


watershed rehabilitation plan

april 1981

REDWOOD

NATIONAL PARK / CALIFORNIA





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WATERSHED REHABILITATION PLAN

REDWOOD NATIONAL PARK

United States Department of the Interior
National Park Service

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INTRODUCTION

Public Law 95-250 directed that a rehabilitation program be developed for some 48,000 acres in the Redwood Creek basin of Redwood National Park. Before these lands were added to the park in 1978, timber harvesting and related road construction had adversely influenced erosion rates, sediment deposition, and water quality within the entire basin. It is these problems that are to be addressed in the rehabilitation program. PL 95-250 also established a 33,000-acre park protection zone (PPZ) upstream of the park boundary. In this area the secretary of the interior was given responsibility for ensuring that logging does not adversely affect park resources and for generally protecting the park from adverse impacts caused by activities outside the park. The act authorized appropriations of \$33 million for rehabilitation work (see appendix A).

The purpose of this document is to present a program to minimize man-induced erosion within Redwood National Park and to encourage the return of a natural pattern of vegetation, pursuant to PL 95-250. The program will consist of several interrelated projects to be carried out over 15 years. The projects include erosion control, planting of forest vegetation, and removal of roads not needed for access to rehabilitation sites or for future park management. Where necessary, stream channels disrupted by logging activities will be reconditioned, and restoration activities along the main stem of Redwood Creek will be undertaken to protect downstream redwood groves and aquatic communities. A monitoring program will be implemented to determine the effectiveness of rehabilitation techniques, with conclusions recorded for the benefit of other governmental and private agencies with similar tasks. Accelerated recovery rates of disturbed slopes are considered beneficial for the watershed on a cumulative basis. Ultimately the efforts should result in the restoration of natural ecosystems to a condition similar to what would have existed without disturbance by man. The program will also seek to minimize or eliminate man-induced erosion within the PPZ through the review of timber harvest plans and ongoing sediment source studies, while still fostering the productivity of commercial forestland.

THE AFFECTED ENVIRONMENT

NATURAL RESOURCES

Overview

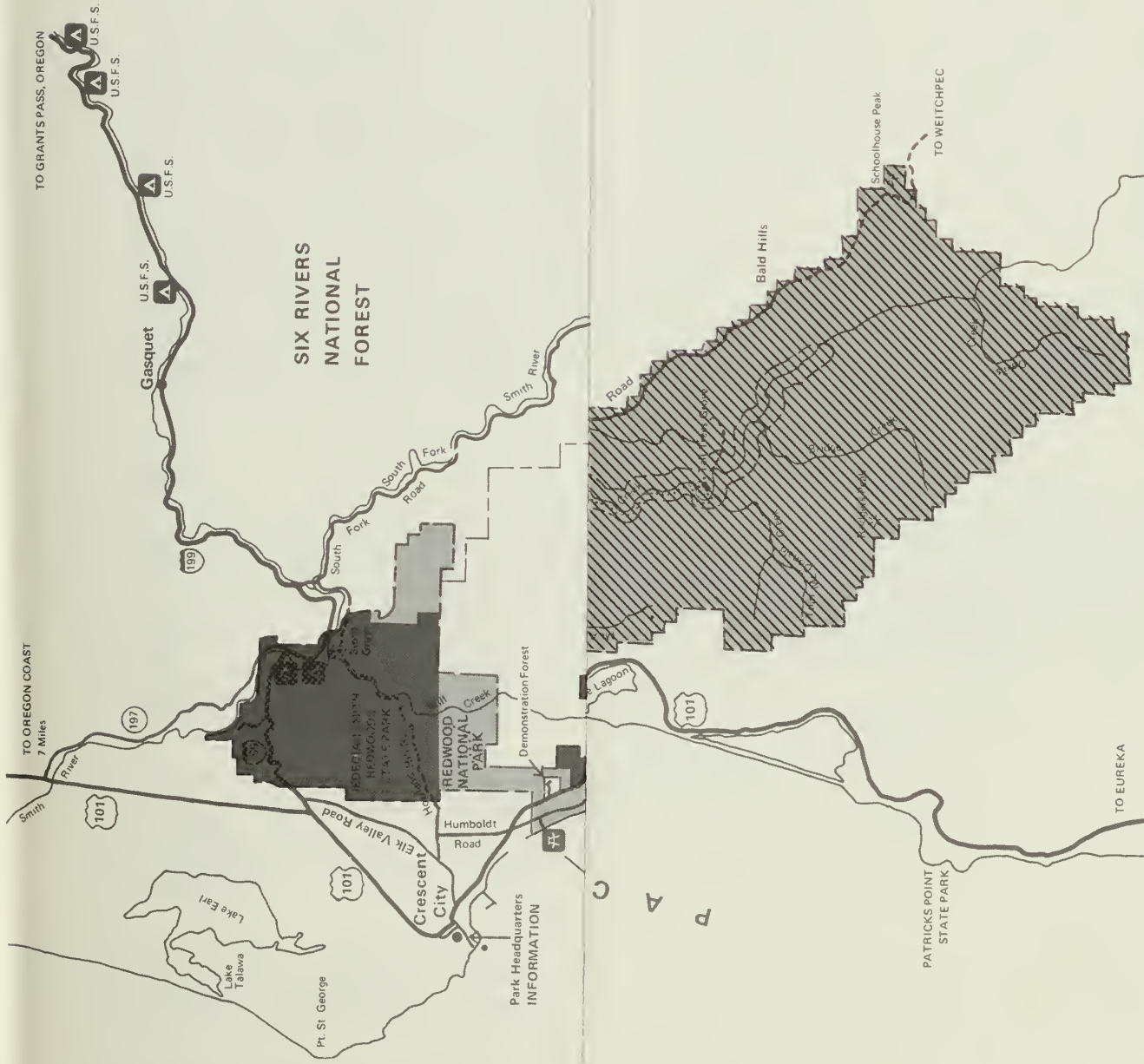
Redwood Creek drains a 280-square-mile watershed in the mountainous, coastal region of northwestern California. The creek begins near an elevation of 5,000 feet and flows northwest for 55 miles until it empties into the Pacific Ocean near Orick. The watershed is characterized by high relief, steep unstable slopes, and narrow valley bottoms. Average hillslope gradients range from 31 to 34 percent, and over a third of the basin shows evidence of past or present mass movement (U.S. Department of the Interior, Geological Survey [USDI, GS] 1976b).

Redwood Creek and its tributary streams are subject to frequent flooding from winter storms, and basin soils are naturally unstable and highly erodible. Landslides and earthflows are widespread, and even under natural conditions streams swelled by winter rains transport large volumes of sediment. Mean annual erosion rates for the north coast area in general result in sediment yields in excess of 4,000 tons per square mile per year (Janda and Nolan 1979). For Redwood Creek, with over 90 percent of the forests in the basin harvested, the sediment yields are in excess of 8,000 tons per square mile per year (U.S. Congress, House, Committee on Government Operations 1976).

The existence of over 300 miles of truck roads and 3,500 miles of tractor trails has created the greatest erosion problems in the watershed. The cutting of logging roads into steep slopes has often resulted in massive slope failures, causing sediment to be delivered directly into perennial and intermittent stream channels. Surface runoff is intercepted and concentrated by inboard ditches along these roads, and it often empties onto slopes that have no natural drainage channels, resulting in severe gullying. During major storms, culverts and inboard ditches often become blocked, and water is diverted onto road surfaces, causing new gullies and saturating road fills, which in turn leads to slope failures.

Many natural deep-seated mass movements in the prairies in the watershed have also been aggravated by logging. Road construction across unstable prairie grasslands has altered the natural drainage patterns, resulting in deep gullies and slumping as the prairie slopes adjust to changing hydrologic conditions.

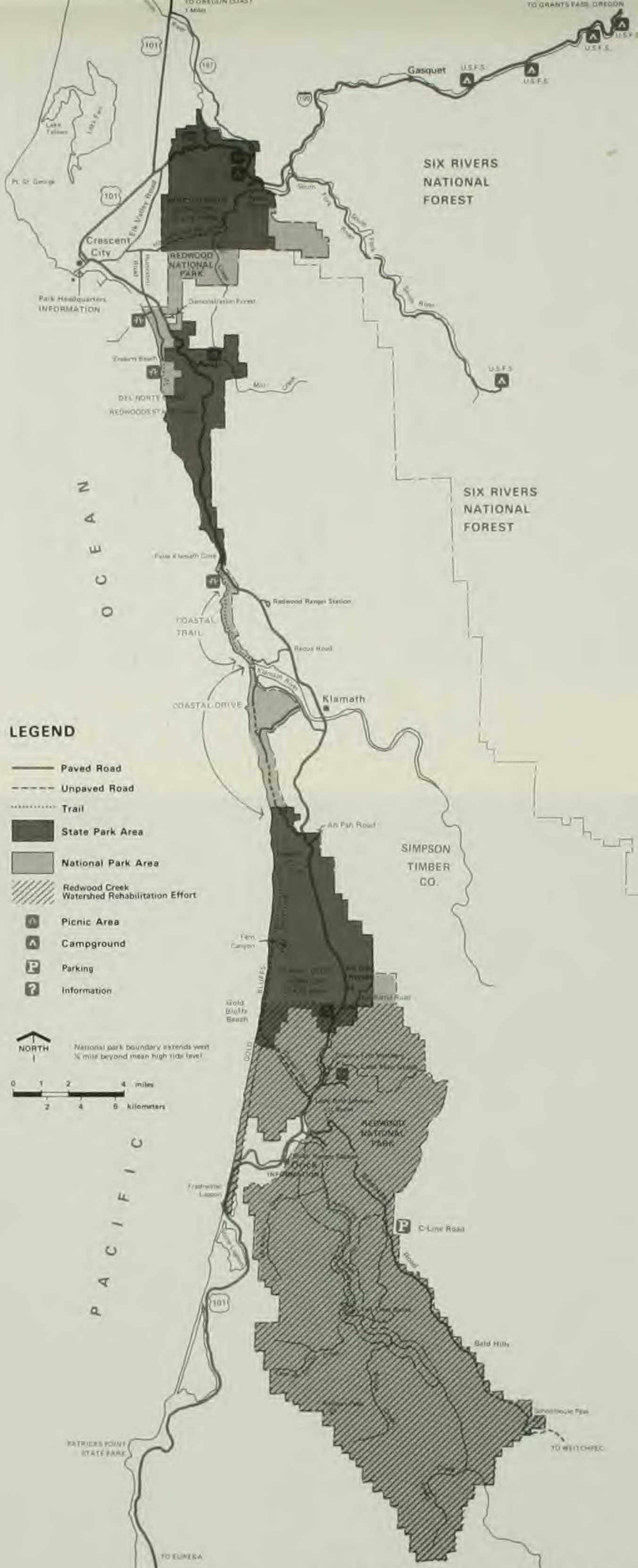
Altered drainage patterns, loss of topsoil, soil compaction, destruction of ground cover and subsequent decreased evapotranspiration, increased runoff rates, increased soil temperature, and decreased soil moisture are among the results of the logging activities. Downstream from the cutover lands, the effects include the aggradation of streambeds, the loss of anadromous fish-spawning habitat due to increased sedimentation, increased streamside slope failures, greater bank erosion, loss of streamside vegetation, higher winter stream discharge, lower summer discharge (accompanied by higher water temperatures), and altered flow patterns and sediment quantities in the estuary. Changes wrought by



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these events have led to general degradation of the watershed, including damage to the aquatic and riparian environments of the Redwood Creek corridor.

Vegetation

Historically, the Redwood Creek basin supported a dense mosaic of forest, prairie, and woodland. Forest types ranged from Sitka spruce (Picea sitchensis) on slopes and valleys adjacent to the ocean, to the redwood/Douglas-fir (Sequoia sempervirens/ Pseudotsuga menziesii) associations in the more upland areas approximately 10 miles from the coast. Redwoods dominate the alluvial forests and reach their greatest height here. California laurel (Umbellularia californica) and bigleaf maple (Acer macrophyllum) are common associated species on alluvial flats. Elsewhere associated species of importance include hemlock (Tsuga heterophylla), grand fir (Abies grandis), madrone (Arbutus menziesii), tanoak (Lithocarpus densiflorus), and red alder (Alnus rubra). In the upper basin, redwoods are absent or are confined to valley bottoms. At higher elevations, true firs (Abies sp.) replace Douglas-firs.

Approximately 65 percent of the basin within the park has been cutover or otherwise disturbed by activities associated with logging (i.e., construction of roads, skid trails, and landings). Only 29 percent remains in old-growth and/or advanced second-growth stands, while the remaining 6 percent consists of prairies, woodlands, valleys, and riparian bottomlands. (See table 1, Land Disturbance Categories, under "Watershed Rehabilitation.")

Wildlife

A wide range of wildlife habitats for a variety of species are found in Redwood National Park, the three state parks, and surrounding areas. In addition to the habitats coinciding with various vegetation types, there are marine, intertidal zone, sand and gravel beach, rocky seashore, saltwater marsh, and offshore rock habitats. The species associated with these various habitat types are listed in appendix F-7 of the Draft Environmental Statement for the General Management Plan (DES 79-55; see USDI, NPS, DSC 1979).

Common mammals within the Redwood Creek basin include the Roosevelt elk, black-tailed deer, black bear, and various small mammals. Bobcat, gray fox, coyote, and mountain lion also occur in the area. Mink, otter, and beaver are more closely associated with Redwood Creek and its tributaries.

Birds in the watershed include larger species such as hawks, waterfowl, and turkey vultures, as well as smaller species such as sparrows and warblers. Occasionally, eagles, falcons, and osprey are observed, but only the osprey is known to nest in the immediate area.

Sightings of endangered or threatened birds have been made primarily along the coast of Redwood National Park, and peregrine falcons, brown

pelicans, and the Aleutian Canada goose have been seen. No endangered or threatened mammals inhabit the project area.

Additional information pertaining to the affected environment may be found in DES 79-55. More detailed discussions on the natural environment of the Redwood Creek watershed can be found in USDI, NPS 1975; USDI, GS 1975b; and U.S. Congress 1976.

CULTURAL RESOURCES

Archeology/Ethnography

Archeological sites identified in the Redwood Creek basin are situated within the ethnographic territory of the Chilula peoples, also known as the Redwood Creek or Bald Hills Indians. The last Chilula family left Redwood Creek early in the 1900s, but prior to that date, the Chilula occupied most of the lower portion of Redwood Creek.

The Chilula were inland oriented, since they had no direct access to the ocean without going through the "danger zone" that separated them from the Coast Yurok, their traditional enemies. Because coastal and riverine resources were less abundant or accessible for the Chilula than for their Yurok and Wiyot neighbors, the Chilula probably placed greater emphasis on vegetable foods and game than on fish. In addition, their subsistence effort was probably more mobile and not necessarily oriented around Redwood Creek itself, except during the limited period of the creek's yearly salmon run.

Within their territory, the Chilula could use the creek for salmon and eel, the forests for acorns and elk, the prairies for bulbs, grasses, and game, and the forest/prairie ecotone for the diversity of plant species it offered. During the year, various resources would be utilized at the appropriate season, and temporary camps or procurement sites would be occupied away from permanent Chilula villages.

Information about the settlement patterns and early lifeways of the Chilula is contained at archeological sites in the proposed Bald Hills archeological district. This resource information is valuable to anthropological research, to local Chilula descendants, and to the interpretation of events and changes in the Redwood Creek basin.

The earliest European knowledge of northwestern California dates from the Spanish and Russian sea explorations between 1542 and 1800, but these expeditions did not reach the Redwood Creek area. After 1800, however, Chilula territory was traversed by fur traders and gold miners, and permanent homesteads were established during the 1850s and 1860s. The Trinidad Trail, a primary pack trail from the coast to the Trinity River goldfields, crossed Redwood Creek at the Tall Trees and then ascended the Bald Hills ridge. During this period, the Chilula people resisted the incursions of white settlers and their population was greatly reduced, resulting in near extinction.

Today there are not more than two or three Chilula descendants with direct ties to the Redwood Creek basin. The living Native Americans of Chilula ancestry represent a cultural continuum, and they are actively following traditional beliefs and customs.

History

Historic properties within the Redwood Creek basin are primarily associated with homesteading and ranching, a result of the broad expansionist movements encouraged by the initiation of trade and commerce with the interior mining regions at the head of the Sacramento Valley. By the end of the 19th century, the ranchers of the Redwood Creek valley and Bald Hills had laid the foundations of a thriving lifestyle based on agriculture, horticulture, and livestock raising. These pursuits lasted well into the 20th century, when they were finally disrupted, and almost entirely destroyed, by the arrival of the lumber industry.

Pursuant to executive order 11593, two surveys were initiated within the Redwood Creek basin to ascertain sites and structures of historic and architectural significance (USDI, NPS 1969; USDI, NPS, DSC 1978 and 1980b). The Lyons ranch homestead site and remnants of the Tall Trees/Trinidad Trail were identified as possessing intrinsic historic importance and are being nominated to the National Register of Historic Places. Two other properties, the Lane barn at Elk Camp and the Dolason half-barn in Dolason Prairie, possess exemplary architectural significance and are recognized for their local value, although they are not of National Register caliber. Ongoing archeological surveys and a proposed oral history program may identify additional historic sites, which would be added to the cultural resources data base for the park. Their significance would be evaluated against the criteria for inclusion on the National Register of Historic Places (36 CFR 1202). Actions specific to the management of the Lyons ranch site, the Dolason barn, and the Lane barn are found in the cultural resources management portion of the General Management Plan (USDI, NPS, DSC 1980a).

SOCIOECONOMIC CONDITIONS

The Regional Economy

Until the 1980 census results become available, current socioeconomic data on Humboldt County will not be known. The following discussion is based primarily on projections and observations published in the Socio-Economic Base Study on Six Rivers National Forest (TerraScan 1979). Additional economic information may be found in DES 79-55 and in the 1980 report to Congress on the status of the implementation of the park expansion act (USDI, NPS 1980).

The population of Humboldt County has increased slightly since 1970. In 1976 Humboldt County's population was estimated by the state to be 106,000, reflecting a growth rate of 6.5 percent between 1970 and 1976. The 1980 census is likely to reveal an additional net migratory inflow.

Employment in forest products industries has declined, while agriculture, commercial fishing, tourism, and government have all expanded. The decline in forest products has been accompanied by a substantial increase in unemployment rates. Between 1970 and 1980, the unemployment rate for Humboldt County has increased from 10.1 percent to an estimated 12.9 percent (USDI, NPS 1980). Concurrently, taxable transactions, personal income, and residentiary employment have increased. The total Humboldt County income in 1980 has been estimated at \$523,800,000 and residentiary employment at approximately 19,100 (Jewett). These increases may be partially due to the Redwood Employment Protection Program, which was set up to maintain the incomes of those persons who lost jobs because of the expansion of Redwood National Park. The increases may also partially result from an increase in professional and white collar occupations, as well as unskilled and semiskilled positions. In addition, the decrease in forest products manufacturing has resulted in an increase in the cost of wood products, a leveling of productivity, and possibly the adoption of more labor-intensive methods (TerraScan 1979).

Visitor Characteristics and Trends

Visitor characteristics and trends at Redwood National Park were surveyed during the summer and winter of 1977. Additional information concerning visitation can be found in DES 79-55 and in the "Redwood National Park Tourism Study: Economic Impacts of Alternative Park Development Plans" (Grobey and others 1979).

The survey revealed that 60 percent of the Redwood visitors are California residents, 75 percent travel more than 200 miles to reach the park, and 70 percent visit the park for recreation. The majority of visitors come in private automobiles, and one-third travel in some type of recreation vehicle. The majority spend more than eight nights away from home, and only 8 percent cited Redwood National Park as the primary destination of their trip. Only 27 percent of the visitors surveyed were in the park for the first time, and 29 percent had previously visited seven or more times. Ninety percent planned to spend less than eight hours in the region.

The number of park visits is projected to increase by 1990. In 1970, 62 percent of all the visits were during July, August, and September. This is projected to decline to 38 percent by 1990, with the winter and fall seasons absorbing larger numbers of visitors. Visitation figures will depend somewhat upon gasoline availability and prices, as well as national and state park programs and facilities.

WATERSHED REHABILITATION

Many site-specific actions for watershed rehabilitation will not be prescribed until various surveys and inventories have been completed, and until pilot rehabilitation activities have been evaluated for effectiveness.

The most important objectives of the overall effort include the rehabilitation of logged hillslopes, the restoration of ephemeral, intermittent, and perennial stream channels, and the revegetation and restoration of denuded forestland. These objectives will be accomplished by controlling gully, rill, and slope erosion; by diverting streams back into their natural, prelogging channels; by excavating fills placed in road and skid trail stream crossings; by removing organic debris and stored sediment in natural stream channels where necessary; and by stabilizing mass movement features where feasible. Vegetation will be planted to directly control erosion, to reestablish forest vegetation, and to restore disturbed prairie vegetation.

Additional projects include the removal of unnecessary roads and the maintenance of roads considered to be essential. Monitoring for effectiveness of treatment techniques will assist in evaluating the relative success of efforts. A basinwide inventory of sediment sources and the habitat quality of tributaries will provide information relative to the rehabilitation of aquatic communities and streamside vegetation. Timber harvest plans in the PPZ and cooperative agreements with federal, state, and local governments, and also with private landowners, will continue to be evaluated.

The programs and specific actions that are being proposed to achieve these objectives are described below. The erosion control program is the focus of initial rehabilitation efforts and is discussed first. Other programs include revegetation and the rehabilitation of prairies, riparian resources, and the Redwood Creek estuary.

EROSION CONTROL PROGRAM

Existing Conditions Evaluation

A Ground Disturbance and Erosional Landforms map has been prepared to indicate the degree of ground disturbance within the park for the Redwood Creek watershed (see map in pocket at back of report). Major erosional features such as large earthflows and debris slides are also identified on the map. Information for the map comes from photo interpretation of 1:6000 color vertical aerial photos, taken in June and July of 1978. Ground reconnaissance for the mapping took place at various locations throughout the area during the past two years.

The Ground Disturbance/Erosional Landforms map is being used along with additional scientific data and NPS policies to determine rehabilitation priorities for disturbed sites throughout the basin. The map does not show the order in which sites will be treated because these priorities

must be decided by applying all of the criteria discussed below. The map does show the conditions at the various sites, which can then be evaluated according to the criteria to determine treatment priorities--site proximity to a perennial stream, relative age of logging, logging method, accessibility of the site in terms of the road network, and the size of the drainage area above the site. However, other conditions, such as relative sediment yield, site-specific erosion problems, and the comparative condition of roads, can only be determined by onsite inspection.

The map also delineates both the active and inactive major erosional landforms that are clearly visible on the aerial photographs. These include forested earthflows that are either dormant or slow-moving; relict, bowl-shaped avalanche scars; large slope hollows that may be prehistoric landslides; and erosion-cut terraces that now form flat ridgetops. These natural features of the landscape indicate the degree of erodibility of the terrain, but they are not the sole basis for any rehabilitation treatment.

The lands shown on the map have been categorized according to the condition of the resource and the vegetation type, and the aggregate acreage for each category has been calculated. This information is shown in table 1. For disturbed lands within a particular category, the type of general treatment that may be considered is also shown in the table.

Site Selection Criteria

The primary aim of rehabilitation work will be to minimize the delivery of sediment from logged hillsides into perennial stream channels in the Redwood Creek watershed. In general, the tributary basins with the highest sediment yields will be treated first, but other factors will also be considered before final decisions about treatment sites and schedules are made. Critical areas include sites of major disturbances, such as logging roads and/or tractor-logged slopes, that are close to perennial streams. Disturbed areas at the ends of logging roads and the end portions of logging roads themselves may be treated before other equally critical areas are treated because once roads are pulled, disturbed slopes are no longer easily accessible and other road sections cannot be pulled until dead-end sections have been treated.

The following criteria, listed in order of importance, are to be considered in determining priorities in the scheduling of sites for treatment. The most critical areas, as measured by these criteria, will have the highest priorities for treatment.

The amount of sediment yield from the tributary basin in which the site occurs: The higher the estimated sediment yield, the higher the priorities for the treatment of sites in the tributary basin.

The proximity of sites to perennial stream channels: The closer the sites to perennial streams, the higher the priorities.

The condition of logging roads: The more serious the state of disrepair of roads within or adjacent to a site, the higher the priorities.

Table 1: Land Disturbance Categories
(from Land Disturbance and Erosional Landforms map)

Land Category	Land Description	Estimated Total Acres	Expected Treatment	
			Heavy-Equipment Work	Labor-Intensive Work
1	Old-growth stands and advanced second growth	18,590	None	None
2	Older cut units with dense regrowth and few remaining tractor trails; includes well-established second growth	10,665	None	Upgrade water bar network on any existing haul roads
3	Tractor-yarded unit with dense regrowth and minimal bare tractor trails	5,735	None	Upgrade water bar network on any existing haul roads
4	Tractor-yarded unit with adequate regrowth but extensive bare tractor trails; drainage disturbance present	10,450	Rip trails to disaggregate surface; reroute drainage runoff to original water-courses; remove debris from channels to prevent bank erosion; excavate fill material and debris from road crossings; and divert inboard ditch runoff to natural channels	Construct check dams; line stream channel crossings with rock; apply mulches and seed bare trails and landings with grasses and shrubs; if regeneration on slopes insufficient, plant redwood and/or Douglas-fir seedlings
5	Recent tractor-yarded unit with minimal regrowth; drainage disturbance prominent, with obvious erosion due to haul roads/landings and tractor trails	4,600	Disaggregate trails; reroute drainage to original water-courses; remove debris from channels and excavate crossings; divert inboard ditch runoff from roads and landings	Construct check dams; line stream channel crossings with rock; add mulches and consider other soil amendments on bare trails and landings; replant slopes if regeneration insufficient
6	Recent tractor-yarded unit on flat to moderate slopes with negligible erosion problems and minimal regrowth	295	Confirm and upgrade water bar network	If regeneration on slopes insufficient, plant redwood and Douglas-fir seedlings; plant grasses and shrubs on bare roads/trails and landings
7	Recent cable-yarded/high lead unit with no serious erosion; minimal regrowth; drainage problems associated with landings/decks	2,395	Outslope landings and decks where close to streams; improve drainage on wet landings by diverting inboard ditch runoff	Apply mulches and consider other soil amendments on landings/decks; plant grasses and shrubs for ground cover on landings/decks; restock slope if regeneration insufficient
8	Dense alder growth on wet slopes, including midslope seepage zones and recently vegetated landslides	585	None	On unstable slopes where seepage may be contributing to slope failures, possibly improve drainage and route water onto more stable slopes
9	Older cable-yarded unit with negligible erosion; good regrowth; no obvious drainage disturbance and no cuts by tractor trails	400	None	None

Land Category	Land Description	Estimated Total Acres	Expected Treatment	
			Heavy-Equipment Work	Labor-Intensive Work
10	Quarry sites; bare rock with no vegetative cover	40	None	None
11	Large logging decks		Rip surface to disaggregate compacted soil; improve drainage if needed	Apply mulches and plant with grasses, shrubs, and conifers, if desirable
12	Low-gradient valley bottomland with lush riparian growth		None	None
13	Prairie grasslands and oak woodlands; severe local gully erosion associated with roads across prairie	2,275	Remove unnecessary roads; in other cases divert inboard ditch runoff to prevent concentrated flows onto unstable prairie slopes	Remove conifers that have seeded onto disturbed cut-and-fill slopes along road to prevent further encroachment on the prairie; seed native perennial grasses on disturbed sites
14	Flat ridgetop area representing an older erosional surface; currently few erosion problems, regardless of land use history; may include some old-growth forest and tractor-logged units	2,030	Divert problem drainages in headwater areas if feasible	None
15	Highly erosive unit confined to southeast corner of park; most sites have been logged, but have moderate to extensive regrowth; because of naturally erosive soil and highly sheared bedrock, numerous complex slope drainage problems still need treatment	1,720	Conduct extensive slope work because of the area's unstable nature; reroute drainages where slope failure and gulying exist; divert surface runoff to natural channels; remove and outslope all roads; disaggregate trails; remove debris from channels; excavate fill material and debris from road crossings	Same as categories 4, 5, and 7
16	Active earthflows, landslides, debris avalanches, and recent slumps; may or may not be vegetated	50	To be determined	

The date of logging: Recently logged areas are more accessible, and the erosional problems are easier to detect and are not as well developed, therefore these areas should be treated before conditions worsen.

The past logging method: Tractor-yarding results in greater ground disturbance than does cable-yarding, so the former areas will have higher priorities.

The accessibility of the site: Sites at the ends of dead-end logging roads must be treated first because road removal precludes reasonably easy access to the site for rehabilitation.

The amount of drainage area upslope from the site: If a certain site is selected for treatment, all the drainage area immediately upslope to the watershed divide must be treated at the same time so that small watersheds on the slope are rehabilitated as a physiographic unit.

Three other factors will be considered in determining work priorities. Addressing these factors will fulfill the legislative mandates outlined in PL 95-250.

Selecting of sites for training labor-intensive rehabilitation groups: In many instances, training should be conducted at noncritical sites. Whenever practical, labor-intensive rehabilitation groups will employ people from Del Norte and Humboldt counties. At these sites, technique development and improvement can be used to increase the effectiveness of rehabilitation efforts at more critical sites. Noncritical sites are those that do not have the potential to yield large volumes of sediment directly to perennial streams. An adequate buffer of old-growth redwood between the site and a major tributary, or between the site and Redwood Creek, will also qualify a site as being noncritical.

Selecting of demonstration sites: In some cases it may be desirable to illustrate rehabilitation techniques for general park interpretation purposes by treating a site adjacent to a visitor use area. Such a site might not be considered a critical area as defined by the criteria above.

Selecting of sites for experimental or innovative erosion control work: Experimental erosion control work will be done in noncritical areas because the results of such work are unknown. Included as part of the experimental work will be request-for-proposal (RFP) type contracts, which will require bidders to submit proposals for treating specific problem areas. These proposals will be evaluated by NPS personnel for their anticipated effectiveness before contracts are awarded.

Sequence of Activities

The following sequence of activities outlines the critical steps that must be completed for each rehabilitation site after the treatment priority has

been established. The most important procedural steps, or those with the greatest potential time requirements, are listed first. (See the Action Sequence flow chart for implementation sequencing.)

Cultural Resources Survey. Pursuant to executive order 11593 (Procedures for the Protection and Enhancement of the Cultural Environment), all sites will be surveyed for cultural resources that may be affected by the rehabilitation effort. This survey must be made early so that if significant cultural resources are found, a method for avoidance of effect or a plan for mitigation can be developed and implemented well before active rehabilitation work begins. Requisite compliance actions must be approved as outlined in the "Regulations for the Protection of Historic and Cultural Properties" (36 CFR 800). Specific actions are discussed under "Cultural Resources Management" below.

Endangered Species Survey. Pursuant to PL 93-205, the Endangered Species Act of 1973, as amended 1978, all sites will be surveyed to ensure that no threatened or endangered species of plants or animals will be adversely affected by rehabilitation work. If a sensitive species is found at or near an activity site, then an early determination will be made as to what negative impacts may occur and what mitigation or abatement measures may be employed to reduce the degree of impact.

Premapping and Inventory Preparation. Complete aerial photo coverage at an acceptable scale will be obtained for each site, and enlarged photo-mylars from each negative will be produced for the actual mapping of the site. Field inspections of erosional features identified on the aerial photos will be conducted to establish the degree of disturbance and rehabilitation priorities.

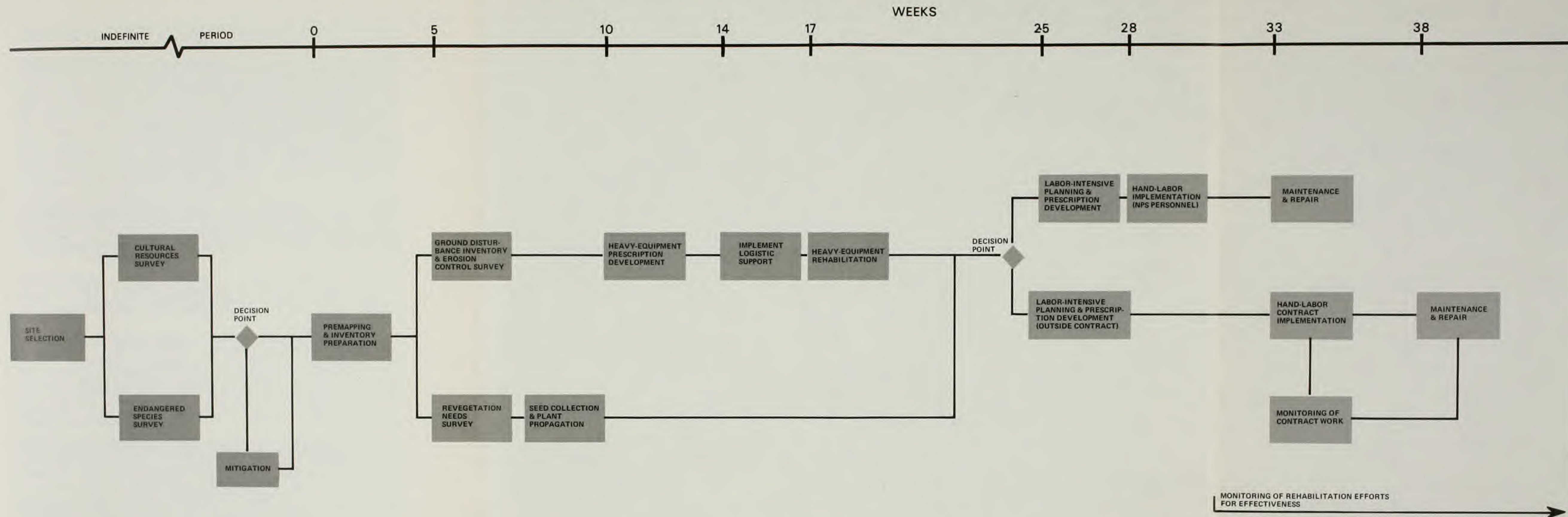
Mapping and Erosional Features Inventory. Sites in the basin that are selected for rehabilitation will be inspected and fully mapped to determine the original natural geomorphic configuration of the slope, and also the extent and nature of erosion on logged slopes, haul roads, and severely disturbed or compacted areas. Determinations will be made about which erosional processes are at work in each area and about whether rehabilitation efforts will improve conditions. Some sites may have already recovered naturally to a point that physical rehabilitation activities will actually increase sediment transport; therefore, these sites may be considered for rehabilitation only through revegetation and not through major physical treatment.

Revegetation Needs Survey. Each rehabilitation site will be inventoried to determine soil types, moisture-holding capacity, nutrients present, slope, aspect, and naturally occurring plant species. This will help in selecting vegetation types best suited to the unit. The survey will be undertaken at the same time as the mapping and inventory of erosional features.

Studies of early plant succession will guide the use of plant species for erosion control and revegetation. In addition, a broad survey of conditions will guide a tree-planting program designed to speed the reestablishment of forests on cutover and understocked land. Generally all sites disturbed by rehabilitation activities will be replanted with

IN

SITE
SELECTION



ACTION SEQUENCE (flow chart)

WATERSHED REHABILITATION PLAN

with appropriate vegetation. Studies of long-term vegetation management needs will be conducted as rehabilitation progresses.

Heavy-Equipment Prescription Development. Work sites where rehabilitation will require heavy equipment will be identified, the type of treatment will be prescribed, and access routes will be determined. All requirements in terms of deciding what personnel and equipment are needed, where camp facilities should be located, and which materials must be purchased or can be provided by the park should be completed by this time. Potential sources of materials such as rocks, redwood boards, and mulches will be identified and storage areas defined. Equipment rental agreements will be prepared for review and authorization. Heavy-equipment work will take into account concurrent work and equipment needs at other rehabilitation units, and work will be scheduled so as to minimize equipment time and cost. Tours of the units for prospective contractors will also be conducted.

Seed Collection and Plant Propagation. The collection of native seeds and the propagation of native plants, as determined by the revegetation needs survey, will be undertaken at the same time as the previous step. Native seed stocks from commercial outlets may be utilized when available. These operations will probably be contracted out, but they can also be carried out by NPS staff.

Logistic Support. The equipment operators selected for the heavy-machinery rehabilitation work will be contracted. All equipment needed to accomplish rehabilitation work will be gathered, inventoried, and transported to the site. Campsites will be set up at the selected locations.

Rehabilitation by Heavy Equipment. Efforts to be undertaken with heavy equipment will focus on stream channel clearance, road removal, fill crossing excavation, cut-and-fill bank stabilization, restoration of predisturbance drainage patterns where feasible, gully stabilization and/or diversions, debris removal (including salvage, milling, and end hauling), and mulch production and transportation. Heavy-equipment work will be supervised by park personnel, including an archeologist when so designated by the clearance document, to provide for continuous onsite monitoring of contractor activities.

Labor-Intensive Erosion Control and Revegetation Prescriptions. This phase will involve the development and supervision of contract work; or if appropriate, all work can be performed by NPS staff. Decisions will be made about intensive work sites, the type of treatment necessary at each site (such as constructing check dams, water ladders, or water bars; rocking channels; willow wattling; and mulching) and monitoring techniques for the work sites. A specific vegetative prescription will also be prepared to detail the type and quantity of each species to be used, planting rates, soil bolstering efforts, and any other steps necessary to ensure successful germination and growth. If work is not to be performed by NPS personnel, work contracts--including statements of work, technical specifications, special considerations (for example, conditions for archeological clearance), field maps, drawings, sketches, figures, and/or diagrams of prescribed techniques or structures--will be

prepared by NPS personnel. After NPS approval of contracts, they will be advertised and awarded according to federal procurement regulations. After contracts for bidding are released, prospective contractors will be given tours of the work sites.

Implementation of Labor-Intensive Work. This step will include NPS monitoring of contracted activities. A determination will be made as early as possible as to whether the rehabilitation techniques prescribed for the sites are effective, and recommendations will be made for changes in techniques where necessary. Contracted personnel will be monitored to ensure compliance with contract stipulations.

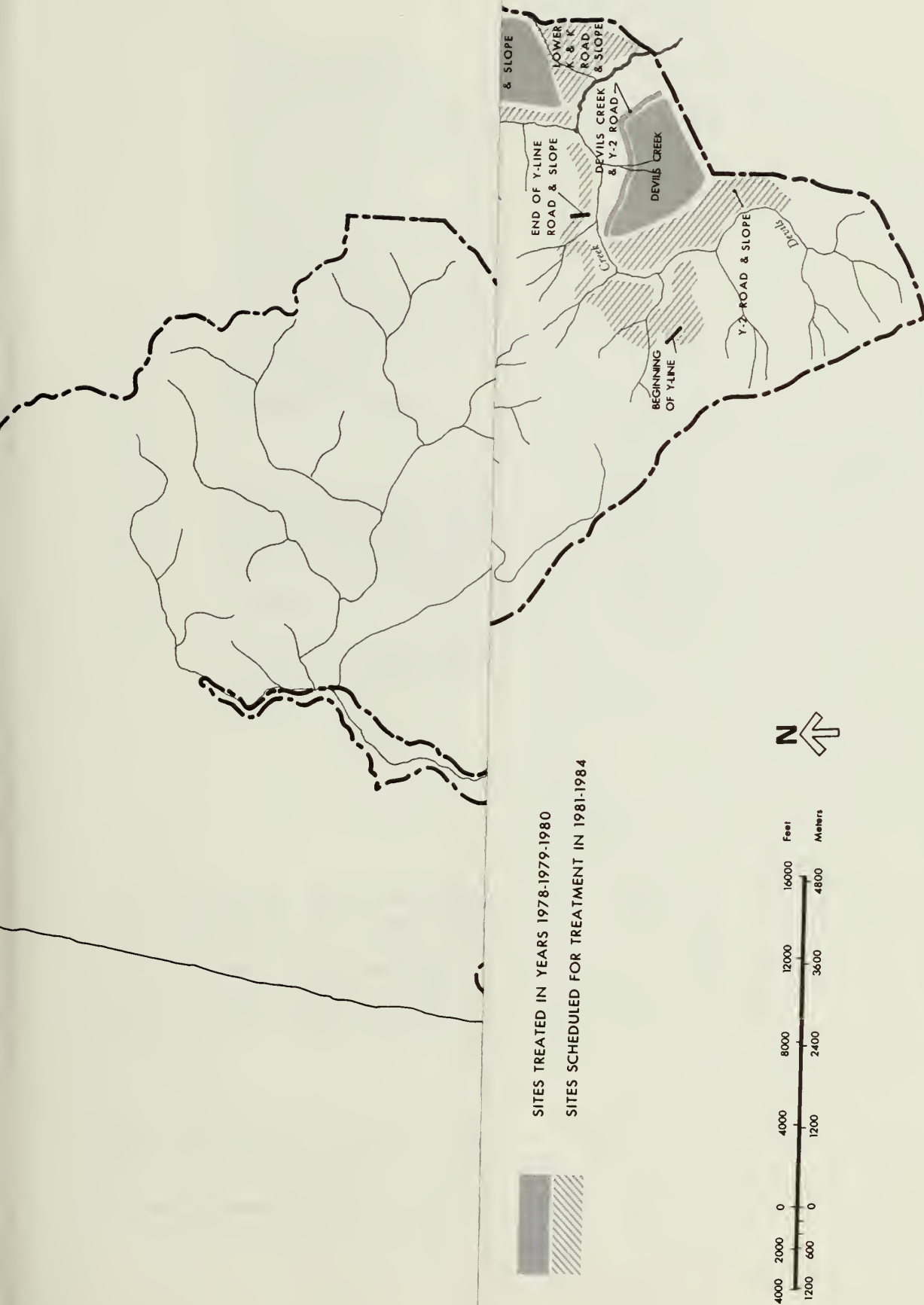
Maintenance and Repair. Winter storms will almost immediately test the structural integrity of the erosion control measures implemented at each site. (Normally, the first winter is considered critical.) Periodic inspections will be made by NPS personnel to ensure that these control measures remain effective. In areas where they have failed, emergency repairs will be undertaken. Repairs and maintenance during and following major storms will be undertaken on an as-needed basis following the evaluation of conditions at the site. A determination will be based on factors such as access feasibility, anticipated effectiveness and projected cost-effectiveness. The frequency of inspections will depend upon the frequency and intensity of storms.

Implementation

During the first three to four years of the rehabilitation program (1980 to 1984), work will be based on rehabilitation units or parcels, each delineated by drainage divides and one or more road segments. During this period, work on the high priority rehabilitation units will be completed. Table 2 shows the schedule for those critical areas with the highest priorities for treatment, as determined from the site selection criteria.

Specific erosion-control projects after the first three to four years will concentrate on treating the remaining tractor trails, former logging haul roads, and landings that were not removed during the treatment of critical areas. The emphasis will be on those sites where erosion is causing slope failures or is blocking or diverting natural drainages. Selected slope treatment will also continue on the slopes above and below the linear corridors chosen for treatment. This shift in emphasis will entail a slight change in approach, although basic techniques and the sequence of work from the planning stages through hand labor should not be affected.

The change in approach will probably necessitate the creation of roving crews of heavy-equipment operators and laborers who will remove segments of roads, followed by labor-intensive erosion control crews who will construct sediment control structures and plant vegetation along selected roads and adjoining slopes.



SITES TREATED IN YEARS 1978-1979-1980

SITES SCHEDULED FOR TREATMENT IN 1981-1984



CRITICAL AREAS REHABILITATION SCHEDULE

REDWOOD NATIONAL PARK/CALIFORNIA

UNITED STATES DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

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Table 2: Critical Areas Site Schedule

<u>Site</u>	<u>Year for Treatment</u>	<u>Acreage*</u>
W-line road and slope	1980	75
1920 road and slope	1980	330
Nose of Bridge Creek	1980	100
Devils Creek and Y-2 road	1980	300
M-6-2 road and slope	1980	50
Maneze Creek	1980	200
Lower K&K road and slope	**	80
Ingomar slope (including K&K and 1800 roads)	**	100
Y-2 road and slope	1981	75
M-7-5-2 road and slope	1981	150
M-7-5-1 (0.5 mi. segment not finished)	1981	50
Copper Creek (north side)	1981	100
Upper Slide Creek	1982	100
Lower Slide Creek	1982	100
M-6-1/M-6-2 roads and slope	1982	370
W-line/C-30 roads and slope	1982	200
End of Y-line; road and slope	1982	75
Y-line/M-2 road and slope	1983	250
D-line road and slope	1983	200
M-11-1-1 road and slope	1983	50
Maneze Prairie	1983	50
Complete critical areas	1984	<u>not available</u>
		3,005

Note: Treatment of the following areas has already been completed: upper Bond Creek, lower Bond Creek, upper Miller Creek, lower Weir Creek, M-7-5-1 road & slope, Copper Creek (south side), Airstrip Creek, C-line landing, and end of C-line road. (See appendix B for a description of early rehabilitation efforts.)

* Precise acreages depend on site-specific mapping and funding availability

**These sites will be treated as soon as possible; however, treatment is contingent on the removal of the K&K road.

Table 3 lists all major designated roads within the main basin scheduled for treatment at this time. Undesignated roads in the Skunk Cabbage Creek and Lost Man Creek drainages, which are not listed at this time, will be added at a later date. The number of major drainage crossings for each road section is given to indicate the amount of heavy-equipment excavation that may be required to rehabilitate that section of road. The Road Removal Priorities map illustrates those linear road corridors listed in table 3.

Major components of this phase of work will be disaggregating road surfaces, clearing fill from stream channels, eliminating inboard road ditches, and pulling back perched material at the outside edge of road fills and landings. The priority for each road or each site/area listed will be reviewed annually, and the schedule will be refined and modified to reflect changes in programs and in local conditions. Consequently,

Table 3: Road Removal Schedule and Priorities

West Side Road System: Devils Creek-Bridge Creek
(exclusive of critical areas)

<u>Road</u>	<u>Section</u>	<u>Length (in miles)</u>	<u>Number of Drainage Crossings</u>	<u>Priority</u>	<u>Year of Projected Start-Up</u>
Y-2	From Y-line rock pit #2 to critical area	3.0	3	1	85-87
Y Line	From M-line to Y-2 road	2.2	4	3	90-92
1320	Entire (to park boundary)	1.0	3	1	85-87
M-2-1	Entire	2.4	6	1	85-87
M-2½	Entire (on ridge)	2.2	0	3	90-92
M-2-4	Entire	0.8	3	3	90-92
M-2-2	From Y-line to M-2, including spurs	2.6	11	2	88-90
M-2	From M-line to M-2/Y-line road & slope critical area	1.3	3	3	90-92
M-2-1-1	From M-2 to Devils Creek divide	2.4	9	1	85-87
M-2-1-1 (remaining) and M-3-1-2	From M-3-1 to M-2-1-1	8.3	17	2	88-90
M-3-1	Entire portion back to M-3-2	3.2	13	1	85-87
M-3	Terminal section of M-3 to M-3-2	1.6	4	1	85-87
M-3-2	Entire	0.6	1	2	88-90
M-3-1	Remainder	0.5	3	2	88-90
M-3	From M-line to M-3-2	1.5	10	3	90-92
1800-2	Entire road network on tractor-logged slope	2.1	2	1	85-87
1800-1	Entire road network on tractor-logged slope	2.3	4	1	85-87
1800	From Redwood Cr. crossing to 1840 road	1.3	5	1	85-87
1840	Entire road network and associated spurs	3.6	22	1	85-87
1850	Entire road	1.1	9	1	85-87
M-7-5	From 1800 road to Bridge Cr. bridge	5.1	20	2	88-90
M-7-1	Entire	0.8	0	2	88-90
M-7-2	Entire	0.6	2	2	88-90
M-7	Entire road from M-line to Bridge at Bridge Cr.	1.3	4	2	88-90
M-line	Entire road from Tall Trees Grove to M-line deck	6.2	9	3	90-92
M-4	Entire	2.5	11	1	85-87
B-5-1	Entire	3.2	12	2	88-90
B-5-1-1	Entire	2.6	7	3	90-92
Subtotal		66.3			

West Side Road System: McArthur Creek-Elam Creek-Bond Creek-Fortyfour Creek-Tom McDonald Creek (exclusive of critical areas)

<u>Road</u>	<u>Section</u>	<u>Length (in miles)</u>	<u>Number of Drainage Crossings</u>	<u>Priority</u>	<u>Year of Projected Start-Up</u>
A-9-7-3	Entire, including spurs	2.8	7	1	85-87
A-9-7	Work access route to end	2.4	3	2	88-90
A-9-7-2	Entire	1.5	11	2	88-90
L-line	Terminus, including spurs	2.5	9	1	85-87
L-line	Middle segment (to L-1 road) including spurs	0.9	3	2	88-90
L-2	Entire	2.7	8	2	88-90
L-2-2-1	Entire	2.5	2	2	88-90
L-1-1	Entire	3.0	2	2	88-90
L-1-5	Terminal portion	0.4	5	1	85-87
L-1-5	Remaining portion back to L-1	1.1	6	2	88-90
L-1-4	Entire	0.7	0	2	88-90
L-1	Entire	2.4	11	3	90-92
A-9-7-1	Entire, including spurs	7.4	17	2	88-90
L-1-2	Entire	0.6	7	2	88-90
M-11	From critical area to A-9 road	1.6	1	2	88-90
A-9	From A-9 deck to end	2.7	4	3	90-92
L-line	L-1 to A-9 deck #2, upper segment	1.1	0	3	90-92
C-line	Terminal portion below A-9-9 road	2.5	11	1	85-87
C-13	Entire	2.0	13	1	85-87
C-12-1	Terminus	0.5	4	1	85-87
C-12-1	Upper segment	0.6	0	2	88-90
G-6-1	Entire	1.6	7	2	88-90
A-9-9	Entire road from A-9 deck #2 to C-line	2.6	7	3	90-92
C-6-1	Entire road plus spur	0.9	1	3	90-92
C-6-2-1	Entire	1.0	0	3	90-92
A-9-6-1	Entire road plus spur	1.7	5	3	90-92
A-9-6	Entire road back to work access road	1.8	8	3	90-92
G-2	Entire	0.5	3	3	90-92
G-4	Entire road network plus spurs	2.6	6	2	88-90
C-9	Entire road from junction with G-6	1.0	4	1	85-87
Subtotal		55.6			

East Side Road System (exclusive of critical areas)

<u>Road</u>	<u>Section</u>	<u>Length (in miles)</u>	<u>Number of Drainage Crossings</u>	<u>Priority</u>	<u>Year of Projected Start-Up</u>
C-20	Entire	2.5	6	1	85-87
C-10	Entire	0.8	4	3	90-92
C-40	Entire	1.5	4	2	88-90
C-30	From C-line to C-30/W-line critical unit	1.2	0	3	90-92
C-50 and end of C-line	Entire length of each section	1.5	2	1	85-87
Maneze Road	Entire	<u>2.1</u>	4	1	85-87
	Subtotal	<u>9.6</u>			
	Total	131.5			



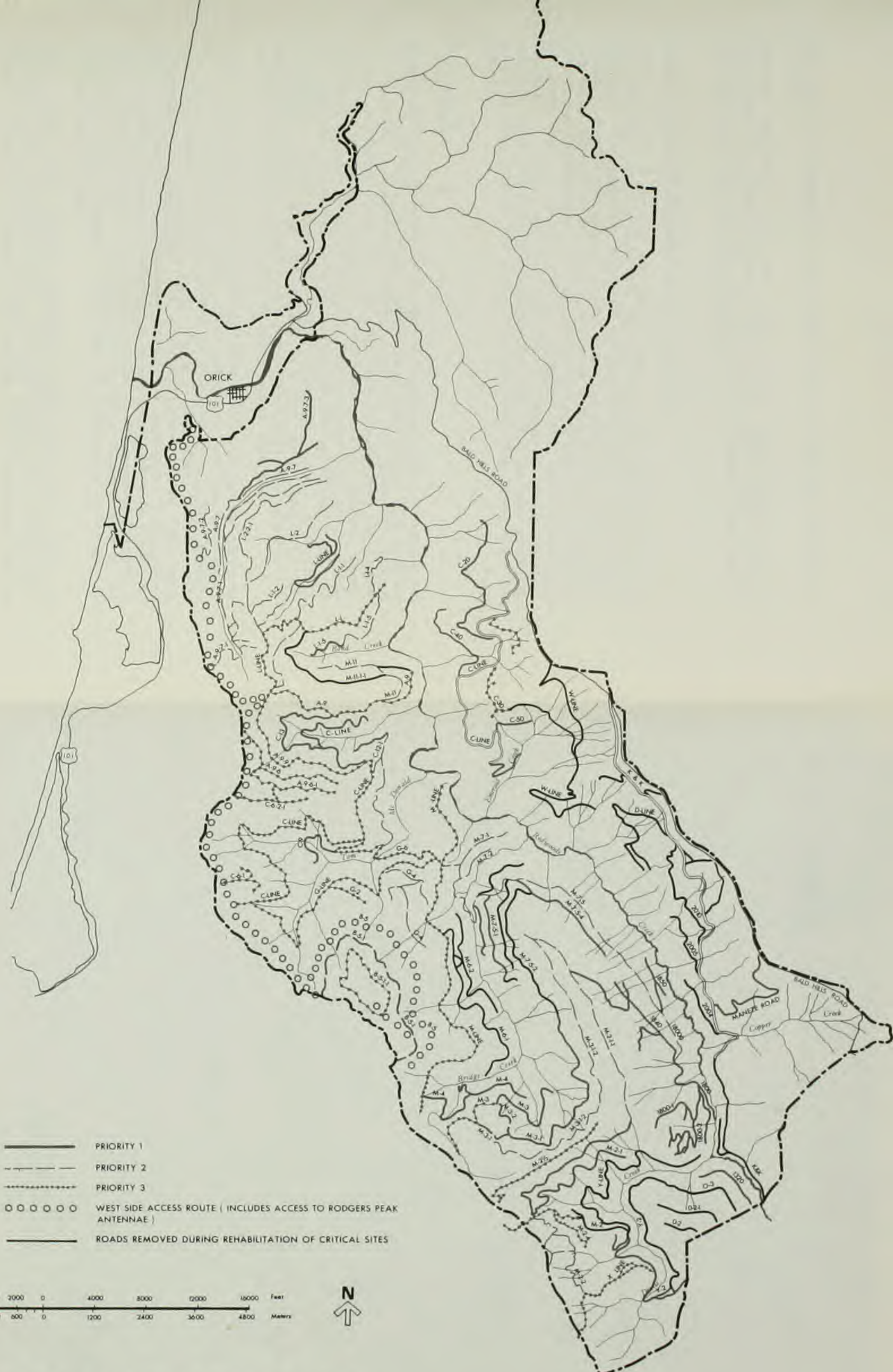
- PRIORITY 1
- - - PRIORITY 2
- . - . PRIORITY 3
- ○ ○ ○ ○ WEST SIDE ACCESS ROUTE (INCLUDES ACCESS TO RODGERS PEAK ANTENNAE)
- ROADS REMOVED DURING REHABILITATION OF CRITICAL SITES


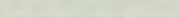


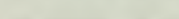


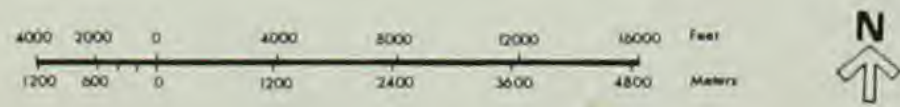
ROAD REMOVAL PRIORITIES

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-  PRIORITY 1
-  PRIORITY 2
-  PRIORITY 3
-  WEST SIDE ACCESS ROUTE (INCLUDES ACCESS TO RODGERS PEAK ANTENNAE)
-  ROADS REMOVED DURING REHABILITATION OF CRITICAL SITES



ROAD REMOVAL PRIORITIES

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sites may be rescheduled for work either earlier or later than indicated in the table.

Projected start-up years are when actual labor-intensive and/or heavy-equipment work should begin at a given site, although preplanning, erosion mapping, and prescription development may actually take place earlier than the year indicated.

OTHER ECOSYSTEM REHABILITATION PROGRAMS

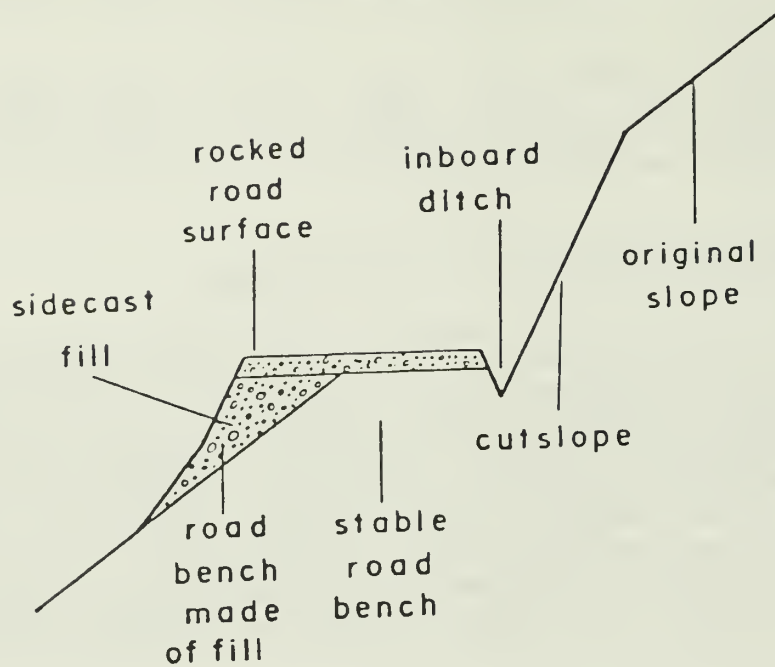
Initial measures to control and diminish man-induced rates of erosion in the watershed also represent the first steps in the rehabilitation of the ecosystem. The long-term ecosystem rehabilitation efforts are so closely related to overall management of park resources that these efforts would best be considered in the natural resources management plan. However, many of the rehabilitation activities can be most efficiently accomplished at the same time as erosion control activities that must be pursued immediately. These activities will be addressed in this document. Decisions regarding such activities will be made by the park staff and should become part of the erosion control/revegetation prescription for each site.

Revegetation

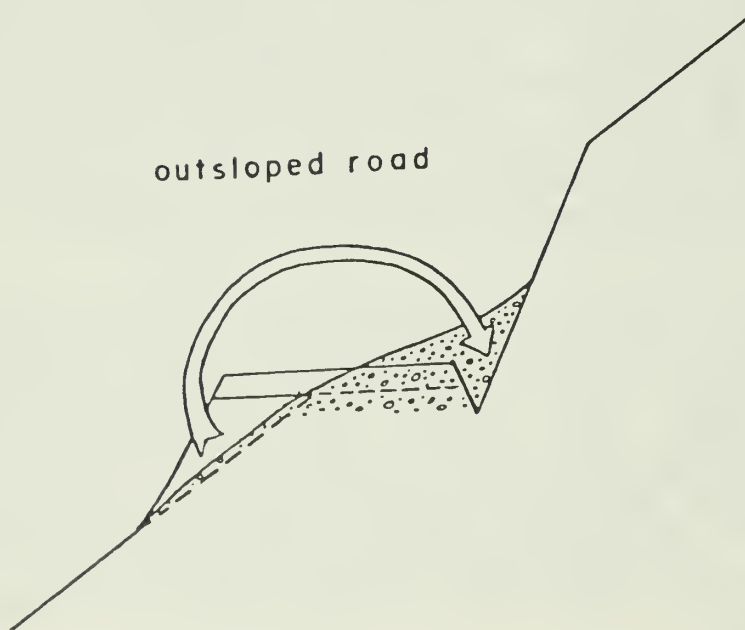
Revegetation will be conducted in portions of the watershed to restore the Redwood Creek basin to a more natural successional stage. This program will be directed toward the eventual return to an old-growth redwood forest. In many cases this will mean only revegetation for erosion control, as previously explained. Work will also be directed toward replanting Douglas-fir and redwood on cutover lands that show unusually slow progress in natural recovery. However, not all cutover lands will be treated. Some sites will recover naturally without any human interference, other sites lack access and are neither physically nor economically feasible to reclaim, and small sites where revegetation is not necessary for erosion control may be left to reseed naturally.

Exotic trees, which are now maturing, were planted on cutover lands as part of the reforestation efforts taken before the park was established. The exotic trees of primary concern are Monterey pine (Pinus radiata), Lombardy poplar (Populus nigra italica), and Port Orford cedar (Chamaecyparis lawsoniana). To a limited extent, these trees were planted to provide a quick-growing screen near highways. These exotics will be located and may be removed as a part of the effort to reestablish native vegetation patterns in the park wherever active erosion control is also being carried out. Large plantation plantings of exotic trees will be studied for future removal. Control will be accomplished by cutting or girdling sprouting species.

Other exotic plant species established within the park, mainly at disturbed sites, will be identified. Their distribution will be determined, and their present and future impacts on park resources will be evaluated. Control of the more prominent exotic species will be emphasized because



Typical logging road in cross-section.



Slope configuration across logging road after heavy-equipment transfers fill and grades on outslope.

many exotics have become naturalized at disturbed sites, such as roads and trails, and are generally established throughout the region.

Prairie Rehabilitation

About 3,000 acres of prairies along the eastern slopes of the Redwood Creek basin were added to the park in 1978. These prairies are usually on south- and west-facing slopes and are between 1,000 and 3,000 feet in elevation.

Many areas are deeply gullied where logging roads have concentrated runoff onto the prairie. A rehabilitation program will be developed to properly disperse road runoff, to remove unnecessary roads that traverse prairies, and to install gully plugs, check dams, and other erosion control techniques so as to stop gully down-cutting and to stabilize gully banks.

Cattle operations during the last century have resulted in the selective grazing of native perennial prairie grasses, thus favoring the spread of introduced nonnative annual grasses. Roads cut through prairies have also allowed conifers to become established along disturbed roadsides. Vegetation conversion to native species will be thoroughly studied, along with elk, fire, and other management issues, in the natural resources management plan. Initial rehabilitation efforts will focus on the removal of invading conifers while management techniques for reestablishing native grasses are being developed.

Riparian Resources Rehabilitation

The higher rate of sediment input to Redwood Creek has resulted in severe aggradation of the stream channel, bank undercutting, loss of streamside vegetation, and severe impacts to aquatic communities. These conditions may be expected to persist for years without active restoration efforts in the main stem of the creek.

Before restoration work begins, existing conditions will be evaluated, including streambank stability, water quality, amount of stored sediment, the quality of aquatic habitat, and an aquatic resources analysis. Research into the prelogging quality of habitat and aquatic populations will be conducted to determine the level of restoration desired. Once this determination has been made, specific actions may be recommended to restore habitats to prelogging quality. Such actions may include the removal of log jams, sediment traps, and reservoirs of stored sediment; the possible restocking of native fish species; and the active stabilization of streambanks.

A basinwide inventory of sediment sources along perennial tributaries to Redwood Creek and an assessment of stored sediment within the channels will be undertaken. Erosion control treatments will then be prescribed where feasible for specific erosion features within the park, the PPZ, and perhaps the remainder of the upstream basin.

A determination will also be made of the habitat quality of basin streams and the availability of food resources for native fish. Recommendations will be made where appropriate to facilitate the establishment of a healthy and diverse, self-perpetuating aquatic community.

Redwood Creek Estuary Rehabilitation

The productivity of the Redwood Creek estuary has been significantly impaired by logging in the watershed and by the channelization and construction of levees through the Orick valley to the mouth of the creek.

Following major floods in northern California between 1953 and 1965, levee construction and stream channelization began on the lower 3.4 miles of Redwood Creek. The project was completed in October 1968.

Logging activities upstream have further exacerbated the problems that originated with the levee system. The level of rehabilitation that is feasible in the estuary will have to be determined, based on practical, legal, and political considerations. Prior to making this determination, however, the existing productivity of the estuary will have to be assessed. Toward this end, studies will be conducted of water quality, aquatic organism community structure, the effective estuary area, existing sediment, and accumulated organic debris. Possible restoration activities may include the modification of levees and portions of levees to restore freshwater circulation, and the removal of sediment and organic debris.

MONITORING ACTIVITIES

Monitoring activities will constitute a significant portion of the overall rehabilitation program. Monitoring at each unit will begin before and will continue immediately after rehabilitation work has been completed, and monitoring throughout the basin will continue after all major rehabilitation efforts have been finished. Control sites where rehabilitation programs have not been implemented will also be monitored so that results can be compared. Both qualitative and quantitative monitoring techniques will help determine the effectiveness and relative benefits of the overall rehabilitation effort and will guide program modifications. Restoration activities will be monitored by installing erosion pins and sedimentation weirs and by establishing photo points from where site changes can be documented through time-sequence photography and channel cross-sections. Appropriate records and data will be consolidated in site-specific studies. Other techniques may be developed to monitor the effectiveness of new erosion control and restoration measures.

Overall watershed monitoring will also be conducted to determine sediment transport trends. This will help determine the effectiveness of the rehabilitation measures and the direction of "management" activities for upper basin areas outside the park. (See discussion under "Activities in the PPZ and Timber Harvest Plan Reviews.")

The effectiveness of revegetation will be monitored to determine the level of erosion control and ecosystem restoration achieved. This determination will be based upon an analysis of germination/survival ratios related to planting, fertilization, and seeding rates. The information collected will be used to modify and improve existing state-of-the-art knowledge pertaining to site-specific vegetation prescriptions.

Certain wildlife populations such as elk and deer may be monitored because they may have direct and significant impacts upon rehabilitation efforts. For example, the success of revegetation at a site may greatly depend upon the numbers of browsers (elk and deer) present.

ADDITIONAL CONSIDERATIONS

Access

During the course of the rehabilitation program, practically all the logging roads within the Redwood Creek unit of Redwood National Park will be removed (see the Road Removal Priorities map). Most of the roads will be removed either because they are not now functional and serve as constant sources of sediment, or because they require annual maintenance and do not serve park management needs. After eight to ten years of rehabilitation work, a limited number of roads that are useful and are on relatively stable terrain will remain. These roads are essentially the main arteries of the extensive, former logging road network. Park managers will be responsible for deciding whether to remove or maintain these stable roads.

On the east side of the basin, probably only the C-line road to the Tall Trees trailhead and the Klamath and Korbel (K&K) road to the Copper Creek divide will remain. (This assumes an alternate K&K road is opened sometime in the next eight to ten years. If the alternate road is not opened, then the entire K&K road will remain.) On the west side, however, a more extensive road system, including major segments of the L-line, the A-9 line, the G-line, the C-line, and the M-line will most likely remain for a longer period of time or until no longer needed for fire control purposes. The M-line is the only reasonably stable, rocked road on the west side that goes from the ridgetop to Redwood Creek. The west side access road, which is described in the following section, may remain after rehabilitation work is finished.

Two primary considerations in determining the fate of a given road are access for rehabilitation maintenance and for fire control. Because access for maintenance should not be required for more than one or two years after the initial work is completed, road segments will be removed relatively soon after areas have been treated. A fire management program has not yet been developed. However, as the Road Removal Priorities map indicates, once all nonfunctional or erosion-sensitive roads are removed, no road access to the lower slopes of any of the tributary basins will exist, and most of Bridge Creek and Devils Creek will be totally inaccessible.

On the top of Rodgers Peak, a 2,790-foot-high broad-topped peak on the western park boundary, are several radio relay antennae used by Humboldt County and the Louisiana-Pacific Corporation. An all-weather access road off the B-5 road, which will become part of the west side access road, serves the site of the antennae, and this access road will be kept open indefinitely.

West Side Access Road. An existing route along a ridge on the west side of the Redwood Creek basin was improved in summer 1980 to allow all-weather access for rehabilitation work for the next seven to ten years. The present access route is through a private gate owned by the Louisiana-Pacific Corporation at Big Lagoon, 15 miles south of Orick. Although Louisiana-Pacific has allowed access for the Park Service since the expansion of the park, this route across private land does not provide the unlimited access needed for effective park management during after-hours and for weekend or holiday operations.

The proposed west side access route will start at the junction of Hilton Road and U.S. 101 in Orick and follow an existing county road, a logging haul road, and a pioneered tractor road for 15 miles to the junction of the B-5 and B-line roads near Rodgers Peak on the western park boundary. The route is geologically stable, well-drained, and involves minimal grades for the most part (steep grades are present in only two short segments). It will be improved to a two-lane, 20-foot-wide subgrade width where feasible and will be rock-surfaced for all-weather use. Significant new road construction will be required in only one place, for about 700 feet, to tie two segments of the route together. Moderate regrading will be necessary in two places, for about 1,000 feet, to achieve an acceptable road grade. Along a total of 4 miles, the road standard is already well above that prescribed. For the remainder of the route, minor grading and widening will occur and adequate drainage will be provided. The road section, roadway grades, drainage measures, and alignment are designed for park management needs only and not for future public use.

The major cost component of access improvement will be the provision of rock surfacing. Alternative sources of rock for surfacing include the two existing Y-line road rock pits within the park, gravel extraction from Redwood Creek (probably on the floodplain near Orick), from outside the park, and from the sites of previous gravel operations upstream. Gravel could also be obtained from existing road surfaces that will eventually be removed.

The K&K Road. The Redwood National Park expansion included approximately 12 miles of the K&K road, which is the major haul road for Simpson Timber Company's milling and logging operations. PL 95-250 states that the secretary of the Department of the Interior shall permit continued access and use of the acquired segment of road at levels and extent of use existing at the time of the expansion.

The acquired segment runs along the east bank of Redwood Creek for approximately 2.5 miles through some of the most unstable and erosive terrain in the entire park. The road provides a perennial source of sediment to Redwood Creek because the road fill often fails, the road

drainage promotes gullyng, and the road itself crosses several very active earthflows. One of the major goals of the rehabilitation program is the elimination of this especially erosive segment of the K&K road by rerouting it along an alternate alignment outside the park boundary.

Both Simpson and the Park Service support the development of a replacement road outside the park. The selection of an alternate route should be accomplished immediately so as to reduce total costs, allow for park planning, and provide for immediate increased protection to the downstream resources.

An alternate route for the K&K road has been proposed within the Coyote Creek basin, which is the farthest tributary downstream in the PPZ on the east side of the basin. This route, which was proposed by the National Park Service in May 1978, is acceptable to Simpson, and evaluations are now underway to ascertain the feasibility of the rerouting.

As long as the K&K road continues to be open for use by Simpson through Redwood National Park, a major erosion problem in the park cannot be treated. Was it not for the legislatively mandated usage of the K&K road, the road and adjacent slopes would be assigned the highest priority for rehabilitation because of the severity of slope stability problems along the road adjacent to Redwood Creek.

The B-line and M-line Road. Just south of Rodgers Peak, along the western boundary of the park, is a 2.5-mile portion of the B-line and M-line road. This is a major Louisiana-Pacific Corporation logging haul road that passes just inside the Redwood Creek watershed and then crosses over the ridge and back out. PL 95-250 allows for this acquired road segment to continue to be used for timber harvesting and road maintenance.

Because Louisiana-Pacific must continue to use this logging haul road, a problem of conflicting use exists because a portion of the road within the park boundary will also be used by the Park Service for rehabilitation access and general park management. (The B-line and M-line road connects with the southern end of the west side access road previously discussed.) Both Louisiana-Pacific and the Park Service have expressed concerns about the long-term mutual use of this road segment in terms of the protection of lands from trespass, conflicting types of use, liability, and sufficient levels of maintenance.

The fact that the road segment lies along one of the park boundaries makes the issue a boundary problem as well as a conflicting use problem. The park boundary in this vicinity is such that an alternate logging haul road could be constructed along the ridge outside the park. Louisiana-Pacific has already surveyed such an alternate route that is suitable both to them and the Park Service. The road would entail 7,000 feet of new haul road construction and another 4,000 feet of road improvements, all of which would be undertaken by Louisiana-Pacific. In addition, the Park Service would have to build approximately 3,000 feet of new road along the ridge on park lands to connect the southern end of the west side access road to the M-line road for rehabilitation access.

Sediment Source and Transport Studies

Two important facets of the rehabilitation plan are the studies of sediment sources and sediment transport for the Redwood Creek basin. Sediment studies will be conducted concurrently with the first phases of the rehabilitation program. Their main focus will be to understand the sources and transport of sediment in the basin. The effectiveness of the current rehabilitation program within the park will also be assessed relative to sediment-contributing areas throughout the Redwood Creek watershed. The studies will help answer the following questions:

Where are the major sediment sources that have resulted in a high amount of sedimentation in the main channel of Redwood Creek?

What land use practices particularly increase erosion rates from the major sediment source areas?

Based on the studies, what specific recommendations can be made concerning the management of watershed lands upstream from Redwood National Park?

How long will it take for the excessive amount of sediment now in the main channel of Redwood Creek within the park to be flushed downstream to the ocean?

How effective is the current rehabilitation program in controlling the major sources of sediment flowing into the main channel of Redwood Creek?

Given the demonstrated capability and capacity of the techniques used in the park's rehabilitation program, is it possible to effectively treat the most serious erosion problems in the watershed?

The above questions will be answered by means of detailed field mapping along the main channel of Redwood Creek and in the major tributaries. The mapping will be done in conjunction with aerial photo interpretation and the sediment sampling being conducted by the U.S. Geological Survey. The sediment study program outlined above succeeds the U.S. Geological Survey studies conducted in the basin starting in 1973, and preliminary answers to the above questions were formed by November 1980. By 1981, these studies will provide specific recommendations for the management of lands within the Redwood Creek basin, both within and upstream from the park. This will help ensure the best protection of park resources, particularly those along the main channel of Redwood Creek, from excessive erosion and sedimentation.

Activities in the PPZ and Timber Harvest Plan Reviews

A major aspect of PPZ monitoring is an NPS review of timber harvest plans within this 33,000-acre area. These reviews allow NPS scientists to suggest alternatives in harvesting schedules and techniques to minimize logging-induced erosion. These recommendations are submitted to the California Department of Forestry, which must approve all plans. Little if

any post-harvesting evaluation has occurred to determine whether the timber harvest was consistent with the procedures and precautions outlined in the plan. In the future, the monitoring program will entail a thorough review of the condition of all roads within the PPZ, and an effort will be made to cooperate with landowners to properly maintain primary and secondary haul roads and those used for forest maintenance access and to eliminate dead-end and temporary roads within the zone.

Other monitoring activities in the PPZ are being carried out as part of the previously mentioned sediment source area studies. The two gaging stations installed in September 1979 by the U.S. Geological Survey on Coyote Creek and Panther Creek will provide data on sediment and water yields from these basins. The stations are on Simpson Timber Company lands and were installed with their concurrence and cooperation. Detailed mapping of selected reaches of all four tributaries in the PPZ (Coyote, Garrett, Lacks, and Panther creeks) will be done by NPS geologists to determine the amount of stored sediment that could be transported into the main channel. Mapping will also help determine the extent and activity of landsliding along the tributary channels that could cause further large introductions of sediment to Redwood Creek.

Both the timber harvest plan reviews and the sediment source studies in the PPZ are being done in cooperation with, or with the permission of, private landowners. The park's policy is to work with the landowners to make mutually agreeable management decisions about activities within the PPZ so as to minimize the possibility of excessive erosion that may damage park resources downstream. If activities in a portion of the PPZ can be demonstrated to be harming downstream park resources, PL 95-250 authorizes the secretary of the interior to acquire that portion of the PPZ.

California Forest Improvement Program

On March 30, 1979, the National Park Service entered into a cooperative agreement with the California Department of Forestry and provided \$400,000 to the California forest resources improvement fund for the restoration of cutover lands within the Redwood Creek watershed. Forest resource improvement projects are limited by the California Forest Resources Improvement Act of 1978 to privately owned parcels with 5,000 acres or less of commercial forestland. Improvement projects include land conservation, forest improvement, and fish and wildlife habitat improvement.

Composting

Logging activities such as road and trail building and log skidding remove much of the upper soil horizons. The remaining subsoil or parent material is low in nutrients and does not support extensive plant growth. Soil amendments, such as compost material, can help reduce sheet erosion and facilitate plant growth in a rehabilitated area. To effectively reduce erosion and to help plant growth, amendments to soil parent-materials must dissipate rainfall, absorb and hold moisture, provide a good growing

medium, and provide a timed release of plant nutrients. The National Park Service is initiating a small-scale compost operation to treat chemical toilet waste generated in the park by mixing it with forest waste.

Redwoods United, Inc.

PL 95-250 provides for the maintenance of Redwoods United, Inc., by stating "that it shall be a purpose of this act that the community services and employment opportunities provided by Redwoods United, Incorporated, a nonprofit corporation located in Manila, California, shall be maintained at the present rate of employment to the greatest degree practicable." Therefore, Redwoods United crews will be permitted to salvage raw material the park deems appropriate for removal. All such salvage work will be coordinated through the chief of resources management, and an accurate record of all wood removed will be kept by the park. The park may also contract with Redwoods United for projects such as tree planting, brush clearing, road maintenance, and exotic plant control. Details of each project and remuneration will be worked out at the time of the undertaking.

Salvage of Down Timber

On cutover lands throughout Redwood Creek basin are large quantities of salvageable down timber (redwood, Douglas-fir, hemlock, etc.) that were left by timber companies at the time the park was expanded in 1978. These logs, stumps, and other cut pieces will only be salvaged if removal does not significantly damage old-growth and second-growth timber or result in excessive sedimentation in Redwood Creek or any of its major tributaries. Much of the salvage operation will be performed by tractors and cranes during the heavy-equipment phase of rehabilitation. Logs will be hauled to a central location, usually a deck or landing, for future milling. Where feasible, however, raw material may be milled in place, and wood products may either be used at that location or transported from the site. Before milling, all logs and larger pieces will be professionally scaled and graded. Wood products will be disposed of as follows:

for rehabilitation erosion control--slabs for check dams, water ladders, planter boxes, stakes, trash racks, etc.

for other park needs--picnic tables, signs, exhibits, fences and stakes, dimensional lumber for shelters, decks, building repair, book shelves, etc.

for Redwoods United, Inc.--a wide variety of products produced at Redwoods United's workshop in Manila, California.

CULTURAL RESOURCES MANAGEMENT

A cultural resources management plan for Redwood National Park was completed in 1980 as part of the General Management Plan (USDI, NPS, DSC 1980a). However, cultural resources in the Redwood Creek basin were addressed only superficially because surveys and data analysis were incomplete and the rehabilitation proposal was only partially defined, making resource evaluation and impact analysis impossible at that time. Therefore, cultural resources management for Redwood Creek basin is discussed more fully in this document.

RESEARCH DESIGN AND MANAGEMENT ACTIONS

The cultural resources in the Redwood Creek basin represent a wide range of human activities and land uses spanning at least 2,000 years. Such resources include archeological remains of prehistoric villages, temporary encampments, and trail sites; historic structures and trails; and religious sites significant to contemporary Native Americans. Cultural resources will be managed for preservation and protection to an extent that is compatible with the legislative directive to rehabilitate and protect the watershed.

Inventories, evaluations, and management recommendations for cultural resources in the Redwood Creek unit are guided by a research design that addresses general anthropological questions pertinent to northwestern California (King and Bickel 1980). In a broad sense, information is being sought about the prehistoric and historic human populations of Redwood Creek to learn more about settlement locations and variations of early land uses, the change in land uses over time, the interactions of various early populations, the interactions of these early human groups with their environment, and their influence upon the natural environment.

The methodology and approach needed to obtain answers to these general research questions are viewed in terms of management objectives and NPS policies. Management actions are detailed below, relative to both an anthropological research design and the prudent consideration of archeological, historical, and contemporary Native American values.

Identification of Resources

Cultural resources will be identified through a combination of archival research, oral history, and field survey.

Historical Survey. Several studies of historic resources in the Bald Hills/Redwood Creek area have been completed, and historic sites have been identified (USDI, NPS 1969; USDI, NPS, DSC 1978, 1980b). Two of the sites have been recommended for nomination to the National Register of Historic Places. Unidentified historic resources may still exist and may be discovered during ongoing archeological surveys. All historic sites identified during archeological surveys will be recorded and added to the existing historic data base.

Archeological Survey. Archeological surveys of portions of the Redwood Creek drainage in 1978 and 1979 recorded 20 prehistoric sites, the majority of which are included in the proposed Bald Hills archeological district now being considered for National Register status (King and Bickel 1980; Hayes and others 1980; Salzman and Bickel 1979; Bickel 1979; Salzman 1979).

The immediate goal of survey efforts is to gain a representative sample of 10 to 15 percent of the lands planned for rehabilitation so that archeological site occurrence models and sensitivity criteria may be developed. Once predictive models have been established and tested, future survey needs will be reduced; intensive surveys will be necessary only in areas where high archeological sensitivity is predicted.

Until an adequate survey sample is attained, archeological surveys in the Redwood Creek unit will be based on the mixed-strategy approach adopted by Salzman and Bickel (1979). Briefly, this strategy uses surface visibility as the primary criterion for conducting a survey; steepness is a secondary criterion. That is, all areas that have adequate ground visibility, except those with slopes exceeding 50 percent, should be surveyed. In addition, areas that are judged "likely" for prehistoric occupation should also be surveyed, regardless of whether or not there is adequate ground visibility. The latter situation might require the clearing of vegetation. This approach permits less-than-complete surveys of rehabilitation units, but it requires a field inspection of each unit and a field evaluation to determine which portions of the unit will be intensively surveyed. Any areas not surveyed will be indicated on surveyors' maps, and reasons for the lack of a survey noted. In a high sensitivity area where ground visibility is poor, intermittent hand-clearing of duff and vegetation may be necessary to accomplish an intensive survey.

Archeological surveys will precede planned rehabilitation activities by at least two years so that adequate time is allowed for resource evaluation, assessment of potential impacts, and the necessary consultations with the California Historic Preservation Office and the Advisory Council on Historic Preservation if sites of National Register significance are identified.

Initial site records will include detailed descriptions of environmental and locational factors as one set of attributes and archeological surface characteristics as another. Coding of environmental and archeological attributes will provide information necessary to prepare site occurrence models and to make site significance evaluations. All archeological sites and isolated finds will become part of the park's cumulative cultural resource data base.

Contemporary Native American Sites

Areas within park boundaries that have continuing significance to living Native Americans who hold traditional ties to Redwood Creek have been identified (Bickel 1978). These areas remain important to present-day Native Americans and constitute continuing land use practices in the

"ethnographic present." As new information is obtained through consultations with the park's Native American heritage advisory committees, it will be added to the confidential inventory of contemporary Native American sites.

Mutually acceptable methods of protection and preservation will be developed by the park and the advisory committee for Redwood Creek basin.

Evaluation of Resources

All cultural resource sites identified will be evaluated according to significance criteria of the National Register of Historic Places. Adequate site records and analyses will be necessary to make informed evaluations. In addition to the initial recording of a site, a return visit to the site will be made to gather more site-specific information if further evaluation is warranted.

Controlled surface analysis, as described by King and Bickel (1980), and/or limited subsurface testing may be required to fully evaluate a site's significance. Artifacts will not be collected from a site surface unless certain diagnostic forms, such as projectile points, are to be used for comparative analysis. The location of any item collected will be mapped with reference to the site datum. Augering is the preferred method of subsurface testing, but shovel testing may be necessary to further define the depth and extent of a site and to make an informed evaluation of site content and significance. Native Americans' consent will be sought prior to any subsurface disturbance of an archeological site.

The value of oral testimony and tradition from Native Americans and others will be utilized in making site evaluations. Interviews and consultations with knowledgeable old-time residents may support the importance of certain historic and prehistoric sites.

Archeological Clearance

All cultural resources eligible for the National Register of Historic Places will be protected in accordance with the Advisory Council's "Regulations for the Protection of Historic and Cultural Properties" (36 CFR 800). Archeological clearance must officially be issued prior to heavy-equipment usage or any activity that disturbs the earth. Archeological clearance procedures established by NPS policies and the Western Archeological Center will be followed, and clearance for each rehabilitation project or unit will be issued only if all requirements of 36 CFR 800 are met. Clearance conditions may include avoidance of certain areas, archeological monitoring of heavy-equipment work, or other measures designed to protect cultural resources.

If the loss or alteration of cultural resources is necessary to accomplish watershed protection goals, and if there is no prudent or feasible alternative, professionally designed salvage of data will be conducted pursuant to standards described in "Recovery of Scientific, Prehistoric,

FIVE-YEAR PLAN AND ACTION SEQUENCE

Overview

By the end of fiscal year 1980, 10 to 15 percent of the rehabilitation lands will have been surveyed. During FY 1981, site occurrence models and archeological sensitivity criteria will be constructed and tested, with the ultimate goal of reducing future survey expenditures. The lands included for FY 1980 survey work consist of rehabilitation units scheduled for treatment from 1981 to 1984. Surveys of these lands during 1980 should provide the two-year "lead" time necessary for adequate consideration of cultural resources. The park archeologist will maintain close interaction with rehabilitation staff and will be made aware of any changes or modifications in scheduled rehabilitation plans. The rehabilitation staff and field crews will be briefed on the importance of certain cultural resource sites and the procedures for reporting new discoveries if archeological remains are encountered during field operations (see table 4).

Coordination with Rehabilitation Plan

Erosion Control. Cultural resource inventories, evaluations, and compliance actions will be completed well before active rehabilitation work is started in those units selected for priority treatment. (The lands included in the 10 to 15 percent archeological survey sample are priority treatment areas.)

Archeological clearances must officially be issued before heavy-equipment rehabilitation takes place in each unit. The rehabilitation unit supervisor and the chief of natural resources management will be responsible for seeing that their field crews are familiar with any special conditions that may be part of the official archeological clearance. The park archeologist will be responsible for notifying the above managerial staff and for monitoring the progress of operations to ensure compliance.

Revegetation. The hand planting of trees and shrubs and the application of mulches and fertilizers on cutover lands normally will not require archeological clearance procedures. Other revegetation techniques that may adversely affect cultural resources will require compliance action. Tree thinning and the removal of exotics will be monitored by the park archeologist to ensure the protection of recorded archeological and historic sites.

Prairie Rehabilitation. A large portion of the proposed Bald Hills archeological district is in a prairie setting. A previous cultural resources survey has shown that the prairies and prairie ecotones are archeologically "sensitive" areas where evidence of prehistoric usage is very likely to be found. Rehabilitation and fire management activities that may affect archeological sites in the district will be coordinated with the provisions of section 106 of the National Historic Preservation Act.

Table 4. Five-Year Plan and Action Sequence
for Archeological Clearances

<u>Season</u>	<u>Project or Unit</u>	<u>Action</u>	<u>Archeological Clearance</u>
<u>FY 1980</u>			
Spring	Bridge Creek M-6-2	Survey completed	Unconditional clearance*
Spring	End of W-line road	Test excavations of HUM-484 completed	Conditional clearance
Spring	1920 road slope	Survey completed	Unconditional clearance*
Spring	2004 road/Maneze Creek	Survey completed	Conditional clearance
Spring	Nose of Bridge Creek	Survey completed	Unconditional clearance*
Spring	Devils Creek Y-2 road slope	Survey completed	Unconditional clearance*
Summer	West side access road	Monitor	Conditional clearance
Summer	15% representation sample (3,000 acres)	Survey and evaluate	Pending survey results
	Other rehabilitation activities	Survey, evaluate, monitor on case-by-case basis	
<u>FY 1981</u>			
Fall/winter	15% representation sample	Further evaluations; develop site occurrence models	
Spring/summer	Scheduled rehabilitation projects	Monitor; design mitigation measures if necessary	
	Other rehabilitation activities	Survey, evaluate, monitor on a case-by-case basis	
<u>FY 1982-1985</u>			
Test and refine site occurrence models and sensitivity criteria. Evaluate need to survey project areas on case-by-case basis.			

*With an unconditional clearance, activities will still be halted and a park archeologist will be consulted if cultural resources are encountered during rehabilitation work.

Riparian Resources Rehabilitation. The restoration of Redwood Creek and its tributaries may include removing log jams and reservoirs of stored sediment. If these activities are planned for areas determined to be archeologically sensitive, compliance with the regulations of 36 CFR 800 will be sought.

Redwood Creek Estuary Rehabilitation. The mouth of Redwood Creek is considered a "sensitive" area in terms of its archeological significance and Native American heritage values. The protection of cultural resources in this area by preservation and monitoring is the recommended action.

West Side Access Road and Road Maintenance. Archeological survey and clearance procedures have been completed for the west side access road. Although no National Register properties were discovered, isolated archeological objects were observed and recorded. The road work will be monitored by the park archeologist in the event that ground-disturbing activities uncover archeological resources. The park archeologist will coordinate with the road engineer to ensure that routine maintenance throughout Redwood Creek basin will not necessarily damage cultural resources situated nearby or under road surfaces.

Park Protection Zone. Significant cultural resources exist in the PPZ. Information about traditional and historical uses of the upper Redwood Creek basin will be sought as part of the effort to understand the cultural and natural history of park lands. All federally assisted or permitted projects must comply with federal cultural resources legislation and Advisory Council regulations (36 CFR 800). The park will continue its support of private citizens' concerns for the protection of archeological, historical, and contemporary Native American heritage values on nonfederal lands.

OPERATIONS MANAGEMENT, PROGRAM BUDGET, AND STAFFING

OPERATIONS CENTER

Field personnel engaged in watershed rehabilitation will operate from a center in Orick. A staff of up to 70 will use the center for offices, laboratories, storage, and equipment maintenance. A 1-acre site at the north end of Orick along U.S. Highway 101 has been temporarily leased to function as the center. Facilities there include a garage for storage and chain saw maintenance, four park-owned trailers, and a small house for office space. Authority exists for acquiring up to 8.5 acres of land from a willing seller for a permanent site. The feasibility of establishing such a site will continually be evaluated as suitable parcels of land become available in the Orick area.

EQUIPMENT NEEDS

Most of the heavy-equipment needs for erosion control will be acquired through short-term equipment rental agreements. Park-owned equipment will be kept to a minimum. On hand or on order are a mobile multidimension sawmill, three brush chippers, and a 2½-ton truck for transporting chips and wood material. Some park-owned road maintenance equipment such as trucks and graders may periodically be used.

CAMPS FOR WORKERS

Spike camps will be established at suitable sites within or adjacent to rehabilitation project locations as needed, but mainly during the summer and fall. Environmental, archeological, and sanitation factors will be considered when selecting sites. Each camp will be completely removed when no longer needed. To prevent harm to animals or other related problems, all refuse will be put in containers and removed regularly.

PROGRAM BUDGET AND STAFFING

The FY 1980 budget for the rehabilitation team breaks down as follows: \$1 million in personnel services and benefits, \$700,000 in support costs (equipment, supplies, other park staff, some monitoring activities, vehicles, services, etc.), and \$800,000 in contracts and cooperative agreements for rehabilitation work (heavy-equipment rental and labor-intensive work). This last amount is over and above rehabilitation work accomplished by park staff. The total FY 1980 budget is about \$2.5 million.

FY 1980 staffing allowances include 10 permanent full-time staff, 17 permanent less-than-full-time personnel, and 65 temporary positions. Several supporting positions are carried under other division rosters, for example, a contracting specialist, an interpretive specialist, and a budget and procurement specialist. Budget and staffing reflect program implementation, technique development and testing, rehabilitation and

erosion monitoring, cultural resources protection and policy compliance, environmental policy compliance, PPZ monitoring of timber harvests, rehabilitation and resources management planning, and environmental and resource monitoring and studies. Other activities include any that are required to effectively develop, implement, support, monitor, and maintain the rehabilitation program.

Rehabilitation program plans call for treating the most critical erosion-prone and high-sediment-yield areas from FY 1980 through FY 1984. By early FY 1981, the rehabilitation team will be fully staffed and operating at a maximum effective level to accomplish identified objectives, including an expansion of activities on cutover land in the watershed above the park addition. An estimated budget for FY 1983 of \$4.9 million includes \$1.4 million in personnel services and benefits for the rehabilitation team (the additional \$0.4 million will cover estimated pay increases and possible conversions from less-than-full-time to full-time positions), \$900,000 in support costs, \$1.5 million for in-park rehabilitation contracts and cooperative agreements, and \$1.1 million in matching funds for rehabilitation in the watershed above the park (to be carried out by private landholders under cooperative agreements with Redwood National Park).

Following 1984, the primary emphasis of the rehabilitation program will be on road pulling. Beginning in 1985, the budget may begin to decrease by about 10 percent per year. By FY 1990, the total budget is expected to be approximately \$2,604,000. This is projected to include \$744,000 for personnel services and benefits for the park rehabilitation team, \$478,000 in support costs, \$797,000 for in-park rehabilitation contracts and cooperative agreements, and \$585,000 in matching funds for rehabilitation in the watershed above the park. During the remainder of the 15-year rehabilitation program, the budget will decrease further, although it is not yet known by how much.

APPENDIXES

A: LEGISLATION

Public Law 95-250 95th Congress

An Act

To amend the Act of October 2, 1968, an Act to establish a Redwood National Park in the State of California, and for other purposes.

Mar. 27, 1978
[H.R. 3813]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE I

SEC. 101. (a) In order to protect existing irreplaceable Redwood National Park resources from damaging upslope and upstream land uses, to provide a land base sufficient to insure preservation of significant examples of the coastal redwood in accordance with the original intent of Congress, and to establish a more meaningful Redwood National Park for the use and enjoyment of visitors, the Act entitled "An Act to establish a Redwood National Park in the State of California, and for other purposes", approved October 2, 1968 (82 Stat. 931), is amended as follows:

(1) In subsection 2(a) after "September 1968," insert "and the area indicated as 'Proposed Additions' on the map entitled 'Additional Lands, Redwood National Park, California', numbered 167-80005-D and dated March 1978."

(2) In section 2, subsection (a), delete "fifty-eight thousand" and substitute "one hundred and six thousand" and delete the period at the end of the subsection and add "and publicly owned highways and roads." In section 2, subsection (b), delete "by donation only". At the end of section 2, insert the following new subsection "(c)":

"(c) Within the area outside the boundaries of Redwood National Park indicated as the 'Park Protection Zone' on the map entitled 'Proposed Additions, Redwood National Park, California', numbered 167-80005-D and dated March 1978, the Secretary is authorized to acquire lands and interests in land: *Provided*, That lands may be acquired from a willing seller or upon a finding by the Secretary that failure to acquire all or a portion of such lands could result in physical damage to park resources and following notice to the Committee on Energy and Natural Resources of the United States Senate and the Committee on Interior and Insular Affairs of the House of Representatives. Any lands so acquired shall be managed in a manner which will maximize the protection of the resources of Redwood National Park, and in accordance with the Act of October 21, 1976 (90 Stat. 2743). Acquisition of a parcel of land under the authority of this subsection shall not as a result of such acquisition diminish the right of owners of adjacent lands to the peaceful use and enjoyment of their land and shall not confer authority upon the Secretary to acquire additional lands except as provided in this subsection."

(3) In subsection 3(a), delete the period at the end of the second sentence and add the following: "which donation of lands or interest in lands may be accepted in the discretion of the Secretary subject to such preexisting reverts and other conditions as may appear in the

Redwood
National Park,
expansion.
Employment
program.

16 USC 79a.
Boundaries.
16 USC 79b.

Park Protection
Zone, land
acquisition.

Notice to
congressional
committees.

43 USC 1701.

16 USC 79c.

title to these lands held by the State of California, and such other reverters and conditions as may be consistent with the use and management of the donated lands as a portion of Redwood National Park. Notwithstanding any other provision of law, the Secretary may expend appropriated funds for the management of and for the construction, design, and maintenance of permanent improvements on such lands and interests in land as are donated by the State of California in a manner not inconsistent with such reverters and other conditions.”

Vested and
possessory rights
in certain real
property.
16 USC 79c.

(4) In subsection 3(b) (1), after “NPS-RED-7114-B”, insert “and effective on the date of enactment of this phrase, there is hereby vested in the United States all right, title, and interest in, and the right to immediate possession of, all real property within the area indicated as ‘Proposed Additions’ on the map entitled ‘Additional Lands, Redwood National Park, California’, numbered 167-S0005-D and dated March 1978, and all right, title, and interest in, and the right to immediate possession of the down tree personal property (trees severed from the ground by man) severed prior to January 1, 1975, or subsequent to January 31, 1978, within the area indicated as ‘Proposed Additions’ on the map entitled ‘Additional Lands, Redwood National Park, California’, numbered 167-S0005-D and dated March 1978.”

At the end of subsection 3(b) (1), insert the following new paragraphs: “Down tree personal property severed subsequent to December 31, 1974, and prior to February 1, 1978 may be removed in accordance with applicable State and Federal law, or other applicable licenses, permits, and existing agreements, unless the Secretary determines that the removal of such down timber would damage second growth resources or result in excessive sedimentation in Redwood Creek: *Provided, however,* That down timber lying in stream beds may not be removed without permission of the Secretary: *Provided,* That such removal shall also be subject to such reasonable conditions as may be required by the Secretary to insure the continued availability of raw materials to Redwoods United, Incorporated, a nonprofit corporation located in Manila, California.

“The Secretary shall permit, at existing levels and extent of access and use, continued access and use of each acquired segment of the B line, L line, M line, and K and K roads by each current affected woods employer or its successor in title and interest: *Provided,* That such use is limited to forest and land management and protection purposes, including timber harvesting and road maintenance. The Secretary shall permit, at existing levels and extent of access and use, continued access and use of acquired portions of the Bald Hills road by each current affected woods employer or its successor in title and interest: *Provided further,* That nothing in this sentence shall diminish the authority of the Secretary to otherwise regulate the use of the Bald Hills road.”

Just
compensation.
Jurisdiction.
16 USC 79c.

(5) In subsection 3(b) (2), delete the last sentence and add the following sentences at the end of the paragraph: “Any action against the United States with regard to the provisions of this Act and for the recovery of just compensation for the lands and interests therein taken by the United States, and for the down tree personal property taken, shall be brought in the United States district court for the district where the land is located without regard to the amount claimed. The United States may initiate proceedings at any time seeking a determination of just compensation in the district court in the manner provided by sections 1358 and 1403 of title 28, United States Code, and may deposit in the registry of the court the estimated just compensation, or a part thereof, in accordance with the procedure gen-

erally described by section 258a of title 40, United States Code. Interest shall not be allowed on such amounts as shall have been paid into the court. In the event that the Secretary determines that the fee simple title to any property (real or personal) taken under this section is not necessary for the purposes of this Act, he may, with particular attention to minimizing the payment of severance damages and to allow for the orderly removal of down timber, revest title to such property subject to such reservations, terms, and conditions, if any, as he deems appropriate to carry out the purposes of this Act, and may compensate the former owner for no more than the fair market value of the rights so reserved, except that the Secretary may not revest title to any property for which just compensation has been paid; or, the Secretary may sell at fair market value without regard to the requirements of the Federal Property and Administrative Services Act of 1949, as amended, such down timber as in his judgment may be removed without damage to the park, the proceeds from such sales being credited to the Treasury of the United States. If the State of California designates a right-of-way for a bypass highway around the eastern boundary of Prairie Creek Redwood State Park prior to October 1, 1984, the Secretary is authorized and directed to acquire such lands or interests in lands as may be necessary for such a highway and, subject to such conditions as the Secretary may determine are necessary to assure the adequate protection of Redwood National Park, shall thereupon donate the designated right-of-way to the State of California for a new bypass highway from a point south of Prairie Creek Redwood State Park through the drainage of May Creek and Boyes Creek to extend along the eastern boundary of Prairie Creek Redwood State Park within Humboldt County. Such acreage as may be necessary in the judgment of the Secretary for this conveyance, and for a buffer thereof, shall be deemed to be a publicly owned highway for purposes of section 101(a)(2) of this amendment effective on the date of enactment of this section."

(6) In subsection 3(e), delete "sixty days" in the last sentence and add the following sentences at the end of the subsection: "Effective on the date of enactment of this sentence, there are made available from the amounts provided in section 10 herein or as may be hereafter provided such sums as may be necessary for the acquisition of interests in land. Effective on October 1, 1978, there are authorized to be appropriated such sums as may be necessary for the implementation of contracts and cooperative agreements pursuant to this subsection: *Provided*, That it is the express intent of Congress that the Secretary shall to the greatest degree possible insure that such contracts and cooperative agreements provide for the maximum retention of senior employees by such owners and for their utilization in rehabilitation and other efforts. The Secretary, in consultation with the Secretary of Agriculture, is further authorized, pursuant to contract or cooperative agreement with agencies of the Federal Executive, the State of California, any political or governmental subdivision thereof, any corporation, not-for-profit corporation, private entity or person, to initiate, provide funds, equipment, and personnel for the development and implementation of a program for the rehabilitation of areas within and upstream from the park contributing significant sedimentation because of past logging disturbances and road conditions, and, to the extent feasible, to reduce risk of damage to streamside areas adjacent to Redwood Creek and for other reasons: *Provided further*, That authority to make payments under this subsection shall be effective only to such extent or in such amounts as are provided in advance in appro-

Interest.
Title revestment.

Down timber,
sale.
40 USC 471 note.

Highway right-of-
way, land
acquisition.

Land acquisition,
availability of
funds.
16 USC 79c.
16 USC 79j.

Contracts and
agreements,
appropriation
authorization.
Retention of
senior employees.

Land
rehabilitation,
contracts and
cooperative
agreements.

Erosion and
sedimentation
study.

priation Acts. Such contracts or cooperative agreements shall be subject to such other conditions as the Secretary may determine necessary to assure the adequate protection of Redwood National Park generally, and to provide employment opportunities to those individuals affected by this taking and to contribute to the economic revival of Del Norte and Humboldt Counties in northern California. The Secretary shall undertake and publish studies on erosion and sedimentation originating within the hydrographic basin of Redwood Creek with particular effort to identify sources and causes, including differentiation between natural and man-aggravated conditions, and shall adapt his general management plan to benefit from the results of such studies. The Secretary, or the Secretary of Agriculture, where appropriate, shall also manage any additional Federal lands under his jurisdiction that are within the hydrographic basin of Redwood Creek in a manner which will minimize sedimentation which could affect the park, and in coordination with plans for sediment management within the basin. To effectuate the provisions of this subsection, and to further develop scientific and professional information and data concerning the Redwood Forest ecosystem, and the various factors that may affect it, the Secretary may authorize access to the area subject to this subsection by designated representatives of the United States.”.

16 USC 1a-1.

(b) The first section of the Act of August 18, 1970 (84 Stat. 825), is amended by adding the following: “Congress further reaffirms, declares, and directs that the promotion and regulation of the various areas of the National Park System, as defined in section 2 of this Act, shall be consistent with and founded in the purpose established by the first section of the Act of August 25, 1916, to the common benefit of all the people of the United States. The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress.”.

16 USC 1b, 1c.

16 USC 1.

(c) Notwithstanding any provision of the Act of October 2, 1968, *supra*, the vesting in the United States of all right, title, and interest in, and the right to immediate possession of, all real property and all down tree personal property within the area indicated as “Proposed Additions” on the map entitled “Additional Lands, Redwood National Park, California,” numbered 167-S0005-D and dated March 1978, as established by subsection (a) (4) of the first section of this Act, shall be effective on the date of enactment of this section. The provisions of subsection 3(b) (3) of the Act of October 2, 1968, *supra*, shall also relate to the effective date of this section. From the appropriations authorized for fiscal year 1978 and succeeding fiscal years such sums as may be necessary may be expended for the acquisition of lands and interests in lands, and down tree personal property, authorized to be acquired, or acquired, pursuant to the provisions of this Act.

Effective date.
16 USC 79c-1.
16 USC 79a.

16 USC 79c.

Economic impact
study.
16 USC 79k.

SEC. 102. (a) The Secretary, in consultation with the Secretaries of Agriculture, Commerce, and Labor, shall conduct an analysis of appropriate Federal actions that may be necessary or desirable to mitigate any adverse economic impacts to public and private segments of the local economy, other than the owners of properties taken by this Act, as a result of the addition of property to Redwood National Park under the first section of this Act. The Secretaries shall also consider the benefits of making grants or entering into contracts or cooperative agreements with the State of California or Del Norte and Humboldt

Counties as provided by subsection (b) for the purpose of development and implementation of a program of forest resource improvement and utilization, including, but not limited to, reforestation, erosion control, and other forest land conservation measures, fisheries and fish and wildlife habitat improvements, and wood energy facilities. Not later than January 1, 1979, the Secretary shall submit to the Speaker of the House of Representatives and the President of the Senate a report of his analysis, including his recommendations with respect to actions that should be taken to mitigate any significant short-term and long-term adverse effects on the local economy caused by such addition.

Report, submittal to Congress.

(b) The Secretary of Commerce and the Secretary of Labor, in consultation with the Secretary, and pursuant to his study, shall apply such existing programs as are necessary and appropriate to further mitigate identified employment and other adverse economic impacts on public and private segments of the local economy, other than with regard to the payment of just compensation to the owners of properties taken by this Act and by the Act of October 2, 1968, *supra*. In addition to the land rehabilitation and employment provisions of this Act, which should have a substantial positive economic effect on the local economy, the Secretaries of Commerce and Labor are further authorized and directed to implement existing authorities to establish employment programs, pursuant to such grants, contracts and cooperative agreements with agencies of the Federal Executive, the State of California, any political or governmental subdivision thereof, any corporation, not-for-profit corporation, private entity or person, for the development and implementation of such programs, as, in the discretion of the Secretaries of Commerce and Labor, may be necessary to provide employment opportunities to those individuals affected by this taking and to contribute to the economic revival of Del Norte and Humboldt Counties, in northern California. Effective on October 1, 1978, there are authorized such sums as may be necessary to carry out the employment and economic mitigation provisions of this Act: *Provided*, That the authority to make payments under this section shall be effective only to such extent or in such amounts as are provided in advance in appropriation Acts.

Employment and economic mitigation programs.

16 USC 79a.

Appropriation authorization.

(c) The Secretary of Agriculture within one year after the date of enactment of this Act, shall prepare and transmit to Congress a study of timber harvest scheduling alternatives for the Six Rivers National Forest. Such alternatives shall exclude the timber inventories now standing on units of the Wilderness Preservation System and shall be consistent with laws applicable to management of the national forests. In developing the alternatives, the Secretary shall take into consideration economic, silvicultural, environmental, and social factors.

Timber harvest study, Six Rivers National Forest. 16 USC 79k note. Transmittal to Congress.

PREFERENTIAL HIRING

SEC. 103. (a) In order to utilize the skills of individuals presently working in the woods and in the mills to the greatest degree possible to both ease the personal economic effects of this taking, and to assist in the necessary rehabilitation, protection, and improvement of lands acquired by this Act through implementation of sound rehabilitation and land use practices, the Secretary shall have power to appoint and fix the compensation of seven full-time and thirty-one temporary personnel to assist in carrying out such programs necessary for the protection and enhancement of Redwood National Park. In filling these positions, preference shall be given to affected employees (as defined in title II of this Act) for a period ending on September 30, 1984, notwithstanding applicable civil service laws and regulations.

16 USC 79l.

(b) In order to effectively administer the expanded Redwood National Park created by this Act in a manner that will provide maximum protection to its resources and to provide for maximum visitor use and enjoyment to ease the local economic effects of this taking, the Secretary shall have power to appoint and fix the compensation of two full-time and twenty temporary employees in the competitive service. In filling these positions, preference shall be given to affected employees (as defined in title II) for a period ending on September 30, 1984, notwithstanding applicable civil service laws and regulations. The Secretary shall further have power to appoint and fix the compensation of an additional thirty-two full-time and forty temporary employees in the competitive service as provided by this subsection at the time of the donation of those park lands or interests in land owned by the State of California as are within the boundaries of Redwood National Park as provided herein. In filling these positions, preference shall be given to those State employees affected by this transfer for a period not to exceed six years from the date of transfer; permanent State civil service employees shall be provided the opportunity to transfer to a comparable Federal civil service classification notwithstanding applicable civil service laws and regulations.

Civilian jobs.

(c) An affected employee shall be given full consideration for certain civilian jobs as provided in this section both with the Federal Government and with those private employers that have certain undertakings or programs that involve Federal participation or approval for the period beginning on the date of enactment of this Act and ending September 30, 1984, if the positions will be primarily located in Humboldt or Del Norte Counties or other counties in California adjacent thereto, and if the employee is otherwise qualified under this section.

Notice, job availability.

(d)(1) Any Federal agency that is creating or filling a civilian Federal job that is within the scope of clause (2)(A) of this subsection, pursuant to contract, civil service merit system, or otherwise, that will be primarily located in Humboldt or Del Norte Counties, California, or other counties in California adjacent thereto, must provide notice in advance of the availability of that job and must provide qualified affected employee applicants for these positions with full consideration for these positions if the further conditions set forth in clause (2)(B) of this subsection are met. The notice required by this paragraph shall be as provided by applicable law and regulation through the offices of the Employment and Training Services located in Humboldt and Del Norte Counties, California, and through such other means as are likely to gain the attention of affected employees.

Consideration for employment, conditions.

(2) Consideration for employment under this section shall be provided under the following conditions:

(A) the job involves skills and training that could reasonably be expected to have been gained by individuals who have been employed as logging and related woods employees or sawmill, plywood, and other wood processing employees, or office employees, or that can reasonably be expected to be gained while so employed, or pursuant to retraining as provided herein; and

(B) the applicant has the ability, or can reasonably be expected to have the ability after appropriate training of reasonable duration as further provided herein, to perform the duties of the job: *Provided*, That the full consideration shall not be required with respect to those affected employee applicants requiring training

in a situation where the schedule for completion of the work is such that the period during which said employee can reasonably be expected to work following completion of training is determined by the Secretary to be incommensurate with the time and funds required to provide said employee with the necessary training.

(e) (1) Any Federal agency involved in the manner provided herein with a private employer responsible for filing an employment position that is within the scope of clause (2) (A) of subsection (d), above, that will be primarily located in Humboldt or Del Norte Counties, or other counties in California adjacent thereto, is directed to require that any Federal contracts, grants, subsidies, loans, or other forms of funding assistance, and any Federal lease, permit, license, certificate, or other entitlement for use, not constituting an existing property right as of the date of enactment of this Act, that is a condition to or a requirement of the conduct of harvesting and related activities or replanting and land rehabilitation or the conduct of wood processing and related activities or the conduct of highway construction and related activities shall be subject to and conditioned upon said private employer giving full consideration to affected employees as provided herein.

Private
employers.

(2) Any private employer who participates with a Federal agency in the manner described above and who is, accordingly, subject to the requirements as provided herein, shall—

(A) provide notice of the availability of those jobs described in subsection (d) (2) (A) in the manner generally provided by subsection (d) (1); and

(B) provide full consideration to qualified affected employee applicants for these positions if the further conditions established by clause (2) (B) of subsection (d) are met.

(f) The Secretary is directed to seek and authorized to enter into agreements with affected employers and industry employers providing that full consideration shall be given with respect to the employment of affected employees who had been employed by affected employers in jobs that may become available in Humboldt and Del Norte Counties and other counties adjacent thereto. The execution and carrying out of such an agreement, or the giving of full consideration to the employment of affected employees under subsection (c) of this section, shall not subject an employer to any additional liability or obligations under any Federal or State equal employment law, rule, regulation, or order.

Employer
agreements.

(g) (1) The Secretary, except as otherwise provided, shall be responsible for the implementation of this section and—

(A) is authorized and directed to make needed training available, upon application, to an affected employee applicant who, although not presently qualified for a position, can be reasonably expected to be qualified after appropriate training;

Training.

(B) is authorized to take such actions as may be necessary to ensure that an affected employee is not denied full consideration because of the need for training where there is no substantial reason to believe that the applicant would be unable to perform the duties of the job after proper training. If the job is one which must be filled while the affected employee would be in training, the Secretary shall encourage the employer to fill the job only on a temporary basis subject to the successful completion of the training by the affected employee;

(C) shall require that, in a case in which two or more affected

Greatest service
preference.

	employee applicants have approximately equal qualifications for a job for which they are to receive full consideration, that applicant with the greatest creditable service shall be given preference among those applicants entitled to full consideration; and
Noncompliance.	(D) upon the filing of a complaint by an employee who alleges that said employee's rights to full consideration were disregarded, the Secretary shall make a finding on the merits of such complaint. If it is determined that there has been noncompliance with this section, the Secretary shall take such action as may be appropriate to correct the situation.
Job opening, agency notification.	(2) To assist in implementing this section, agencies shall notify the Secretary, in advance, of any job opening as provided for by subsection (d) and of any Federal commitment as provided for by subsection (e).
	(3) The Secretary shall—
	(A) seek the cooperation of the State of California and the county and local governments within Humboldt and Del Norte Counties in the implementation of the provisions of this section and in the adoption of similar provisions for full consideration of affected employees with regard to State, county, and local jobs and activities; and
Union liaison.	(B) appoint, from among nominees proposed by certified or recognized unions representing employees, a person or persons who shall serve as the Secretary's liaison with employees and their union and as consultant to the Secretary with regard to the administration of those provisions of this Act for which the Secretary is responsible.
Judicial review.	(h) An employee, a group of employees, a certified or recognized union, or an authorized representative of such employee or group, aggrieved by any determination by the Secretary under this Act shall be entitled to judicial review of such determination in the same manner and under the same conditions as provided by section 250 of The Trade Act of 1974 (88 Stat. 2029).
19 USC 2101.	(i) Nothing in this section shall be construed to affect any additional or alternative rights under a law, regulation, or contract (including, but not limited to, veteran preference and contracts between private employers and unions) in effect as of the date of enactment of this Act, and the implementation of this section shall be carried out in accord with applicable civil service laws and regulations except as otherwise provided for in this section. Employees appointed to Federal jobs pursuant to this section shall have their compensation fixed at rates not to exceed that now or hereafter prescribed for the highest rate of grade 15 of the General Schedule under section 5332 of title 5, United States Code.
Annual report, submittal to Congress. 16 USC 79m.	SEC. 104. (a) The Secretary shall submit an annual written report to the Congress on January 1, 1979, and annually thereafter for ten years, reporting on the status of payment by the Secretary for real property acquired pursuant to section 101(a)(4) and section 101(a)(2) of this amendment; the status of the actions taken regarding land management practices and watershed rehabilitation efforts authorized by section 101(a)(6) and section 102(b) of this amendment; the status of the efforts to mitigate adverse economic impacts as directed by this Act; this status of National Park Service employment requirements as authorized by section 103 of this amendment; the status of the new bypass highway and of the agreement for the donation of the

State park lands as contemplated by section 101(a)(5) of this amendment; and, the status of the National Park Service general management plan for the park.

(b) No later than January 1, 1980, the Secretary shall submit to the Committee on Interior and Insular Affairs of the House of Representatives, and to the Committee on Energy and Natural Resources of the Senate, a comprehensive general management plan for Redwood National Park, to include but not be limited to the following:

General management plan, submittal to congressional committees.

(1) the objectives, goals, and proposed actions designed to assure the preservation and perpetuation of a natural redwood forest ecosystem;

(2) the type and level of visitor use to be accommodated by the park, by specific area, with specific indications of carrying capacities consistent with the protection of park resources;

(3) the type, extent, and estimated cost of development proposed to accommodate visitor use and to protect the resource, to include anticipated location of all major development areas, roads, and trails; and

(4) the specific locations and types of foot trail access to the Tall Trees Grove, of which one route shall, unless shown by the Secretary to be inadvisable, principally traverse the east side of Redwood Creek through the essentially virgin forest, connecting with the roadhead on the west side of the park east of Orick.

SEC. 105. Effective on October 1, 1978, there are hereby authorized to be appropriated \$33,000,000 to carry out the rehabilitation provisions of this Act.

Appropriation authorization.
16 USC 79b.

SEC. 106. (a) Notwithstanding any contrary provision of the Act entitled "An Act to provide for certain payments to be made to local governments by the Secretary of the Interior based upon the amount of certain public lands within the boundaries of such locality", approved October 20, 1976 (90 Stat. 2662), the Secretary is authorized and directed to make payments on a fiscal year basis to each unit of local government, in the manner provided by the Act of October 20, 1976, in which lands owned by the United States within Redwood National Park are located. Such payments may be used for any governmental purpose. The amount of such payments shall be computed as provided in subsections (b) and (c).

Payments to local governments.
16 USC 79c.

31 USC 1601.

(b) Payment made for any fiscal year to a unit of local government shall include that amount determined pursuant to the provisions of section 2 of the Act of October 20, 1976.

31 USC 1602.

(c) Payment made for any fiscal year to a unit of local government shall also include that amount determined pursuant to the provisions of section 3 of the Act of October 20, 1976: *Provided, however*, That any amount computed as provided by section 3(c)(1) of the Act of October 20, 1976, but not paid because of the limitation of subsection (c)(2) and subsection (d) of that section shall be carried forward and shall be applied to future years in which this portion of the total payment would not otherwise equal the amount of real property taxes assessed and levied on such property during the last full fiscal year before the fiscal year in which such land or interest was acquired for addition to Redwood National Park until such amount is exhausted.

31 USC 1603.
Payment carry forward.

31 USC 1602.

(d) The Redwoods Community College District shall be considered as an affected school district for purpose of section 3(a) of the Act of October 20, 1976, as amended herein.

31 USC 1602.
Redwoods United, Inc.,
Manila, Cal.
16 USC 79p.

SEC. 107. The Secretary is further authorized, and the Congress specifically directs that it shall be a purpose of this Act, that the com-

munity services and employment opportunities provided by Redwoods United, Incorporated, a nonprofit corporation located in Manila, California, shall be maintained at the present rate of employment to the greatest degree practicable.

Just
compensation.
16 USC 79q.

SEC. 108. The Congress further acknowledges and directs that the full faith and credit of the United States is pledged to the prompt payment of just compensation as provided for by the fifth amendment to the Constitution of the United States for those lands and properties taken by this Act.

16 USC 79k note.

SEC. 109. Unless otherwise indicated hereinbefore, a reference to the Secretary will refer to the Secretary of the Department of the Interior, except in subsections 103(d) through 103(i), where a reference to the Secretary will refer to the Secretary of the Department of Labor.

Title II has not been reprinted.

B: BACKGROUND OF THE REHABILITATION EFFORT

Reports

Under PL 90-545 (the law that established Redwood National Park), a number of options were available, contingent upon congressional approval, to protect park resources from adjacent land use practices. Pursuant to section 3(e) of the act, the secretary of the Department of the Interior was authorized to enter into contracts and cooperative agreements that would entail the purchase of less-than-fee interests (for example, easements) and the acquisition of lands in fee title by either donation or purchase. (The secretary also had the option of taking land under eminent domain to provide satisfactory protection.) The land acquisition option was limited by legislative ceilings to 58,000 acres and \$92 million.

In response to this legislation, the National Park Service contracted with Stone and Associates (1969) to determine which lands should be acquired and which lands could continue to be harvested, given special restrictions. The firm was also to examine management concepts and techniques for lands surrounding the park to minimize any deleterious effects on park resources. The 1969 report discussed the dynamic nature of the redwood ecosystem, potentially destructive activities near the park, and ownership and management practices on adjacent land. It recommended that an 800-foot buffer zone be established around the perimeter of the park, within the Redwood Creek watershed. The concept of delineating buffers was based on the philosophy that timber harvesting was compatible with adjacent park values if proper intensive land use management was practiced. The report further stated that the major watershed management problems would continue in the Redwood Creek drainage upstream from the park and that the cost of stabilizing the watershed would be considerable.

Soon after the Stone report was published, the Sierra Club presented the Robinson report as a rebuttal. (Robinson 1969). This report stated that the buffers recommended for the Redwood Creek corridor would be inadequate to protect the park resources, but that they would be satisfactory in most other areas surrounding the park. It suggested that some land in the Redwood Creek area be acquired, where ecologically safe logging could continue, with selective harvesting of redwoods and maximum 1-acre clearcuts of Douglas-fir.

Although both reports contained useful information, neither the recommendations of the Stone report nor those of the Robinson report were implemented. Several other reports were prepared before 1972, including a preliminary draft master plan for the park. In January 1972, a special task force of scientists again reviewed the

problems within the Redwood Creek watershed for the Department of the Interior. A concluding report, known as the Curry report, contained a series of recommendations (USDI 1973). One recommendation, fee acquisition of an 800-foot buffer zone around the Redwood Creek corridor, was not approved by the Office of Management and the Budget.

The Curry report outlined additional options to reduce upstream and upslope impacts on the park corridor. It remarked that the upstream impacts were a responsibility of those state agencies charged with regulating forest practices and maintaining water quality standards. Federal efforts along the main channel were to be limited to maintaining natural channel integrity and to minimizing bank undercutting and redirection of flow. Options dealing with upslope impacts were described in more detail, and they proposed a combination of fee or less-than-fee interest in the 800-foot buffer zone, additional tributary streams or slide prone areas, and the lands upslope of the hydrologic boundary. The purpose of these options was not to enlarge the park, but rather to provide existing park resources with adequate protection from damaging inputs from adjacent lands.

In May 1974 the Sierra Club initiated legal actions against the Department of the Interior to compel the secretary to discharge his duties in protecting the national park. The court found the secretary to have certain statutory and fiduciary duties with respect to the park (8 ERC 1013). The evidence presented during the case clearly established damage to park resources directly related to logging activities in the Redwood Creek watershed upstream from the parklands. The department was directed to take those steps required by law to protect timber, soil, and streams within Redwood National Park from adverse consequences of logging on adjacent lands.

In July 1976, the court found the Department of the Interior to have made a good faith attempt to protect the park (8 ERC 2196). In a report to Congress, the department identified several possible alternatives for protecting park resources.

Early Rehabilitation Efforts

In 1977, in anticipation of the congressional authorization to rehabilitate cutover timberlands, four test plots for potential rehabilitation methods were established on park lands. In March 1978, the National Park Service met with erosion control and forest rehabilitation experts from state and federal agencies, the academic community, and the local timber industry. Presentations included studies and methods from areas throughout the Northwest.

In the summer and fall of 1978 the Park Service began five additional pilot rehabilitation projects on recently tractor-logged slopes within the newly acquired park area. Site prescriptions were developed after reviewing the methods utilized and the results of treatments previously used on rehabilitated test sites. The projects incorporated 80 acres in upper Miller Creek, 80 acres in lower Emerald Creek, 85 acres in upper Bond Creek, 7 acres in lower Bond Creek, and 2 acres in lower Miller Creek. Heavy-equipment work, supervised by park staff, was carried out in September under rental agreements with local contractors; labor-intensive erosion-control contracts were issued and successfully completed on all units.

In 1979, additional techniques were tested on four pilot sites: Airstrip Creek basin (160 acres), Copper Creek (640 acres), Bond Creek (60 acres), and Bridge Creek (80 acres). A total of 9.4 miles of road were ripped and/or outsloped, and 1,000 acres of slope were affected by rehabilitation efforts. Also, approximately 200,000 trees were planted on understocked and rehabilitated land during the winter of 1979-1980.

The prescription for each site varied and included a combination of heavy-equipment and labor-intensive work. For example at the Bridge Creek site, approximately 2 miles of road was "pulled." This road segment contained four major stream channel crossings that were failing and delivering sediment directly to perennial/intermittent streams. Each of these stream crossings required the removal of 2,000 to 3,200 cubic yards of road fill material. The channels were rocked or check dammed, and slopes were planted, seeded, and/or mulched. In the Copper Creek unit, however, the gullies resulting from tractor yarding in the late 1960s and early 1970s were so deep that diversion of water to the original water channels was considered infeasible in some cases. Therefore, gullies were stabilized by excavating, recontouring, and revegetating over-steepened gully banks.

C: FINDING OF NO SIGNIFICANT IMPACT

Finding of No Significant Impact - Redwood National Park, Watershed Rehabilitation Plan

In accordance with the provisions of the National Environmental Policy Act of 1969, and the regulations of the Council on Environmental Quality 40 CFR 1508.9, an environmental assessment was prepared on the Redwood Creek Watershed Rehabilitation Plan. General elements and impacts of the plan were presented in the Draft and Final Environmental Impact Statements for the Redwood National Park General Management Plan. The current plan presents more specific and detailed proposals.

The Rehabilitation Plan addresses rehabilitation of up to 30,000 acres in the Redwood Creek basin which has been subjected to extensive timber harvesting and logging road development. The major objective of the plan as stipulated in Public Law 95-250 is to minimize the man-induced erosion impacts and to encourage the return of a natural pattern of vegetation within the basin. The plan specifies sites to be rehabilitated which have suffered accelerated erosion rates, sediment deposition and decreased water quality.

A Ground Disturbance and Erosional Landforms map was prepared which illustrated ground disturbance features and pinpointed areas of critical rehabilitation need. Scheduling and identification of priority treatment areas and road removal was accomplished. Cultural resources management of the Redwood Creek basin were also addressed in detail as well as aspects of resources management such as prairie management, composting, exotic species removal and fire management.

Alternatives considered were optional treatment methods, variable for each site, and the No Action alternative.


Natural rates of recovery as outlined under the No Action alternative are relatively accelerated under plan actions on cut slopes and vastly increased on areas affected by roads. The amount of sedimentation and impacts on water quality occurring during the recovery process would also be appreciably decreased. Cumulative impacts of the proposed actions are also considered beneficial.

The Environmental Assessment was made available for review in October, 1980. Seven responses to the assessment were received. Neither the United States Environmental Protection Agency or the State of California had any comment. One individual indicated support of the plan's objectives. One respondent commented that the National Park Service should extend its concern over cultural resources in the Park Protection Zone, and provide additional monitoring and treatment of specific sites within the park. The Wilderness Society and a respondent from Humboldt State University both expressed concern that greater emphasis be placed on removal of exotic species and restoration of the Redwood Creek estuary. An additional letter from the Redwood Chapter (North Group) of the Sierra Club made specific comments primarily related to contingency plans for major storm damage, budgeting and contracting methods. Concerns were responded to and appropriate comments incorporated into the plan.

The plan is in compliance with all applicable executive orders, laws, and regulations. Based on the analysis of environmental consequences and the public review of the project,

the draft and final impact statements, and the environmental assessment, the National Park Service has determined that the project is not a major federal action significantly affecting the human environment. Therefore, an additional environmental impact statement will not be prepared on the Rehabilitation Plan.

Recommended:



Superintendent, Redwood NP

2/23/81
Date

Approved:



Regional Director, WRO

3/5/81
Date

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As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.


Publication services were provided by the graphics staff of the Denver Service Center. NPS 1746


 QUARRY SITE


 LARGE LOGGING DECK

 LOW-GRADIENT VALLEY BOTTOMLAND WITH LUSH RIPARIAN

 PRAIRIE GRASSLANDS AND OAK WOODLANDS; SEVERELY

 FLAT RIDGETOP AREA REPRESENTING AN OLDER EROSIONAL UNIT
MAY INCLUDE SOME OLD-GROWTH FOREST AND TRACT

 HIGHLY EROSIONAL UNIT CONFINED TO THE SOUTHEAST
BUT HAVE MODERATE TO EXTENSIVE REGROWTH; NUMEROUS

 ACTIVE EARTHFLAWS, LANDSLIDES, DEBRIS AVALANCHES

 LANDSLIDE, EARTHFLOW OR DEBRIS SLIDE SHOWING DIRECTION

 NOTES LOG LANDING ALONG HAUL ROAD AND/OR TRAIL

 MAJOR CROSSING OF DRAINAGE CHANNEL

 SCARP CURRENTLY ACTIVE OR TEMPORARILY

 MOVEMENT SCARP

RIAN GROWTH

LOCAL GULLY EROSION ASSOCIATED WITH ROADS

NAL SURFACE; CURRENTLY FEW EROSION PROBLEMS REGARDLESS OF LAND U
OR-LOGGED UNITS

RN CORNER OF THE PARK; MOST SITES HAVE BEEN LOGGED
EROUS COMPLEX DRAINAGE PROBLEMS

ES, OR RECENT SLUMPS; MAY OR MAY NOT BE VEGETATED

RECTION OF MOVEMENT

ACTOR TRAIL

ORARILY INACTIVE

