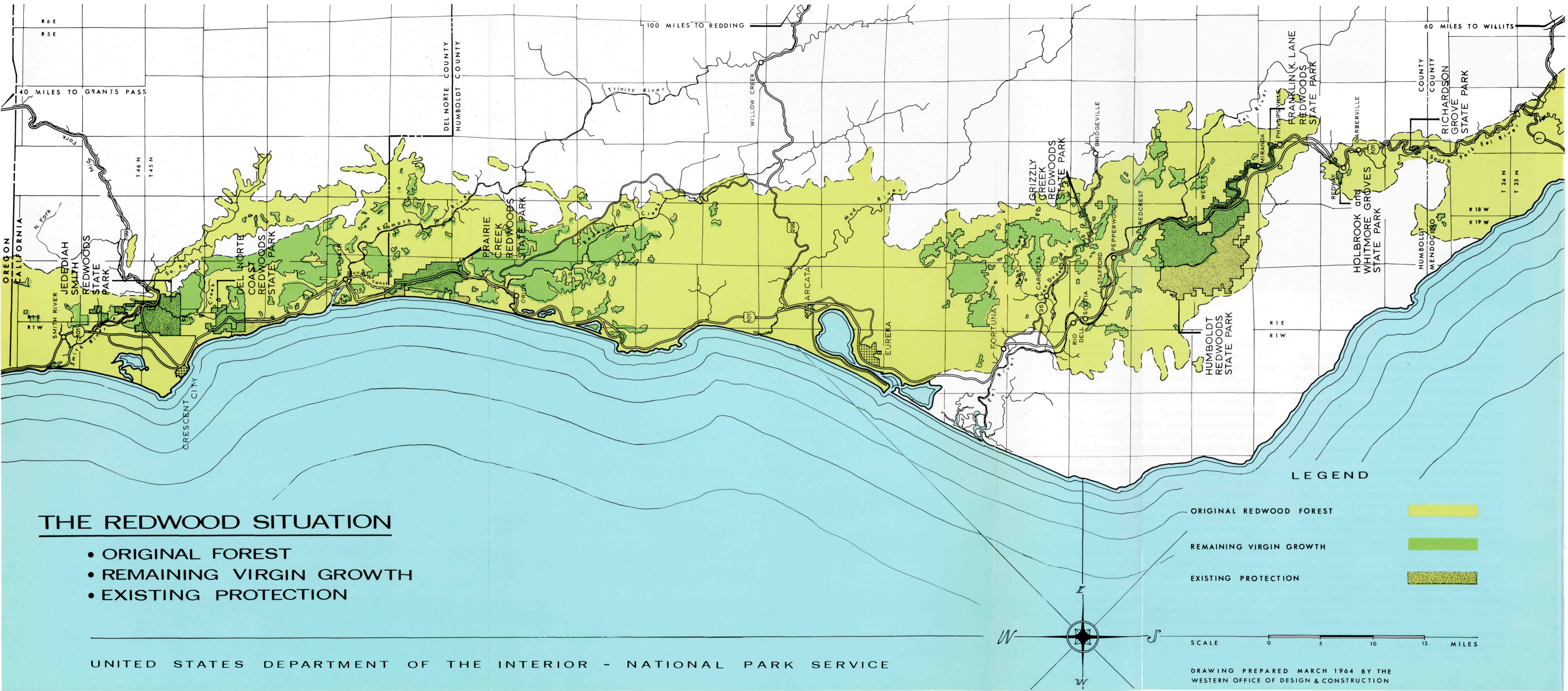
ful planned attention, serious flood damage may increasingly threaten the Park as remaining virgin growth is harvested.

Many of these same intrusions are threatening or even now eating away at other redwood parks, mostly smaller areas where any inroads are more serious.

Now, the discussion in this section of the report is not to imply that freeways aren't needed, or that private lumber firms should not cut timber on their own property. It is simply to point out that the preservation picture is not what many think.

Yes, there are approximately 100,000 acres in redwood State Parks, but of this, slightly less than 50,000 acres is virgin redwood—approximately 2½ percent of the original forest. Already there has been some direct loss and much intrusion on this small percentage. Already it can not be as effective as it could a few years ago; and the inroads continue. All the while, public visitation and use is building up, so that each year the acreage preserved becomes less by comparison.

Obviously, on detailed analysis, the conservation of redwoods is presently losing ground in both area and potential effectiveness.



THE REDWOOD SITUATION

- ORIGINAL FOREST
- REMAINING VIRGIN GROWTH
- EXISTING PROTECTION

UNITED STATES DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE

ORIGINAL REDWOOD FOREST
REMAINING VIRGIN GROWTH
EXISTING PROTECTION

SCALE 0 5 10 15 MILES

DRAWING PREPARED MARCH 1964 BY THE
WESTERN OFFICE OF DESIGN & CONSTRUCTION

The Opportunities



CONCLUSIONS

This study carried out during the past year under a grant from the National Geographic Society, coarse screened the total redwood belt and then fine screened the three northern counties, where it became clear the major remaining problems and opportunities exist. Through special contracts, it explored the great mass of pertinent literature and undertook some primary research. Much of this will be published as appendix material. The study was able to draw on detailed aerial coverage which, by happy coincidence, the counties had had flown during the current and the preceding year.

With all this, much still remains to be learned about the redwoods. In a sense, therein lies one of the intriguing preservation potentials—a variety of research on a unique and significant tree specie.

But, a number of fundamental findings and conclusions do emerge now—conclusions which point to further conservation needs and to possible plans for action. These are set down on the following pages.

Fern Canyon—a unique and fragile jewel.



The significance of the redwoods as a part of our heritage justifying preservation does not need arguing; it is accepted. Since the turn of the century, it has been recognized. Time and again it has been reaffirmed by people across the country. Just so, this year, the proposed routing of freeways which threatened some of the Redwood State Parks brought a statewide and nationwide storm of protest.

The three northern redwood counties, Del Norte, Humboldt, and Mendocino, include some of the finest forest producing land in the world. Predictably, their economy accents the timber industry. It is, however, relatively static in comparison with the state as a whole, and appears to have lost some ground in recent years. Population growth is well below the state average and unemployment above average. It does appear that the timber industry can remain a major but relatively stable part of the local economy, and that the tourist and outdoor recreation industry offers the most promising growth possibilities.

The present situation, to summarize, finds that of the original nearly 2 million acres of redwood forest, approximately 750,000 acres of old-growth now remain. Of this only ap-

proximately 300,000 acres are essentially untouched virgin growth. And of this in turn, a scant 50,000 acres are preserved in state parks—roughly 2½ percent of the original forest.

The Save-the-Redwoods League and the State Division of Beaches and Parks, which jointly have accomplished so much to date, now find themselves in an increasing dilemma. The dramatic growth of population in central and southern California is pulling more of the park and recreation dollar in that direction. At the same time, the price of virgin redwood has increased many fold since the 1920's and 30's when most of the acquisition for parks took place. The program of the League and the State in recent years has been designed to fill in and round out the existing Redwood State Parks. Since the disastrous Bull Creek flood in 1955, it has further concentrated on acquisition of that particular upper watershed. The net result of these several factors and trends, naturally, has been a greatly reduced program in terms of acquiring additional acreage of virgin redwood, even important key tracts.

Compounding this picture even further are two subtle trends, often little understood or ignored completely. One is the dramatic



Gold Bluffs and Mouth of the Klamath adjoin Prairie Creek Redwoods State Park—still wild, rugged and beautiful.



Dr. Melville Grosvenor and party stand immediately below the world's tallest known tree.

and continuing increase in park visitor use; the other a relentless eating away of existing virgin growth in the parks, both in actual acreage and its effectiveness for full public enjoyment and inspiration. The fact is that in a very real sense, there is less in effective acreage "preserved" today than a decade ago.

At the same time, remaining opportunities are fast being lost—betimes a cliché, but in this case all too true. Since the Second World War, the harvest rate of redwood has risen sharply to an average for the last five years just short of a billion board feet. Remaining old-growth has already been reduced to the point where the major lumber companies locally, have now moved to re-evaluate their positions. Most are converting to relatively short-term sustained yield management (partly in the face of the present tax structure) and look towards a fuller utilization of their harvest including, notably, pulp products to sustain their operations. The days of old-growth redwood lumber in quantity are numbered.

Remaining virgin growth has dwindled even more drastically. Opportunities to set aside complete watersheds still untouched no

longer exist except in terms of a few small sub-drainages. Concentrations of virgin growth having significant park value are now found in only three general locations—the Mill Creek drainage a few miles southeast of Crescent City; the Redwood Creek and Lost Man Creek drainages in the vicinity of Orick; and the Yager Creek drainage about 20 miles southeast of Eureka.

All of this leads to the most basic conclusions: there is an urgent need now, to shore up and consolidate the preservation position in the existing Redwood State Parks, and to set aside additional acreage of virgin growth. This is judged to be in the national interest, in fact essential, if continuing attrition and encroachments are to be offset, and if opportunity is to be provided for future generations in increasing numbers to see and enjoy these magnificent forests to the full.

To add bits and pieces here and there will not do the job. A major addition is required and one preferably which would add not merely size, but high quality redwood groves and forests in a situation where, so far as possible, they can be preserved, interpreted, and made available to the public as outstanding



The lower Redwood Creek valley broadens and virgin redwood grows from ridge to ridge.



Large Meadow at lower end of Redwood Creek valley —possibly a development site.

examples in an outstanding manner. Far too easily the natural heritage we "preserve" may end up as a watered down experience seen hastily and superficially from a fast moving car.

This does not mean that all remaining virgin growth should be so reserved. That would not be either reasonable or feasible.

Along with these objectives and as a part of the formula, opportunity exists to preserve additional stands of redwood along highways or still attractive streams, and to incorporate in redwood parks wild beaches, bluffs, and ocean frontage which could be a wonderful part of the coast redwood picture. Today these opportunities are reduced almost to the vanishing point.

Public ownership of such attractions would tend also to correct an existing situation of some awkwardness. Today where redwood stands in private ownership occupy such publicly attractive sites, the owners for the most part have refrained from harvesting the timber—recognizing the long term public interest, or in some cases, frankly, to avoid incurring public wrath. At the same time, they continue to pay taxes.

One important conclusion points to the significance that cooperation between conservation interests and industry could play, quite possibly to mutual advantage. A good example is the question of full watershed control to safeguard important groves or forest stands which lie downstream. One solution, of course, is public acquisition. But in some cases, it appears that a sound coordinated management plan could leave the upper drainages in private ownership and still assure protection to downstream values. This might be particularly true where cutting has already seriously disturbed the ecological integrity of the drainage.

As will be seen on accompanying drawings remaining stands of virgin redwood are concentrated in Humboldt and Del Norte Counties. Here also are located the major Redwood State Parks which include most of the highest quality groves now set aside for public enjoyment. Clearly, here is where the important possibilities remain and the serious preservation problems as well.

At the northern end of the belt there are

significant blocks of virgin growth in commercial forest ownership. These adjoin Jedediah Smith and Del Norte Redwoods State Parks. Certain strategic and high quality groves or tracts are critically important in rounding out and completing the basic park picture, for example, the acreage which lies along the northeast corner of the park between the Smith River and State Highway 199. Generally, they are concentrated in the upper Mill Creek watershed, the lower part of which flows through Jedediah Smith.

Here, potentially serious flood threats could jeopardize the outstanding groves and forests in the heart of Jedediah Smith as cutting in the watershed continues. Much of it has already been cut. To place all of it under public ownership as it now stands would still be very costly. Also it would put a major lumber firm out of business in the county, and in terms of the sparse population and limited economy, represent a serious blow. Here is a situation where a cooperative coordinated management plan leaving most of the present commercial timber in private ownership could be explored to all-round advantage.

Somewhat farther south near the lower Klamath River there is another concentration of virgin growth. Much of this lies in several "subdrainages" in the Northern Redwoods Purchase Unit under the jurisdiction of the U.S. Forest Service. It includes approximately 12,000 to 13,000 acres of old growth managed by the Forest Service, in part for research jointly with private industry, and in part for timber harvest and related multiple use. It is apparently fine quality old growth timber. From a park standpoint, it would not appear outstanding because of its shape and topographic distribution and also because considerable of the upper reaches lie along the natural fringe of the redwood belt where Douglas-fir mingle with redwood in greater percentage. It was not studied in detail for this report.

Just south of Prairie Creek Redwoods State Park and east of Orick the Redwood Creek and Lost Man Creek drainages contain what is apparently the largest uncut block of virgin growth not preserved—certainly the most significant large block in terms of park

values. It is all in private ownership largely under two of the major redwood lumber companies. Lower Redwood Creek from ridge to ridge is essentially uncut. It presents an outstanding redwood valley picture, fortunately set to one side of the main highway and much of it still inaccessible except by foot or in a few places by logging roads. By wonderful coincidence, outstanding large groves along Redwood Creek are the site where earlier this year the National Geographic Society discovered the world's tallest known tree and subsequently they, jointly with this Service, located also the second, third and sixth tallest tree.

Redwood Creek watershed is long and narrow extending south and east some 50 miles from its mouth. Much of the upper drainage has long since been cut, and some of it also lies outside the redwood belt where grassland and Douglas-fir predominate. As with Mill Creek, farther north, a sound, carefully coordinated land and forest management plan for the whole watershed is needed to minimize flood threat and to rehabilitate stream damage already done.

The adjoining drainages of Lost Man and Little Lost Man Creek, also still largely uncut, extend this block of virgin growth almost to Prairie Creek Redwoods State Park. They include delightful small streams, one of which serves as the water supply for a trout hatchery.

The only other significant concentration of virgin redwood lies generally along the Yager Creek subdrainage of the Van Duzen River. Here the timber stand is dense and of high quality from a lumber standpoint. For the most part, it comprises upland growth rather than bottomland groves and is judged to be of less significance for park purposes, particularly in view of the way it is now broken up.

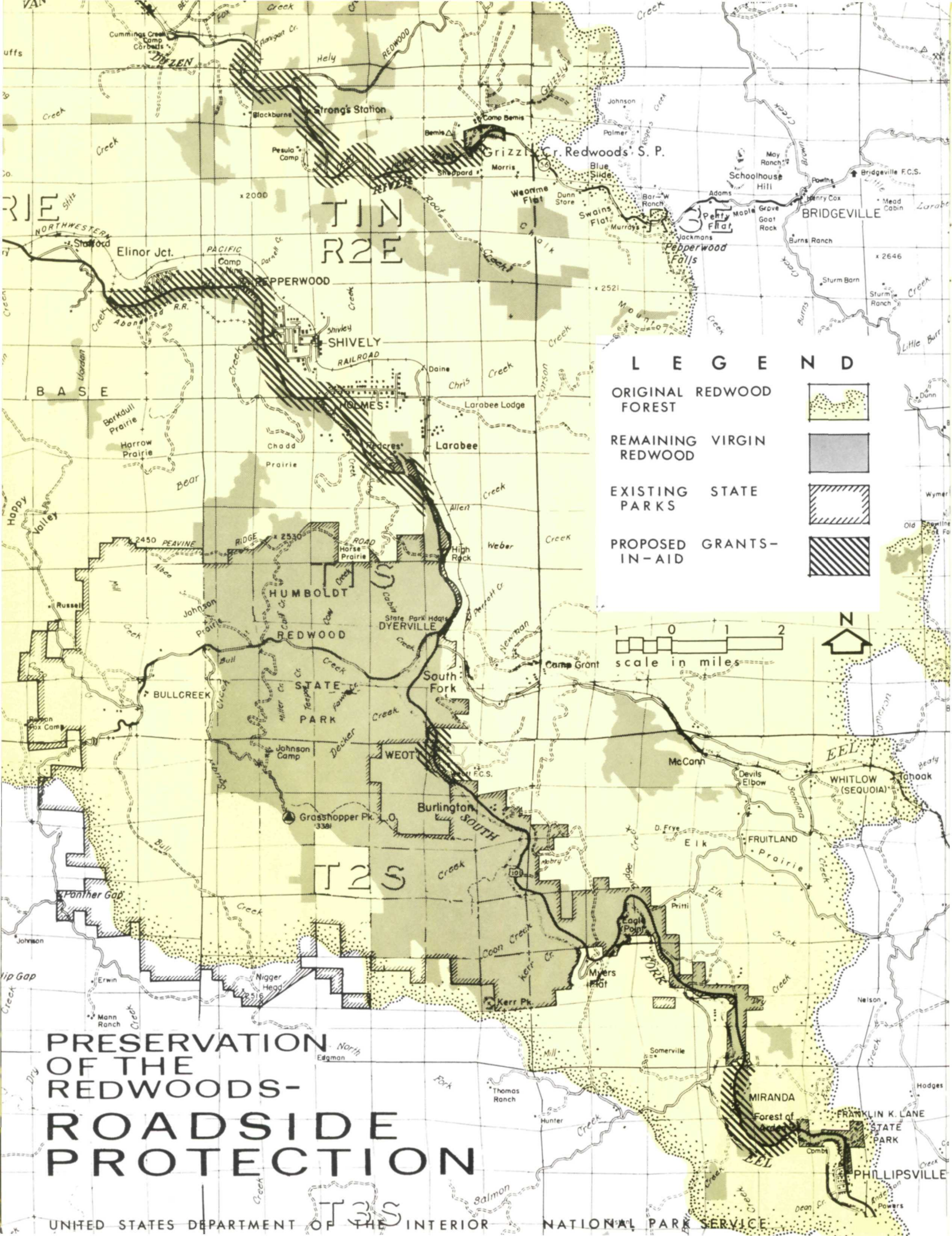
Related both geographically and ecologically to portions of these magnificent forests are sections where virgin redwood sweeps downward toward the sea, to still wild bluffs and beach and rugged rocky shore. In two places this wonderful combination still exists—in two places only, along this whole coast, or for that matter in the world. They lie adjacent to Prairie Creek and Del Norte Coast

Redwoods State Parks. Most of this is in private ownership but almost completely undeveloped.

In addition, there are still some sections of highway bordered by outstanding privately owned redwood groves. In a few cases these purposely have been left uncut by commercial forest interests recognizing their public value and with the hope they might be ultimately publicly acquired. Outstanding examples exist at the northern end of the Avenue of the Giants, where for some time the Save-the-Redwoods League and the state have hoped they could be acquired to extend the Avenue. In some cases, these roadside groves border rivers or streams as well, and are, therefore, the more attractive.

At the southern extremity of the redwood belt below Monterey a number of small canyons each draining individually toward the ocean, contain small but very attractive stands of old redwood. Most are just outside the Los Padres National Forest and in private ownership. This basically is grazing and ranch, not timber country. These small secluded stands of redwood represent a most unusual opportunity for preservation this far south along the coast.





T1N
R2E

LEGEND

- ORIGINAL REDWOOD FOREST
- REMAINING VIRGIN REDWOOD
- EXISTING STATE PARKS
- PROPOSED GRANTS-IN-AID

1 0 1 2
scale in miles



PRESERVATION OF THE REDWOODS-ROADSIDE PROTECTION

UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE

Alternative Plans

Over-all, the objectives which stem from conclusions reached, in terms of urgency, cost, and the national interest involved, point clearly to the need for a cooperative program including Federal assistance, to do the job while it yet can be done.

Collectively, the significant remnants of original redwood forest represent the opportunities which are left us to consider in weighing what further can be done—what further *should* be done—to assure that people from across the Nation and around the world can continue to have the chance to see and enjoy to the full these truly unique and inspiring monarchs of nature.

In combination, the conclusions, objectives, and opportunities have led to three alternative plans which are presented in the following drawings and descriptive material. All the lands involved, aside from existing State Parks, are in private ownership. Each alternative has two complementary parts:

1. Federal assistance to the State in their program (and that of the Save-the-Redwoods League) to round out the existing Redwood State Parks and protect additional redwood forests along the highway, including extension

of the Avenue of the Giants.

2. Federal acquisition of additional outstanding redwood forests and related lands for a major redwood park.

PLAN 1

This number 1 alternative is presented as the desirable solution from a professional planning standpoint, recognizing the national interest in further safeguarding existing state parks and in adding significant new areas to offset losses which are accruing and to better prepare for increasing public use.

As seen in the following material and the accompanying drawings, it suggests Federal aid to the state in joining and rounding out Jedediah Smith and Del Norte Coast Redwoods State Parks, including some additional areas for development and to serve as buffers for further protection of the extremely valuable existing resources. It also includes Federal aid toward extension of the Avenue of the Giants and to provide public protection for groves east of Grizzly Creek Redwoods State Park along State Highway 36.

The plan also suggests a major redwood park to comprise existing Prairie Creek Redwoods State Park, portions of the lower Redwood Creek drainage, Lost Man and Little Lost Man drainages, plus additional ocean frontage and buffer areas for development and protection. Federal acquisition would incorporate the outstanding lower Redwood Creek valley with essentially virgin forests from ridge to ridge and the newly discovered record breaking giants. It would also include 13 miles of wild ocean bluff and beach in one of only two remaining locations in the world where the original redwood forests sweep down in natural ecological transition to the ocean.

This is presented here as a potential major redwood park and one in which development and management of the total complex under one coordinated plan would be important because of the variety and distribution of park values and features. The potential of this area for a Redwood National Park, including the existing state park, will be a consideration weighed in reaching final recommendations.

If this should materialize, a formula to retain the identity of Prairie Creek Redwoods State Park might desirably be worked out.

Plan 1 does not propose acquisition of the full Mill Creek watershed adjoining Jedediah Smith, with the hope that reasonable and acceptable safeguards can be worked out in a coordinated management plan with commercial forest interests. If this formula could not be negotiated or should prove ineffective, it might well raise again the consideration of whether public ownership of additional upstream acreage is necessary. Similarly, in the Redwood Creek drainage it is hoped that reasonable safeguards against erosion and stream damage can be worked out through a sound management plan for the watershed.

It should be noted, and clearly, that this plan does not represent the ultimate which might be considered worthwhile, if other interests and feasibility factors were not considered. Certainly in detail it is not the solution which might be suggested if the clock could be turned back a decade or two.

Federal Acquisition for a Major Redwood Park

Redwood Creek—acquisition of major groves with “record” trees plus full downstream watershed and additional upstream protection.

Lost Man Creek and May Creek watersheds
Prairie Creek Redwoods State Park (10,330 acres)—acquisition of high priority inholdings, additions required for developments and protection, plus adjoining bluffs and shoreline.

Total acreage including existing Redwoods State Park

Federal Aid to the State

Avenue of the Giants extension

Redwood groves along State Highway 36 and Van Duzen River

Jedediah Smith and Del Norte Redwoods State Parks—acquisition of high priority inholdings and additions, a corridor joining the two parks, and wild ocean frontage.

Approximate Area Involved

21,300 acres (including 15,220 acres virgin growth and 8.5 miles of Redwood Creek)

14,280 acres (including 5,870 acres virgin growth)

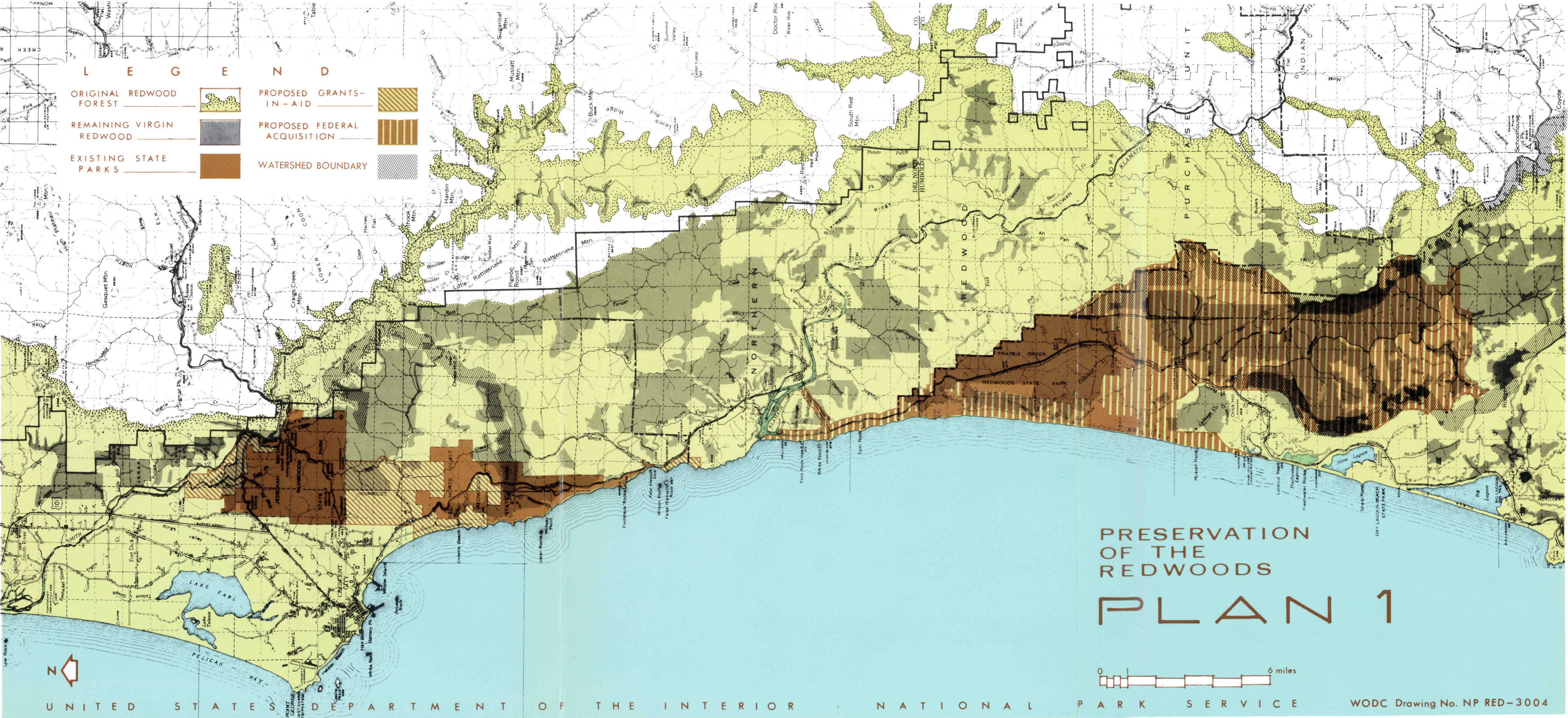
7,690 acres (including 1,490 acres virgin growth and 13 miles of shoreline)

53,600 acres

600 acres (providing a 7.5 mile extension)

250 acres (providing protection to redwoods along 4.5 miles of highway and river)

7,990 acres (including 1,810 acres of virgin growth and 5 miles of shoreline)



L E G E N D

- ORIGINAL REDWOOD FOREST
- REMAINING VIRGIN REDWOOD
- EXISTING STATE PARKS
- PROPOSED GRANTS-IN-AID
- PROPOSED FEDERAL ACQUISITION
- WATERSHED BOUNDARY

PRESERVATION OF THE REDWOODS
PLAN 1

0 1 6 miles

PLAN 2

Under this alternative Federal aid to the State remains as in Plan 1.

Federal acquisition for a major redwood park is reduced by deletion of the Lost Man, Little Lost Man and May Creek drainages. This would lessen land acquisition costs. At the same time it removes from the potential area three small but complete watersheds, two of which still contain high quality and very attractive virgin redwoods with clear year round streams. One of these in fact serves a fish hatchery.

This reduction in area is accompanied by a distinct separation of the Redwood Creek and Prairie Creek portions of the overall park potential. This in turn would necessitate a more tenuous parkway type connection between the two. It would have to be carefully planned in coordination with plans for the U.S. 101 freeway routing as the latter is finally established and finalized.

Other features, values, and planning requirements for this major park complex would remain as stated for Plan 1.

Federal Acquisition for a Major Redwood Park

Redwood Creek—acquisition of major groves with “record” trees plus full downstream watershed and additional upstream protection.

Prairie Creek Redwoods State Park (10,330 acres)—acquisition of high priority inholdings, additions required for developments and protection, plus adjoining bluffs and shoreline.

Total acreage including existing Redwood State Park

Approximate Area Involved

21,300 acres (including 15,220 acres virgin growth and 8.5 miles of Redwood Creek)

7,690 acres (including 1,490 acres virgin growth and 13 miles of shoreline)

39,320 acres

Federal Aid to the State

Avenue of the Giants extension

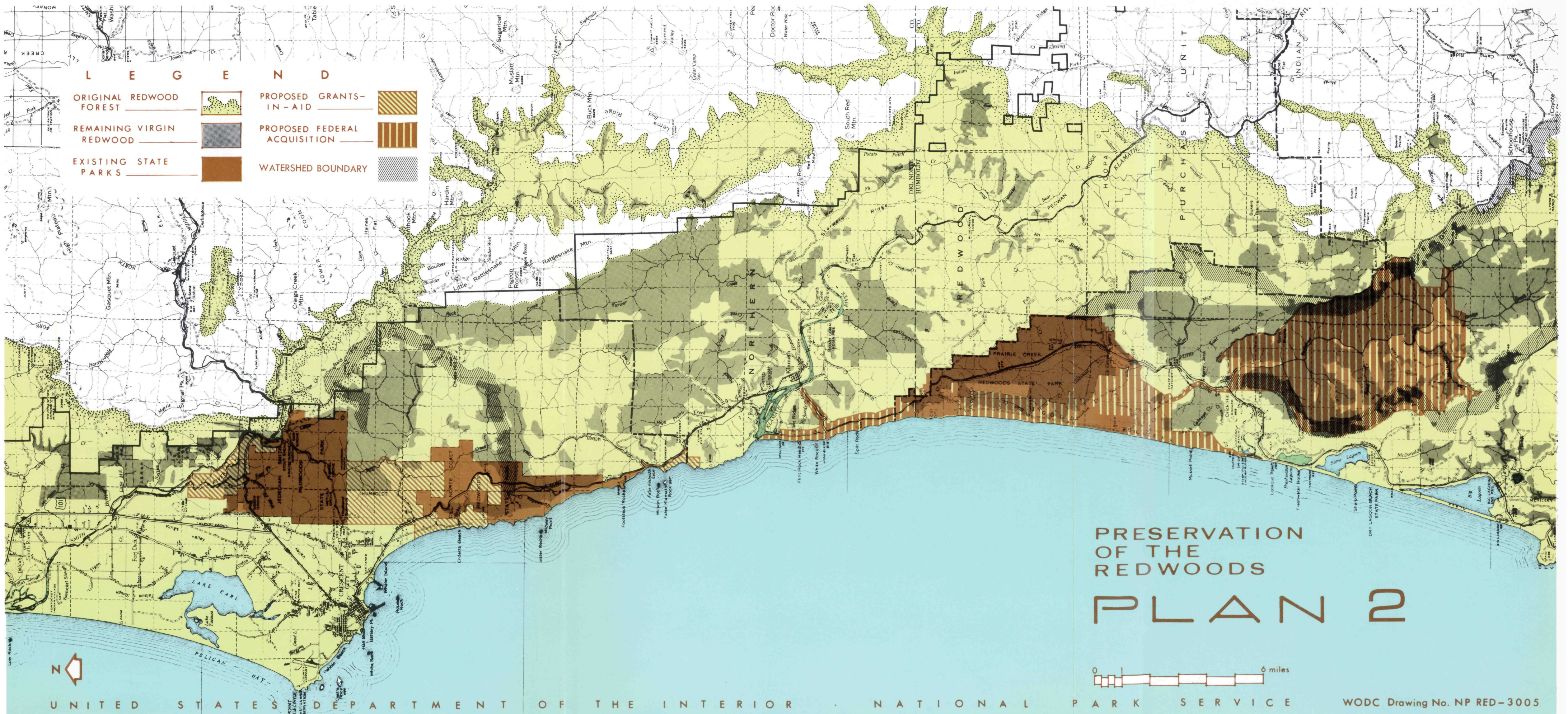
600 acres (providing a 7.5 mile extension)

Redwood groves along State Highway 36 and Van Duzen River

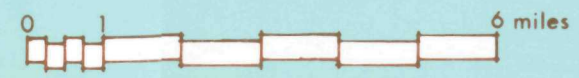
250 acres (providing protection to redwoods along 4.5 miles of highway and river)

Jedediah Smith and Del Norte Redwoods State Parks—acquisition of high priority inholdings and additions, a corridor joining the two parks and wild ocean frontage.

7,990 acres (including 1,810 acres virgin growth and 5 miles of shoreline)



PRESERVATION
OF THE
REDWOODS
PLAN 2



PLAN 3

In this, the third alternative presented, the suggested program of Federal aid to the State still remains the same. This reflects the conclusion that the long range plans of the State to round out and shore up major Redwood State Parks is eminently worthwhile.

The plan for a major new area along Redwood Creek is further reduced. It pulls in suggested federal acquisition along the west boundary to the point where sight distance from within the valley is still protected, but much of the upper drainage along that side would not be contained. Erosion damage

would threaten the several small drainages, and their ecological integrity, where now untouched, would ultimately be lost. Similarly along the south, protection to outstanding groves, including those with the giant trees, would be materially lessened.

The cumulative reductions represented in Plans 2 and 3 at this point become critical. This outstanding valley setting with still uncut virgin forests from ridge to ridge in the lower portion, relies on this very backdrop both scenically and ecologically for its outstanding park value.

Federal Acquisition for a Major Redwood Park

Redwood Creek—acquisition of major groves with “record” trees plus top quality lower drainage.

Prairie Creek Redwoods State Park (10,330 acres)—acquisition of high priority inholdings, additions required for developments and protection, plus adjoining bluffs and shoreline.

Total acreage including existing Redwoods State Park

Approximate Area Involved

13,730 acres (includes 10,480 acres virgin growth and 8.5 miles of Redwood Creek)

7,690 acres (including 1,490 acres virgin growth and 12 miles of shoreline)

31,750 acres

Federal Aid to the State

Avenue of the Giants extension

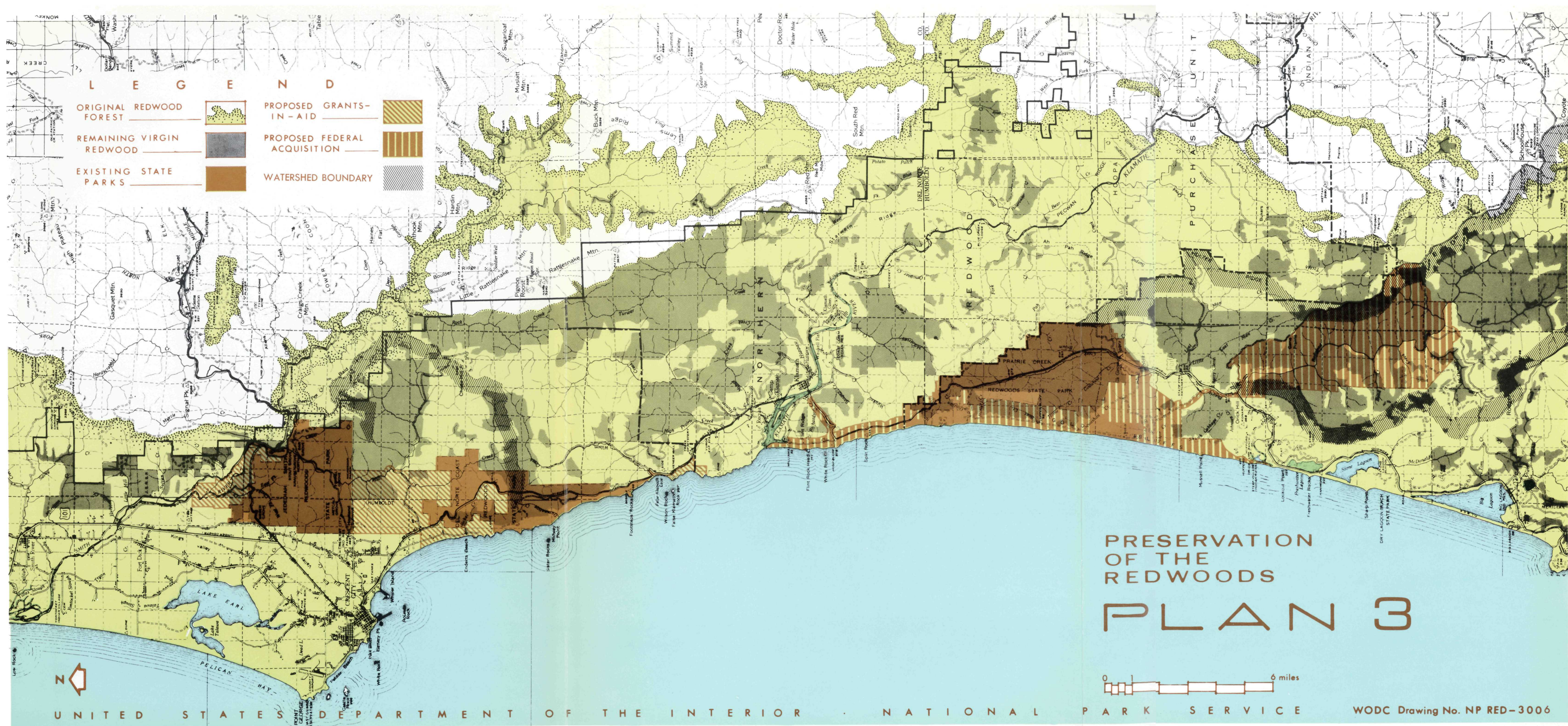
600 acres (providing a 7.5 mile extension)

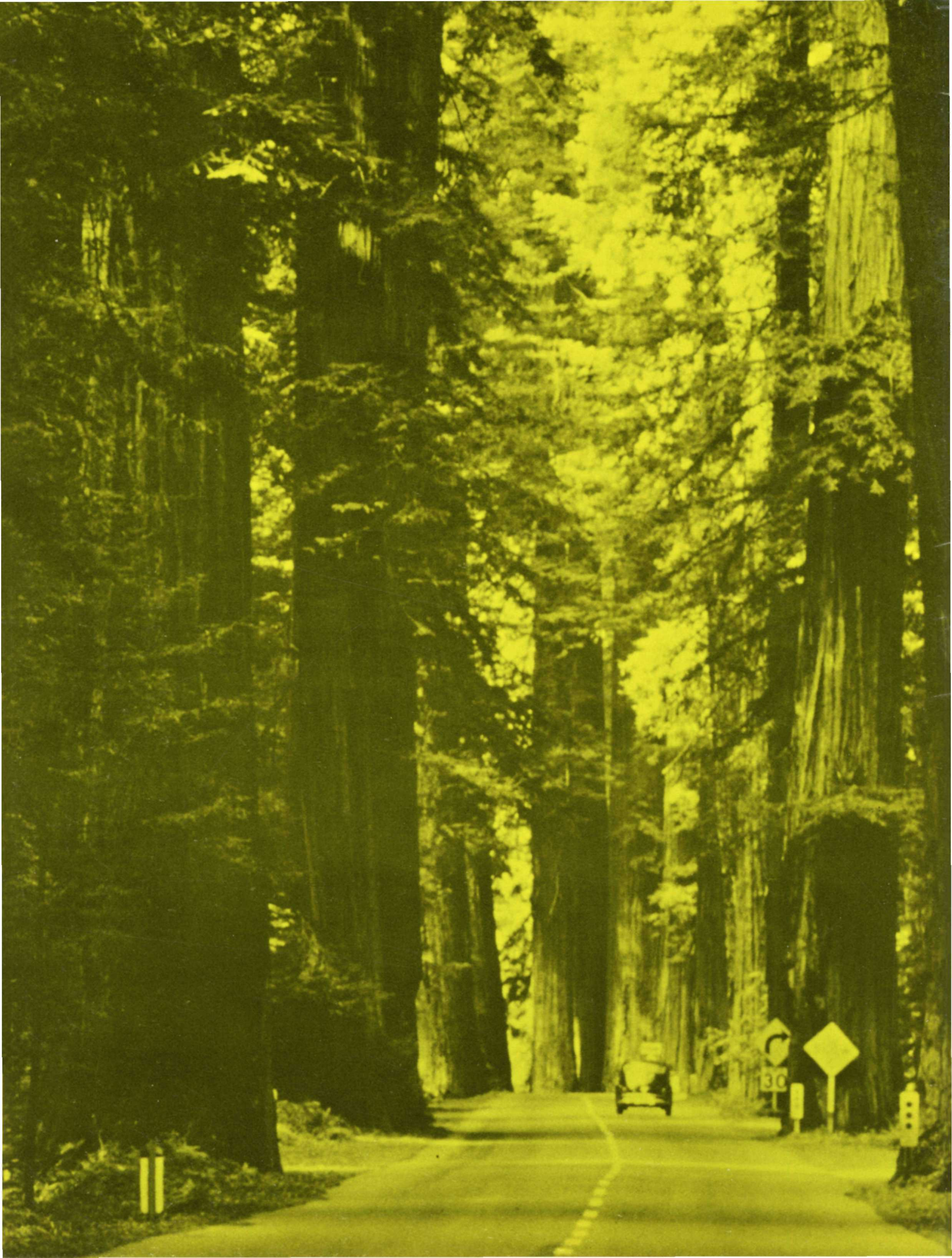
Redwood Groves along State Highway 26 and Van Duzen River

250 acres (providing protection to redwoods along 4.5 miles of highway and river)

Jedediah Smith and Del Norte Redwood State Park—acquisition of high priority inholdings and additions, a corridor joining the two parks, and wild ocean frontage.

7,990 acres (including 1,810 acres virgin growth and 5 miles of shoreline)





Economic Values



In its comprehensive Coast Redwood Study, the National Park Service secured the services of John Kenneth Decker, a private economist from Berkeley, California, to make an economic appraisal of the North Coast area in California. This would also determine the effect of a redwood national park—if such a proposal should develop from the study—principally upon the economies of Del Norte and Humboldt Counties.

BACKGROUND

At the time of the 1960 population census Del Norte, Humboldt and Mendocino Counties had a combined population of 174,000. This population was located principally in the coastal portion along North-South Highway 101. In recent decades population growth of the area has generally kept pace with growth of the State at large, but according to projections made by California's Department of Finance, growth rates for the North Coast will lag behind the State over the next sixteen years. By 1980, the combined population of the three North Coast counties will have increased by 28 percent over 1960, as against an expected increase in the State of 77 percent for the same period.

Employment in the area in 1960 was led by manufacturing, particularly lumber and



Richardson Grove State Park, only 790 acres in size, accommodated nearly 300,000 visitors in July and August, 1962.



Salmon fisherman at the mouth of the Klamath River in the Redwood Country.

wood products. The latter accounted for 31 percent of total employment in Humboldt County, 23 percent in Mendocino and 38 percent in Del Norte. The number employed in the trade and service industries reflects the importance of tourism in the area. It is interesting to note that manufacturing accounted for a higher percentage in all three counties than in the State as a whole indicating that the higher rate of manufacturing in itself does not assure a higher level of income or of employment.

The average yearly income for a family as reported in the 1960 census was \$6,277 in Del Norte, \$5,282 in Humboldt, and \$5,803 in Mendocino, compared with \$6,726 for the State. At the same time, unemployment rates were higher in the three North Coast counties. The percentage of the labor force that was unemployed averaged 8.1 percent in Del Norte County, 7.5 percent in Humboldt, and 8.2 percent in Mendocino in contrast to a statewide unemployment level of 6.1 percent.

A look into the future suggests that the North Coast counties should enjoy a moderate increase in employment in wood products from 17,000 in 1960 to 21,000 in 1980. This is based partly on anticipated conversion of the timber industry from lumber to plywood, pulp and paperboard. Such products are forecast to have a rising national market in the near future. Projected timber production of 2.66 billion feet board measure consisting of 0.9 billion board measure redwood and 1.76 billion board measure of Douglas fir is forecast by 1980. This represents a one-third increase in production over 1960.

In terms of redwood harvest, it is anticipated production will level off at about 0.9 billion board measure by the mid-1980's. The trend in manufacturing, other than in wood products, indicates a decline and leveling off of general activity in the years ahead. There may be a small but expanding mining activity and a modest increase in agriculture, but with a limited outlook in the three North Coast counties. A strong fishing industry, which has maintained about the same level in recent years, offers some growth possibilities. Steady growth is predicted for the wholesale, retail and service industries, all of which are closely related to travel and recreation.



Sunbathers and swimmers in Jedediah Smith Redwoods State Park.

IMPACT

This economic appraisal was based on a premise that a Redwood National Park would comprise a total of approximately 30,000 acres including the preservation of approximately 10,000 acres of virgin redwood growth not now preserved, largely in Humboldt County in the Prairie Creek Redwoods State Park environs. Conclusions concerned with development in such a park, and park staffing and operational costs, were based on tentative development and management plans prepared by the National Park Service to serve as premises.

After establishment of such a park, assuming adequate development, total attend-

ance is estimated at 1.2 million visitor days by the 5th year of operation, and 2.5 million by the 15th year. This would be in addition to the normal growth in State Park attendance that would have occurred in the general area. Visitors would spend an estimated \$3.6 million in the vicinity of the park in the fifth year after its establishment. About one-half of this amount would be spent by those visitors who would use motel accommodations outside the park boundary. Campers and trailerites would spend about 40 percent and day-users the remaining 10 percent. By the 15th year, visitor expenditures would amount to an estimated \$11.2 million. While the proportion spent by motel users would remain at about 50 percent, day-users, trailerites and campers would spend relatively less of the total than in the fifth year. This relative decline would be offset, however, by a new type of clientele—the resort visitor. By the 15th year, it is expected that the expansion of the private resort industry outside the park boundary would provide additional investment and employment opportunities for local capital and labor and would contribute substantially toward regional economic growth.

Capital improvements within the park might total approximately \$7.5 million over the first five-year period; thus averaging about \$1.5 million a year. Of this amount, some \$450,000 would be paid directly to local labor and about \$840,000 a year would be spent with local wholesalers and distributors for equipment and supplies.

In addition to the above annual capital outlays, annual operating expenditures, on the basis of very preliminary studies, are estimated by the 5th year at \$516,000 and at \$774,000 by the 15th. The principal component of the annual operating cost would be wages and salaries for members of the park staff, and most of this would enter the income stream in the two counties.

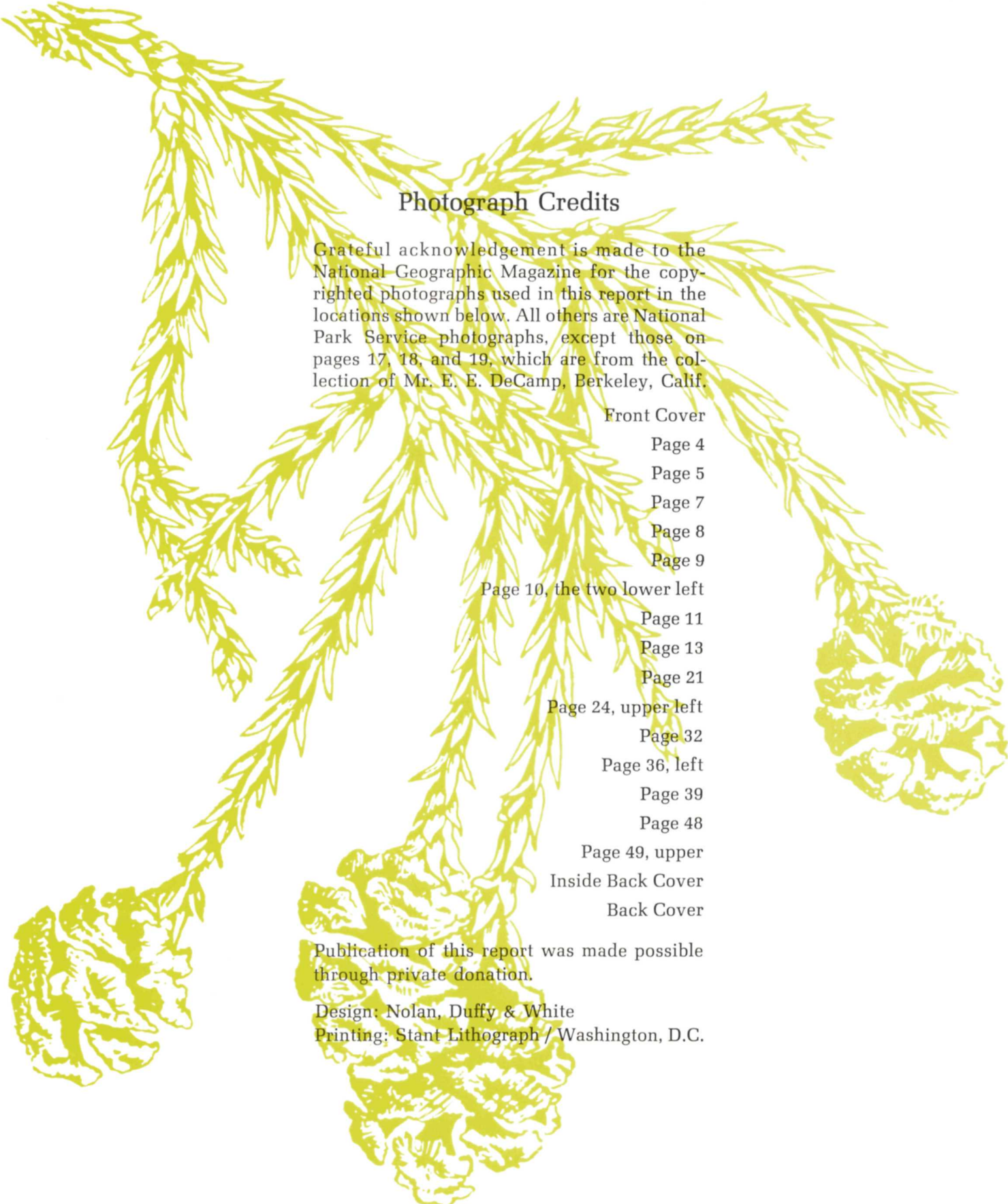
Estimated assessed valuation of land and improvements that might be acquired for the proposed park by the 5th year, again as a premise, totals \$880,000 in Humboldt and \$169,000 in Del Norte counties. A loss in assessed valuation might be anticipated in the first five years after establishment of the park through removal of land and improvements

from the tax rolls. However, under the present tax structure the assessed valuation of standing timber on these lands would decline rapidly to an average of about one-half of these figures as the balance of the remaining old growth is cut—in other words an average of approximately \$440,000 for Humboldt County and \$85,000 for Del Norte County over the succeeding decades. In Humboldt County, this would be less than 1 percent of the \$53.7 million in assessed valuation on timber operations in the county, and less than four percent of the \$12.1 million in total assessed valuation of the three school districts which might be involved in the proposal. The percentages are even lower in Del Norte County.

More than offsetting the above losses in assessed valuations, it is estimated that by the fifth year after park establishment some \$688,000 in Humboldt County and \$172,000 in Del Norte County will have been added to assessed valuations by the presence of the park solely as a result of visitor spending. Additions to assessed valuations that might be anticipated from enhancement of values in properties adjacent to the park are estimated at \$1,349,000 in Humboldt and \$150,000 in Del Norte by the fifth year. The estimates do not include additions that might result from park operating expenditures and from expenditures by employees and proprietors for family housing.

It is anticipated that local revenues will also be increased from higher sales taxes and hotel-motel taxes resulting from increased attendance in the area. Projections for such sales and use taxes for the two counties total \$57,200 for the fifth year, and \$218,400 for the 15th year. When added to the new property tax revenues, the total net increase in revenues to the two counties attributable to the proposed national park might amount to \$177,000 by the fifth year and \$721,000 by the 15th year.

The economic impact study summarized in this preliminary report is necessarily based on certain premises, but cannot see the whole picture. When final recommendations are made there will be further opportunity to analyze economic effects. Until such time it is assumed it would not be possible for industry, on their part, to assess the effects and project their own management plans.



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Back Cover

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*A virgin forest setting on Redwood Creek for
the second tallest tree known—367.4 feet.*



