National Park Service
Cultural Landscapes Inventory

Tall Trees Grove
Redwood National Park
2021

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Redwood National Park
Cultural Landscape Inventory

National Park Service
U.S. Department of the Interior

Tall Trees Grove Historic District

Redwood National Park

Redwood National Park concurs with the finding of the Cultural Landscape Inventory that the Tall Trees Grove Historic District is eligible for listing in the National Register of Historic Places as a cultural landscape.

DocuSigned by:
Steve Mietz
8815748A67964C8...

9/7/2022

Steven N. Mietz, Superintendent Date

Please return to :

Kevin McCardle
Historical Landscape Architect
Redwood National Park
121200 Highway 101
P.O. Box 7
Orick, CA 95555

State of California • Natural Resources Agency

Gavin Newsom, *Governor*

DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION

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RECEIVED
JUN 29 2022
Redwood National & State Parks

June 7, 2022

In reply to: NPS_2022_0201_001

Steven N. Mietz, Superintendent
Redwood National Park
1111 Second Street
Crescent City, CA 95531

RE: Section 110 Evaluation, Tall Trees Grove, Redwood National Park, Humboldt County, California

Dear Mr. Mietz:

Pursuant to Section (a)(2)(A) of Section 110 of the National Historic Preservation Act (NHPA), the Office of Historic Preservation has been asked to review the determination of eligibility of resources associated with the above identified property, per Section 110 of the National Historic Preservation Act, located in Redwood National Park, Humboldt County.

This office concurs with your determination regarding the eligibility of Tall Trees Grove. The property is eligible for listing in the National Register of Historic Places (National Register) under Criterion A at the national level of significance, meeting the requirements of Criteria Consideration G, with a period of significance of 1962-1978, based on the boundary and characteristics described in the Cultural Landscape Inventory and retaining sufficient historic integrity for listing. The property's significance based on its association with. A list of contributing and non-contributing buildings and structures follows this letter.

If you have any questions about our assessment of this document, please contact William Burg of my staff at (916) 445-7004 or william.burg@parks.ca.gov.

Sincerely,

Julianne Polanco
State Historic Preservation Officer
California Office of Historic Preservation
Enclosures

Table 1:
Contributing/Non-Contributing Properties, Tall Trees Historic District

Contributing Resources: Based on the information provided in the CLI, the following resources have been identified as contributors to Tall Trees Grove Historic District. All built resources were constructed during the period of significance:

Contributing Resource Name
1964 Tallest Tree
1964 Second Tallest Tree
1964 Third Tallest Tree
1964 Fourth Tallest Tree

Contributing Resource Name
View of first, third and sixth tall trees from Tall Trees Trail
Continuous views in redwood forest
Continuous views of Redwood Creek

Contributing Resource Name
Second tallest tree sign, ArCo (archeology)
Trinidad Trail (archeology)
Smokehouse (archeology)
Brining vat (archeology)

Non-contributing Resources: Based on the information provided in the CLI, the following resources have been identified as non-contributors to the Tall Trees Grove. All resources were constructed after the period of significance, although specific construction dates could not always be identified:

Non-Contributing Resource Name
Tall Trees Grove Loop Trail
Redwood Creek Trail
Tall Trees Trail
C-Line Road
Parking Lot

Non-Contributing Resource Name
Comfort station
Shuttle-stop shelter

Non-Contributing Resource Name
Interpretive wood posts (19)
Split-rail fence (1)
Benches (2)
Trail signs(5)

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Inventory Unit Summary & Site Plan

The Cultural Resources Information System (CRIS)

CRIS is the National Park Service's database of cultural resources on its lands, consisting of archeological sites, historic structures, ethnographic resources, and cultural landscapes. The set of CRIS records for cultural landscapes is referred to as CRIS-CL. CRIS-CL records conform to a standardized data structure known as the Cultural Landscapes Inventory (CLI). The legislative, regulatory and policy directions for conducting and maintaining the CRIS are: Section 110 of the National Historic Preservation Act, NPS Management Policies (2006), Director's Order 28 (Cultural Resources) and Director's Order 28a (Archeology).

The Cultural Landscapes Inventory (CLI)

The CLI is the data structure within CRIS used to document and evaluate all potentially significant cultural landscapes in which NPS has, or plans to acquire, any enforceable legal interest. Each CRIS-CL record is certified complete when the landscape is determined to meet one of the following: Landscape individually meets the National Register of Historic Places criteria for evaluation; or, Landscape is a contributing element of a property that is eligible for the National Register; or, Landscapes does not meet the National Register criteria, but is managed as cultural resources because of law, policy or decisions reached through the park planning process. Cultural landscapes are historic sites, historic designed landscapes, historic vernacular landscapes, and historic ethnographic landscapes, but may also include more than one type. Those eligible for the National Register have significance in the nation's history on a national, state, or local level, as well as integrity or authenticity. The legislative, regulatory and policy directions for conducting and maintaining the CLI within CRIS are:

> National Historic Preservation Act of 1966 (16 USC 470h-2(a)(1)). Each Federal agency shall establish a preservation program for the identification, evaluation, and nomination to the National Register of Historic Places…of historic properties….
>
> Executive Order 13287: Preserve America, 2003. Sec. 3(a)…Each agency with real property management responsibilities shall prepare an assessment of the current status of its inventory of historic properties required by section 110(a)(2) of the NHPA…No later than September 30, 2004, each covered agency shall complete a report of the assessment and make it available to the Chairman of the Advisory Council on Historic Preservation and the Secretary of the Interior….
>
> Executive Order 13287: Preserve America, 2003. Sec. 3(c) Each agency with real property management responsibilities shall, by September 30, 2005, and every third year thereafter, prepare a report on its progress in identifying…historic properties in its ownership and make the report available to the Council and the Secretary….
>
> The Secretary of the Interior's Standards and Guidelines for Federal Agency Historic Preservation Programs Pursuant to the National Historic Preservation Act, 1998. Standard 2: An agency provides for the timely identification and evaluation of historic properties under agency jurisdiction or control and/or subject to effect by agency actions (Sec. 110 (a)(2)(A) Management Policies 2006. 5.1.3.1 Inventories: The Park Service will (1) maintain and expand the following inventories…about cultural resources in units of the national park system…Cultural Landscape Inventory of historic designed landscapes, historic vernacular landscapes, …and historic sites….

Cultural Resource Management Guideline, 1997, Release No. 5, page 22 issued pursuant to Director's Order #28. As cultural resources are identified and evaluated, they should also be listed in the appropriate Service-wide inventories of cultural resources.

Scope of the CLI

The information contained within the CLI is gathered from existing secondary sources found in park libraries and archives and at NPS regional offices and centers, as well as through on-site reconnaissance of the existing landscape. The baseline information collected provides a comprehensive look at the historical development and significance of the landscape, placing it in context of the site's overall significance. Documentation and analysis of the existing landscape identifies character-defining characteristics and features and allows for an evaluation of the landscape's overall integrity and an assessment of the landscape's overall condition. The CLI also provides an illustrative site plan that indicates major features within the inventory unit. Unlike cultural landscape reports, the CLI does not provide management recommendations or treatment guidelines for the cultural landscape.

Inventory Unit Description:

The Tall Trees Grove Historic District is a discontinuous district of two nearby old growth coast redwood (*Sequoia sempervirens*) groves along Redwood Creek within Redwood National Park. The unit acquired significance after a 1963 National Geographic and National Park Service survey found what were then the world's tallest, second, third and sixth tallest trees on land owned by a lumber company. The survey and subsequent 1964 article in National Geographic Magazine fostered interest and support from the public, environmentalists, and wilderness enthusiasts for the establishment of a redwood national park. The original 1968 Redwood National Park boundary included the grove, but the later Redwood Expansion Act of 1978 expanded the park to protect the grove from the environmental effects of logging in the region and became an example of a more scientifically informed natural resource management era. The discontinuous district is approximately twenty acres of coast redwood in two separate groves along Redwood Creek. Although a map in the 1964 article drew one boundary around "The Tall Trees," the trees are in two distinct groves with no contributing features between. The first, third, and sixth tallest trees as identified in the 1963 survey are in the south grove most visited by the public. The second tallest tree is in a grove approximately ¾ of a mile north, or downstream, with no direct access. Because the two groves were historically referred to as one, they will continue to be referred to as "Tall Trees Grove" in this document. The trees are significant because they demonstrated that the trees of Tall Trees Grove are not a few single monumental organisms, but part of the ecology of Redwood Creek basin.

Site Plan

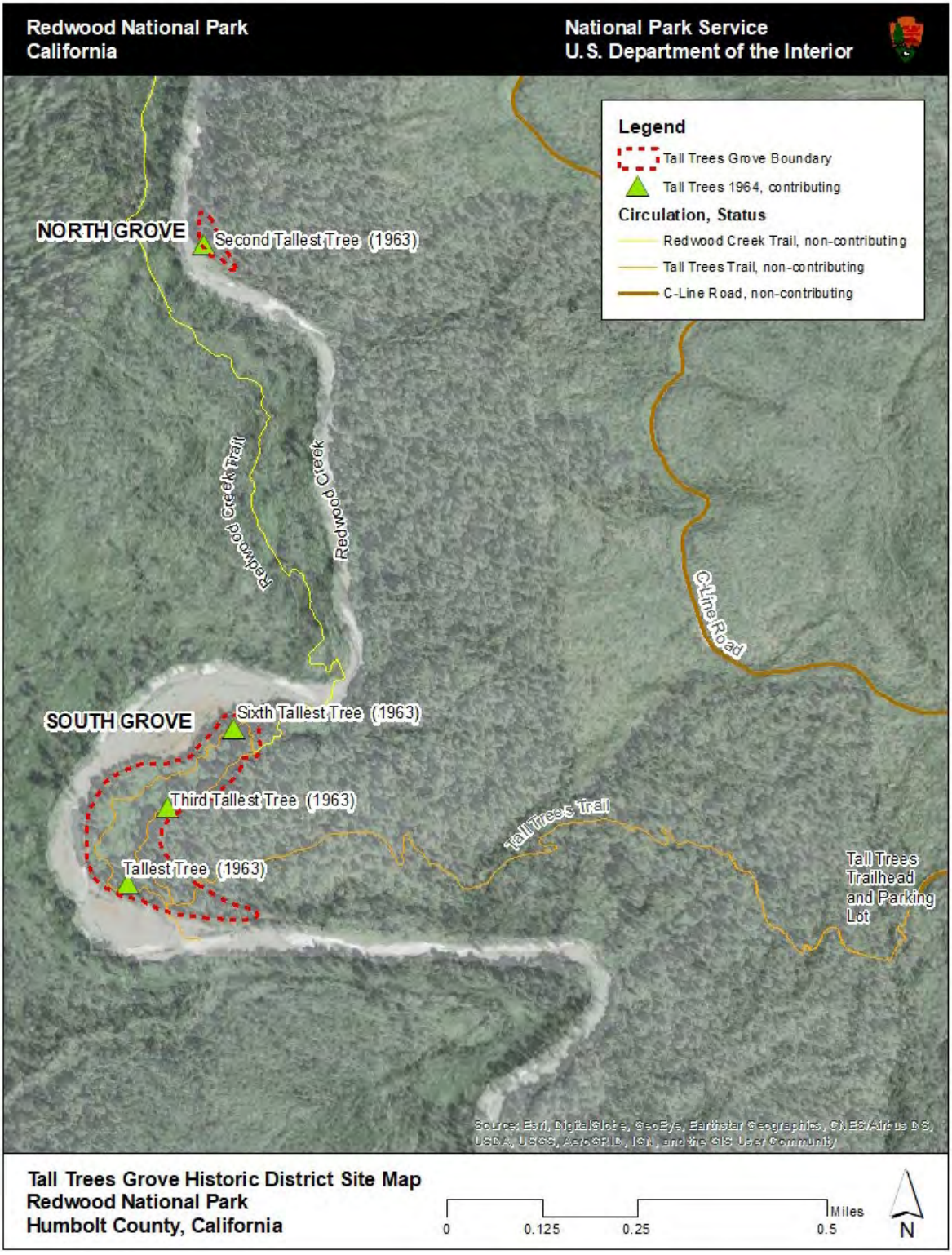

Figure 1. *Site plan of Tall Trees Grove Historic District in Redwood National Park.* [NPS 2021].

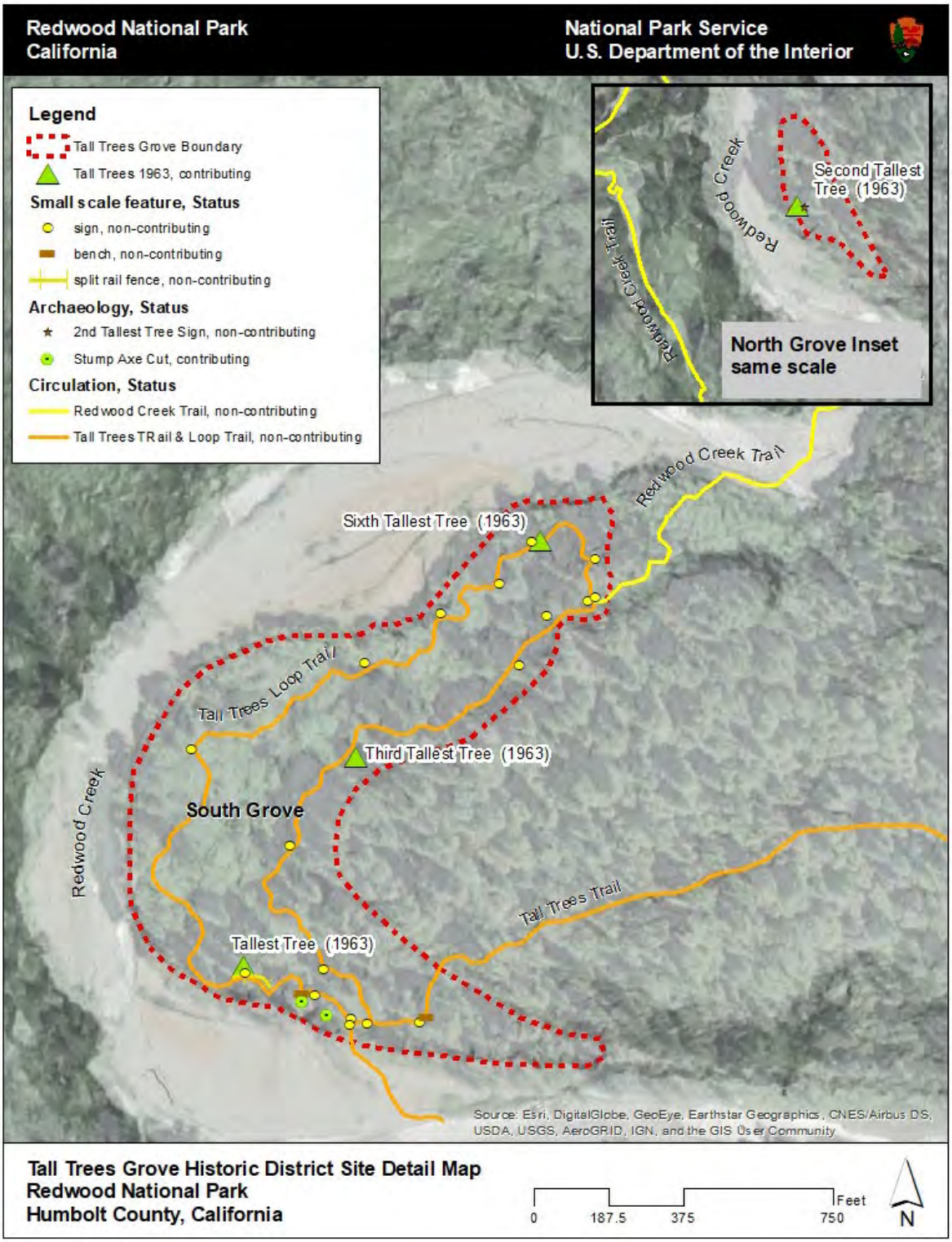

Figure 2. Detail of *Tall Trees Grove Historic District showing contributing and non-contributing resources* [NPS 2021].

Inventory Unit, Property Level and CLI Numbers

Inventory Unit Name:	Tall Trees Grove Historic District
Inventory Unit Size:	19.9 Acres
Property Level:	District
CLI Identification Number:	975808
Parent CLI Name:	none
Parent CLI Identification Number:	none

CLI Hierarchy Description

CLI Hierarchy Description: There is no parent landscape.

Park Information

Park Name and Alpha Code:	Redwood National Park (REDW)
Park Organization Code:	8480

Concurrence Status

Inventory Status: Complete

Completion Status Explanatory Narrative:

Fieldwork was undertaken by the National Council for Preservation Education interns Nicole Rehnberg, Jacob Torkleson, and Redwood National Park Historical Landscape Architect Kevin McCardle in the summer of 2018. Background and historical context were completed by Timothy Babalis, PhD, Historian, Pinnacles National Park, in spring/summer 2018. The report was finalized by NCPE intern Megan McPherson and Kevin McCardle in 2021.

Concurrence Status:

Park Superintendent Concurrence:	Complete
Park Superintendent Date of Concurrence:	September 7, 2022
National Register Eligibility:	Complete
National Register Concurrence:	Eligible - SHPO
Date of Concurrence Determination:	June 6, 2022

National Register Concurrence Narrative:

This district is eligible for the National Register of Historic Places under Criterion A, meeting the requirements of Consideration G, with a period of significance of 1962 to 1978 at the national level of significance.

Geographic Information & Location Map

Inventory Unit Boundary Description:

Boundary Description

The Tall Trees Grove Historic District contains two discontinuous groves along the east bank of Redwood Creek that contain the first, second, third and sixth tallest trees as identified in a 1963 National Geographic and National Park Service survey. The north grove of the district contains the second tallest tree, while the south grove contains the first, third, and sixth tallest trees. The boundaries follow the limits of the coast redwood groves on river terraces, the creek to the west, and the toe of the slopes to the east.

Boundary Justification

The boundaries are drawn around the extent of the coast redwood alluvial groves which contain the tall coastal redwood trees as identified in 1963 and subsequently publicized in 1964. Although the National Geographic article showed the trees within one area (Figure 4), ecological factors such as the limit of coast redwoods, soil type, and natural landforms define two separate redwood groves. The unique conditions found on alluvial flats create the tall trees. The intervening space between the two groves lacks significance.

GIS File Description:

State and Counties:

State: California

Counties: Humboldt

Size (Acres): 19.9 Acres

Boundary UTMS:

Source	Type	Datum	Zone	Easting	Northing
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415221*	*4563791*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415215*	*4563724*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415230*	*4563701*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415254*	*4563694*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415290*	*4563669*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415250*	*4563744*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415333*	*4562726*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415335*	*4562636*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415303*	*4562630*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415231*	*4562540*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415138*	*4562489*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415336*	*4562296*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*414986*	*4562380*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415012*	*4562581*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415176*	*4562628*
GPS–Differentially Corrected	*Line*	*NAD 83*	*10N*	*415276*	*4562725*

Location Map:

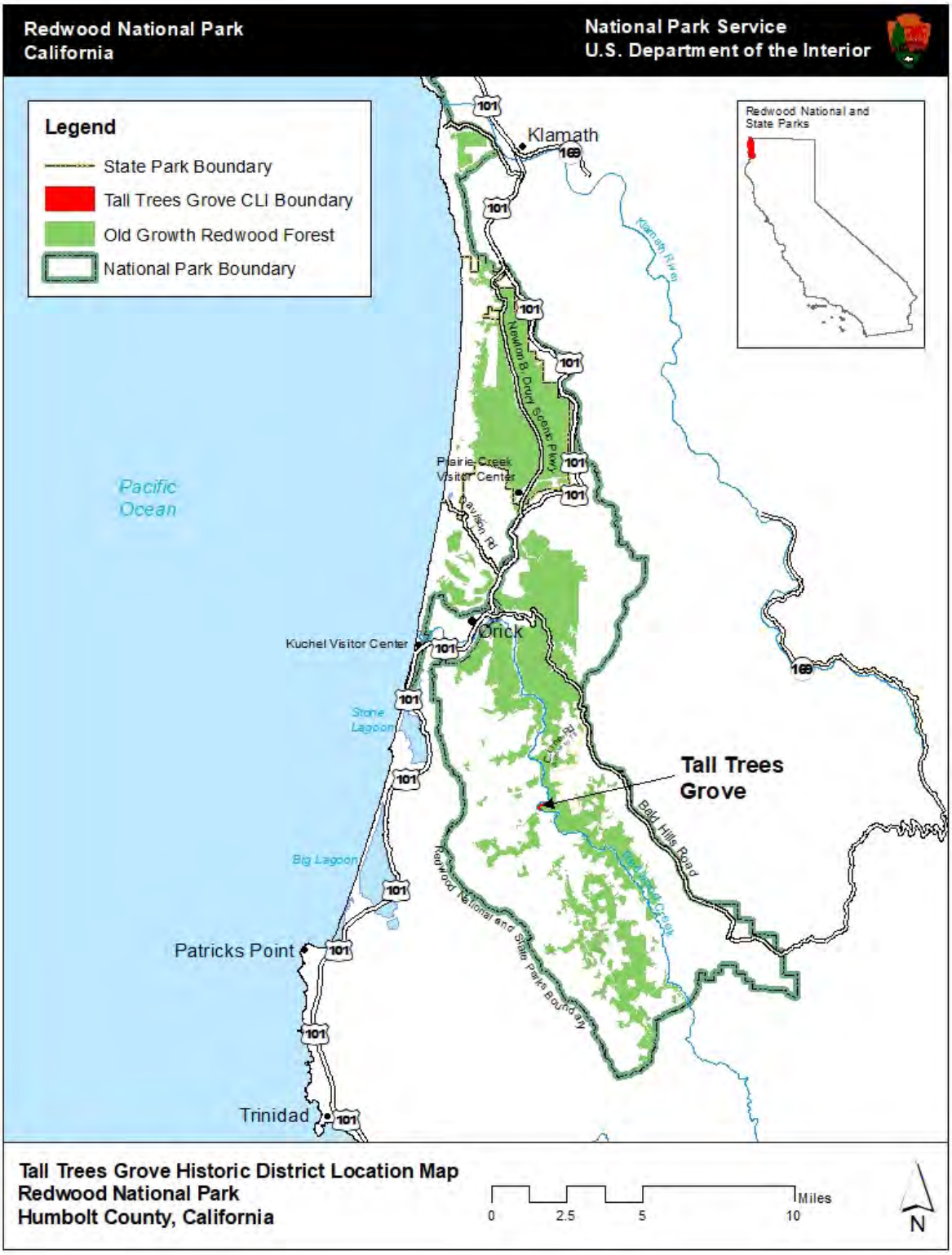

Figure 3. *Location of Tall Trees Grove Historic District within Redwood National Park.* [NPS 2018].

Management Information

General Management Information

Management Category: Recommend B: Should be Preserved and Maintained

Management Category Date: TBD

Management Category Explanatory Narrative:
The Tall Trees Grove Historic District meets the criteria for Category B—Should be Preserved and Maintained. The inventory unit is compatible with the park's legislated significance, which was created, in part, to preserve sites that can provide scientific study as well as have historical values related to the coast redwood forest and the streams with which they are associated (Public Law 90-545).

NPS Legal Interest

Type of Interest: Fee Simple

Public Access

Type of Access: Other restrictions

Public Access Explanatory Narrative:
The larger south grove of Tall Trees Grove Historic District is open to the public and can be accessed from two trails: Tall Trees Trail and Redwood Creek Trail. Visitors must have a permit to drive to the Tall Trees Trail parking lot. Up to 50 free permits a day are issued and traffic is controlled by a locked gate. The smaller grove to the north is not connected to any trail or road.

Adjacent Lands Information

Do Adjacent Lands Contribute? No

Adjacent Lands Description: NA

FMSS Assets

Tall Trees Trail (Location 3429)

Asset	Description	Contributing
313152	Sign, Wood	No
313153	Sign, Wood	No
313155	Sign, Wood	No
313158	Sign, Wood	No
313159	Sign, Wood	No
313160	Sign, Wood	No
313163	Sign, Wood	No
313164	Sign, Wood	No
313166	Sign, Wood	No

313169	Sign, Wood	No
313171	Sign, Wood	No
313174	Sign, Wood	No
313177	Sign, Wood	No
313178	Sign, Wood	No
313179	Sign, Wood	No
313181	Sign, Wood	No
313183	Sign, Wood	No
313186	Sign, Metal	No
313188	Sign, Metal	No
313192	Sign, Wood	No
313200	Sign, Wood	No
313207	Sign, Wood	No
313212	Sign, Wood	No
313586	Sign, Wood	No
313589	Sign, Wood	No
313594	Sign, Wood	No
313595	Sign, Wood	No
313601	Sign, Wood	No
313603	Sign, Wood	No
313610	Trail surface, soil, 4-feet wide	Partially
313695	Fence/Gate, Fence, Wood, 2.5 FT	No
313706	Culvert, Galvanized Steel, 32 FT, 12 IN	No
313712	Culvert, Galvanized Steel, 24 FT, 12 IN	No
313715	Seating, Bench, Wood, 7.9 FT	No
313730	Seating, Bench, Wood, 7.9 FT	No
313737	Seating, Bench, Wood, 7.9 FT	No
313742	Seating, Bench, Wood, 7.9 FT	No
313745	Walkable Structure, puncheon bridge	No
313759	Wall, Retaining, Wood, 33 FT	No
313763	Wall, Retaining, Wood, 6 FT	No
313766	Wall, Retaining, Wood, 11 FT	No
313774	Wall, Retaining, Wood, 300 FT	No
455779	Sign	No
5688	Sign, Wood	No

National Register Information

Existing National Register Status

National Register Landscape Documentation: Documented

National Register Explanatory Narrative: This district is eligible for the National Register of Historic Places under Criterion A, meeting the requirements of Consideration G, with a period of significance of 1962 to 1978 at the national level of significance.

National Register Eligibility

National Register Concurrence:	Complete
Contributing/Individual:	Individual
National Register Classification:	District
Significance Level:	National
Significance Criteria:	A – Associated with a major turning point in the history of American nature conservation and its underlying values
Period of Significance:	1963- March 27, 1978
Historic Context Theme: **Subtheme:**	Social and Humanitarian Movements Environmental Movement
Historic Context Theme: **Subtheme:**	Conservation of Natural Resources Origins of Watershed and Water Conservation
Historic Context Theme: **Subtheme:**	Conservation of Natural Resources Wilderness System
Historic Context Theme: **Subtheme:**	Recreation Tourism

Area of Significance:

Area of Significance Category: Conservation

NRIS Information:

Alpha Code/NRIS Name (Number) NA

National Historic Landmark Information

National Historic Landmark Status: No

World Heritage Site Information

World Heritage Site Status:	Yes
World Heritage Site Date:	9/5/1980
World Heritage Site Category:	Natural

Statement of Significance:

Summary

The Tall Trees Grove Historic District (Grove) consists of two nearby stands of old growth coast redwood (*Sequoia sempervirens*) located on Redwood Creek about ten miles downstream from the mouth near the town of Orick. The Grove acquired historic significance during the 1960s and 1970s for its key role in the establishment and subsequent expansion of Redwood National Park. A 1963 survey by the National Geographic Society and National Park Service found what were then the world's first, second, third, and sixth tallest trees identified. This discovery would help galvanize public support for a redwood national park protecting the old growth forests. The remote and pristine character of the surrounding valley appealed to wilderness enthusiasts and advocates. These values became increasingly important in the expansion of Redwood National Park to include the watershed of Redwood Creek—at least the lower third of it—from ridgeline to ridgeline.

The 1978 park expansion around the Grove demonstrates a shift in the values of redwood preservation from the first half of the twentieth century. Earlier preservation efforts were essentially aesthetic, focusing on the spectacular character of large or otherwise unusual old growth trees in easily accessible groves. Often known as "museum stands," these were usually located on the alluvial flats adjacent to roads or highways. While the Tall Trees Grove Historic District contains certain spectacular tall trees, it was relatively inaccessible to most tourists. Its preservation appealed to a more environmentally aware public and a new generation of wilderness enthusiasts. For wilderness advocates, the primitive experience of an unscathed nature was more important than the aesthetic spectacle. The preservation of the Tall Trees Grove also appealed to natural scientists who recognized the ecological importance, not only of the grove itself, but of the entire watershed and its biological communities. For them, the Grove epitomized a more wholistic interest in preserving or restoring intact natural habitat on the basis of scientific rather than aesthetic or recreational values. While there was no hard line between wilderness enthusiasm and ecological interest—the former often inspired the latter— the expansion of Redwood National Park reflected the growing importance of scientifically-informed natural resource management in the National Park Service and among its supporters.

National Register Significance Criteria:

Criterion A

The Tall Trees Grove Historic District is significant under National Register Criterion A for its association with a significant shift in the history of American nature conservation. The initial efforts to preserve the remote Grove within a redwood national park was an inspiration to the growing interest in wilderness experience and environmental activism of the 1960s which contrasted with the more aesthetically-oriented values of the preceding generation. The 1978 expansion of Redwood National Park around the Grove was recognition that individual sites could not survive in isolation from their surrounding environment. This change reflected the growing importance of the ecological sciences among conservationists and park resource managers by the 1970s.

The characteristics embodied in the Tall Trees Grove Historic District include the tall trees that captured the public's attention in 1964, the Grove's remote nature appealed to wilderness enthusiasts that helped galvanize their support in establishing Redwood National Park in 1968. The recognition of the need to manage whole ecosystems around Tall Trees Grove was key to the park expansion of 1978. Three sets of character-defining features reflect the values associated with these historical stages. First, the extraordinary size of the old growth redwoods within the grove reflects the aesthetic interest in spectacle. Second, the isolation, limited access, and minimal development of the grove support an experience of quiet, pedestrian exploration that reflects the interests of wilderness enthusiasts (even though Redwood Creek was never designated a Wilderness Area). And third, ecological values are reflected in the qualities associated with old growth forest as it would have existed in the absence of human-induced disturbances of European American culture. These latter character-defining features are natural conditions but have cultural meaning for their significance to the history of science and scientifically based resource management.

Criteria Consideration G

National Register criteria consideration for properties that have achieved exceptional significance within fifty years applies to this property. Tall Trees Grove achieved exceptional significance due to its association to historical events (1963 to 1978) that occurred before and after the fifty-year guideline. The significance of the property within the fifty-year guideline are associated with the historic trends toward public land management and public perception that lands could not be managed in isolation but existed within a broader environment that must be considered. This shift in land management was codified throughout the NPS with the Redwood Expansion Act of 1978. The association of Tall Trees Grove to these historic trends is well documented in works such as Susan Schrepfer's book *The Fight to Save the Redwoods: A History of Environmental Reform, 1917-1978*, Dale Hudson's book *Sierra Club v. Department of Interior: The Fight to Preserve the Redwood National Park*, and numerous other scholarly and popular publications.

National Register Period of Significance: 1963 – March 27, 1978

The period of significance dates from 1963 to March 27, 1978. In 1963 a National Geographic Society and National Park Service survey team found and documented the tallest trees then known to exist in Tall Trees Grove and the results brought widespread public attention. This discovery strongly supported efforts to establish Redwood National Park in 1968. The Redwood Expansion Act was signed by President Jimmy Carter on March 27, 1978, extending protection of the lower third of the watershed surrounding the Tall Trees Grove from ridgeline to ridgeline. The act supported ecologically based management and rehabilitation of the Redwood Creek watershed.

Chronology & Physical History

Cultural Landscape Type and Use

Cultural Landscape Type: Historic Site

Current and Historic Use/Function

Primary Historic Function–Major Category: Landscape
Primary Historic Function–Category: Natural Area
Primary Historic Function: Forest

Primary Current Function–Major Category: Recreation/Culture
Primary Current Function–Category: Outdoor Recreation
Primary Current Use: Other (Hiking trails)

Current and Historic Names

Current and Historic Name	Type of Name
Tall Trees Grove	Current and Historic
Glen of Giants	Historic

Ethnographic Associated Groups

Ethnographic Study Conducted: Yes

Ethnographic Associated Groups: Chilula
Association Historic, Current or Both: Both Current and Historic

Chronology

Year Begin	Year End	Event	Annotation
1879	1879	Proposed	Secretary of the Interior Carl Schurz proposes to protect two townships of old growth redwood forest with no resolution.
1901	1901	Established	California Redwood State Park, later renamed Big Basin State Park, in Santa Cruz County becomes the first park to protect any coast redwoods. The park is created by the newly formed Sempervirens Club.
1908	1908	Established	4,000 acres are added to Big Basin State Park.
1917	1917	Developed	Madison Grant, Henry Fairfield Osborne, and John C. Merriam drive north from San Francisco to the redwood forests along the rudimentary, and still-unfinished, Redwood Highway, inspiring them to create the Save-the-Redwoods League two years later.
1919	1919	Established	Save-the-Redwoods League is established.
1919	1919	Established	Save-the-Redwoods League begins advocating for the creation of a redwood national park.
1927	1928	Established	California State Parks Commission is established, and Fredrick Law Olmsted Jr. is hired to conduct a state-wide survey of potential park units.
1935	1935	Purchased	Congress authorizes two Redwood National Forest Purchase Units: 130,000 acres in Del Norte and Humboldt counties and 600,000 acres in Mendocino and Sonoma counties. Only the northern unit is realized with 14,500 acres acquired by the Forest Service on the Lower Klamath River.
1938	1938	Opposed	Opposition prevents the National Park Service from submitting its final Mill Creek proposal to Congress for a national park.
1946	1947	Proposed	Congresswoman Helen G. Douglas proposes creating a 2.4 million acre Franklin Delano Roosevelt Memorial Forest. This would be managed for multiple use by the U.S. Forest Service but would also include 180,000 acres for four national park units. The ambitious proposal failed.
1954	1955	Damaged	Torrential rains on steep slopes, exacerbated by logging, causes hillsides to give way and wash piles of slash and stacks of huge logs into Bull Creek, destroying 525 old-growth redwoods downstream in Humboldt Redwoods State Park.
1955	1960	Published	The Sierra Club publishes articles on the Bull Creek disaster and on the expansion of the Redwood Highway within redwood groves, garnering support for the creation of a redwood national park.
1961	1961	Established	Secretary of the Interior Udall expresses interest in the idea of a redwood national park at a meeting of the Sierra Club.
1963	1963	Surveyed	Discovery of the world's tallest trees in Tall Trees Grove by the National Geographic Society and National Park Service survey.

1964	1964	Built	Arcata Redwood Company, the owner of the grove, opens a trail in Tall Trees Grove as a public relations project calling it Gale of Giants.
1964	1964	Published	The National Park Service publishes *The Redwoods: A National Opportunity for Conservation and Alternatives for Action*, a comprehensive study of the north coast redwoods, concluding that more old growth needs to be protected in larger contiguous areas.
1964	1965	Damaged	A winter storm from 18 December 1964 to 7 January 1965 floods much of northern California and Oregon. Redwood Creek, with a flood stage of 19 feet, reaches a height of 23.27 feet.
1965	1968	Opposition	Local opposition to the creation of a redwood national park emerges.
1965	1968	Established	Save-the-Redwoods League and the Sierra Club advocate for competing ideas, one centered on Mill Creek and the other on Redwood Creek, respectively, of where a redwood national park should be located.
1965	1965	Published	The Sierra Club publishes *The Last of the Redwood.*
1965	1965	Established	Laurance Rockefeller submits a report to President Johnson on behalf of Save-the-Redwoods League, persuading the president to support the Mill Creek option.
1966	1966	Proposed	In January and February of 1966, Secretary of the Interior Stewart Udall recommends a single-unit park located at Mill Creek, comprising 39,000 acres. Udall forwards the Administration's plan for the proposed park, and it is introduced as S. 2962, the Kuchel-Clausen bill.
1966	1966	Proposed	The Sierra Club submits a competing proposal centered on the Redwood Creek watershed, comprising 90,000 acres.
1966	1966	Opposed	In anticipation of the creation of a redwood national park at Mill Creek, the Miller Redwood company began aggressively clear-cutting its property up to the boundary of Jedediah Smith State Park, causing irreparable damage.
1968	1968	Established	Redwood National Park is established with President Lyndon B. Johnson signing the Redwood National Park Act creating the park on 2 October 1968 (P.L. 90-545). The bill was a compromise of the Mill Creek and Redwood Creek options, consisting of a large unit near Mill Creek and a long, narrow strip (referred to as "the worm" or "Redwood Creek Corridor") along Redwood Creek to include Tall Trees Grove.
1968	1968	Established	Redwood National Park dedication ceremony takes place in the park on 25 November 1968. Lady Bird Johnson attends representing the President.
1972	1973	Surveyed	The Curry Study is initiated to study the Redwood Creek basin and potential threats to the park resources within it, concluded Tall Trees Grove stood a good chance of being washed away in a severe weather event.
1975	1975	Surveyed	Richard Janda begins his study of Redwood Creek watershed conditions.

1973	1975	Developed	The Sierra Club files a lawsuit against the Department of the Interior alleging that the Department had failed both its statutory and public trust responsibilities to preserve the park's primeval redwood forest and associated ecosystems.
1975	1975	Established	In July 1975 U.S. District Court ruled in favor of the Sierra Club, determining that persuasive evidence already existed showing that Redwood National Park was suffering damage from adverse impacts outside its borders and finding that the Department of the Interior's failure to take action to protect the park from these impacts was "unreasonable, arbitrary, and an abuse of discretion."
1978	1978	Expanded	Redwood National Park is expanded to include the lower Redwood Creek watershed surrounding Tall Trees Grove. The act was signed into law by President Carter on March 27, 1978.
1978	1978	Built	National Park Service constructs the present Tall Trees Trail from the bottom of C-Line Road to the Grove.
1978	1978	Built	Shuttle bus service to Tall Trees Grove begins.
1981	1981	Built	NPS report recommends the installation of a split-rail fence around the tallest tree, following significant visitor damage to its base.
1988	1988	Built	Keyed, wooden, interpretive posts installed along the trail.
1995	Today	Maintained	Shuttle is replaced with a permit system whereby a limited number of visitors drive personal vehicles down C-Line Road to the trailhead at the former shuttle turn-around.

Physical History

i. Background and Context

Early Preservation of the Redwoods

By almost any standard, the Tall Trees Grove Historic District is an exemplary stand of coast redwoods. Many of the trees there have lived to remarkable ages and grown to equally remarkable heights. Their success is due to environmental conditions that are well-suited to the needs of *Sequoia sempervirens*, the coast redwood species, but these conditions are not unique to Redwood Creek where the Tall Trees Grove is located. Similar environments, just as ideal, may be found throughout the two million acres of north and central coastal California where the coast redwood is endemic, but most of this vast region was logged during more than two centuries of European and Euro-American settlement. Only two and a half per cent of the original old-growth redwood forest was left standing when the Tall Trees Grove was discovered and documented by modern Americans. The most extraordinary thing about the Tall Trees Grove is the fact that it exists at all after so many years of aggressive logging upstream, a circumstance it owes to the remoteness of Redwood Creek and the challenges associated with working there (Figure 3). These conditions spared Redwood Creek from the attention of the lumbermen until after World War II, when technology and economic demand made logging the remote watershed a potentially profitable undertaking for the first time. By then, however, interest in preserving the redwoods for aesthetic and recreational purposes had begun to compete with more traditional utilitarian values, and the Tall Trees Grove would become the center of a long and acrimonious debate over the cultural significance of the old-growth forest and of nature itself.

The first redwoods to be protected on the north coast of California were stands of exceptionally tall trees, like the Tall Trees Grove. They grew on well-watered alluvial flats along the lower reaches of coastal rivers and streams, often close to roads and development, making them relatively easy to access. Their early protection was, in fact, closely associated with the development of the Redwood Highway, later to become Highway 101. The highway provided a vantage from which to enjoy the scenic beauty of the redwood trees while at the same time making it possible for many more people interested in scenic beauty to visit them. These same people would become the core of the movement that succeeded in preserving the trees. By contrast, the Tall Trees Grove lay nowhere near any major road, or even the possibility of a road, and was largely inaccessible to the motor tourists who constituted the first generation of conservationists.[1] Had they known about the Tall Trees Grove, these early conservationists would have been impressed by the monumentality of its trees but still might not have considered the place a good candidate for a park because of the remoteness of the site in the midst of a vast, roadless forest.[2] Years later, after values had changed, this remoteness would become an important characteristic arguing in favor of preserving the grove within a redwood national park. The significance of these changing priorities is apparent only in relation to the values that preceded them, many of which persisted and still contributed to the preservation of the Tall Trees Grove even after newer values had largely taken their place.

[1] Except only the Trinidad Trail, which crosses Redwood Creek at the Tall Trees Grove. This was an unimproved trail that probably followed a traditional Chilula route. It was used by muleteers carrying supplies from Trinidad to the gold diggings on the Klamath and Salmon Rivers from 1850 to the 1890s. It had already been abandoned by the early twentieth century. [Edwin C. Bearss, "Chapter IX.A," in *History Basic Data: Redwood National Park, Del Norte and Humboldt Counties, California* (Washington, D.C.: National Park Service, Div. of History, 1969)].
[2] The Redington Report of 1920, discussed below, did in fact consider Redwood Creek in a survey of potential national park sites, but dismissed the remote area with little comment.

Monumental Groves and Scenic Corridors

The earliest proposal to protect the coast redwoods dates from 1879, when Secretary of the Interior Carl Schurz suggested "that the President be authorized to withdraw from sale or other disposition an area at least equal to two townships in the coast range in the northern, and an equal area in the southern portion of the state." This proposal was a response to the rapid deforestation resulting from private, unregulated logging at that time, but nothing came of it. The first actual protection of any coast redwoods came with the establishment of the California Redwood State Park in Santa Cruz County in 1901, preserving 3,800 acres. This was established through the efforts of a citizens group representing local colleges and San Francisco Bay Area urban residents who formed the Sempervirens Club that year. In 1908, an additional 4,000 acres of federal public lands were added to this park, which was later renamed Big Basin Redwoods State Park. In 1908, Muir Woods National Monument was established under the Antiquities Act of 1906. This was the first federal action to protect coast redwoods. It preserved 295 acres of mostly old growth forest in Marin County on the north side of San Francisco Bay.[3]

By this time, most of the coast redwoods at the southern end of the species' population had been logged. Only the forests in California's north coastal counties remained abundant, but they were increasingly threatened as logging in this region accelerated to compensate for the exhaustion of the southern forests and as improved shipping and railroad links to the north coast made it easier to exploit once inaccessible stands. Road development brought new threat, but also opportunities, following approval of a state highway bond in 1910. With the construction of the Redwood Highway over the next two decades, the north coast redwoods became even more accessible to loggers, but they also became accessible to motor tourists, many of whom would become active in the effort to protect the redwoods from further logging.[4]

The redwoods of northern California were a scenic attraction for motorists almost as soon as there was a rudimentary road to make them accessible. As the Redwood Highway gradually opened up the northern California coast in the years following World War I, enthusiasm among auto tourists increased. The Redwood Highway began before a scenic highway was differentiated from another highway, but the aesthetic and recreational interests of so many of its early users eventually led to the promotion of these values by preserving roadside corridors and prioritizing the most attractive alignments.[5]

In 1917, three men—Madison Grant, a zoologist; Henry Fairfield Osborne, a paleontologist and president of the American Museum of Natural History in New York; and John C. Merriam, a professor of paleontology at the University of California in Berkeley—drove north from San Francisco into the redwood country along the rudimentary, and still-unfinished, Redwood Highway. They were amazed by the massive old growth trees—larger and more beautiful than anything arboreal they had ever seen—and appalled by the devastation of the loggers who were cutting them down. Their experience would inspire the men to found the Save-the-Redwoods League two years later with the intention of preserving as much of the remaining old growth trees as they could.[6] The fact that these men first encountered the redwoods,

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[3] Mark David Spence, *Watershed Park: Administrative History, Redwood National and State Parks (Seattle, WA: National Park Service, 2011)*, pp. 50-51; and Susan R. Schrepfer, *The Fight to Save the Redwoods: A History of Environmental Reform, 1917-1978* (Madison: University of Wisconsin Press, 1983), pp. 11-12

[4] Spence, *Watershed Park*, p. 53; Schrepfer, *Fight to Save the Redwoods*, pp. 8-9; Kenneth C. Adams, "Start of Highway System," *California Highways and Public Works—Centennial Edition* (September 9, 1950): 71-80; and John Robinson, "The Redwood Highway: Part II, Building the Road," *California Highways and Public Works* 43, nos. 7-8 (July-August, 1964): 24-33.

[5] The highway engineers were initially criticized for their reckless indifference to these values. See, for example, Madison Grant, "Saving the Redwoods: An Account of the Movement During 1919 to Preserve the Redwoods of California," [New York] *Zoological Society Bulletin* 22, no. 5 (1919): 99. As Grant makes clear, the road builders first had to be made aware of the significance of redwood scenery through the persuasion of conservationists like himself before they would begin to protect it.

[6] Schrepfer, *Fight to Save the Redwoods*, pp. 3-17.

and conceived their plans to save them, from the seat of an automobile was significant. Not only did it illustrate the affinity of the early motorist with nature enthusiasm, the event foreshadowed the conservation strategy these men would subsequently adopt. Knowing that motorists, by and large, shared a similar regard for the scenic value of nature as themselves, Grant and his companions would address much of their early campaign to save the redwoods toward the motoring community.

The League was able to cultivate many wealthy donors through personal connections, since most League members were themselves of wealth and privilege. At the same time, the Save-the-Redwoods League successfully cultivated popular support through innovative marketing techniques, as evidenced by their hiring of the advertising firm of Drury Brothers (Newton and Aubrey Drury), who made effective use of direct mailings as well as descriptive articles and photography placed in popular magazines.[7] The League's first private land acquisition was made in 1919 with donations from wealthy League members William Kent and Stephen Mather for portions of what would later become Humboldt Redwoods State Park on the south fork of the Eel River. Over the years, the League would continue to acquire individual redwood groves with private funds. As incentive, the donor's name would be inscribed on a sign placed before the sponsored grove. More than a thousand groves were eventually protected in this manner throughout the state, and the practice continues today.[8] In addition to acquisitions in fee simple, early League efforts also involved lobbying to persuade existing property owners, and potential owners, to protect redwood groves. These efforts included petitioning the California Highway Commission to obtain wider roadside easements for scenic buffers and cooperating with the Commission to halt the then common practice of allowing easements to be logged prior to their conveyance.[9]

The League was also involved in one of the first serious efforts to establish a redwood national park on the north coast. The idea had been suggested in 1917 at the American Association of Park Superintendents' annual meeting in St. Louis. The Association praised Congress for having protected the giant sequoia (*Sequioadendron giganteum*) of the Sierra Nevada mountains within Sequoia National Park and resolved that a similar reservation be made in coastal northern California to protect the state's other redwood species, the *Sequoia sempervirens*.[10] The resolution was later published in the June 1918 number of *The Timberman*, a Portland-based trade journal of the logging industry whose editor was a friend of Save-the-Redwoods League founders.[11] It was also submitted to Congress and to Secretary of the Interior Franklin K. Lane. Stephen T. Mather, who was both Director of the recently-established

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[7] Sara Amy Leach and Brian Grogan, *Redwood National & State Parks Roads: Haer No. Ca-269* (Washington, DC: U.S. Dept. of the Interior, National Park Service, 2001), pp. 32-33.
[8] Save-the-Redwoods League announced its thousandth memorial grove in 2007. [http://www.savetheredwoods.org/about-us/mission-history/league-milestones (accessed 19 June 2017)].
[9] Leach, *HAER*, pp. 29-33.
[10] Such an act, the superintendents insisted, would transcend the merely utilitarian value of timber production and possessed quasi-religious significance, as they grandiloquently observed in reference to the giant sequoia: "One of the sublimest attributes of man being the power to appreciate and enjoy the handiwork of God as shown in mountain, lake and waving forest, to have lost the "Big Trees of California" would have been, in effect, to mar and despoil the aesthetic heritage of future generations. Within the shade of these grand temples' lessons are forever taught that tend to inspire the soul of man and to lift it to a higher plane. The oldest living things on earth, these mighty trees have tossed their waving arms to greet the morning suns of 40 centuries. Within their sturdy hearts are safe locked deep secrets of millenniums that are gone. Antedating the Pharaohs and the pyramids, the story of Columbus, the Vikings and the Red Man's mysterious coming are to them but events of yesterday. Future millions standing in their awesome presence will bless the noble men who rescued these ancient monarchs of the forest for the delight and inspiration of posterity." [George M. Cornwall, ed., "A National Redwood Park," *The Timberman* 19, no. 8 (June 1918): 29]. Language and sentiments such as this were still being used to extol the coast redwoods even forty years later and show the persistence of certain tropes, such as the monumentality of age, that were consistently employed by conservationists to justify the preservation of old growth forests.
[11] George M. Cornwall, ed., "A National Redwood Park," *The Timberman* 19, no. 8 (June 1918): 28-29.

National Park Service and a founding member of the Save-the-Redwoods League, endorsed the idea and on 30 June 1919 officially recommended to Secretary Lane that he follow through with the proposal for a redwood national park. One week later, Congressman Clarence F. Lea of California introduced H.R. 159 authorizing the Department of the Interior to appoint a three member committee to investigate "the suitability, location, cost, if any, and advisability of securing a tract or tracts of land … containing a typical stand of redwood trees …[to] be set apart and dedicated as a national park for the benefit and enjoyment of the people of the United States and for the purpose of preserving such trees from destruction."[12] The committee examined sites along the Klamath River, the South Fork Eel River, Prairie Creek, Redwood Creek, and Big Lagoon. Its conclusions, summarized in the Redington Report (after its principal author, USDA District Forester Paul Redington) suggested that the lower Klamath afforded the best opportunity for a national park with potentially 64,000 acres of old growth forest meeting park criteria. The Report also recommended protecting a smaller unit of about 1,800 acres on the South Fork Eel River for a roadside park along the proposed Redwood Highway. It dismissed the Redwood Creek basin altogether, noting only that it remained untouched by logging but possessed no further values. Although the Redington Report received a favorable reception with the Wilson administration, Congress proved reluctant to appropriate funds to acquire private lands for a public reservation, a principle which at that time had no precedent. As a result, the proposal languished and was forgotten. Its most enduring legacy was a certain skepticism about federal involvement among conservation groups like the Save-the-Redwoods League, who determined that future efforts would have to look elsewhere than Washington DC.[13]

By 1925, if not earlier, the League began to recognize the need to protect larger units of redwood forest even as it continued to dedicate roadside memorial groves. That year it supported legislation to establish a state parks system. The League cooperated closely with other conservation organizations and the automobile clubs to promote a parks bill. Although initially vetoed by Governor Friend Richardson, who opposed any measure that might bring increased taxes, the proposal was resubmitted the following year under a more progressive administration and approved in April of 1927 by a unanimous vote of the legislature. One of the first acts of the newly-created State Parks Commission was to contract a state-wide survey of potential park units. This was conducted under the supervision of renowned landscape architect Frederick Law Olmsted, Jr. and completed at the end of 1928. The coast redwood forests figured prominently in Olmsted's recommendations, which included both preservation of roadside scenery (through control of development and acquisition of easements) as well as development of more expansive protected areas beyond the highway itself. The latter would be achieved with the establishment of the redwood state parks.[14]

Even as Olmsted was completing his survey of recommended park units, the state legislature presented voters with a bond act to fund park acquisition. The Save-the-Redwoods League helped organize an aggressive advertising campaign to support this measure, complete with a movie short produced by Hollywood's Mary Pickford Company. It was the largest publicity effort up to that time in California and resulted in overwhelming approval of the bond by a nearly three-to-one margin. With the help of these public funds, which were used to match private donations, the Save-the-Redwoods League was able to establish the nuclei of four redwood state parks in northern California—Humboldt Redwoods, Prairie Creek Redwoods, Del Norte Coast Redwoods, and Jedediah Smith Redwoods. These were gradually

[12] Paul G. Redington, *Report on Investigation for Proposed Redwood National Park, California* (Washington, DC: U.S. Forest Service, 1920).
[13] Leach, *HAER*, pp. 37-38; Save-the-Redwoods League, "Chronology, Redwood National Park," July 1979, in REDW Archives Library, Orick, CA; and Spence, *Watershed Park*, 54-55.
[14] Schrepfer, *Fight to Save the Redwoods*, pp. 29-36; Leach, *HAER*, pp. 41-43; and Frederick Law Olmsted, Jr., *Report of State Parks Survey of California* (Sacramento, Calif.: California State Parks Commission, 1928).

expanded over the subsequent decades with additional land purchases and donations.[15] While the redwood state parks were far more than roadside scenery, they remained anchored to the highway that passed through them and were, in an important way, products of it. Olmsted had noted in his 1928 report that one major category of state parks should exist in relation to the highways they adjoined and provide interesting places for motorists to stop and enjoy "the qualities that give them special value, scenic, recreational, historic, scientific or otherwise."[16] NPS Director Stephen Mather was even more specific about the secondary role of state parks, arguing that they should act like stepping stones for motorists enroute to final destinations in a national park. In his annual report for 1920, Mather had encouraged both the League and the state to develop scenic attractions along the Redwood Highway, including redwood state parks, to serve as adjuncts to a redwood national park that Redington had recently proposed for the far northern end of the highway in Del Norte County.[17]

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In its early efforts to protect old growth redwoods, the Save-the-Redwoods League was principally motivated by its founding members' interest in scenery and monumentalism. Scenery, which implies the enjoyment of landscape from a picturesque vantage, was, at this time, closely tied to motor tourism, a sport that was becoming increasingly popular during the first two decades of the twentieth century. As a result, the forests that the League sought to protect were those that were readily accessible to roads, or could easily be seen from them.[18] The emphasis on roadside scenery was implicit even in the League's early efforts to promote a national park, as shown by the observations of Charles Punchard, an NPS landscape engineer who accompanied an early League reconnaissance of the northern redwoods: "If cooperation [of private land owners] can be secured at this time," Punchard wrote in his report, "it will be a step toward the preservation of the growths along the highways, which are so important in their attractiveness, popularity, and maintenance. Shaded highways are always the most pleasant to drive upon and therefore the most popular while the annoyance of blowing dust is lessened considerably because of their ability to hold moisture longer than highways exposed to the sun at all time."[19] With statements such as this, it can be difficult to tell whether early conservationists valued the highway as a means of appreciating (and protecting) the redwoods, or whether they valued the redwoods as attractive scenery to embellish the highway. At this early stage of automobile development, when motorists still traveled at modest speeds and even the Redwood Highway was only a winding one-lane road of cobbled together county roads, there was little reason to see any contradiction between road construction and redwood conservation. Not until the second half of the century, when the demand for higher speeds resulted in larger, more complex freeways did it become apparent that road development was itself a threat to conservationist values.

The other interest that motivated the founders of the League was monumentalism. Like so many visitors to the north coast redwoods, League members were struck by the enormous size of these trees, especially their height. The coast redwood is the tallest species of tree in the world, capable of growing well in excess of 300 feet under optimal conditions. These conditions are typically found in the deep alluvial

[15] Schrepfer, *Fight to Save the Redwoods*, pp. 36-37.
[16] Olmsted, *State Parks Survey*, p. 32.
[17] Both the lower Klamath and Mill Creek sites recommended by the Redington Report were located in Del Norte County. [Schrepfer, *Fight to Save the Redwoods*, p. 18; and Paul Sutter, *Driven Wild: How the Fight against Automobiles Launched the Modern Wilderness Movement* (Seattle: University of Washington Press, 2002), p. 37].
[18] Spence, *Watershed Park*, p. 53; and Sutter, *Driven Wild*, pp. 19-53.
[19] Charles P. Punchard, Jr., "Report on a Proposed Redwood Park in California," 20 September 1919. Quoted in Leach, *HAER*, pp. 35-36. These comments also reflect the prevailing landscape aesthetic of the National Park Service at that time, which was largely consistent with that of Save-the-Redwoods League].

soils along the lower reaches of streams. The League's earliest conservation efforts consequently focused on groves of the largest trees that grow in these bottomlands. (It helped that these groves were also more accessible, being nearer the coast where roads and population centers were located.) But the monumentality of these redwood giants consisted not just in their remarkable size but in their equally-remarkable age, which could be greater than 2000 years. The writings of prominent League members, such as John Merriam and Madison Grant, emphasized this depth of time far more than the height and girth of the trees themselves. Great size, in fact, seemed to impress these men mainly as a sign of the trees' extraordinary age. John Merriam, in *The Garment of God*, wrote about the ability of giant redwoods to inspire us with the vast accumulation of years embodied in their massive forms,

> Standing in the deep forest among great pillars that are a real expression of strength and stability resulting from eons of creative molding, we look out through the living canopy which they support and see their growing plumes stretching on into the light. One cannot avoid the feeling that there is in this view something comparable to a vision through the avenues of time from past to future. Out of deep shadows, from the midst of surroundings like those of other ages, we look through the long sweep of trunks standing like monuments, and see beyond the crown of verdure which is their living present … The vision of the years presented by the redwood forests is one of the most important in all nature.[20]

The monumentality of age that awed visitors to the coast redwood groves was part of the scenic spectacle of these places. But to Merriam and other founders of the League, it served a didactic purpose as well. The vision of time extending from primitive past to distant future illustrated the vast scale of life itself at a moment when the biological sciences were coming to grips with new discoveries in paleontology—Merriam's own field of study—and Darwinian evolution. The former gave evidence of life's multifold diversity, while the latter suggested its longevity.[21]

Time was implicit throughout the redwood forest not only because each tree was capable of extraordinary age, but because the species itself was extraordinarily ancient. In that context, the redwoods become expressions of evolutionary time, a point that the League's founders were fond of pointing out. Madison Grant begins an article on saving the redwoods with a discussion of the history of the genus *Sequoia*,

> These trees, virtually in their present form, flourished in California before the mammals developed from their humble, insectivorous ancestors of the Mesozoic and while the dinosaurs were the most advanced form of land animals. The mountains upon which these trees now stand contain fossil records of early Sequoia-like trees, proving that this group abounded before the rocks that constitute the present Sierras and Coast Ranges were laid down in the shallow seas, to be upheaved later and eroded into their present shapes.[22]

But the redwoods spoke so evocatively of evolution not simply because they exemplified evolutionary processes but because they had stood changeless for so long in the midst of these processes. According to a prevailing interpretation of Darwinian theory, accepted by Merriam and other members of the League, evolution was linear, leading inexorably to more complex and superior stages of development.[23] The redwoods represented the culmination of an evolutionary lineage, a climax stage frozen in primeval

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[20] John C. Merriam, *The Garment of God: Influence of Nature in Human Experience* (New York: C. Scribner's Sons, 1943), pp. 98-99.
[21] The value of primitive nature to illustrate these scientific principles was an idea that Merriam developed at length in *The Garment of God*. For an earlier treatment of this theme, see John C. Merriam, "The Unity of Nature as Illustrated by the Grand Canyon," *The Scientific Monthly* 33, no. 3 (1931): 227-234.
[22] Madison Grant, "Saving the Redwoods: An Account of the Movement During 1919 to Preserve the Redwoods of California," [New York] *Zoological Society Bulletin* 22, no. 5 (1919): 91.
[23] On orthogenesis in evolutionary theory, see Schrepfer, *Fight to Save the Redwoods*, pp. 80-87.

perfection. This perfection contributed to the monumental significance of the ancient redwoods for League conservationists, who saw in them evidence both of evolution's great depth of time and its progressive thrust. The most exemplary groves preserved by the League were, in essence, museums of life's grandest accomplishments. Reflecting on Jedediah Smith State Park, Merriam writes that,

> The redwood grove, as typified for example by the splendid primitive, primeval forest of Mill Creek, is an *island in time*, where we may go to be thrilled, and to worship, in nature as it was and is—preserved perhaps to show us in the living state some of the grandest works of creation accomplished within the span of time revealed to us by the records of the earth.[24]

Belief in the unidirectional, progressive nature of evolution allowed scientists like John Merriam and his contemporaries to integrate humans into the natural world in a manner that preserved many of the assumptions of their predominantly Christian culture. That culture assumed the superiority of humans relative to nature. By asserting that humans were the summit and culmination of an evolutionary process "reaching through vast ages in the story of the earth and leading ultimately to advance in human life and institutions," humans could be both superior and natural. Human civilization became not the antithesis of nature but its fulfillment.[25] The redwoods seemed proof of these assumptions, exemplifying a climax stage of development that was the arboreal analogy of human dominance.[26]

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After initial efforts to establish a redwood national park had failed by 1920, conservationists, primarily working through the Save-the-Redwoods League, focused their attention on private purchases and developing a state park system. Not until the 1930s was interest renewed in federal protection of the north coast redwoods as President Roosevelt stimulated dramatic growth in the federal government to address the challenge of the Depression. At the same time, declining demand for timber products was forcing logging companies to divest themselves of unproductive forest lands, which the government now sought to acquire. In 1935 Congress authorized two Redwood National Forest Purchase Units—130,000 acres in Del Norte and Humboldt counties, and 600,000 acres in Mendocino and Sonoma counties. Only the northern unit was ever realized, with approximately 14,500 acres acquired by the U.S. Forest Service on the lower Klamath River. The National Park Service also became interested again in the redwoods, attempting to purchase 18,000 acres on the Mill Creek watershed, but its efforts were stymied by resistance from the League and other conservationists, who were alarmed by the Park Service's aggressive development of visitor facilities and other infrastructure which it was undertaking with the assistance of federal unemployment relief programs such as the Civilian Conservation Corps. Their opposition

[24] Merriam, *Garment of God*, p. 95.
[25] Merriam, *Garment of God*, p. 149.
[26] For at least some of the League's founders, this analogy was construed in more narrowly racist terms. Madison Grant, an ardent proponent of eugenics, compared the superlative characteristics of the coast redwoods to the alleged superiority of the Nordic race. Both had to be protected from the depredations of inferior competitors, an idea he developed in *The Passing of the Great Race*. The second edition of this book appeared the same year that the Save-the-Redwoods League was founded. John Merriam's own views on racial superiority are less clear, though he participated in some of the same eugenics organizations as Grant. Although Susan Schrepfer mentions the relationship between redwood preservation and white, or Nordic, supremicism, fuller treatment of this theme is given in the following: Alexandra Minna Stern, *Eugenic Nation: Faults and Frontiers of Better Breeding in Modern America* (Berkeley: University of California Press, 2005); Jonathon Peter Spiro, *Defending the Master Race: Conservation, Eugenics, and the Legacy of Madison Grant* (Burlington: University of Vermont Press, 2009); and Garland E. Allen, : “Culling the Herd: Eugenics and the Conservation Movement in the United States, 1900-1940," *Journal of the History of Biology*, 46, no. 1 (2013): 31-72.

prevented the NPS from submitting its final Mill Creek proposal to Congress in 1938. The rising value of timberlands with the outbreak of war shortly afterwards would preclude any further proposals.[27]

The final attempt to establish a federal reserve among the north coast redwoods prior to the modern movement came just after the conclusion of World War II. In 1946 and again in 1947, Congresswoman Helen G. Douglas proposed creating a 2.4 million acre Franklin Delano Roosevelt Memorial Forest. This would be managed for multiple use by the U.S. Forest Service but would also include 180,000 acres for four national park units. The ambitious proposal failed. It was opposed by the League, whose members had become wary of federal involvement and preferred to work through private philanthropy; it was also opposed by the timber companies, who feared restrictions on logging despite the multiple-use doctrine that would prevail over most of the land; and it was opposed by the Forest Service which preferred to focus on its planned Six Rivers National Forest and feared that Douglas' proposal would accelerate commercial logging before the private lands could be acquired. Surprisingly, the Douglas proposal was even opposed by the National Park Service, who believed that the best redwood forests were already protected within the existing state parks. Any chance of pursuing this idea was finally dashed when Helen Douglas lost her bid for U.S. Senate against Republican candidate Richard M. Nixon in a campaign so vicious it earned Nixon the nickname "Tricky Dick."[28] Unfortunately, this was the last opportunity to protect any substantial area of contiguous old growth redwood forest.[29] A booming housing market with the country's post-war economic growth dramatically increased demand for timber over the next two decades. Assisted by improved technologies developed during the war, the north coast logging industry doubled its production rates during this period to an average annual cut of more than a billion board feet by the late 1950s.[30] The value of redwood timber lands grew commensurately, making it increasingly costly to purchase private lands for conservation purposes.

ii. A New Type of Park (1960-1968)

After a hiatus of nearly two decades, interest for creating a Redwood National Park once more emerged during the early 1960s. The principal impetus was the growing threat to the redwoods as cutting accelerated. A related but secondary threat that would prove even more consequential in motivating public interest was freeway development. Not only did road construction directly impact the redwood forests by cutting trees and bulldozing easements, but it also brought countless more people to witness the scene of devastation. Finally, the environmental damage resulting from both activities was illustrated through a series of natural events with dramatically unnatural consequences when winter storms eroded the cut-over slopes and toppled hundreds of old growth trees in the river bottoms below.

Roads through the north coast redwood belt had had relatively minor effect on the forest environment up through World War II. Even the Redwood Highway, constructed between 1919 and 1930, had mostly followed existing county roads that utilized natural topographical contours and required little, if any, grading, felling of trees, or other modifications of the environment.[31] Such rudimentary engineering would soon prove inadequate to meet post-war expectations, however, as auto ownership expanded, auto-tourism became more popular, and improved technology produced faster, more reliable cars. In 1952, the California State Legislature adopted Senate Concurrent Resolution 16, which acknowledged that rapidly increasing traffic on the Redwood Highway was becoming both a safety hazard and an inconvenience for

[27] Spence, *Watershed Park*, pp. 58-59.
[28] On Douglas and her political career see, Ingrid Winther Scobie, *Center Stage: Helen Gahagan Douglas, a Life* (New York: Oxford University Press, 1992).
[29] Spence, *Watershed Park*, pp. 59-60.
[30] U.S. Dept. of the Interior, *The Redwoods: A National Opportunity for Conservation and Alternatives for Action* (San Francisco, CA: National Park Service, Western Regional Office, 1964), p. 22.
[31] Construction on the southern portion of the highway, in Marin and Sonoma counties, began as early as 1912, but the far northern counties did not see any progress until after World War I.

motorists. In response, the Legislature directed the Highway Commission to study the feasibility of upgrading the highway to a four-lane, high-speed freeway. The Commission's report, which was completed later that year, concluded that more than half of the highway should be improved as soon as possible, while noting that the entire road from San Francisco to the Oregon border would eventually have to be upgraded as well. In 1953, companion bills were introduced in the State Legislature granting easements within Humboldt Redwoods State Park for new road construction. This attracted considerable attention and confirmed conservationists' fears that the redwood groves were threatened by highway improvements. Although a compromise was eventually reached between conservationists and the State Highway Commission whereby new construction would bypass the principal redwood groves in the riparian corridor, the freeway would still cut through the park on the steep slope above the river, threatening downslope erosion and the loss of hundreds of old growth trees.[32]

Long before this perceived threat could materialize, however, a very real catastrophe occurred on Bull Creek within the Humboldt Redwoods State Park. During the early 1950s, some of the most intense, and irresponsible, logging was conducted on the steep slopes of this watershed above the park. During the winter of 1954-55, torrential rains saturated the denuded soils and unstable road cuts of the upper basin, which gave way and washed down the hillsides along with piles of slash and stacks of huge logs awaiting transport to the mills. Bull Creek, usually a modest stream, became a raging river of mud, gravel, logging debris, and giant timbers that tore through the famous Rockefeller Forest in Humboldt Redwoods State Park. In a matter of hours, 50 acres of the forest floor had been scoured away, 525 ancient trees had fallen, and another 100 were damaged so badly they had to be cut down.[33] Scarcely two years later, work began on the first four miles of the controversial freeway bypass, which was located on the slopes above the already devastated bottomland groves. Large swaths of the Humboldt Redwoods were cut and bulldozed, and the state park was split in half by road construction. Even more alarming, for those who were paying attention to the ecological implications, was the potential for greater devastation downslope as freeway improvements destabilized an already precarious topography.[34]

This combination of accelerated logging and freeway improvements within the north coast redwood forest would reawaken interest in a redwood national park. The idea of a redwood national park, formerly dismissed by redwood conservationists prior to World War II, was now seen as the best, and possibly the only way to preserve the remaining old growth forest, because the magnitude of the threat had become so great that it precluded any other remedy short of Federal involvement. Early proposals included locations such as the lower Klamath watershed that still contained extensive old growth forest and were readily accessible to potential tourists. But accessibility also allowed these forests to be logged, and before long only the least accessible, and recreationally less desirable, lands remained intact. Among these was the Redwood Creek basin, which by the mid-1960s possessed the most extensive remaining old-growth habitat on the north coast outside of existing protected areas. The persistence of Redwood Creek's forest was due in great part to the challenges of its environment. Not only was it difficult to access, but the basin's steep slopes and unstable soils made it notoriously difficult to log. As it turned out, the watershed's unique environment also proved conducive to extraordinary natural growth, as demonstrated by the discovery in 1963 of the world's tallest redwoods growing on the alluvial flats of Redwood Creek. Between this singular expression of monumentality and the persistence of extensive old growth habitat, Redwood Creek would become the centerpiece of latter-day efforts to establish a redwood national park. The Tall Trees Grove, which stood in the midst of this forest, would become the symbol of the forest

[32] John Robinson, "The Redwood Highway: Part III, Bringing It up to Modern Standards," *California Highways and Public Works* 43, nos. 9-10 (September-October 1964), pp. 14-21.
[33] Spence, *Watershed Park*, pp. 61-62; and Peggy Wayburn, "The Tragedy of Bull Creek," *Sierra Club Bulletin* 45, no. 1 (January 1960): 10-11.
[34] Schrepfer, *Fight to Save the Redwoods*, pp. 110-111.

itself. Its significance only increased as scientific research revealed the ecological relationship between the tall trees and the larger environmental context of the surrounding watershed.

The Early Stages

The idea of renewed federal involvement in the preservation of the north coast redwoods was first broached by state park officials in 1960 in response to the recent floods. The California Division of Beaches and Parks realized that it would have to acquire the upper watersheds in order to effectively protect its downstream assets, but the estimated cost of purchasing these private timber lands was far beyond the agency's capacity. State park administrators brought these concerns to the attention of the National Park Service's Western Regional Office, where Regional Director Lawrence Merriam agreed that the problem was "a proper Federal function," vaguely implying that a redwood national park might once more be considered.[35] There was little precedent at that time, however, for federal appropriations being used to acquire private lands, especially on the scale that would be required here.[36]

The Save-the-Redwoods League was also growing concerned about the vulnerability of the state parks in the aftermath of the 1955 floods. In 1961, it contracted soil scientist Walter Lowdermilk to inspect flood damage to the Humboldt Redwoods on the Bull Creek watershed.[37] Based on Lowdermilk's recommendations, the League's directors voted to support expansion of the state park to provide whole-watershed protection. Increased logging in the Mill Creek watershed by Miller Redwood Company soon made it apparent that the downstream groves at Jedediah Smith and Del Norte Redwoods were also vulnerable. This watershed would later become the focal point of League efforts to establish new park lands.[38] Like state park administrators, League directors acknowledged the magnitude of whole-watershed protection and grudgingly began to accept the need for Federal involvement and the establishment of a national park to achieve their goals.[39]

The Sierra Club became interested in the north coast redwoods about this time as well. Traditionally based in the Sierra Nevada mountains where John Muir had led the club following its establishment in 1892, the Sierra Club only became active in conservation issues farther afield after World War II. Its first major battle outside the Sierra Nevada was the successful effort during the early 1950s to prevent inundation of Dinosaur National Monument on the upper Colorado River by dam construction.[40] The north coast redwoods came to the attention of the Club in 1955 with the Bull Creek floods, resulting in an article on the disaster by prominent club member Peggy Wayburn for the *Sierra Club Bulletin*, but the

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[35]Schrepfer, *Fight to Save the Redwoods*, p. 116. Schrepfer references correspondence from Merriam to Acting Regional Chief [of the State Parks], 14 December 1960.

[36] Though the first such example was soon to come with the authorization of Cape Cod National Seashore in 1961, the first park unit to be purchased entirely with federal funds. Four years later, in 1965, the Land and Water Conservation Fund Act was passed, providing a reliable source of funding for land acquisition. [Schrepfer, Fight to Save the Redwoods, p. 116; and Paul Sadin, *Managing a Land in Motion: An Administrative History of Point Reyes National Seashore* (Point Reyes Station, CA: National Park Service, 2007), p. 86].

[37] W.C. Lowdermilk, a scientist with the Soil Conservation Service, was renowned for work he had done throughout the world on issues of soil erosion and conservation of natural resources. Among his better known publications was *Conquest of the Land through Seven Thousand Years* (Washington, DC: U.S. Dept. of Agriculture, Soil Conservation Service, 1950).

[38] Schrepfer, *Fight to Save the Redwoods*, pp. 111-113.

[39] As historian Susan Schrepfer observes, this acceptance was consistent with a broader receptivity to Federal involvement in post-war America, but the League's traditional skepticism of big government does not seem to have changed—e.g., Newton Drury resigned himself to the growing role of the Federal government "for good or for evil," making it clear that his acceptance was not an endorsement. [Schrepfer, *Fight to Save the Redwoods*, p. 116].

[40] David Brower, *For Earth's Sake: The Life and Times of David Brower* (Salt Lake City, UT: Peregrine Smith Books, 1990), pp. 325-341; and Michael P. Cohen, *The History of the Sierra Club, 1892-1970* (San Francisco, CA: Sierra Club Books, 1988).

threat from road construction would be the Club's principal concern for the next several years. In 1960, the Sierra Club helped raise public interest in the north coast redwoods with the publication of a widely-viewed photo piece in *Sunset Magazine* showing state freeway construction through Humboldt Redwoods State Park. Although the popular magazine was not directly related to the Sierra Club, its travel editor, Martin Litton, was a close friend of Sierra Club executive director David Brower and had already been involved in club conservation efforts, including the Dinosaur National Monument campaign. Litton would soon become a leading figure in the Sierra Club's efforts to establish a redwood national park.[41] That same year the Club began planning a redwood exhibit book, to be titled *The Last Redwoods*.[42] The exhibit book was an idea that originated with David Brower, or at least with his directorship, and reflected Brower's interest in appealing to a popular constituency that comprised an increasingly influential percentage of the Club's membership. The typical exhibit book adopted a coffee-table format and presented a highly-aestheticized account of its subject through large-format photography and evocative narrative. The first of these books, *This Is the American Earth*, written by Nancy Newhall with photographs by Ansel Adams, appeared in 1960.

Like the League, the Sierra Club understood that the only way to adequately protect the remaining old growth redwoods was to acquire all or most of the watersheds in which they stood. This was the essential lesson of the Bull Creek disaster. Knowing this was beyond the reach of private organizations with their traditional reliance on philanthropy, the Sierra Club reached the same conclusion as the League that the future of the north coast redwoods depended on the establishment of a redwood national park. The Club readily embraced this goal, despite misgivings it shared with the League about National Park Service management and determined to urge the Kennedy administration to support the establishment of such a park. In 1961, the Club invited President Kennedy's newly-appointed Secretary of the Interior, Stewart Udall, to its biennial Wilderness Conference, where Peggy Wayburn, the author of the Bull Creek article, was purposely seated next to him in order to broach the subject of a redwood national park. Secretary Udall expressed interest in the idea. Later that year, Brower followed up with a letter to the secretary, who reiterated his interest in the park idea. Udall even agreed to write a foreword to the Club's proposed exhibit book, but he declined an invitation to visit the redwoods himself, sending instead his assistant secretary John Carver. Peggy and her husband Edgar Wayburn took Carver up the Klamath River as far as Blue Creek. At that time this area had not yet been cut over and still represented the Club's preferred location for a national park. The lower Klamath had been the foremost site recommended in 1920 by the Park Service's first survey of the redwood country. Soon afterward, however, the lower Klamath was logged and lost any value as a potential park area.[43]

Not long after this visit by the Assistant Secretary of the Interior, the Arcata Redwood Company (which owned much of the Redwood Creek watershed) logged down to the highway at the southern boundary of Prairie Creek Redwoods State Park. This eliminated the screen of standing trees that had prevented motorists on the Redwood Highway from seeing the clear cuts lying farther inland and revealed the effects of these logging practices in all their striking ugliness. The resulting scene, visible to anyone driving by, galvanized popular opposition to the logging companies. When Arcata Redwood posted the following explanation in front of its clear-cut— "Overmature Timber Harvested Here In Full Compliance With California Forest Practice Laws And Regulations"—much of the visiting public concluded that the state, as well as private industry, was culpable in this apparent desecration. Some thought that it was this

[41] Edgar Wayburn, *Edgar Wayburn: Sierra Club Statesman Leader of the Park and Wilderness Movement: Gaining Protection for Alaska, the Redwoods, and Golden Gate Parklands: An Interview Conducted by Ann Lage and Susan Schrepfer, 1976-1981* (Berkeley, CA: Bancroft Library, Regional Oral History Office, 1985), pp. 63-66; Michael McCloskey, "The Last Battle of the Redwoods," *American West* 6, no. 5 (Sept. 1969): 56; and Clyde Thomas, "The Redwoods Report: A Proposed National Park," *Sierra Club Bulletin* 49, no. 8 (November 1964): 10-13.
[42] Schrepfer, Fight to Save the Redwoods, p. 111; cross-check SC sources, e.g., Cohen.
[43] Wayburn, *Interview*, pp. 63-64; and Schrepfer, Fight to Save the Redwoods, p. 117.

ill-considered action by Arcata Redwood Company that got the effort for a redwood national park started, or at least got the public motivated to support such a proposal. The episode illustrates the logging industry's early naiveté with respect to public perception of its activities, but it was scarcely a generation earlier that the logging of otherwise useless wilderness was seen as a respectable occupation, provided it was done responsibly. Most of the executives who still managed or owned these industries had grown up with these assumptions and were unaware that different values had emerged within the urban populations to the south that now challenged their right to cut trees. Company leadership would have to learn how to address this new reality or risk appearing as an enemy of the public good.[44]

The Last Redwoods and the Tall Trees Grove

With official interest now growing for a redwood national park, Secretary Udall directed the National Park Service to survey potential locations. Lacking sufficient funds to conduct such a study, NPS Director Conrad Wirth approached the National Geographic Society, whose president, Melville Bell Grosvenor, offered to help subsidize the project.[45] On 8 May 1963, the National Geographic Society formally announced that it would be making a grant of $64,000 to the NPS for a coast redwoods survey. The NPS sent a team of planners to northern California led by Chet Brown to do the field work. They were accompanied by National Geographic senior naturalist Paul Zahl, who later wrote a companion article for the Society's magazine (Appendix A). The Sierra Club also played an important role in this survey, helping orient the NPS team to the area.[46] Martin Litton, for example, offered to fly them over the redwood country in his personal aircraft.[47] Executive Director David Brower later asserted that Litton was the one most responsible for pointing NPS attention toward the Redwood Creek basin. According to Brower, Litton was more familiar with the area than any of the other Club leaders at that time, who "were ready to go for the wrong Redwood National Park. It was Martin who knew where the best redwoods were, and who had the creativity to propose a comprehensive Redwood National Park that would have been a monument to conservation genius."[48]

When David Brower reflected on the people who initially brought to life the Sierra Club's redwood national park campaign, he mentioned the Wayburns and Martin Litton but also François Leydet and Philip Hyde.[49] The latter were the author and photographer, respectively, of the Sierra Club's sixth exhibit book, *The Last Redwoods*.[50] This influential publication was completed in December 1963, soon after the NPS planners had begun their work, and included the promised foreword by Secretary Udall calling for the establishment of a redwood national park. *The Last Redwoods* did not indicate where the Club believed this park should be located, or how it would be established. The book emphasized instead why the park was important, making a powerful case in both words and images for the significance of the redwoods themselves and the gravity of the threats confronting them. *The Last Redwoods* provides an eloquent summary of the values that lay beneath the Sierra Club's interest in protecting the last old growth redwood forests.

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[44] McCloskey, "Last Battle of the Redwoods," p. 56; and Schrepfer, *Fight to Save the Redwoods*, p. 108, figure 10.
[45] Melville Bell Grosvenor, "World's Tallest Tree Discovered," *National Geographic* 126, no. 1 (July 1964): 8; also Wayburn, *Interview*, pp. 63-64; and Schrepfer, *Fight to Save the Redwoods*, p. 116. Wayburn recalled that Secretary Udall got Grosvenor interested in the proposal, but Schrepfer notes that Grosvenor had been discussing the idea of a redwood national park with the League for at least a year.
[46] Wayburn, *Interview*, p. 64.
[47] Litton had been a glider pilot in World War II and was a competent aviator, though infamous for his daredevil risk-taking. He owned a small Cessna that he flew during his years as travel writer with *Sunset Magazine*.
[48] Brower, *For Earth's Sake*, p. 179; and Bettina Boxall, "Martin Litton Dies at 97; Passionate Wilderness Conservationist," *Los Angeles Times*, 1 December 2014.
[49] Brower, *For Earth's Sake*, p. 364.
[50] Philip Hyde and François Leydet, *The Last Redwoods: Photographs and Story of a Vanishing Scenic Resource* (San Francisco, CA: Sierra Club, 1963).

Like the Save-the-Redwoods League, the Sierra Club valued the redwoods for their monumental character, both in size and age. *The Last Redwoods* begins with an imaginative description of the life of a single tree, which sprouted more than 2000 years ago. The age of this one example, spanning much of western history, underlined the extraordinary depth of time represented by an entire stand of old growth trees.

> Time, time as we dissect it in days and hours and minutes, loses all meaning in a setting such as this. Here is a forest that was young when life itself was young. Here are trees that have already stood for a millennium or two—and still their lives will outlast yours a thousand years.[51]

Author François Leydet amplified still further this monumentalism of time by considering the age of the species *Sequoia sempervirens*, for which there is fossil evidence dating back at least 130 million years, making it contemporaneous with the dinosaurs. Large format photographs, provided mostly by co-author Philip Hyde, complement Leydet's narrative with dramatic impressions of the great size of the trees, dwarfing adjacent vegetation and human passers-by. The account is meant to awe, and there is a distinctly reverential tone to the book. There are even echoes of the religious ideas that motivated the founders of the League a generation earlier—the faith in progressive evolution that led John Merriam, Madison Grant, and Henry Fairfield Osborn to value redwoods as a climax species. Using language that could have been penned by any of these men, Leydet writes that "the Sequoias of California's coast and Sierra represent Nature's supreme achievement in the evolution of trees. No other race of trees comes close to matching them."[52] Leydet in fact lists both Merriam and Osborn, as well as other League authors, among his sources.

While these traditional values dominate the text and imagery of *The Last Redwoods*, some new ideas also find their way into the narrative. One of these is the concept of ecological unity (Figure 9). This was inspired by recent developments in the biological sciences that were beginning to have a strong influence on the younger leadership of the Sierra Club, including executive director David Brower.[53]

Ecology takes a wholistic view of biology, emphasizing the relationship between living things and their environment rather than just the things themselves.[54] Hyde and Leydet discuss the importance of this field of science for understanding and preserving the redwoods in their "Acknowledgments" at the beginning of the book. It is an odd place to put this discussion, as though the authors wanted to acknowledge the value of ecology without quite knowing what to do with it,

> "Ecology" is a term with which the reader will meet more than once in this book. As defined in the dictionary, ecology is "the branch of biology which deals with the mutual relations between organisms and their environment." A Redwood grove, for instance, does not just happen as a result of a whim of nature. An ecological study of such a grove must take into consideration the complex interaction of climate, topography, soil, soil-fertilizing organisms, associated plants, and so forth. Disturb one element in the chain and you are likely to disturb them all—a truth which man, to his peril, has too long ignored in his treatment of the natural world.[55]

Although the science of ecology had been around since the turn of the 20th century—the term was coined in 1866 by German biologist Ernst Haeckel—the concept would not begin to have widespread popular

[51] Hyde and Leydet, *The Last Redwoods*, p. 32.
[52] Hyde and Leydet, *The Last Redwoods*, p. 30.
[53] Schrepfer, *Fight to Save the Redwoods*, pp. 98-99.
[54] For a historical treatment of this subject see, Donald Worster, *Nature's Economy: A History of Ecological Ideas, Second Edition* (Cambridge, UK: Cambridge University Press, 1994).
[55] Hyde and Leydet, *The Last Redwoods*, p. 13.

influence in America until after World War II.[56] By that time, the idea of an ecological system, or ecosystem, had also been introduced to define the basic ecological unit in which the biological and abiotic elements of an environment interact. First used by A.G. Tansley in 1935, the ecosystem concept was adopted by Eugene Odum in the 1950s and would become the basis of his systems ecology, providing a framework for understanding the "structure and function of levels of organization beyond that of the individual and species."[57] The new ecology spawned by these developments was just becoming popular at the same time that conservationists were turning their attention to the north coast redwoods.

The importance of the larger environment to the growth and preservation of the monumental redwoods had always been appreciated to a certain extent—for instance, it was widely understood that the most spectacular groves were found only on the alluvial flats in the lower watersheds where specific environmental conditions favored the growth of the largest trees. It was also understood that the entire redwood belt was limited to a relatively narrow strip of the central and northern California coast where the marine layer supported temperate rain forest-like conditions. Beyond these basic facts, however, little attention was given by conservationists to the complex relationship, and interdependencies, that tied the redwood groves to the surrounding landscape until after World War II, beginning with the catastrophic floods on Bull Creek in 1955. The event made all conservationists from the League to the Sierra Club appreciate the importance of protecting whole watersheds. Leydet saw in this tragic event an illustration of the new scientific paradigm and drew larger meaning from it when he wrote that,

> The entire basin, then, formed an ecological unity, and all its components—the trees, the streams, the climate and soil—were interrelated and interdependent. The incomparable forest in Bull Creek Flat, known today as the Rockefeller Forest, did not owe its splendor to factors existing in the flats alone, but was the end product, the climactic achievement of forces at work in the watershed as a whole.[58]

But Leydet was not an ecologist and could say little more on the subject than this. While he appreciated the importance of ecology to understanding and preserving the redwood forest, he avoided the finer details of the ecological sciences. Science, however, would play an increasingly greater role in the campaign to establish Redwood National Park and its subsequent expansion.

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As *The Last Redwoods* was preparing to go to press, a surprising discovery was made in the redwood forests of Humboldt County. National Geographic Society naturalist Dr. Paul Zahl, while exploring Redwood Creek in mid-October 1963, came upon the magnificent Tall Trees Grove on a sharp bend in the stream. Making preliminary measurements, Zahl estimated that at least one of the redwoods here was taller than any other tree yet recorded. His estimate was later confirmed by professional foresters, who found that the grove contained the third and sixth tallest trees as well.[59] The discovery was not entirely accidental. Zahl had been informed of the extraordinary character of Redwood Creek by others who were already familiar with the area. He entered the basin knowing there was a good chance he would find something significant, and his discovery, while important in its own right, helped confirm the suspicion of

[56] Worster, *Nature's Economy*, pp. 191ff.
[57] Eugene P. Odum, "The New Ecology," *Bioscience* 14, no. 7 (1964): 15. For the first use of the ecosystem concept, see A.G. Tansley, "The Use and Abuse of Vegetational Concepts and Terms," *Ecology* 16, no. 3 (1935): 284-307. For Odum's adoption of this concept, see Eugene P. Odum, *Fundamentals of Ecology* (Philadelphia, PA: W.B. Saunders, 1953). See also, Frank Benjamin Golley, *A History of the Ecosystem Concept in Ecology: More than the Sum of the Parts* (New Haven, CT: Yale University Press, 1993).
[58] Hyde and Leydet, *The Last Redwoods*, p. 91.
[59] Paul A. Zahl, "Finding the Mt. Everest of All Living Things." *National Geographic* 126, no. 1 (July 1964): 10-51.

NPS planners and the Sierra Club both that the Redwood Creek watershed was the best location for a redwood national park. This was agreed upon a few months later at a meeting in Washington, DC between Interior Secretary Udall and NPS Director George Hartzog. NPS planner Chet Brown as well as Dr. Zahl and Melville Grosvenor, president of the National Geographic Society, were also present to share their findings from the field.[60]

The discovery of the Tall Trees Grove and the significance that was quickly attributed to it made it clear that traditional values of scenery and monumentality remained important considerations. The exuberant response of Melville Grosvenor amply illustrated this truth. Grosvenor had flown out to visit the Tall Trees Grove immediately after hearing of its discovery. In a brief introduction that would accompany Dr. Zahl's article in the July 1964 issue of the National Geographic Magazine, Grosvenor described his first impression of the giant trees on Redwood Creek. He writes that, after crossing miles of second growth forest,

> With dramatic suddenness, we came to the bright waters of Redwood Creek. The view inspired pure silence. Throughout the world, it has been my good fortune to see many dramatic panoramas: Fuji by moonlight, the Grand Canyon, the Taj Mahal—each is superlative in its own way. Yet for sheer impact, the view of the magnificent grove and Redwood Creek Valley compares with any one of these. … Here crystal waters flex into a sweeping bend of stream with a margin of gravel beach. And from the rich flatlands just beyond rise the heavy red columns of living trees that soar up, up—as eyes and spirits lift—into the deep sky itself. Other groves of coast redwoods present a viewing problem; the higher trees often crowd far into the forest, where it is impossible to see them from base to crown. But here the redwoods stand forth in their full vertical splendor.[61]

Undaunted by its remoteness, Grosvenor found the Tall Trees Grove both picturesque and sublime, and he understood that these aesthetic values would be important motivations for protecting the place. But just as important was the grove's context or setting within old growth forest extensive enough to retain both a wilderness character and ecological integrity. The Sierra Club in particular would acknowledge the importance of these values. They had led Club members such as Martin Litton to steer NPS planners toward Redwood Creek in the first place. Michael McCloskey, who took charge of the Sierra Club's redwood campaign that December, affirmed that the grove was significant not only because it contained the world's tallest trees, but because it lay within "the largest, and one of the finest, surviving virgin forests."[62] Edgar Wayburn, president of the Sierra Club, summarized the Club's criteria for a redwood national park in an article for the *Sierra Club Bulletin* that May. Among other things, Wayburn wrote, "the club hopes that an adequate area can be purchased and established as a national park and that it will preserve intact an ecological unit of virgin forest worthy of national status," implying that Redwood Creek possessed all of these characteristics. Wayburn's article appeared only days after the *New York Times* brought widespread public attention to the recent discovery of the Tall Trees Grove. The extraordinary size of these trees seemed to support Wayburn's criteria for national significance, while his other criteria were supported by the remote setting of the surrounding Redwood Creek basin.[63]

The National Park Service Report (The Redwoods)

[60] Schrepfer, *Fight to Save the Redwoods*, pp. 119-120.
[61] Melville Bell Grosvenor, "World's Tallest Tree Discovered," *National Geographic* 126, no. 1 (July 1964): 9.
[62] McCloskey, "Last Battle of the Redwoods," p. 57.
[63] Edgar Wayburn, "Sierra Club Policy on the Last Redwoods," *Sierra Club Bulletin* 49, no. 4 (May 1964): 10-11; and "The Biggest Thing Alive Anywhere: A Coast Redwood," *New York Times*, 3 May 1964, p. 63.

By June 1964 the NPS had completed its study of the north coast redwoods, though its final report would not be released to the public for another three months.[64] After previewing an advance copy, President Lyndon B. Johnson held a White House Conference on June 25 to formally endorse the idea of a redwood national park, implicitly supporting the Redwood Creek location with its Tall Trees Grove. Referencing the study, Johnson observed that,

> At the present rate of logging and with destruction resulting from inadequate conservation practices, the future of the redwoods is in doubt. Once there were two million acres of virgin coast redwoods reaching from Point Sur to southern Oregon. Today only about 15 percent remains uncut. Only about 2 1/2 percent has some degree of permanent protection [in the existing state parks] … Last year, the National Geographic Society discovered in a secluded grove of coast redwoods the world's three tallest trees—the tallest standing 367 feet … Now a preliminary report from the National Park Service and the National Geographic Society indicates there remains a last-chance opportunity for the United States. This nation can protect these redwoods by creating a great and unique national park in one area of northern California. I have directed Secretary Udall to prepare a plan for a redwoods national park and to have it ready for presentation to the Congress next January.[65]

Finally published in September of that year, *The Redwoods: A National Opportunity for Conservation and Alternatives for Action* was a comprehensive study of the north coast redwoods, providing an overview of the redwood forest and forest ecology; a history of human occupation and use, especially logging; and a history of conservation up to the present time. Central to the report's message were the observations summarized by the President two months earlier detailing how much old growth forest had been lost to logging since the mid-nineteenth century, making preservation of the little that remained an urgent necessity. That the redwoods should be protected was not open to serious question, the authors asserted, since they were widely understood to possess national, even international, significance. This was evidenced "by visitation from all over the Nation and the world, and by the willingness of many to contribute substantial sums for the purchase and preservation of dedicated groves," as the Save-the-Redwoods League and its many supporters had been doing since 1918.[66] What was in question, the study insisted, is whether the existing protected areas, primarily in state parks, were sufficient to preserve outstanding examples of these redwood forests. If not, where should additional protection occur, and how much should be protected? Of the 48,383 acres of old growth lying within state parks, most was concentrated on the lower reaches of watersheds and was vulnerable to upstream impacts from logging, as the Bull Creek floods of 1955 had demonstrated. Intrusions from freeway construction and other development, as well as crowding from increased visitor use, were also taking their toll on the state park groves, impairing both ecological integrity and the quality of the visitor experience.[67] In short, the NPS authors concluded that more old growth stands needed to be protected in larger contiguous areas in order to preserve the fundamental significance of the redwood ecosystem.

Where protection should occur had a great deal to do with the nature of this fundamental significance, which the report also attempted to define. Departing from older trends in redwood conservation, which had focused narrowly on concentrated groves of monumental trees, the NPS planners now sought to identify groves that still existed "in situations where their setting and total ecology is essentially undisturbed, and where the visitor can have the best possible opportunity to see and experience the

[64] U.S. Dept. of the Interior, *The Redwoods: A National Opportunity for Conservation and Alternatives for Action* (San Francisco, CA: National Park Service, Western Regional Office, 1964).
[65] Quoted by McCloskey in "Last Battle of the Redwoods," p. 57. Full text of statement reproduced in Sierra Club, "President Johnson Orders Redwood Park Study," *Sierra Club Bulletin* 49, no. 5 (June 1964): 3.
[66] NPS, *The Redwoods*, p. 25.
[67] NPS, *The Redwoods*, pp. 30-33.

redwoods to the fullest."[68] In other words, they valued the forest as well as the trees. The reason was not just to have space to accommodate a growing number of visitors, although this was important. The NPS planners acknowledged that the giant trees were integral parts of a web of relationships that involved the surrounding forest as well as other habitat types and even abiotic elements constituting the total ecological system—or ecosystem—in which they grew. The importance of this perspective in the planning process was illustrated by the prominence given to ecology in the report, which opens with a lengthy discussion of the subject. This was the product of a concentrated study by scientists at Humboldt State College (now Humboldt State University) who had been contracted by the National Park Service. In their contribution to the report, they discussed the redwood ecosystem in its relationship to the watershed, where,

> considerations of flood flows, watershed orientation, storm movement and the texture, nutrient and moisture relations and upland and alluvial soils indicate that the species depends not only on its immediate environment, but on the entire land unit which lends its characteristics to those of the stand.[69]

While a single stand might be preserved in a small area, this isolates it from its natural setting and results in an artificial "museum grove" like those preserved in the state parks. The NPS planners were clear that they sought an intact ecological unit where natural processes were free to unfold with as little human interference or management as possible, and this required an extensive area that would ideally comprise an entire watershed.

Unfortunately, no single watershed remained in which the old-growth forest had not been at least partially logged, so the options that were left for a redwood national park on the north coast were all less than ideal. The NPS planners identified three: Mill Creek drainage in Del Norte County; the Redwood Creek watershed in Humboldt County; and Yager Creek, a tributary of the Van Duzen River, also in Humboldt County. The last they rejected because it comprised mostly upland growth with none of the monumental groves that occur on alluvial bottomlands and was therefore judged to be less significant for park purposes. The Mill Creek site included Jedediah Smith State Park on the lower reaches of the watershed but would necessitate making substantial acquisitions in the upper watershed to protect the bottomland groves from flooding and to secure an ecologically significant extent of habitat. Most of the privately-owned lands on the Mill Creek watershed belonged to a single company—Miller Redwood. Since Miller was one of the largest employers in Del Norte County, a park on this site would have a significant negative impact on the local economy. The NPS planners therefore concluded that cooperative management of the upstream forests was preferable to public ownership of the entire watershed. This would protect the state park groves downstream but would fall well short of preserving an area worthy of becoming a national park.

The best opportunity for a redwood national park, in the opinion of the planners, lay on Redwood Creek. Although much of the upper watershed had already been logged, the middle and lower reaches remained uncut and possessed some of the finest stands of redwood on the north coast, including the recently-discovered Tall Trees Grove. Redwood Creek had all of the characteristics of a potential national park, provided that enough of the watershed could be protected. It contained the largest extent of contiguous old growth redwood forest, remote from existing roads and other development; it contained monumental groves that included the tallest trees yet recorded; it was large enough to absorb a growing population of backcountry visitors while still providing a primitive, wilderness experience; and it represented an intact ecological unit with diverse habitats and functioning natural processes. The NPS report summed up these opportunities in its conclusion,

[68] NPS, *The Redwoods*, p. 30.
[69] NPS, *The Redwoods*, p. 11.

> Lower Redwood Creek from ridge to ridge is essentially uncut. It presents an outstanding redwood valley picture, fortunately set to one side of the main highway and much of it still inaccessible except by foot or in a few places by logging roads. By wonderful coincidence, outstanding large groves along Redwood Creek are the site where earlier this year the National Geographic Society discovered the world's tallest known tree and subsequently they, jointly with this Service, located also the second, third and sixth tallest tree.
>
> Redwood Creek watershed is long and narrow extending south and east some 50 miles from its mouth. Much of the upper drainage has long since been cut, and some of it also lies outside the redwood belt where grassland and Douglas-fir predominate. As with Mill Creek, farther north, a sound, carefully coordinated land and forest management plan for the whole watershed is needed to minimize flood threat and to rehabilitate stream damage already done.[70]

The authors acknowledged that the upper watershed, degraded by past logging, no longer possessed national park characteristics but still needed to be addressed in the planning effort because of its ecological relationship to the middle and lower reaches of Redwood Creek. These would always be vulnerable to upstream impacts. As at Mill Creek, the NPS proposed cooperative management rather than outright ownership in order to achieve these objectives so that it could avoid negatively affecting the economy of Humboldt County.

Concern for the economic impact of a redwood national park also led the NPS planners to recommend protecting far less than they believed was ideal, from a park perspective, in their preferred alternative. They noted their reservations in the introduction to this alternative, labeled "Plan 1," admitting that,

> this plan does not represent the ultimate which might be considered worthwhile, if other interests and feasibility factors were not considered. Certainly, in detail it is not the solution which might be suggested if the clock could be turned back a decade or two.[71]

Plan 1 proposed that a total of 53,500 acres be included in a redwood national park. The majority of this acreage would lie within the Redwood Creek watershed, with 21,300 acres on Redwood Creek itself (extending eight and a half miles upstream from its mouth to the Bridge Creek tributary); 14,280 acres would lie on the Lost Man Creek and May Creek watersheds; while 7,690 acres would be added to the existing 10,330 acres of Prairie Creek Redwoods State Park, which lay at the lower end of the Redwood Creek watershed. This plan would preserve a total of 22,580 acres of old growth redwood. In addition to acquiring new lands for the proposed redwood national park, the preferred alternative would also provide Federal aid to the state for new acquisition or extension of existing parks on the Avenue of the Giants (in Humboldt Redwoods State Park), along the Van Duzen River, and high priority sites on Mill Creek to round out Jedediah Smith and Del Norte Redwoods State Parks. The other alternatives were essentially the same but provided for less acquisition of new lands in the Redwood Creek basin, resulting in a total area of 39,320 acres for Plan 2, and 31,750 acres for Plan 3. Neither of these alternatives were ever seriously considered.[72]

* * *

It was no accident that the Park Service's preferred alternative for a redwood national park closely resembled the Sierra Club's own ideas. The Sierra Club had played a critical, though largely behind-the-scenes role in the initial planning process, as Club president Edgar Wayburn recalled years later,

[70] NPS, *The Redwoods*, p. 39.
[71] NPS, *The Redwoods*, p. 42.
[72] NPS, *The Redwoods*, p. 42.

> There was influence going back and forth. We were looking for the optimum redwood forest to preserve. We wanted not just to find groves, as the Save-the-Redwoods League and the state of California wanted; we were looking for a redwood forest which could be preserved in perpetuity. We were looking for a forest to preserve from ridge to ridge; from the coast to the inland limits of the redwoods.[73]

Both Club and NPS planners were interested in protecting ecological values as much as monumental characteristics and were drawn to Redwood Creek because it seemed to offer the best remaining opportunity to realize these objectives. Where Club and Park Service disagreed was over the extent of area to be included in the proposed park. The Park Service's most ambitious plan, its preferred alternative, would protect less than one third of the Redwood Creek watershed. In the Club's opinion, this would not be enough to provide the values it sought or to prevent another catastrophe like the Bull Creek event of 1955 from occurring on the lower reaches of Redwood Creek.[74] Several months after the NPS report appeared, Edgar Wayburn, writing in the *Sierra Club Bulletin*, presented the Club's official response in the form of an alternative proposal, which the Club's Board of Directors had adopted that October. Rather than 53,500 acres, as the NPS recommended, the Club proposed a redwood national park totalling 90,000 acres. It would comprise all of the Redwood Creek basin up to and including the subwatersheds of Bridge and Devil's Creek, just above the Tall Trees Grove, as well as Lost Man and Little Lost Man Creeks and a coastal strip north of Orick that would include Skunk Cabbage Creek. The Club also proposed acquiring all of the remaining private land along Mill Creek in Del Norte County in order to protect the entire Mill Creek watershed.[75] In effect, the Sierra Club advocated protecting as much of the remaining old-growth redwood forest as possible, as well as associated watersheds. While the NPS might agree with these objectives in principle, in practice the agency hesitated to make such a bold request out of concern for competing interests in the local, extraction-based economy. The Sierra Club was not constrained by these concerns.

Opposition and Division

By the early months of 1965, local opposition to the NPS proposal for a redwood national park began to emerge, both among industry leaders and resident workers, primarily from economic fears. The state administration under Governor Pat Brown also resisted the idea, mostly out of sympathy for the economic interests of north coast communities. While the majority of the timber industries were willing to accept additions to existing state parks, including on the Mill Creek watershed, they would not accept substantial acquisitions of forested lands within the Redwood Creek area, which would have too great an impact on their revenue and potentially put at least one of the companies out of business. Most of the Redwood Creek basin was owned at that time by three large corporations—Georgia-Pacific, Simpson, and Arcata Redwood. Both Georgia-Pacific and Simpson owned mature forest in other locations and might have been able to absorb the financial impacts of this potential loss, but the majority of Arcata's old growth holdings were concentrated here. While the company possessed extensive cut-over lands, the second growth on these properties was not yet sufficiently advanced to support harvesting, even for low quality pulp wood, and the company claimed it would not be able to survive a lapse in production while it waited for its second growth to mature.[76] The economic vulnerability of Arcata Redwood was particularly

[73] Wayburn, *Interview*, p. 64.
[74] Clyde Thomas, "The Redwoods Report: A Proposed National Park," *Sierra Club Bulletin* 49, no. 8 (November 1964): 10-13.
[75] Edgar Wayburn, "The Redwoods Report: A Proposed National Park, Part II," *Sierra Club Bulletin* 50, no. 1 (January 1965): 8-9; and "The Sierra Club's Position on a Redwoods National Park," *Sierra Club Bulletin* 49, no. 8 (November 1964): 11.
[76] Edward C. Stone, Rudolf F. Grah, and Paul J. Zinke, *An Analysis of the Buffers and the Watershed Management Required to Preserve the Redwood Forest and Associated Streams in the Redwood National Park* (Crescent City, CA: National Park Service, Redwood National Park, 1969), pp. 46-47, and 51-58. But see also Schrepfer, *Fight to*

crucial to the debate over the proposed national park since Arcata Redwood owned the east slope of the Redwood Creek basin, which included the Tall Trees Grove (Figure 7). The company had always supported preserving the grove itself, offering enthusiastic assistance to Dr. Zahl during his initial reconnaissance and later agreeing to exempt these trees from its harvest plans (Figure 5), but it was not willing to give up any more of its old growth forest within the Redwood Creek basin.[77]

As it became clear that a redwood national park could not be avoided, the logging industry attempted to mitigate potential damage to its interests by proposing alternatives that supported public recreation but would allow logging to continue on an economically profitable basis. A committee representing timber industry owners and investors prepared a detailed plan that would accomplish these goals through multiple use management of private timber lands. This plan, summarized in a pamphlet entitled "The Redwood Park and Recreation Plan," was transmitted to the White House at the end of April.[78] At about the same time that the industry proposal appeared, the League Board of Directors passed a resolution officially endorsing Mill Creek as its preferred location for a redwood national park.[79] The League's decision was justified by its longstanding commitment to Jedediah Smith and Del Norte Redwoods State Parks. Acquisition of the remaining private lands on the Mill Creek watershed would unite these parks and provide complete watershed protection for their downstream groves. The League argued that the resulting protected area would be sufficient to meet national park standards at relatively low cost, but its resolution was a rebuff of the NPS (and Sierra Club) proposal for a park centered on Redwood Creek, which the League was reluctant to support for fear of alienating the large lumber companies.

Although the Mill Creek proposal would spare the previously mentioned companies, it would devastate Miller Redwood, whose assets were concentrated exclusively within this watershed. Miller Redwood was a family-owned business, managed by Harold Miller, and was one of the largest employers in Del Norte County. Its potential demise would have a substantial impact on local communities, but for anyone seeking a compromise between logging and preservation, this seemed like the least worst option. Ironically, once Harold Miller discovered that his presumed allies all supported a national park on Mill Creek, he became an advocate for the Sierra Club, promoting the Club's preference for a redwood national park on the corporate-owned lands of his rivals to the south.[80]

In response to resistance from local communities and the logging industry, the Sierra Club began building a dedicated campaign to support the redwood national park proposal by early 1965. Club president Edgar Wayburn was appointed to head a special Redwood Task Force, while Club attorney Michael McCloskey was transferred from the Pacific Northwest to San Francisco to serve as Wayburn's assistant. In order to marshall local support for the park effort and counter the opposition of logging industry sympathizers within Del Norte and Humboldt Counties, the Club organized the Citizens Committee for a Redwood National Park in March of that year. This was composed primarily of students from Humboldt State College (now Humboldt State University), who endorsed "the establishment of a national park in the

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Save the Redwoods, p. 138, who points out that much of the company's supposed vulnerability was only apparent. While its loggers and other local employees would likely suffer financial hardship as a result of the proposed park, company executives would not, since Arcata Redwood was owned and administered by members of the Weyerhaeuser family and was, for all practical purposes, affiliated with the extensive Weyerhaeuser interests.

[77] Arcata's early cooperation had inspired the National Geographic Society to name the tallest tree within the grove, not after Dr. Zahl who discovered it, but after Howard Libbey, the executive director of the Arcata Redwood Company. The name "Libbey Tree" is rarely used anymore.

[78] Darrell H. Schroeder, Co-Chairman, Redwood Park and Recreation Committee, to President Johnson, 29 April 1965, Papers of Lyndon Baines Johnson 63-69 [LBJ], Box 16, f. PA3, 5/6/65 - 11/19/65, Lyndon Baines Johnson Library and Museum, Austin TX.

[79] Save-the-Redwoods League, "Chronology," p. 4.

[80] Schrepfer, *Fight to Save the Redwoods*, pp. 138-139, 142.

vicinity of Prairie Creek State Park and Redwood Creek containing no less than 25,000 acres of virgin [old growth] redwoods."[81]

In May 1965, shortly after learning of the Save the Redwood League's resolution to support a Mill Creek location, the Club drafted its own version of a redwood national park bill.[82] This was in essence the 90,000 acre recommendation that the Club's Board of Directors had adopted the previous fall. Describing the proposal, Edgar Wayburn reiterated the Club's criteria for a national park,

> The club believes that a Redwood National Park proposal, to be adequate, must fulfill these objectives: it must include a major block of virgin redwoods of national significance. (The block should include enough virgin redwoods, with protected watersheds, to insure perpetuation of the species in its native state.) It should include scenic vistas and other features of interest, and should offer broad recreational opportunities. It should be able to withstand the constantly increasing visitor use that a National Park inevitably invites.[83]

Wayburn argued that only Redwood Creek, of the potential remaining sites for a redwood national park, could adequately fulfill these criteria. Addressing the League's preferred site (though without mentioning the League itself), Wayburn pointed out that the Redwood Creek watershed was larger and held more old growth redwood forest than Mill Creek. It also contained "record displays" that included the world's tallest trees; it contained greater diversity of habitats owing to a more complex topography and elevational range; and its larger area had the potential to absorb and disperse more users without crowding, an observation that implicitly supported the Club's interest in preserving a wilderness experience for outdoor recreationists. The Club also asserted that there was better opportunity for protecting the old growth redwoods on Redwood Creek than Mill Creek, but its reasoning on this matter was poorly justified and would not be taken up again. Offering its draft to the Department of the Interior, the Club hoped these arguments would persuade Secretary Udall to adopt the Club's proposal as the basis for an administration bill.

The Department of the Interior was at that time working on a draft administration bill based on the NPS preferred alternative from *The Redwoods* report. In June 1965, responding to growing pressure for a Mill Creek site, the Park Service revised its original proposal to include a substantial portion of the Mill Creek drainage as well, but it still located the bulk of the proposed park on Redwood Creek. This hybrid alternative would be a two-unit park, with 56,000 acres on Redwood Creek and 37,000 acres on Mill Creek. The cost was estimated at $120 million, an increase of more than $40 million over its earlier proposal, but the Land and Water Conservation Fund, established in September 1964, provided a means to fund new park acquisitions that had not previously existed. The Park Service suggested that the cost of the proposed park could be paid from this fund in ten yearly increments. The revised proposal was not made public until later that year to avoid tipping off the logging companies, which, it was feared, might accelerate their cut in order to preempt potential park acquisitions.[84] (These fears were later justified.)

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[81] Sierra Club, "Support for Redwoods National Park," *Sierra Club Bulletin* 50, no. 3 (March 1965): 18.
[82] Edgar Wayburn and Michael McCloskey, "Plans for a Redwood National Park," *Sierra Club Bulletin* 50, no. 5 (May 1965): pp. 3-6.
[83] Wayburn and McCloskey, "Plans for a Redwood National Park," p. 4.
[84] Schrepfer, *Fight to Save the Redwoods*, p. 132. The new Park Service alternative was described in a twelve page document titled "A Proposed Redwood National Park." The Department of the Interior estimated that the original NPS preferred alternative, known as Plan 1, would cost $78 million. By contrast, the Sierra Club's 90,000 acre plan was estimated at $140 million. In his "Weekly Report to the President" for 18 May 1965, Secretary Udall vaguely alluded to the cost of the NPS revised alternative, which was to be the basis for a proposed administration bill, as "$100 million or more." This raised some eyebrows and elicited requests for clarification from the Bureau of the Budget. [Papers of Lyndon Baines Johnson 63-69 [LBJ], Box 16, f. PA3, 5/6/65 - 11/19/65, Lyndon Baines Johnson Library and Museum, Austin, TX].

By that time, however, competing influences were moving the Johnson administration in a different direction.[85]

In July 1965, Laurance Rockefeller, grandson of the famous oil magnate John D. Rockefeller, Sr., sent a brief report to President Johnson summarizing his personal views on the proposed redwood national park. At that time, Laurance Rockefeller was chair of the Citizens Advisory Committee on Recreation and Natural Beauty, which worked closely with the administration on matters relating to parks.[86] The Rockefeller family had been interested in redwood conservation for nearly half a century, and Laurance Rockefeller was a life member of the Save-the-Redwoods League and a trustee of the National Geographic Society. Up to this point he had not been actively involved in the park controversy, though he had followed it closely. Earlier that month, Laurance Rockefeller visited California on an unrelated matter and toured the redwood state parks, meeting with representatives of the timber industry as well as conservationists. In his subsequent report to the President, he emphasized his support for a redwood national park in principle and expressed his belief that a consensus might be reached between all reasonable parties, though not with the administration's current proposal. Rockefeller implicitly identified the NPS preferred alternative with the Sierra Club's ambitious plan for a large, Redwood Creek-centered park, an idea that he characterized as one of the extreme and inherently impractical positions in the present controversy. The other extreme, he noted, was the industry's proposal, which Rockefeller characterized as "constructive" but not moving "in the direction of a major park." Rockefeller thought that the League's proposal of a redwood national park centered on Mill Creek represented a reasonable middle ground that would be capable of attracting the widest possible support and recommended "that the Park Service develop a viable plan for a park in the Mill Creek area by expanding and joining the present Del Norte and Jedediah Smith State Parks and the preservation of the 'Big Trees' area [that is, the Tall Trees Grove]."[87] In Rockefeller's proposal, the Tall Trees Grove would be the only new acquisition within the Redwood Creek basin, a proposition that Arcata Redwood had already agreed to support.

By the time the Rockefeller report reached President Johnson, the administration was already beginning to back off from its initial support of the NPS proposal in response to industry pressure.[88] Rockefeller's intervention proved to be the final push needed to persuade the President to abandon Redwood Creek and adopt the industry-friendly alternative instead. Udall had personally favored the initial Redwood Creek proposal and was sympathetic to both NPS and Sierra Club interests, but he had little choice than to comply with the President's wish. In January 1966, Secretary Udall formally recommended a single-unit park on Mill Creek comprising just under 40,000 acres as suggested by Laurance Rockefeller and consistent with the Save-the-Redwoods League's stated preference. This would become the official administration proposal. As historian Susan Schrepfer explains, "Udall's influence with the president was clearly eclipsed by that of Rockefeller, a man of great stature within conservation circles since the 1950s. It is not surprising that Udall finally concluded, “Mill Creek is the art of the possible.” But as Schrepfer also notes, Rockefeller was persuaded to support the Mill Creek proposal over Redwood Creek by the League, whose leadership Rockefeller both knew and trusted.[89] The League believed it had the most to gain from this strategy, since it would achieve its long-standing goal of rounding out the northernmost state parks while at the same time preserving its traditional relationship with industry (excepting Harold Miller), but the League's opposition to the Sierra Club opened a schism in the conservation movement

[85] Wayburn, *Interview*, pp. 77-79.
[86] Lewis L. Gould, *Lady Bird Johnson and the Environment* (Lawrence: University Press of Kansas, 1988), pp. 216-220.
[87] Laurance S. Rockefeller to President Johnson, 20 July 1965, Papers of Lyndon Baines Johnson 63-69 [LBJ], Box 16, f. PA3, 5/6/65 - 11/19/65, Lyndon Baines Johnson Library and Museum, Austin, TX.
[88] McCloskey, "Last Battle" p. 57.
[89] Schrepfer, *Fight to Save the Redwoods*, pp. 136-139.

that would delay efforts to establish a redwood national park and ultimately diminished the opportunities to preserve old growth redwood forest.

Soon after Secretary Udall had announced the administration's preference for a single-unit park centered on Mill Creek, companion bills supporting this proposal were drafted by Senator Thomas Kuchel (R-Calif.) and Representative Don Clausen (R-Calif.). The Kuchel-Clausen bill would protect 39,000 acres on Mill Creek as well as 1,600 acres on Redwood Creek encompassing the Tall Trees Grove. This was submitted to the 89th Congress during its second session in March 1966. At the same time, the Sierra Club bill asking for a 90,000 acre park centered on Redwood Creek (but including Mill Creek as well) was submitted by Senator Lee Metcalf (D-Montana) and Representative Jeffrey Cohelan (D-Calif.).[90] While the momentum generated by the initial NPS survey was lost amid these competing proposals, much of the finest old growth forest was logged. In the two and a half years since the Park Service had become involved, more than 4,000 acres of old growth redwood was cut, with the rate of cut increasing by more than a third as the logging companies hastened to liquidate their standing assets on lands that might be condemned for park purposes. While Congress attempted to impose a moratorium to prevent further logging within these areas, their efforts had only limited results with increasingly frustrated and intransigent industry representatives. The big companies on Redwood Creek were hesitantly willing to adjust their harvest plans, but Miller Redwood, believing it had little to lose, was defiant and began clear cutting on Mill Creek until forced to stop. By that time, however, much of the remaining old growth forest between the state park boundaries had been cut.[91]

Terms of the Debate

By the end of 1965, the redwood national park initiative had resolved itself into a controversy over two basic alternatives—locating the proposed park on Mill Creek or locating it on Redwood Creek.[92] The Mill Creek location preserved less old-growth redwoods but would unite the existing redwood state parks in Del Norte County and provide whole watershed protection for them. It would also have the least impact on the logging industry, affecting only one company. The Redwood Creek location would protect more old-growth redwoods, as well as offering an extensive undeveloped area with diverse habitat types, but it would have the greatest impact on industry, directly affecting three of the largest companies. The differences between these locations would define the essential terms of the debate for the next two years. (A few substantially different proposals were also suggested—such as locating the park in the King Range, or developing a parkway, rather than a park, along Highway 101, but none of these were ever serious considerations.) The principal contestants were the League, which favored Mill Creek, and the Sierra Club, which favored Redwood Creek. The Park Service attempted to compromise in response to pressure from all sides but, by and large, favored the Redwood Creek option. The majority of industrial interests would side with the League's proposal as the least worst option (with the exception of Miller Redwood Company, whose holdings lay on Mill Creek).

The League's preference for Mill Creek was understandable from a pragmatic point of view, given its longstanding commitment to the state parks and the desire to preserve its traditional relationship with industry leaders. But Mill Creek also exemplified many of the League's values better than Redwood Creek did. It provided ready public access to monumental groves and opportunities to enjoy both

[90] Schrepfer, *Fight to Save the Redwoods*, p. 140; and McCloskey, "Last Battle" p. 58.
[91] Edgar Wayburn, "The Redwood National Park—A Forest of Stumps?" *Sierra Club Bulletin* 50, no. 7 (October 1965): 10-11; and Michael McCloskey, "Progress On Redwoods," *Sierra Club Bulletin* 51, no. 8 (September 1966): 20-22.
[92] Edgar Wayburn and Michael McCloskey, "Plans for a Redwood National Park," *Sierra Club Bulletin* 50, no. 5 (May 1965): 3-6. This article compared the Redwood Creek and Mill Creek proposals, arguing in favor of the former. It was the first time that the Sierra Club publically suggested these alternatives were in competition, and the first time it failed to include the League as an ally.

aesthetic spectacle and pedagogical lessons on evolutionary progress. Redwood Creek possessed many of the same opportunities—at the Tall Trees Grove, for example—but its greater isolation and rugged terrain precluded access to all but intrepid hikers. This, however, is what appealed to members of the Sierra Club, most of whom had been drawn to their organization for vigorous outdoor recreation. For them, the opportunity to experience wild nature and the freedom to roam unconfined were more important than preserving exemplary types such as the monumental groves that formed the core of the redwood state parks. By the end of the decade, as the controversy over alternative sites for a redwood national park drove the two organizations apart, Club members would look at their former allies in the League and see that they were divided not simply over conservation strategy but over fundamental differences of value.

Wilderness

A salient expression of the values deriving from the Sierra Club's recreational mission was its advocacy of wilderness. In 1949, the club had begun holding biennial wilderness conferences to consider wilderness recreation and the problems associated with it. Preeminent among these problems, acknowledged at the second conference in 1951, was the declining extent of wilderness itself. This concern would prompt Howard Zahniser of the Wilderness Society, who attended the conference, to propose legislation that gave wilderness the protection of law thirteen years later with an act that would make it "the policy of Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness."[93] The idea that wilderness might be a benefit in its own right was relatively new for Americans who, for most of the nation's history, had seen wilderness either as a challenge to be overcome or a repository of resources to be exploited (and many still saw it that way). Only with the affluence of the post-war decades would enough Americans begin to enjoy outdoor recreation to support setting aside large areas of wilderness in which to recreate. But recreation was only part of this idea. After all, a city park or playground could also provide outdoor recreation. The unique value of wilderness recreation was the opportunity to escape civilization, or at least all appearance of it, through a direct experience of nature in what advocates considered its purest form, untainted by human influence.[94] This implied not only that wilderness stood radically apart from human civilization, but that it was morally superior or otherwise preferable to it, making it desirable to go there.

For many intellectuals of an earlier generation, such as John Merriam of the League, wilderness was simply a more primitive stage in an evolutionary progression that culminated in modern civilization.[95] By contrast, Wallace Stegner, speaking for the Sierra Club in 1967, presented wilderness as an alternative to progress itself, a respite for the insanity of modern life. He wrote of its rejuvenating qualities with Turnerian melodrama as a confrontation of the weary civilizations of an older Europe meeting the energies of a new frontier,

> For an American, insofar as he is new and different at all, is a civilized man who has renewed himself in the wild. The American experience has been the confrontation of old peoples and cultures by a world as new as if it had just arisen from the sea. That gave us our hope and our excitement, and the hope and excitement can be passed on to newer Americans, Americans who never saw any phase of the frontier. But only so long as we keep the remainder of our wilderness as a reserve and a promise—a sort of wilderness bank. [96]

[93] "Wilderness Conservation," *Sierra Club Bulletin* 52, no. 11 (December 1967): 12-20.
[94] Michael McCloskey, "The Wilderness Act of 1964: Its Background and Meaning," *Oregon Law Review* 45 (1966): 288.
[95] John C. Merriam, "Nature and the Religion of Progress," in *The Garment of God: Influence of Nature in Human Experience* (New York: Charles Scribner's Sons, 1943), p. 149ff.
[96] Wallace Stegner, "Wilderness As Idea," in "Wilderness Conservation," *Sierra Club Bulletin* 52, no. 11 (December 1967): 12.

Despite his nationalist connotations, Stegner posed wilderness as the opposite of civilization (and America as fundamentally uncivilized). Nature does not represent the primeval origins of modern society but its antithesis, a more vital place where the intrepid outdoor recreationist can be reborn, at least for a while, in the vigors of a youthful earth.

Another important difference about the Sierra Club's understanding of wilderness, as opposed to Merriam's, was its primarily experiential rather than didactic value. Mountaineers by avocation, club members sought in wilderness the opportunity for physical exertion through hiking, climbing and other vigorous activities. For them, its unique characteristics were best understood through direct experience rather than abstract contemplation. Enumerating the values of wilderness, the authors of the Sierra Club's 1967 *Handbook* began with recreation,

> Hikers and climbers find the physical challenge and the necessary elbow room for their sports especially in wilderness. These activities are, of course, possible to some extent outside of wilderness, but the vast, untrammeled space, the sense of being away from crowds, the nearness to a natural state—these are the unique wilderness qualities enjoyable nowhere else. [p. 15]

Of course, the old-style conservationist also valued outdoor recreation, but not as a means of getting away from civilization. For men like Merriam, recreation did not require vast, untrammeled spaces where the evidences of modern life were absent. The League had been content to protect relatively small redwood groves along developed highways where motor tourists could enjoy vestiges of primeval nature from the comfort of their autocamps. This was not wilderness recreation as post-war conservationists—soon to become known as environmentalists—understood it.

There were parallels between the club's idea of wilderness and the new ecology. In the decades following World War II, ecologists had begun to challenge earlier notions of an orderly balance of nature, seeing more randomness and less evidence of purpose in the systems they studied. They were influenced by recent advances in the study of evolution that had come from the marriage of Mendelian genetics with Darwin's theory of natural selection. The resulting "new synthesis" demonstrated that it was possible for evolutionary change to occur through random genetic mutations, eliminating the need for external teleology and rendering notions of linear progress, at least in nature, meaningless. For ecologists, this suggested that nature might be less-harmonious and more unpredictable than formerly thought, but the larger implications affected not only the idea of nature but our very place within it.[97] As historian Susan Schrepfer observes, in the absence of design or notions of progress, "empirical evidence supported only the belief that randomness characterized the universe. Biology revealed interdependence, specialization, and adaptation, but it allowed no judgment as to superiority of species. Man was the accident of the chance-filled course of human genetics."[98] Wilderness might then be the most natural condition of life, and humanity occupies no special place or status, "a visitor who does not remain."[99]

Possibly because of these parallels, the Sierra Club was noticeably receptive to recent developments in the natural sciences. David Brower, executive director of the club from 1952 through 1969, was a voracious reader of the geneticists who had so profoundly affected the status quo in evolutionary theory.[100] Another telling demonstration of this influence on the club were the authors represented in its publications. Prominent among these was Loren Eiseley. Widely respected for his literary eloquence, Eiseley was also a competent scientist and scholar, with formal training in both anthropology and paleontology. Articles

[97] Schrepfer, *Fight To Save the Redwoods*, pp. 92-97; and Worster, *Nature's Economy*. The first edition of Worster's book was published in 1977 by the Sierra Club.
[98] Schrepfer, *Fight to Save the Redwoods*, p. 90.
[99] "Wilderness Act," P.L. 88-577, Sec. 2(c)
[100] Schrepfer, *Fight to Save the Redwoods*, pp. 98-99.

and selections from his writings began to appear in the *Sierra Club Bulletin* as early as 1964, and Eiseley was chosen to write the foreword to the club's tenth exhibit book, *Not Man Apart*, the following year. Eiseley first achieved public recognition for his book *The Immense Journey*, published in 1957, which discussed Darwinian evolution and its significance.[101] It was through Eiseley's informed but popularizing account of evolution that many Sierra Club members became aware of recent developments in evolutionary theory. More importantly, Eiseley's lyrical prose taught them to appreciate the radical implications of these discoveries. In an article published by the Sierra Club in 1964, Eiseley described the unsettling mystery of life that is full of possibility but lacking purpose or intent,

> The novelties of evolution emerge; they cannot be predicted. They haunt, until their arrival, a world of unimaginable possibilities behind the living screen of events, as these last exist to the observer confined to a single point on the time scale.[102]

The unpredictable openness of evolution here stands in marked contrast to the intentional, human-centered march of progress assumed by an earlier generation of evolutionary theorists that had included John Merriam and other League founders. Cynicism in the wake of World War II, exacerbated by the violence and futility of the ongoing conflict in Vietnam, were good enough reasons to doubt humanity's superiority in the order of life. But the new science provided further justification for questioning these anthropocentric assumptions, and wilderness offered an alternative which to many now seemed a welcome respite from the troubling implications of human dominance.[103]

Wilderness and Redwood Creek

When the Sierra Club turned its attention toward the north coast redwoods in the early 1960s, it found existing conservation efforts by the Save-the-Redwoods League inadequate. Guided by fundamentally different values than the Club, the League had made little effort to preserve areas expansive enough to support either wilderness or ecological integrity. Reflecting on this legacy in 1967, Peggy and Edgar Wayburn commented that, "much of what *has* been saved is in a series of small isolated groves which, while lovely to look at briefly—as in a museum—or to drive through, do not offer the possibility of really experiencing a redwood forest."[104] By this time the Sierra Club had already settled upon Redwood Creek as the most promising alternative to the League's museum groves, because here the values that the club esteemed could still be found. Redwood Creek possessed uncut forest that was sufficiently extensive and diverse to be ecologically meaningful while at the same time providing a wilderness experience for outdoor recreationists.

Dr. Paul Zahl had remarked on the wilderness qualities of the Redwood Creek watershed when he explored this area for National Geographics in 1963. Entering the upper canyon from the southwest, he descended a slope that was already partially cut-over by Georgia-Pacific and made his way toward Redwood Creek, which marked not only the property boundary but the furthest extent of logging up to that time,

> Eastward beyond the stream as far as eye could see, lay a forest of virgin redwood, towering, richly dense … Rain had been sparse, and the creek at this point was only knee

[101] Loren Eiseley, *The Immense Journey* (New York: Vintage Books, 1957).
[102] Loren Eiseley, "The Illusion of the Two Cultures," *Sierra Club Bulletin* 49, no. 9 (December 1964): 7.
[103] Michael McCloskey of the Sierra Club writes, "with the growth of the biological sciences, man's traditional anthropocentric view of his relations with the natural world was questioned. Doubting the biblical injunction that the creatures of the earth were put here just for man's use, writers began asking what moral right man had to subjugate and exterminate as he pleased." [Michael McCloskey, "The Wilderness Act of 1964: Its Background and Meaning," *Oregon Law Review* 45 (1966): 292].
[104] Peggy and Edgar Wayburn, "What the Redwood Industry Fails to Say," *Sierra Club Bulletin* 52, no. 3 (March 1967): 14.

> deep and 100 feet across. The tracks of elk, deer, and even bear were scattered along the water's edge, and fighting to get upstream against the rapids were several big steelhead trout. To complete the picture of authentic wilderness, a flock of merganser ducks sped low over the water, veering sharply as they saw me.[105]

Although the focus of Zahl's expedition was the soon-to-be-discovered tall trees, this eloquent description conveys his sense that the context in which these trees stand was also significant. They are part of a much larger forest, remote from humans and full of diverse life, the picture of authentic wilderness.

Later, after discovering the tall trees and estimating their height, Zahl and his companions floated down Redwood Creek through seven miles of nearly untouched forest,

> During the greater part of our journey, as we drifted past line after line of redwood treasure, we saw no sign of human intrusion. This was certainly one of the few remaining redwood wildernesses neither protected within public preserves nor yet scheduled for logging. If we saw no giants to challenge our new champions, we still saw some of the most extraordinary scenery in the world.[106]

Even without its monumental trees to boast of, Redwood Creek would still have possessed extraordinary qualities, but it was the combination of having both the world's tallest trees and immense, pristine wilderness that made this place truly outstanding and convinced the Sierra Club that it should be the core of the proposed national park. Two years later an even taller tree was discovered a short distance from the Tall Trees Grove by forest research consultant Rudolph Becking, prompting the Sierra Club to speculate that the Redwood Creek drainage possessed some unique combination of environmental conditions that encouraged such unusual growth.[107] The discovery added even greater significance to Redwood Creek. Not only did it possess groves of exemplary trees, it also possessed an intact ecological habitat supporting their growth within a setting that allowed them to be discovered and enjoyed as part of a wilderness experience.

The Redwood Park Act (1968)

With the Johnson administration opting decisively for a Mill Creek park, the Miller Redwood Company began aggressively clear-cutting its Mill Creek forests up to the boundary of Jedediah Smith State Park in the summer of 1966. Realizing that it would probably be forced out of business if a national park were established at this location, the company appeared to be trying to liquidate its assets as quickly as possible. The company rejected pleas from Secretary Udall to halt its logging of the proposed park lands. Miller Redwood did not cease until a general moratorium was negotiated later that fall with all of the major lumber companies. By that time, however, much of the original justification for establishing a national park on Mill Creek had been lost.[108]

By January the following year, the Save-the-Redwoods League acknowledged that irreparable damage had been done to the old growth forests at Mill Creek and reluctantly agreed to consider other sites for a potential national park. While it still supported a Mill Creek unit, combined with the existing state parks at Jedediah Smith and Del Norte Redwoods, the League was now willing to consider *either* this location *or* a Redwood Creek location. The Department of the Interior also saw the need to compromise and proposed, as a third alternative, a two-unit park comprising both Mill Creek and 36,800 acres on

[105] Zahl, "Mt. Everest of All Living Things," p. 35.
[106] Zahl, "Mt. Everest of All Living Things," pp. 50-51.
[107] Editors, "Senate Hearings Indicate Marked Preference for a Redwood National Park at Redwood Creek; Becking party discovers tallest redwood and record-height trees of four other species," *Sierra Club Bulletin* 51, no. 9 (November 1966): 14-15.
[108] Schrepfer, *Fight to Save the Redwoods*, pp. 140-142.

Redwood Creek. It reasoned that the additional acreage on Redwood Creek would make up for the lost old growth forest on Mill Creek.[109]

In March 1967, the administration itself compromised by opting for a watered-down version of this third alternative, proposing a Mill Creek unit and 17,000 acres on Redwood Creek. This was submitted to Congress by Senator Thomas Kuchel (R-Calif.). The administration's alternative was strongly opposed by the Sierra Club, who still insisted on centering the national park on Redwood Creek and believed this alternative would protect far too little of that watershed. The Club continued to advocate for its 90,000 acre park on Redwood Creek. All three of these alternatives were introduced to the 90th Congress, but none was able to gain sufficient support to come to a vote.[110]

* * *

In an effort to break this impasse, Senators Henry Jackson (D-Wash.), Thomas Kuchel (R-Calif.), and Alan Bible (D-Nev.) authored a bipartisan compromise bill that proposed a two-unit park comprising 61,654 acres on both Mill Creek and Redwood Creek. This was known as the Jackson-Kuchel bill, S.2515. It also included substantial compensations for both labor and industry, including a land exchange with Miller Redwood for the Forest Service's Redwood Purchase Unit, comprising about 14,500 acres on the lower Klamath River and valued at approximately $40 million. The bill reported favorably out of the Senate Committee on Interior and Insular Affairs and was passed on the floor of the general Senate at the beginning of November 1967.

In June 1968, a companion to the Jackson-Kuchel bill was submitted to the House. As reported by the House Committee on Interior and Insular Affairs, chaired by Wayne Aspinall, it recommended a substantially smaller park, totaling 28,500 acres. Much of the Redwood Creek portion comprised only a narrow corridor along the creek itself leading up to, and including, the Tall Trees Grove. Known as the "worm" for its appearance on maps, this corridor was later extended two miles upstream of the Grove to include an extraordinary stretch of old growth redwoods growing along the banks of the creek. House members became convinced of the significance of this proposed addition, referred to as the "emerald mile," after visiting the area following House Committee hearings in Eureka, California on 17-18 April. The Sierra Club had arranged for a helicopter to carry several of the Congressmen up Redwood Creek to see the remarkable sight first-hand.[111]

The House and Senate versions of S.2515 were reconciled in conference committee and emerged for a vote of the full Senate in September. The resulting compromise proved to be far more generous than Congressman Aspinall's disappointing House bill but still represented far less than the Sierra Club and its allies wanted. Fearing that it was the best that could be achieved at this time, the Club reluctantly chose to support it. Without significant opposition, S.2515 was approved by the full Senate on 19 September 1968. It proposed a two-unit Redwood National Park comprising a total of 58,000 acres. Of this, 27,468 acres were already protected within state parks, leaving 30,532 acres of newly-protected lands. The southern unit at Redwood Creek contained the majority of the new lands, totaling 22,476 acres on Lost Man, Little Lost Man, and Skunk Cabbage drainages, as well as the "worm" and the "emerald mile" on Redwood Creek, and a coastal strip by Stone Lagoon. It saved only 10,876 acres of old growth redwood. The remainder of the 30,532 acres of newly-acquired lands (totaling 19,656 acres) had all been previously

[109] Schrepfer, *Fight to Save the Redwoods*, p. 146.
[110] Schrepfer, *Fight to Save the Redwoods*, pp. 146-148; and McCloskey, "Last Battle of the Redwoods," pp. 60-61.
[111] Schrepfer, *Fight to Save the Redwoods*, pp. 150-152; Wayburn, *Interview*, pp. 70-71, 85; Edgar Wayburn, "Club Proposes Additions to Redwood National Park as Voted by the Senate," *Sierra Club Bulletin* 53, no. 3 (March 1968): 14-15; and John Flannery, "Field Hearings on a Redwood National Park," *Sierra Club Bulletin* 53, no. 5 (May 1968): 12, 21.

logged. The total cost of the proposal was estimated to be $92 million, of which $40 million was represented by the Redwood Purchase Unit that was given in exchange for the Miller Redwood lands on Mill Creek. The final cost would eventually come to approximately $198 million. President Johnson signed the bill into law on 2 October 1968 (P.L. 90-545), and a formal dedication ceremony was held on 27 August 1969 at what would later be designated the Lady Bird Johnson Grove.[112] While the First Lady spoke, hundreds of activists quietly protested outside the grove, carrying signs that read, "Ladybird, tell the world the park still has a long way to go," and similar messages. The Sierra Club was already campaigning for the addition of more acreage to round out this "half park."[113]

iii. The Struggle to Complete the Park

The unambiguous intent of the Redwood National Park enabling act was preservation, stated clearly in its opening lines: "to preserve significant examples of the primeval coast redwood (*Sequoia sempervirens*) forests and the streams and seashores with which they are associated…" But the act was the result of political compromise and failed to implement the most ecologically sensible means of realizing this objective through whole watershed protection. Instead, the final authorization of 58,000 acres included only about half of the watersheds of both Lost Man Creek and Mill Creek and less than 10 percent of the Redwood Creek watershed. The iconic heart of the new park, the Tall Trees Grove, was located in the latter and proved especially vulnerable to external impacts because much of the protected area within this watershed comprised only a narrow corridor along the creek itself, the so-called "worm." Studies would later reveal that the upslope soils of the Redwood Creek basin were among the most unstable in the park.[114]

That the boundaries of Redwood National Park were less than perfect, from an ecological point of view, was well-understood by the Congressional authors of the 1968 act, but they hoped this shortcoming could be effectively mitigated through cooperative management of the private lands surrounding the park, most of which were owned by logging companies. Accordingly, Congress gave the Secretary of the Interior broad, if vaguely-defined, authority to enter into contracts and agreements with private landowners to achieve the desired protection of park resources. Section 3(e) of the park act stated that,

> the Secretary is authorized … to acquire interests in land from, and to enter into contracts and cooperative agreements with, the owners of land on the periphery of the park and on watersheds tributary to streams within the park designed to assure that the consequences of forestry management, timbering, land use, and soil conservation practices conducted thereon, or of the lack of such practices, will not adversely affect the timber, soil, and streams within the park as aforesaid.[115]

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[112] Schrepfer, *Fight to Save the Redwoods*, pp. 157-161.
[113] "Nat'l Redwood 'Half Park' Not Enough," Sierra Club Bulletin 54, no. 9 (September 1969): 20; Tracy Wood, "Lady Bird Dedicates Redwood Park," *Daily Courier*, Grants Pass, Oregon, 26 November 1968; "Redwood National Park: First Visit By a First Lady," *Medford Mail Tribune*, Medford, Oregon, 26 November 1968; and unidentified newspaper clippings, Redwood National Park Establishment Papers, REDW 15828, Box 4, f. 12, REDW Archives, Orick, CA.
[114] Dale A. Hudson, "Sierra Club v. Department of Interior: The Fight to Preserve the Redwood National Park," *Ecology Law Quarterly* 7 (1978-1979): 798; Edward C. Stone, Rudolf F. Grah, and Paul J. Zinke, *An Analysis of the Buffers and the Watershed Management Required to Preserve the Redwood Forest and Associated Streams in the Redwood National Park* (Crescent City, CA: National Park Service, Redwood National Park, 30 April 1969); and U.S. Congress, House Committee on Government Operations, *Protecting Redwood National Park: House Report No. 95-106*. 95th Cong., 1st sess., 23 March 1977, p. 1. Stone discusses the particularly unstable Atwell-type soils, which are common in the Redwood Creek basin, in his report on pages 28-45.
[115] P.L. 95-545, Sec. 3(e).

The act went on to clarify that these interests were generally not to include fee title—that is, ownership—unless absolutely necessary. Nonetheless, at Section 2(a) Congress did grant the Secretary of the Interior authority to modify the boundaries of the park, "from time to time," in order to achieve the purpose of the act. Few, if anyone, expected this to involve more than minor boundary adjustments, and the bulk of attention following the establishment of Redwood National Park was instead given to the special protective powers that Congress had instituted under Section 3(e). Many park managers saw this as an unprecedented opportunity for cooperation between the National Park Service and private land owners as well as a chance to heal some of the bad feelings that had arisen during the controversy over the park's establishment.[116] This initial optimism was soon checked as two irreducible facts became apparent—first, that industrial logging on the boundaries of the park was fundamentally incompatible with the preservation of park values; and, second, that the adherence of private landowners with the management prescriptions of park staff was voluntary and would rarely, if ever, be given priority over economic interests. While the latter might have seemed obvious from the beginning, it was not perceived as a fatal flaw to the cooperative management approach until the inherently destructive effects of industrial logging on the park could be demonstrated beyond doubt, and this would not be possible without scientific analysis of the evidence.

Cooperative Management

Addressing the daunting challenge posed by the park enabling act, one of the first actions taken by the Park Service directorate was to assemble a team of planners led by the new park's first superintendent, Nelson Murdock. Over the next five years, they would work on drafting the park's Master Plan, which was required before any appropriation could be made for park development. One of the principal objectives of this team was to determine how to implement the unusual mandate contained in Section 3(e) of the act. The team quickly concluded that this would require better knowledge both of Redwood ecology inside the park as well as silvicultural practices outside of it in order to assess the effects of logging on park resources and develop an effective prescription for cooperative management.[117]

Acting on the planning team's recommendations, the NPS contracted Edward C. Stone from the University of California's School of Forestry in Berkeley.[118] As a professional forester, Stone was, not surprisingly, sympathetic to the logging industry and optimistic about the prospect of cooperative management. "Contrary to a widely accepted public attitude that the Park Service and the industrial forest owners surrounding the Park have unresolvable, conflicting interests," he wrote, "many areas of common interests exist, which, if expanded and developed, can serve to protect the Park and enhance its values."[119] Much of this optimism was due, however, to Stone's confidence in the value of logging rather than to his knowledge of redwood ecology. Stone assumed—correctly—that private logging companies would soon cut all of the remaining old growth forest outside the park but believed this could be done in a way that not only minimized impacts on the park but eventually benefitted park resource values. He also asserted—with justification—that the natural ecosystem of the primeval redwood forest had already been so disrupted and constrained by human impacts that the remaining vestiges within park boundaries would need to be preserved artificially through active management. Ironically, the very place that the Sierra Club had fought to protect because of its supposed wilderness characteristics, Stone now insisted could

[116] David Turello, Bruce Black, and Nelson Murdock, "Concept Paper for Proposed Buffer and Watershed Management, Sec. 3(e), Public Law 90-545, Redwood National Park," 21 November 1969. Discussed in Mark Spence, *Watershed Park*, p. 99. Nelson Murdock was the first superintendent of Redwood National Park, while David Turello and Bruce Black were NPS planners from the Western Service Center.
[117] Spence, *Watershed Park*, p. 113.
[118] Edward C. Stone, Rudolf F. Grah, and Paul J. Zinke, *An Analysis of the Buffers and the Watershed Management Required to Preserve the Redwood Forest and Associated Streams in the Redwood National Park* (Crescent City, CA: National Park Service, Redwood National Park, 30 April 1969).
[119] Stone, et al., *Buffers and Watershed Management*, p. 2.

only be preserved as a cultural landscape. This included the Tall Trees Grove, which Stone described as a climax community that would not survive without human intervention to maintain the conditions that had made its evolution possible. If such measures were implemented, the Tall Trees Grove would become, in effect, a natural museum on the same order as the state park groves that the Sierra Club had once dismissed for their artificiality. Stone's management prescriptions included actively thinning second-growth forest within park boundaries in order to manage natural succession to favor old-growth characteristics, though he also recommended establishing an 800-foot buffer zone around the perimeter of the park. The only impediment he saw to successful watershed management was the wilderness romanticism—as he characterized it—of certain conservationists who believed that the primeval forest could best be preserved by leaving it alone. Were the primeval forest still intact, Stone observed, that might be true, but it was not.[120]

The Sierra Club responded quickly to this direct attack not only on the Club's interest in preserving wilderness values but on the Club itself, which was the obvious referent of Stone's allusion to "certain conservationists." Gordon P. Robinson, a forestry consultant retained by the Sierra Club, prepared a detailed critique of the Stone report, which he presented to the Park Service in July of that year (1969). Among other things, Robinson questioned Stone's knowledge of redwood ecology. The climax communities that Stone recommended be maintained through artificial means, for example, Robinson characterized as "highly speculative." His criticism was consistent with some of the uncertainties prevailing in the ecological sciences at that time. Rather than actively managing for a putative climax state, Robinson suggested that "preservation means the application of ecological management techniques to neutralize influences of man, thus permitting the natural environment to be maintained essentially by nature."[121] This prescription called upon resource managers to exercise greater humility than Stone's recommendations, but it also suggested that the park should play a more active role in limiting extra-border activities rather than cooperating with them. Missing, however, was the science to justify taking this potentially controversial approach.

The Sierra Club had been encouraging the Department of the Interior to be more active about managing threats to the new park almost from the moment the park was established. On 20 December 1968, scarcely a month after the official dedication of the national park, the Club wrote to Secretary Udall pleading with him to use his authority to add key acreage, consistent with Sections 2(a) and 3(d) of the enabling act that permitted minor additions and boundary changes to protect park resources and the viewshed along the Highway 101 corridor, provided the total park acreage did not exceed 58,000 acres. At the time of its establishment, Redwood National Park comprised less than 56,000 acres, leaving more than 2,000 acres that could still be added. The Club recommended several critical areas that were immediately threatened by logging, including Skunk Cabbage Creek and tributaries of Redwood Creek above the Tall Trees Grove, but Udall was able to do nothing before his departure with the outgoing Johnson administration the following month.[122]

The Club persisted in its efforts with the Nixon administration, writing to Undersecretary of the Interior Russell Train on 3 July 1969 and pleading for urgent action after observing that Arcata National (formerly Arcata Redwood Company) had recently constructed a logging road from the Bald Hills Road down to the east boundary of the park, above the Tall Trees Grove, while Georgia-Pacific had begun building roads up to the west side of the park on the western slopes of the Redwood Creek basin. Over the next

[120] Stone, et al., *Buffers and Watershed Management*, p. 16.
[121] Gordon P. Robinson, *A Critique of an Analysis of the Buffers and the Watershed Management Required to Preserve the Redwood Forest and Associated Streams in the Redwood National Park* (San Francisco, CA: Sierra Club, 1969), p. 5.
[122] Edgar Wayburn, "Redwood National Park: A Promise Unfulfilled," *Sierra Club Bulletin* 56, no. 6 (June 1971): 10-13, 30.

two years, much of the basin on either side of the Tall Trees Grove was clear cut. Portions of Lost Man Creek and Skunk Cabbage Creek, adjacent to Prairie Creek Redwoods State Park, were also logged. Frustrated with the lack of response from the administration, the Sierra Club legally petitioned Secretary of the Interior Rogers Morton to meet his statutory obligations to protect Redwood National Park. It also began working through Congress, calling for Senate oversight hearings in order to begin laying the groundwork for future legislative action.[123]

Scientific Study

Even with increasing pressure from conservation groups like the Sierra Club, the government took no immediate action to moderate logging activities adjacent to Redwood National Park or to modify the park's boundaries. Instead, Secretary Morton requested that the Park Service contract additional scientific studies. Intended to support the Park's mandated cooperative management approach, these studies would have the opposite effect as they revealed the severity of logging's impact on the old-growth redwood forest and associated ecosystems within the park.[124]

The first of these studies was initiated in early 1972 by Dr. Richard C. Curry, science advisor to the Assistant Secretary of the Interior for Fish, Wildlife and Parks. Curry assembled an interdisciplinary team of specialists to study the Redwood Creek basin and potential threats to park resources within it. Their report, presented as an "options paper," was completed at the end of that year but not made public until early 1973. The Curry report was accompanied by an analysis of aerial photography made by Earth Satellite Corporation of Berkeley, California.

The Curry team identified two general categories of park resources that were currently endangered: "the "Redwoods and associated vegetation, and the water quality and aquatic ecosystem of Park streams and particularly Redwood Creek."[125] The principal threat to these resources was posed by erosion of the unstable soils in the Redwood Creek basin and associated changes in the channel of Redwood Creek itself. This upslope erosion into the creek created "channel aggradation," or elevation of the creek bed, which directly threatened the floodplain groves of redwoods, such as the Tall Trees Grove, by deposition of sediments and organic debris that can bury the roots of the trees and deprive them of both oxygen and moisture.[126] Elevation of the stream level through channel aggradation can also lead to undercutting of the banks, toppling streamside redwoods and eroding the toes of unstable slopes. Dormant landslides can then become reactivated, causing further wasting of debris into the stream and perpetuating the chain of events farther downstream. The creekbed in the vicinity of the Tall Trees Groves was estimated to have risen about five feet as a result of more than a decade of accelerated erosion from the upper watershed. By the mid-seventies it had become apparent to anyone who thought carefully about the matter that the grove stood a good chance of being washed away in the next bad winter if the sources of this channel aggradation, natural or otherwise, were not curtailed.[127]

Although the Curry team's report was much more critical of logging than Stone's, it provided little new evidence directly linking industrial practices with these destructive effects. While there was little doubt that erosion had accelerated in recent decades, it was impossible to determine the relative contribution of timber harvesting and such natural, if unusual, causes as major storm events that had occurred during the

[123] Ibid.; and Peggy Wayburn, "The Short, Sorry History of Redwood National Park," *Sierra Club Bulletin* 60, no. 8 (October 1975): 52-55.
[124] Michael McCloskey, "The Redwoods: To Stand How Long?" *Sierra Club Bulletin* 58, no. 6 (June 1973): 17-18.
[125] Richard C. Curry, et al., *Resource Management Actions Affecting Redwood Creek Corridor—Options Paper* (Washington, DC: U.S. Dept. of the Interior, 1973), p. 6
[126] Redwoods can sustain, and even benefit from, deposition of silt, but gravelly sediments associated with higher rates of erosion dry out too fast and desiccate the redwoods' roots, while woody debris associated with logging monopolizes available oxygen in the soil as it decays.
[127] Marc Reisner, "The Tragedy of Redwood National Park," *NRDC Newsletter* 6, no. 4 (July/August 1977): 2.

same period. "In conclusion, the Curry team decided that although recent timber harvest and road construction have undoubtedly increased the sediment loads and modified the aquatic habitat of Redwood Creek and its principal tributaries, the magnitude and duration of these impacts cannot be documented quantitatively with available data."[128] While not having definitive data, the Curry team nonetheless recommended fee acquisition of an 800-foot buffer to protect the Redwood Creek corridor from upstream logging—much as Stone had recommended—but this proposal was removed from the public draft of the report at the request of the Office of Management and Budget because it was considered fiscally impractical.[129]

While these studies were underway, the NPS continued to work on its Master Plan for Redwood National Park. The planning team had endorsed the optimistic conclusions of the 1969 Stone report insisting that industrial logging and park values could be maintained in proximity to one another through proper management.[130] The Master Plan—completed in 1973 but never certified—identified the need to protect park resources from adverse outside activities but adopted a vaguely-defined resource management concept in which logging would continue unabated throughout the redwood forests around the park, mitigated only by cooperative management in a buffer zone immediately adjacent to the park boundary.[131] In effect, the Master Plan simply formalized the intent of the park enabling act. (Constrained by policy, Park Service planners could do nothing more.) Like the act, the Master Plan acknowledged the park's responsibility for adverse impacts originating outside the park but failed to provide adequate means for addressing these impacts. This failure was in great part due to the planners' initial optimism, which led them to underestimate the gravity of the threat from industrial logging, but it also resulted from their lack of adequate knowledge about the actual effects of logging on the redwood ecosystem. Recognizing this deficiency, though without fully appreciating its implications, the Master Plan also identified the need for developing a research program to assist in the cooperative management of logging and park resources.[132]

The Curry Team had come to similar conclusions about the need for further research, though with less optimism. In response to its recommendations, the Secretary of the Interior requested assistance from the U.S. Geological Survey in 1973. Later that year, Dr. Richard Janda from the Survey's Menlo Park office commenced a three-year study focusing on erosion and sediment loads in the Redwood Creek corridor. The results of his research would show definitively that upstream logging was directly related to accelerated erosion and its harmful impacts on the downstream environment.[133] Dr. Janda and his team ultimately published seventeen reports documenting these findings, while Janda himself provided extensive testimony before Congress on the effects of industrial logging on Redwood Creek and associated ecosystems.[134]

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[128] U.S. Dept. of the Interior, *Environmental Surveillance for Redwood Creek: The Study Plan* (Menlo Park, CA: U.S. Geological Survey, 20 August 1973).
[129] U.S. Dept. of the Interior, *Environmental Assessment: Management Options for Redwood Creek, Redwood National Park* (San Francisco, CA: National Park Service, Western Regional Office, 1975), pp. 1-5.
[130] David Turello, Bruce Black, and Nelson Murdock, "Concept Paper for Proposed Buffer and Watershed Management, Sec. 3(e), Public Law 90-545, Redwood National Park," 21 November 1969.
[131] The plan's resource-management concept called for a new ethic, "wherein all the divergent and varied interests within the region cooperate to assure that future generations will be able to share in our rich heritage of these redwood forests. Under this ethic, preservation and utilization [that is, logging] would differ only in approach, not philosophy." Following the acrimonious and painful struggle for the initial park establishment, such baseless optimism would have bewildered even the most generous reader.
[132] U.S. Dept. of the Interior, *Master Plan: Redwood National Park, California* (Denver, CO: National Park Service, 1973); and Spence, *Watershed Park*, pp. 98-106.
[133] U.S. Dept. of the Interior, "Environmental Surveillance for Redwood Creek."
[134] Richard J. Janda, *Recent Man-Induced Modifications of the Physical Resources of the Redwood Creek Unit of Redwood National Park, California, and the Processes Responsible for Those Modifications: Open-File Report 75-*

The Sierra Club Lawsuit

In the years immediately following the establishment of Redwood National Park, the Sierra Club was responsible for much of the pressure that led the NPS to conduct further scientific studies. When it discovered that the Park Service was withholding the findings of the Curry task force, the Club filed a Freedom of Information Act request to obtain a copy. Although the Curry team had admitted that it could not definitively link industrial logging to impairment of park resources, the Club understood that the preponderance of evidence documented by the team pointed to just that conclusion and suspected this was why the Park Service had been reluctant to release the final report.[135] The Sierra Club responded by filing a lawsuit against the Department of the Interior alleging that the Department had failed both its statutory and public trust responsibilities to preserve the park's primeval redwood forest and associated ecosystems.[136] (That same year—1973—the Natural Resources Defense Council filed suit against the private companies that were logging the Redwood Creek basin, charging them with creating a public nuisance.)[137]

The Interior Department responded to the Club's allegations by insisting that there was not sufficient evidence, based on existing studies completed by Stone, Curry, et al., to establish a causal relationship between logging and erosional damage to the park. It pointed out that it had taken action to obtain more definitive data by retaining Dr. Richard Janda of the U.S. Geological Survey, whose research was in process, and that administrative action would be based on Janda's findings. But the U.S. District Court rejected these arguments, and in July 1975 ruled in favor of the Sierra Club, determining that persuasive evidence already existed showing that Redwood National Park was suffering damage from adverse impacts outside its borders and finding that the Department of the Interior's failure to take action to protect the park from these impacts was "unreasonable, arbitrary, and an abuse of discretion."[138] Over the following year, the Department administered the park under the court's supervision and was required to seek remedy for the Sierra Club's complaint. Interior attempted to mitigate the effects of logging on the park through a variety of means—persuading the state to impose stricter silvicultural and harvesting regulations; requesting voluntary cooperation from the logging companies; seeking additional appropriations from Congress for fee acquisition of buffer zones around the park; seeking authority from Congress to regulate forestry practices on private lands; and, as a last resort, bringing suit against the logging companies themselves through the Department of Justice. All of these efforts failed for one reason or another. When it became apparent that there was little the Department of the Interior could do on its own to protect park lands within the Redwood Creek basin from upstream logging, the U.S. District Court finally ruled that the Department was "purged" of its previously found culpability, and it concluded all legal actions. While the Sierra Club had technically won its case, it was a victory without consequences. The old growth continued to fall along the upper reaches of Redwood Creek, and the park remained threatened as logging progressed to even steeper, more unstable slopes than before.[139]

The Redwood Expansion Act (1978)

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56 (Menlo Park, CA: U.S. Geological Survey, 1975); and Richard J. Janda, *Summary of Watershed Conditions in the Vicinity of Redwood National Park, California: Open-File Report 78-25* (Menlo Park, CA: U.S. Geological Survey, 1977).

[135] Michael McCloskey, "The Redwoods: To Stand How Long?" *Sierra Club Bulletin* 58, no. 6 (June 1973): 17-18.

[136] Hudson, "Sierra Club v. Department of Interior," pp. 807-808.

[137] Reisner, "Tragedy of Redwood National Park," p. 8.

[138] Hudson, "Sierra Club v. Department of Interior," pp. 817-827; and Schrepfer, *Fight to Save the Redwoods*, pp. 192-193.

[139] Hudson, "Sierra Club v. Department of Interior," pp. 828-846; and Schrepfer, *Fight to Save the Redwoods*, pp. 193-197.

While the Department of the Interior was struggling unsuccessfully to fulfill its obligations to the court, Congress had already begun pursuing legislative alternatives to protect Redwood National Park. The inadequacy of the original park act was apparent to anyone interested in the redwoods, and as early as 1969 members of Congress from both sides of the continent were attempting to remedy the act's most glaring deficiency—its failure to protect downstream forests on Redwood Creek. By the middle of the following decade Congressman Phillip Burton of California, one of Congress' most ardent supporters of national parks, had taken up the redwood cause and was proposing legislation to add 74,000 acres to the park, encompassing much of the Redwood Creek watershed. By this time few believed that cooperative management alone could solve the park's problems so long as cooperation remained voluntary. With the Department of the Interior's failure to obtain regulatory authority over private lands, park supporters both within and outside of Congress concluded that their only remedy lay with acquisition in fee simple of the most critical remaining private forest lands. This was the strategy that the Sierra Club had advocated all along but had been rejected, or watered down, by the political compromises leading up to the 1968 act. It would now be the objective of renewed legislative efforts.

In September 1976, California Congressman Leo Ryan ordered hearings by the Conservation, Energy, and Natural Resources Subcommittee of the House Committee on Government Operations. Ryan's subcommittee had no authority to propose legislation, so he could not sponsor a bill, but he successfully used the hearings to publicize the Redwood problem and draw greater attention to the need to do something legislatively to protect the park.[140] The findings from more than three years of scientific research in the Redwood Creek basin, especially the work of Dr. Janda and his team from the U.S. Geological Survey, would play an important role in these hearings and in the resulting House report.[141] In his spoken testimony before the subcommittee, Dr. Janda noted that the major problem confronting downstream park resources was the introduction of increased sediment loads to Redwood Creek, with effects that had already been observed and well-described in 1972 by the Curry team (of which Janda had been a member). He observed that upstream logging was only one of several causes of erosion responsible for these sediments, and that present logging practices were, in fact, more responsible than in the past. But Janda explained that the various impacts resulting from historic logging as well as natural causes such as recent storms were cumulative, with each event adding something more to the sediment load that was still working its way down through the watershed. As a result, even responsible logging in the present and near future would have destructive long-term consequences far in excess of its immediate impacts. Dr. Janda pointed out, however, that responsible by industry standards meant the efficient, economical harvesting of trees and reflected the logic of the market rather than ecological realities.[142] Contemporary industry practice in the upper Redwood Creek basin met or exceeded standards of the California Forest Practices Act, but at the same time the preferred method of logging by clearcut with tractor yarding was highly disruptive of forest soils and produced more erosion than earlier practices.[143]

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[140] Schrepfer, *Fight to Save the Redwoods*, p. 198.

[141] U.S. Congress, House Subcommittee on Conservation, Energy, and Natural Resources of the Committee on Government Operations, *Forest Management and Redwood National Park: Hearings*. 94th Cong., 2d sess., 18 September 1976; and U.S. Congress, House Committee on Government Operations, *Protecting Redwood National Park: House Report No. 95-106*, 95th Cong., 1st sess., 23 March 1977.

[142] Schrepfer, *Fight to Save the Redwoods*, pp. 200-201.

[143] California's Forest Practices Act was recently modified as a result of a lawsuit by the NRDC, which argued that the logging industry should comply with CEQA, the state's version of the National Environmental Policy Act. The courts agreed and in 1975 concluded that all timber harvest plans needed to include or incorporate an Environmental Impact Report (EIR). This regulatory burden was largely mitigated through a compromise with the state whereby industry was allowed to give verbal testimony of its proposed annual harvest plans in lieu of a full EIR. [Schrepfer, *Fight to Save the Redwoods*, p. 196; and "Statement of Claire T. Dedrick," pp. 28-46 in U.S. Congress, *Forest Management and Redwood National Park*,18 September 1976].

Future cuts in the upper basin would occur on steeper, more unstable slopes than in the past and could be expected to cause even greater impacts than before.

Earlier in the day the subcommittee had heard that the Tall Trees Grove, and much of the eight-mile corridor of park land along Redwood Creek—known as the worm—was endangered by these various upstream impacts. Taylor Miller, the assistant secretary of the California Resources Agency, explained that sediment aggradation had already raised the bed of Redwood Creek between five and fourteen feet, while Claire Dedrick, secretary of the agency, described with sobering clarity the implications of these impacts for the grove itself. Responding to Congressman Ryan's questions, Dedrick admitted that, "one or two heavy storms, the way that we did not get them last year, would have a good possibility of wiping out the tall tree growth. There is no guarantee one way or the other, but the probability is very high."[144]

Dr. Janda, who provided testimony later that day, did not entirely agree with Secretary Dedrick that the entire Tall Trees Grove could be lost at a single stroke, but he admitted that the effects of continued logging, exacerbated by future storms, would cause substantial damage to Redwood National Park, especially along Redwood Creek where the majority of the park was concentrated. "We are talking," he responded to Congressman Ryan, "about drastically modifying the physical appearance along the stream and losing a finite number of trees. The exact number and exactly where they will fall I don't think anyone can tell you." Janda's professional reserve did little to mitigate the implications of his statement. It was clear to the subcommittee that the existing park, centered around the Tall Trees Groves on Redwood Creek, was unsustainable in its present configuration. It was also clear that it would no longer be enough simply to acquire more lands in the upper watershed and to retire them from logging. Active rehabilitation would also be necessary in order to repair the damage already done and defuse the time bomb of accumulated sediments that continued to threaten downstream resources. Both strategies would become part of subsequent legislation to amend the Redwood National Park enabling act.

Following the presidential elections of 1976 which brought Jimmy Carter into office, the political environment for a new park bill greatly improved. Congressman Phillip Burton was able to move his expansion bill out of committee for a favorable vote on the floor of the House. Senator Alan Cranston, also of California, sponsored a companion bill in the Senate, which was also approved. After going through conference mark-up, the combined bill was sent to President Carter, who signed the act to enlarge Redwood National Park (Public Law 95-250) on 27 March 1978. The expansion act was, in effect, an amendment of the Redwood enabling act of 1968. Its most salient feature was the boundary revision it authorized, bringing an additional 48,000 acres into the park and nearly doubling its size. Most of these lands lay toward the upper end of the Redwood Creek basin, above the Tall Trees Grove, and included the slopes of the valley from ridgeline to ridgeline. The new additions also included portions of the lower watershed on Lost Man Creek and May Creek, as well as Skunk Cabbage Creek on the west side of Highway 101. But the expansion act did more than simply enlarge the park. It provided for rehabilitation of forest habitat damaged by past logging, and it addressed the economic consequences of park expansion. The act's broad consensus of support was due in great part to the compensations it offered timber workers and local communities that would be affected by the inevitable closure of mills. Title II of the act was largely written by union leaders and offered, among other things, the equivalent of full pay and benefits for six years to any timber industry worker who became unemployed as a result of the park act. These entitlements would ultimately total more than $40 million.[145]

Possibly the most significant element of the new act, however, was its endorsement of science. While generous unemployment assistance made it possible to get the bill passed in the labor-friendly

[144] "Statement of Taylor Miller," p. 29; and "Statement of Claire T. Dedrick," p. 46 in U.S. Congress, *Forest Management and Redwood National Park*, 18 September 1976.
[145] Schrepfer, *Fight to Save the Redwoods*, p. 224; and Spence, *Watershed Park*, pp. 149-151, who puts the cost significantly higher.

environment of a Democratic majority, science had played the critical role in convincing Congress of the need for additional action to protect the redwoods in the first place, and science would continue to play an essential role in the legislative prescription for managing the enlarged park. In order to fulfill Congress' mandate "to preserve significant examples of the primeval coast redwood (*Sequioa sempervirens*) forests and the streams and seashores with which they are associated," the park expansion act provided for the rehabilitation of upslope and upstream damage "contributing significant sedimentation because of past logging disturbances and road conditions," authorizing $33 million for a watershed rehabilitation program.[146] Not only would such management protect downstream resources such as the Tall Trees Grove on Redwood Creek, it would help restore redwood forests on the cut-over lands. Congress realized, however, that this rehabilitation program could not be effective without reliable knowledge to guide it. It therefore also provided that scientific research and monitoring would have an important place in the management of the park, stipulating that the park, "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 [its] general management plan to benefit from the results of such studies."[147]

Despite the substantial enlargement of Redwood National Park, much of the upper watershed of Redwood Creek remained outside park boundaries and was still subject to logging. A Park Protective Zone was identified here where the park was directed to cooperate with private landowners to mitigate or prevent destructive land use practices. Unlike the mostly ineffective provisions for cooperative management of the original enabling act, the expansion act included much broader authority to acquire property within this zone if it proved necessary to prevent damage to park resources. The expansion act also authorized entry onto these private lands for the purpose of collecting "scientific and professional information and data concerning the Redwood Forest ecosystem."[148] This further established the principle that future resource management, and even administrative decisions, would be scientifically informed.

Science and the National Park Service

Although the Redwood expansion act greatly increased the role of science in the National Park Service, it was not without precedent. The agency had acknowledged the importance of science and the need for science-based resource management for over a decade. In 1962, just as the campaign for a redwood national park was beginning, Secretary of the Interior Stewart Udall had called for a thorough review of science and resource management in the National Park Service. This was in response to criticism that the Park Service had neglected its responsibility for its natural resources during more than three decades of intense recreation-oriented development.[149] It was this aggressive development, beginning with Depression-era unemployment relief projects, that had first dissuaded League conservationists from supporting a redwood national park until circumstances by the 1950s had made it necessary. The requested studies appeared the following year. One was the product of an independent advisory board chaired by A. Starker Leopold, son of the well-known wildlife biologist and author Aldo Leopold. The other was prepared by a committee of the National Academy of Sciences chaired by William J. Robbins. Both were intensely critical of current practice in the National Park Service which paid little attention to

[146] P.L. 95-250, Sec. 101(a)(6). Although $33 million was authorized, not all of this money was actually appropriated. The park's current chief of natural resources, Leonel Arguello, estimates that scarcely a third of this amount ever saw its way to the park, but this proved enough to establish a robust and successful rehabilitation program. [personal communication with author, 20 April 2018].
[147] P.L. 95-250, Sec. 101(a)(6)
[148] P.L. 95-250, Sec. 101(a)(6)
[149] The immediate cause of Secretary Udall's investigation was a report by the chief of the Park Service's Branch of Natural History, Howard Stagner, in response to criticism over NPS wildlife policy in Yellowstone. [Ethan Carr, *Mission 66: Modernism and the National Park Dilemma* (Amherst: University of Massachusetts Press, 2007), pp. 307-308].

the role of science outside of interpretation. The more influential Leopold Report urged that scientific research should "form the basis for all management programs" and that "every phase of management" should come under the "full jurisdiction of biologically trained personnel."[150] The National Academy report recommended that the Park Service develop a science advisory board at the directorate level as well as scientific staffing in parks with funding for science constituting at least 10 percent of the agency's budget.[151] Secretary Udall endorsed the Leopold Report soon after it appeared and instructed the NPS to "take such steps as are appropriate to incorporate the findings of the [Advisory] Board into the administration of the National Park System," giving the report's recommendations the effect of policy.[152] The Park Service at first resisted the changes recommended by these critical reviews, though it would gradually accede to pressure from both inside and outside the agency to give science a more prominent role in its management of natural resources.[153]

Redwood National Park played an important part in this evolution of agency culture. One of the first actions taken in response to these reports was the creation of the Division of Natural Science Studies by NPS Director Conrad Wirth in 1964 in an attempt to implement the National Academy of Science's recommendation for an independent science advisory board in the Washington, DC directorate. Under the administration of Director Wirth's successor, George Hartzog, this became the Office of Natural Science Studies in 1967, and Starker Leopold, the principal author of the Leopold Report, was placed in charge. Among the scientists hired by Leopold that year was Stephen Veirs, who was assigned to a planning team that studied the effects of erosion on the Redwood Creek unit of the proposed park. Three years later, Veirs would be transferred from the Washington office to Redwood, and in 1972 he would become the park's research biologist.[154] Following the Redwood Expansion Act of 1978, the Congressional mandate for science-based watershed rehabilitation would become the basis of a robust research and natural resource management program in which Veirs figured prominently. One of the few other national parks with a comparable science program at that time was Channel Islands, which was established in 1980 with a similar mandate for research and resource management written into its enabling legislation.[155]

In 1979, a report by the National Parks and Conservation Association on external threats to parks prompted Congress to request that the National Park Service make a thorough assessment of its park units, paying particular attention to such threats as the NPCA report had identified. The resulting *State of the Parks—1980: A Report to Congress*, found both external and internal threats, but just as important noted that most parks lacked the scientific capacity to identify these threats, or the baseline documentation needed to measure their cumulative effects over time. Redwood National Park was one of the few exceptions. It possessed good baseline data on Redwood Creek from the research conducted by Dr. Janda and his team during the previous decade, and it was continuing to monitor conditions in the park through the efforts of its research biologist Stephen Veirs. The Redwood Expansion Act, in responding to the Sierra Club and NPCA lawsuits, included language that encouraged the protection of the park from

[150] Quoted in Richard W. Sellars, *Preserving Nature in the National Parks: A History* (New Haven: Yale University Press, 1997), p. 215.
[151] Sellars, *Preserving Nature*, pp. 215-216.
[152] Secretary Udall issued his memorandum endorsing the report on May 2, 1963. [Sellars, *Preserving Nature*, p. 244].
[153] In principle, this only meant that decisions should be informed by empirically-derived evidence, but the practical implication of bringing science into the administrative hierarchy of the National Park Service was to deprive superintendents of their accustomed practice of unilateral decision-making. They would now be expected to rely on the advice of specialists, who were often perceived as outsiders. Their reluctance was hardly surprising. [Sellars, *Preserving Nature*, pp. 217-233].
[154] Ella Ross, "Finding Aid: Stephen D. Veirs Collection," 2002, REDW Archives, Orick, CA.
[155] Sellars, *Preserving Nature*, pp. 239-240.

threats outside its boundaries, setting a precedent that was urged by the *State of the Parks* report for the management of all national parks. When the Park Service issued a second *State of the Parks* report the following year, outlining for Congress proposed mitigations for the deficiencies identified in the first report, many of these measures were already being implemented at Redwood through its watershed rehabilitation program, which effectively linked scientific research with practical resource management. As the program grew and diversified over the next decade and a half, it would come to include as many as 40 professional staff in a wide range of scientific disciplines. It would constitute one of the most robust science-based resource management programs in the National Park Service and became a precedent for the later growth of science agency-wide by the end of the 1990s.[156]

* * *

From the early 1960s through the following decade, the Tall Trees Grove played a central role in the history of Redwood National Park. The grove's exemplary aesthetic qualities had first drawn popular attention to the Redwood Creek basin where the park would be principally located. The Tall Trees Grove remained significant as the park was later expanded to protect the grove by protecting the surrounding watershed, and as the park—and the National Park Service—placed growing emphasis on scientifically-based ecological management. While the grove was not responsible for this evolution in management philosophy, it stood at the center of the change and represents many of the priorities that came to the forefront as a result. The existence of the grove was itself a reflection of the complex and unique ecological relationships of the Redwood Creek watershed, while its vulnerability to upslope and upstream impacts from logging showed the interconnectedness of this diverse ecosystem, and the need to understand these interconnections demonstrated the importance of science for responsible and effective resource management.

iv. Physical Development in the Tall Trees Grove and Vicinity

Trail Development

Shortly after the discovery of the Tall Trees Grove by the National Geographic Society in 1964, Arcata Redwood Company opened a trail to the grove as a public relations project, providing limited access to the site on its privately-held lands (Figure 6).[157] A primitive trail within the grove, and signage associated with the tall trees (Figure 5), were introduced at this time as well. Both are present during the early (pre-expansion) Redwood National Park period.

When Redwood National Park was first established in 1968, public access to the Tall Trees Grove was possible only by hiking from near Orick up the west side of Redwood Creek along a former logging road approximately eight miles through the narrow, park-owned corridor known as "the worm." The trailhead and a small parking area were located just off of Bald Hills Road near its junction with Highway 101, opposite the Cal-Pac Mill. A primitive campground was constructed at the southern end of the trail near the Tall Trees Grove. The grove itself was reached by crossing Redwood Creek.

With the expansion of Redwood National Park in March 1978, the Park Service acquired the former Arcata Redwood Company's lands on the east side of the Redwood Creek valley. The Tall Trees Grove could now be accessed more easily from the Bald Hills Road by descending C-Line Road to the edge of the old growth forest near the 1968 park boundary and hiking the remaining distance (Figure 10). During the summer of 1978, the NPS constructed the present Tall Trees Trail from the bottom of C-Line Road to the Grove itself on Redwood Creek (Figure 11). The original trail followed portions of an Arcata

[156] Sellars, *Preserving Nature*, pp. 262-266.
[157] Bearss, "Chapter IX.A," in *History Basic Data* (1969).

Redwood Company's pre-1968 access road. The Tall Trees Trail was completed and open to public use by early fall.

Shuttle Service

Concerned about overcrowding and safety if visitors were allowed to drive unimpeded to the Tall Trees trailhead at the bottom of C-Line Road, the Park Service decided to control access by providing a shuttle service from its visitor center at Orick (Figure 12). C-Line Road was secured by locked gate, and a small parking lot was cleared on the opposite (east) side of Bald Hills Road for visitors who wanted to drive this far in their own vehicles and catch the shuttle for the remainder of the trip. At the bottom of C-Line Road, a larger turn-around was cleared for the shuttle and a wooden shelter constructed with picnic benches adjacent to the trailhead. These improvements were completed shortly after July 1978 and shuttle service began soon afterward (Figure 13).

The Tall Trees Shuttle proved immediately popular, with 8,435 visitors using the service during its first season. On most weekdays, the shuttle made hourly runs, with less frequent service on Fridays, weekends, and holidays. The service operated from May through the middle of November. A small bus was leased for the purpose and was driven by an NPS seasonal employee (GS-05) who provided interpretation along the way. Visitors were asked for a $7.00 donation.

Just prior to the beginning of shuttle service, in late June and early July of 1978, a survey of the Tall Trees Grove was made in order to establish a baseline for future monitoring of visitor impacts. Monitoring was carried out over the subsequent four seasons of heightened visitor use along the Tall Trees Trail and within the grove. In a report completed December 1981, biological technician Bill Lennox concluded that there was little significant damage to surrounding vegetation with one notable exception: The tallest tree (the Howard Libbey Tree) showed substantial erosion of the bark from handling by visitors (Figure 14). The eroded area extended from grade level up to the height of an average person's arm length. Bark was apparently being removed as souvenirs of the famous tree. None of the other trees in the grove showed similar damage. Lennox also discovered initials that had been carved into the bark by vandals. He recommended that a barrier, such as a split-rail fence, be placed around the tree. The following year, NPS monitors discovered and removed a small American flag that had been placed about 40 feet up the Howard Libbey tree, marking some climber's ascent. These events were troubling at the time but do not seem to have led to more serious damage.[158] Moreover, they were not malicious in intent, though that too was a concern of park managers, as only a handful of years before vandals had cut two large trees in Lady Bird Johnson Grove, presumably in protest of the park's establishment.[159]

Although the Tall Trees shuttle had appeared successful in the beginning, ridership declined steadily after its first year, and by the fourth-year expenses would begin to exceed receipts from rider donations (Figure 15). In 1994, the per-passenger cost of running the shuttle was more than twice the $7.00 donation, while ridership that year totaled only 566, less than 7 per cent of the first year of service. These fiscal liabilities proved impossible to maintain, and the following year the service was discontinued.[160] The shuttle was replaced with a permit system whereby a controlled number of visitors were allowed to drive their personal vehicles down C-Line Road to the trailhead, where they could park in the former shuttle turn-

[158] Bruce Lennox to Superintendent, "Vandalism to the Tall Trees," 18 December 1981; and Lennox to Superintendent, "More Vandalism to the Tall Tree," 28 June 1982, Stephen D. Veirs Coll., REDW 32502, Box 18, f. 2, REDW Archives, Orick, CA.
[159] Peggy Wayburn, "The Short, Sorry History of Redwood National Park," *Sierra Club Bulletin* 60, no. 8 (October 1975): 55.
[160] Kim Sikoryak to Smitty Parratt, "Shuttle stats for report justifying discontinuation," 13 December 1995, RG 002, Interpretive Division Coll., INDI-1, Box 16, REDW Archives, Orick, CA.

around. Access was provided by gate combination, which was given to visitors when they received their permit at the visitor center in Orick.

Waysides and Interpretation

One of the earliest structures in the Tall Trees Grove associated with the present historical context was an interpretive sign, or "wayside," which stood before the tallest tree, the Howard Libbey Tree (Figure 16). It was present in 1978 but almost certainly installed earlier, possibly by the Arcata Redwood Company between 1964 and 1968 but more likely by the NPS after 1968. The design is relatively simple, consisting of a single panel, approximately three to four feet on a side and inclined about twenty-five degrees on two posts. The content of the panel is unknown.

In 1982, an interpretive wayside plan was developed for several park locations, including the Tall Trees Grove. Four wayside panels were designed and placed in pairs along the trail (Figures 17, 18, 19, and 20). "Magic Forest Circle" and "Forest's Secret Society" were located about 400 feet below the trailhead, while "Poetry of the Forest" and "Woodmusic" were located another 600 feet farther down the trail. An orientation wayside (#19) stood at the edge of the forest about 200 feet from trailhead.[161]

In the fall of 1988, or shortly afterwards, numbered wooden posts were placed along the Tall Trees Trail. These were keyed to a self-guiding interpretive program, with a printed brochure providing information about each numbered location. The existing interpretive waysides located along the trail were removed at this time.[162] In addition to the self-guided trail, planning documents from this year describe five "pods" or stations that were also proposed for the Tall Trees Trail. Four of these would include wayside exhibits while one consisted of benches placed beneath trees within the grove. At least some of the wayside exhibits would be enclosed within small- roofed shelters. There is no evidence that any of these “pod” structures were ever installed.

While wayside exhibits and trail guides provided passive interpretation for visitors to the Tall Trees Grove, the Park Service also offered active interpretation through its shuttle service. One of the benefits of the shuttle was the opportunity it created to bring a trained interpretive ranger—the driver—together with a group of visitors as they traveled through multiple park landscapes. The park used this opportunity to highlight the watershed rehabilitation program, explaining the complex ecological and historical processes that lay behind its implementation as well as its long-term objectives for restoring a healthy forest environment. Interpretive rangers avoided criticizing the logging industry—many of their passengers were local residents and resented the loss of timber-related jobs.—but emphasized instead the positive theme of the forest being restored to life.[163] The challenge of maintaining this studied optimism could be difficult, even ironic, as suggested in the artwork of an early shuttle schedule, which intended to show the regenerative vitality of the redwood forest but instead draws attention to a landscape of old-growth stumps. The scene that visitors would have witnessed through the windows of their bus was even more dramatic.

The basic elements of the interpretation provided by shuttle bus operators was summarized in a widely-distributed brochure produced by the park in 1980 and revised in 1984. Its title, *Redwood Renaissance*, reflected the theme that park interpreters emphasized.[164] *Redwood Renaissance* was matter-of-fact in

[161] RG 002, Interpretive Division Coll., INDI-1, Box 17, REDW Archives, Orick, CA; and Spence, *Watershed Park*, p. 324, n. 201.
[162] Susan Branch, and Todd Cutler, "Tall Trees Trail: A Self Guided Trail," 6 September 1988, RG 002 Interpretive Division Coll., Box 16, REDW Archives, Orick, CA.
[163] Spence, *Watershed Park*, p. 294.
[164] "Redwood Renaissance: The Story of Stabilizing and Reforesting Logged-Over Lands in Redwood National Park," 1984, RG 002, Interpretive Division Coll., INDI-1, Box 16, REDW Archives, Orick, CA; and Spence, *Watershed Park*, p. 292.

describing the history of logging, noting its intensification in the decades following World War II. It also described the unique ecological environment of the Redwood Creek watershed, with its heightened vulnerability to erosion, and explained how logging practices had exacerbated otherwise natural processes. Without criticizing the industry, however, the brochure went on to list the challenges inherited by the Park Service with the creation and subsequent expansion of Redwood National Park—"about 250 miles of abandoned logging roads and 2,000 to 3,000 miles of tractor trails [that] crisscross the hillsides of the cutover lands." Most of these roads and trails would have to be restored. Describing the watershed rehabilitation program, the brochure explained how the Park Service was going about this daunting task. In 1978, the first year of the rehabilitation program, the park treated 300 acres on an experimental basis. The following year, this area increased to 1,100 acres, and in 1980 it was 1,500 acres. By this time, the park's professional staff had grown to 22 permanent scientists and more than 50 temporary appointments that included geologists, plant ecologists, and archeologists, as well as administrative staff. Of the $33 million appropriated by Congress for the rehabilitation program, approximately $2.25 million was expended that year, and the program was expected to continue another ten to fifteen years.[165] It had already matured through experimental trial and error and was accumulating unique expertise in restoring disturbed landscapes, knowledge that would be valued and shared with conservation biologists around the world. While these restoration activities would not directly affect the Tall Trees Grove, their indirect effect was critical. The stabilization of upstream and upslope landscapes within the Redwood Creek watershed would help mitigate the threat of the worst case scenario posed in Claire Dedrick's Congressional testimony of 1976. Erosion from the most recent logging activities was curtailed, and the sediment load already dissipating through the watershed was not further augmented. Redwood Creek escaped catastrophe, and the Tall Trees Grove remained standing. How much this fortunate outcome is due to human intervention and how much to meteorological good luck—no storms comparable to the 1955 deluge have occurred in recent years—is impossible to know, but there is little question that the Redwood Creek watershed has been made more resilient as a result of the Park Service's watershed rehabilitation program.

v. Other Historic Resources

Precontact Use and Occupation

The Redwood Creek watershed lies within the traditional homeland of the Chilula people. Their past use and occupation of this landscape, including the Tall Trees Grove, is an important legacy that include both ethnographic and archeological resources. These resources, however, belong to a different historical context than the one considered in this study and are not documented here. Many are documented in previous archeological surveys including the Bald Hills Archeological District.

Early Historical Use and Occupation

With the advent of the historical period, which begins with Euro-American contact in the mid nineteenth century, the Tall Trees Grove became subject to passing encounters that may have left potentially significant archeological deposits. Some of the known events associated with these encounters are briefly noted in the following. There may be others. Like precontact history, these events belong to a different context than the one considered in this study.

The Josiah Gregg Party

In November 1849, Dr. Josiah Gregg led a small party of men from the recently-opened gold diggings on the headwaters of the Trinity River west to the coast in search of a convenient route over which the

[165] Stephen D. Veirs, Jr., "Redwood Restoration Efforts Succeeding," *Park Science* 1, no. 2 (Winter 1981): 7-8; and James K. Agee, "Issues and Impacts of Redwood National Park Expansion," *Environmental Management* 4, no. 5 (1980): 407-423.

miners could be supplied by sea. Hoping to reach Trinidad Bay, the Gregg party mistakenly headed too far north along the ridge of the Bald Hills before discovering their error and turning west, descending from the hills into the old growth forest of Redwood Creek. They crossed Redwood Creek in the vicinity of the Tall Trees Grove, possibly passing through the grove itself along an existing Chilula trail. From here they continued west and south toward the coast, which they finally reached in early December after four weeks of arduous travel. In the journal he kept of the expedition, Gregg remarked on the extraordinary size of the redwoods the party encountered, some of which he attempted to measure. This was the first recorded attempt to document these trees within the Redwood Creek watershed by an European American explorer.[166]

The Trinidad Trail

In 1850, less than a year after the Josiah Gregg party had crossed the coastal mountains to the Pacific, towns were established at Trinidad and Humboldt Bays (The latter would become Arcata). During the same year, new gold diggings were discovered on the middle Klamath and Salmon Rivers. The mining camps that quickly grew up there had to be supplied from the coast, and a pack trail was developed between the Klamath Diggings and the port town of Trinidad that mainly followed a Native American route. The Trinidad Trail, as it was known, followed the coast north from Trinidad Bay to Big Lagoon, then turned inland, crossing the first ridge of the coastal range and descending to Redwood Creek, which was forded at the Tall Trees Grove. From here the trail ascended the Bald Hills to Elk Camp and thence along the ridge to French Camp, where the trail forked, with one branch leading north to Martins Ferry and the other toward the south to Hoopa Valley. During the Red Cap War of 1855, travel along the Trinidad Trail was curtailed owing to the danger of assault. Following the restoration of peace, the Army established a fort at Elk Camp to protect the road in 1862 but would remain only two years. The route across Redwood Creek and the Tall Trees Grove was superseded in the 1890s when the Bald Hills Road was constructed from Orick, providing a more convenient alternative. However, the Trinidad Trail does not appear on an 1890 map of Humboldt County roads, suggesting that it may already have fallen out of use even before the Bald Hills Road was completed.[167]

Later Use and Occupation

Even after the abandonment of the Trinidad Trail at the end of the nineteenth century, the Tall Trees Grove may have continued to experience occasional visitors from nearby homesteads in the Bald Hills and from downstream communities. Any use or manipulation of the site by these visitors would have been minor and probably ephemeral, but some traces or artifacts of their passing may still be extant. Two known examples are a redwood log that was hollowed out and lined with cement as a brine vat, and a goosepen used as a smokehouse (Figure 21), by Orick resident Bert Robinson in the 1920s.[168] More intensive exploitation of the Redwood Creek watershed would not occur until after World War II with the arrival of logging, which was the impetus for the conservation movement described in this history. Logging represents a significant history in its own right that has not been covered here—except indirectly—but should be addressed in a separate context and study.

[166] Edwin C. Bearss, "Chapter III.D," in *History Basic Data: Redwood National Park, Del Norte and Humboldt Counties, California* (Washington, D.C.: National Park Service, Div. of History, 1969)
[167] Bearss, "Chapter IX.A," in *History Basic Data* (1969); and John Robinson, "The Redwood Highway: Part I, Early History of Transportation in the Northern Coastal Counties," *California Highways and Public Works* 43, nos. 5-6 (May-June 1964): 6.
[168] Susan Branch, and Todd Cutler, "Tall Trees Trail: A Self-Guided Trail," 6 September 1988, RG 002 Interpretive Division Coll., Box 16, REDW Archives, Orick, CA.

Physical History Graphics

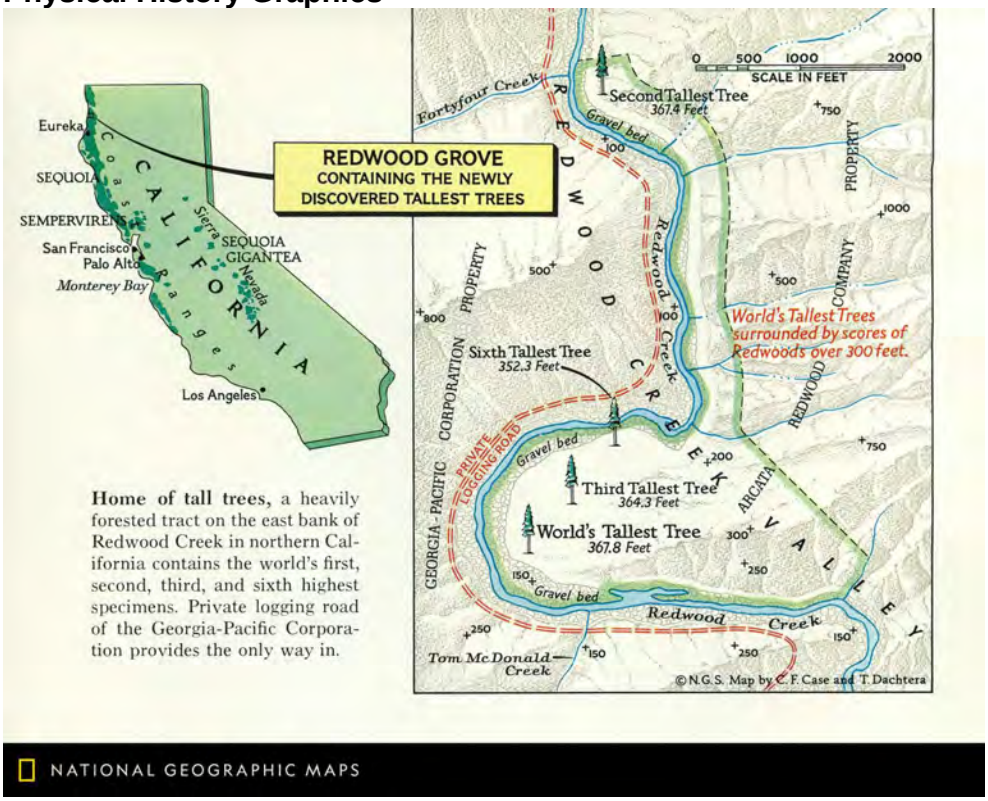

Figure 4. *National Geographic Magazine published the article "Finding the Mt. Everest of All Living Things" in 1964, making the Grove nationally known.* [National Geographic, July 1964]

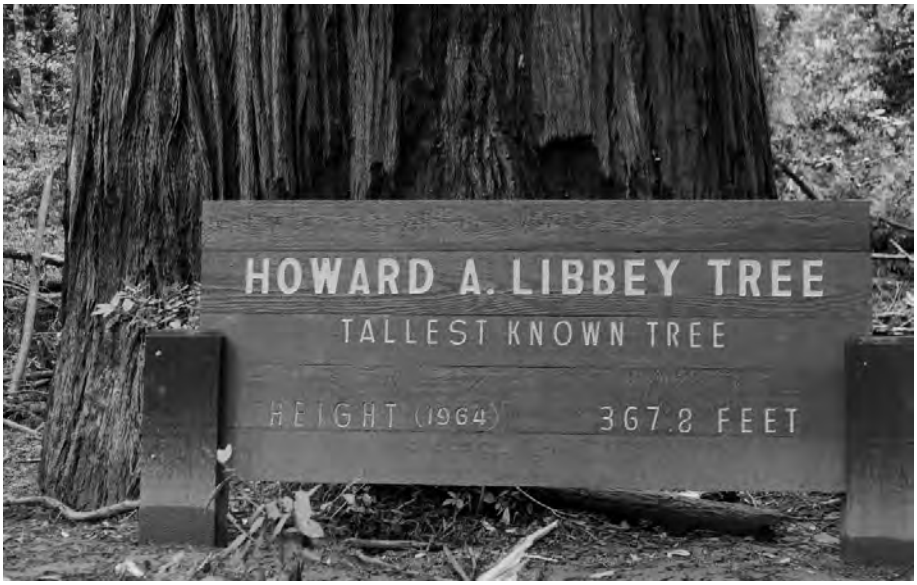

Figure 5. *Signs were constructed by Arcata Redwood Company (ArCo) at the base of the four tall trees identified in the National Geographic article, ca. 1965. Howard Libbey was the president of ArCo at the time. The signs were built, and public access allowed, in part, to assuage any public anxiety regarding the newly identified natural treasures on private logging land.* [Dave van der Mark, Dave van der Mark collection, REDW National Park Archives, Orick, CA]

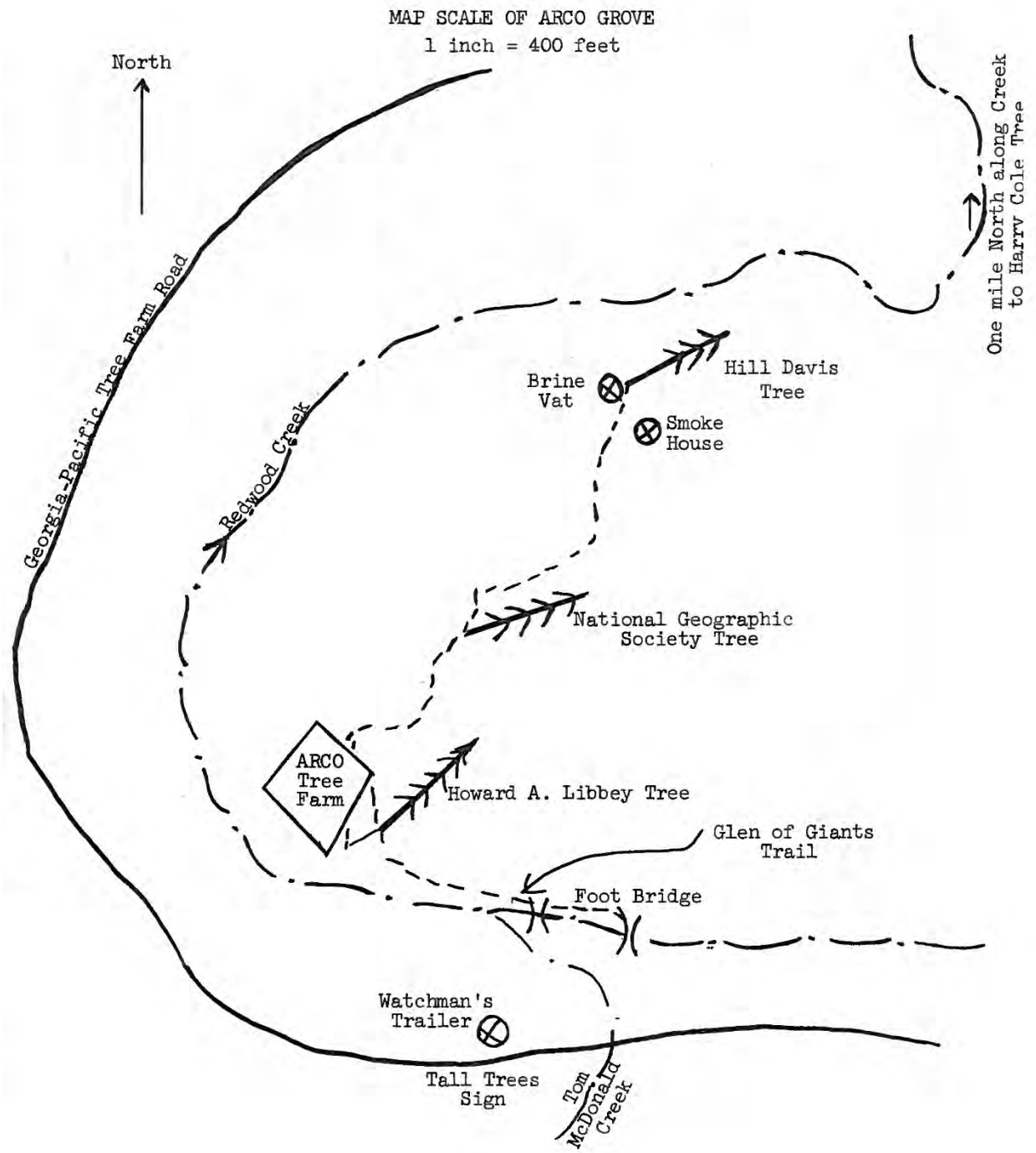

Figure 6. *Schematic map from ArCo brochure for public access to the Glen of Giants (Tall Trees Grove) ca. 1965.* [REDW Archives, Orick, CA]

Figure 7**.** *Aerial view of Tall Trees Grove looking north, ca. 1968.* [RG 004, REDW 34245, Series 002.1.11, ff. 002-003, Drawer #6, REDW Archives, Orick, CA]

Figure 8**.** *Aerial view of Tall Trees Grove looking east, 1966, two years before becoming a national park. Note the Georgia Pacific access road and clear cut hillsides above the west bank of Redwood Creek. Later, the area to the east was cut outside the new 1968 national park boundary, see Figure 10, highlighting the vulnerability of the Grove.* [Dave van der Mark, Dave van der Mark collection, REDW National Park Archives, Orick, CA]

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

Figure 9. *In this illustration from the Park Service's 1964 report, The Redwoods, both picture and caption embodied the relationship between monumental trees and natural setting that was fundamental to the overall significance of the redwood forest. This represented a departure from an earlier tradition of conservation that had emphasized only the trees, or individual groves of trees. In the adjoining text, under the heading "Significance for Preservation," the NPS authors write that public interest in the redwoods derives from "their very special inspirational qualities which so greatly impress the visitor—qualities which derive not from individual trees or cold statistics, but rather from virgin groves in natural settings. For this reason, from a park point of view, the concern is with virgin stands in situations where the ecology still has integrity and where it can be preserved."* [U.S. Dept. of the Interior, *The Redwoods: A National Opportunity for Conservation and Alternatives for Action* (San Francisco, CA: National Park Service, Western Regional Office, 1964), pp. 24-25]

Figure 10. *View on C-Line road near the trailhead parking lot looking down, south, toward Harry Weir Creek (now Emerald Creek), 3 July 1978. Tall Trees Grove lies to the right, just outside of picture.* [Stephen D. Veirs Coll., REDW 32502, Box 18, f. 1, REDW Archives, Orick, CA]

Figure 11. *View of nature trail within Tall Trees Grove, 5 July 1978. Trail here utilizes a fallen redwood log for its tread*. [Visitor Impact Study, Stephen D. Veirs Coll., REDW 32502, Box 18, f. 1, REDW Archives, Orick, CA]

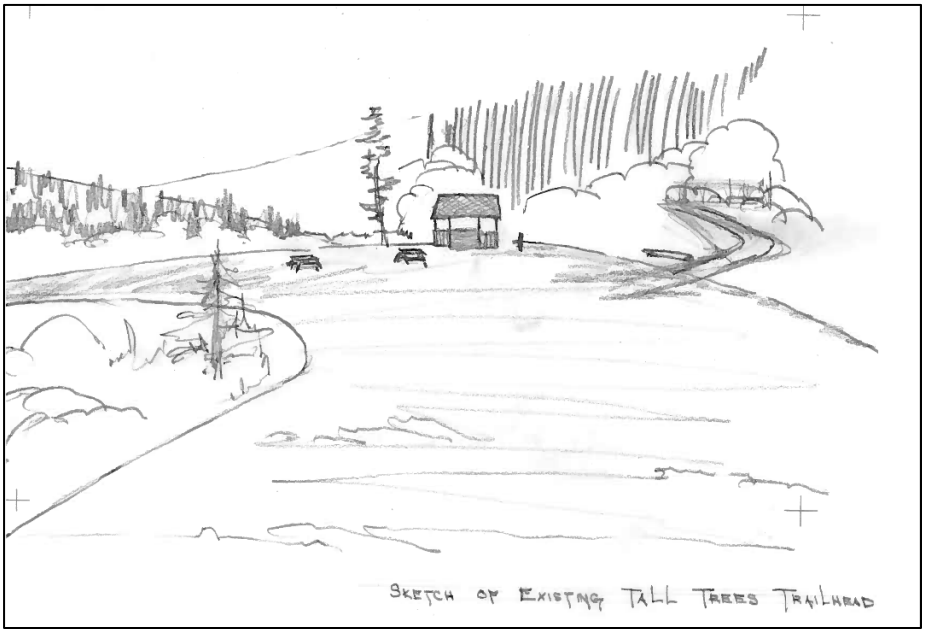

Figure 12. *Sketch from 1986 of existing trailhead with shelter and shuttle bus turn-around. These structures probably date from late 1978 or early 1979.* [Sketches by Art Dreyer, NPS landscape architect from the Western Regional Office in San Francisco, RG 004, REDW 34245, Ser. 002.1.7, Box 1 f. 17, REDW Archives, Orick, CA]

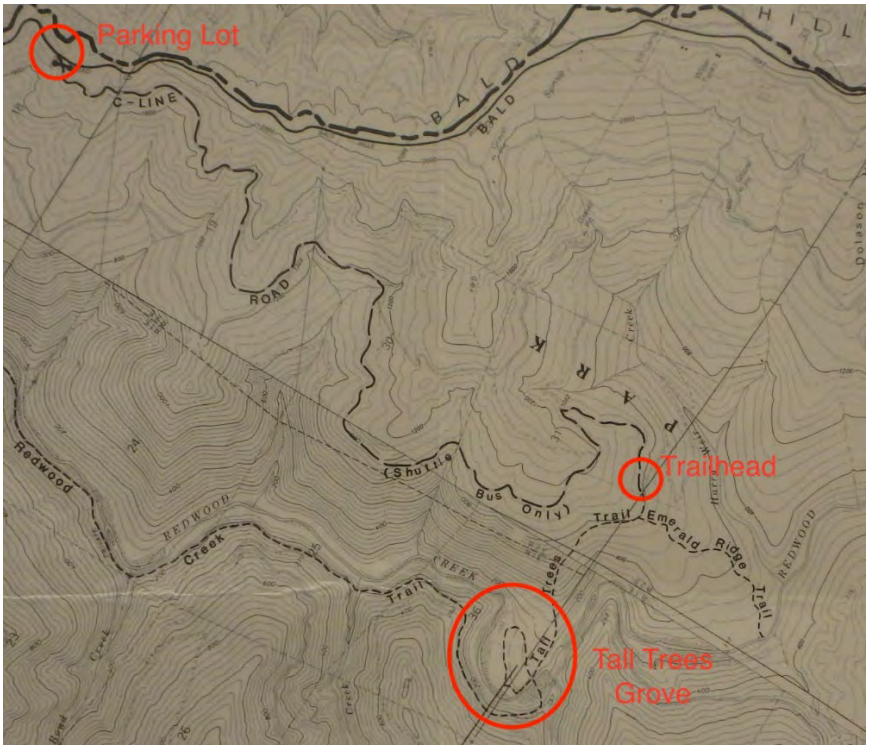

Figure 13. *Redwood National Park base map, ca. 1979, showing location of shuttle service on C-Line Road to Tall Trees trailhead.* [RG 004, REDW 34245, Ser. 002.1.11, ff. 002-003, Drawer #6, REDW Archives, Orick, CA]

Figure 14. *View of tallest tree (Howard Libby Tree) in December 1981 showing erosion of bark from handling by visitors only three years after opening of trail. Other trees within grove did not show similar damage.* [Bill Lennox, Biological Technician, Stephen D. Veirs Coll., REDW 32502, Box 18, f. 2, REDW Archives, Orick, CA]

Figure 15. *Shuttle schedule from first full year of service. Artwork illustrates the theme of a "redwood renaissance" within the formerly logged forest that park guides attempted to convey.* [RG 002, Interpretive Division Coll., INDI-1, Box 16, REDW Archives, Orick, CA] *See also Figure 10, (C-Line Road, 1978), which illustrates the recently cut-over landscape through which shuttle passengers would have passed.*

Figure 16. *View within grove showing tallest tree (Howard Libby Tree) with simple, double pedestal wayside located on the trail, 29 June 1978.* [Visitor Impact Study, Stephen D. Veirs Coll., REDW 32502, Box 18, f. 1, REDW Archives, Orick, CA]

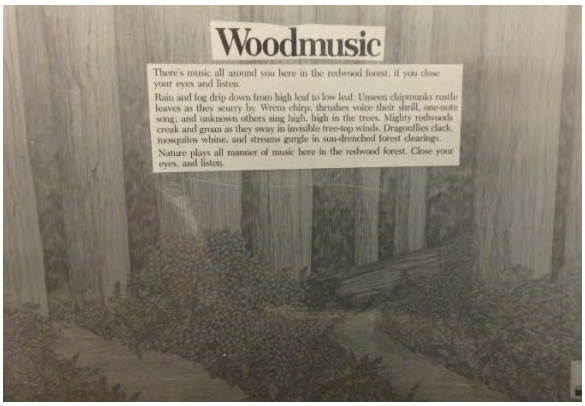

Figure 17, 18, 19, 20. *Design mock-ups for the interpretive panels that were installed along the Tall Trees Trail in ca.1983. The panels were inclined and mounted on low-profile, cantilevered bases of square metal tube.* [RG 002, Interpretive Division Coll., INDI-1, Box 17, REDW Archives, Orick, CA]

KODACHROME (ABOVE) AND EKTACHROME BY GEORGE F. MOBLEY © N.G.S.

Home in a tree near Redwood Creek leaves no clue to the identity of its long-departed occupant. Chicken-wire ceiling catches falling debris.

Figure 21. *Within Tall Trees Grove* a *goosepen was utilized as a smokehouse by Orick resident Burt Robinson in the 1920s. This photograph appeared in the 1964 National Geographic article that publicized the Tall Trees Grove.* [National Geographic Magazine, July 1964]

Analysis & Evaluation of Integrity

Analysis and Evaluation Narrative Summary:

Natural Systems and Features

The natural features in Tall Trees Grove Historic District are the principal features of the historic district. The natural topography, geology, hydrology, and climate allow for the coast redwoods to grow to be some of the tallest trees in the world and allow other flora to thrive. The Grove, located on an alluvial plane, is occasionally affected by flooding of Redwood Creek and sediment deposition.

Spatial Organization

The Tall Trees Grove is on an alluvial plane. Redwood Creek flows around the southern grove from the south to the west and back east as it flows north. Steep forested hillsides enclose the area to the east and across the creek. Within, the old-growth groves are punctuated with massive trunks and a dense canopy approximately 150 to 200 feet overhead. The southern grove has a loop trail around the perimeter and connects to other trails to the north and south. The north grove is ¾ of a mile to the north but not connected to any trail.

Land Use

Indigenous peoples were the first to travel through the area and harvest local resources. Beginning in the 1850s, the Trinidad Trail, a trail that followed an earlier indigenous route, supplied mines on the Klamath River from Trinidad and crossed Redwood Creek at the south grove. The Grove came to be owned by the Arcata Redwood Company but was not logged. In 1963 the National Geographic Society and National Park Service surveyed the area for tall trees and found redwood trees of significant height. In response the Arcata Redwood Company opened the area for visitors until the creation of Redwood National Park in 1968. Since then, the Grove's primary use is recreational hiking by national park visitors.

Topography

The natural topography of the Grove has remains largely untouched. Minor land manipulation has occurred with the construction of trails.

Vegetation

No formal plantings have been made in the Grove. It is significant for being an exceptional example of an old-growth coast redwood forest with trees of exceptional height. Notable trees include what were the first, second, third, and sixth tallest trees in 1963. Please refer to the "Natural Systems and Features" section for details on the Grove's ecology and vegetation.

Circulation

Most visitors reach the Grove by driving southwest on the C-Line Road from Bald Hills Road, arriving at a parking lot. From there, Tall Trees Trail descends a steep slope to the Grove and the Tall Trees Grove Loop Trail that generally follows the south grove's perimeter. Visitors can also access and exit the grove via Redwood Creek Trail that follows Redwood Creek.

Building and Structures

There are no buildings or structures in the Grove. In the parking lot and trailhead is a concrete comfort station and a wooden shuttle shelter for the former shuttle.

Views and Vistas

The near views in the Grove of the first, third, and sixth tallest trees as surveyed in 1963 from the Tall Tree Trail Loop are important in the visitors' experience and understanding. There are also continuous

close to middle-ground views throughout the grove of the surrounding redwood forest and Redwood Creek that allow an appreciation of the natural context.

Small-Scale Features

The grove is largely devoid of built features and maintains a rustic character. Various non-contributing features are modern additions to the landscape that include a split rail fence, interpretation signs, trail signs, and benches. One small-scale feature that was identified as contributing was recently destroyed is the Arcata Redwood Company sign noting the second tallest tree in the north grove.

Archeological Sites

An archaeological survey is outside the scope of this current survey. Previous archaeology investigations assessed the Trinidad Trail and two associated axe-cut stumps along Redwood Creek. Other archaeological features exist in the grove by have not been evaluated, such as the stump goosepen smokehouse, and the brine tank.

Integrity

The Tall Trees Grove Historic District is an approximately twenty-acre, old-growth coast redwood forest within the Redwood National Park. The grove gained significance after a 1963 National Geographic Society study identified the world's tallest trees within and became a significant factor in the park's establishment.

Integrity is the ability of a property to convey its significance. There are seven aspects that contribute to a resource's integrity: location, design, setting, materials, workmanship, feeling, and association. To retain historic integrity, a property must possess several, and usually most, of the aspects. The whole grove retains aspects of location, setting, feeling, and association. The remaining three factors are not significant due to the lack of major built elements within the district.

Location is the place of the historic property when it became significant. The location of the grove has not changed since the period of significance. The location of the property, complemented by the setting, explain why the tall trees thrive here, and led to the establishment of a redwood national park.

Design is the combination of elements that create the form, plan, space, structure, and style of a property. Although features such as trails, signs, etc. exist, the Grove is largely devoid of designed elements and it is this lack of built features that is important.

Setting is the physical environment of a historic property. The grove's natural setting within an old-growth redwood forest is a significant character defining feature. Although some of the surrounding old growth forest was lost to logging, this occurred during the period of significance and was not directly adjacent to the Grove. Logging, which once posed a direct threat to the grove, ceased after the creation of the park. The indirect threat of logging was significantly reduced with the expansion of the park. Subsequent forest management and watershed rehabilitation have maintained and improved the health of adjacent forested lands, maintaining the Tall Tree's Grove's integrity of setting.

Materials are the physical elements that were utilized or existed during the period of significance. The Grove is largely devoid of designed elements and it is this lack of built features that is important.

Workmanship is the physical evidence of the craft of a particular culture or people. The Grove is largely devoid of designed elements and it is this lack of built features that is important.

Feeling is a property's expression of the aesthetic or historic sense of the period of significance. Feelings of sublime beauty associated with age and immense size are conveyed by the old growth redwoods and surrounding forest. The Grove was historically remote, and the surrounding area has not been developed, this provides Tall Trees Grove with a sense of solitude. This feeling visitor's experience today, is the

same feeling that was present after the discovery of the tall trees in the grove.

Association is the direct link between an important historic event or person and a historic property. Associations are tied to the discovery of the tall trees in the 1963 survey on an alluvial flat and are evident.

Summary

The integrity of the grove is primarily in the location, setting, feeling, and association of the old-growth coast redwood forest from the time of discovery of the tall teres in 1963 to the park's expansion in 1978. The feeling of walking through the grove amongst the tall trees provides the same awe and wonder as it did during the discovery of the trees, linking visitors via direct association to those historic events. Materials, design, and workmanship are not major elements in the historic district. The Grove is largely devoid of designed elements and it is this lack of built features that is important.

Landscape Characteristics

Natural Systems and Features

Natural Systems and Features are the natural aspects that have influenced the development and physical form of a landscape. Among other aspects, the natural systems in a landscape include its climate, geology, hydrology, soils, and ecology. These natural features collectively form the environmental context of Tall Trees Grove Historic District and have played an integral role in its development and evolution. The grove is remarkable for several individual trees of significant height. The height and size of these trees can be attributed to the optimal natural conditions of the location. The factors include abundant groundwater from the creek, nutrient-rich soil, frequent fog from the nearby ocean, and steep surrounding slopes that protect the trees from strong wind and lightning.

Geomorphology

Tall Trees Grove is located on alluvial flats along the east bank of Redwood Creek, which has changed course throughout its history due to deposition of sediments and flooding. Additionally, northern California is tectonically active, earthquakes of magnitude 9 occur on an approximately 500-year interval, triggering landslides and tsunamis in the broader area of Tall Trees Grove. The intensity of seasonal precipitation, paired with steep mountain sides above the grove, have led to debris slides, block falls, landslides, and earthflows in the Redwood Creek watershed.[169] Timber removal and slash burning around the grove have contributed to surface land movement as well. Removing and burning timber reduces the mechanical support the cohesive network of roots provides, leading to severe erosion or mass land movement.[170] The steep mountainside topography above the grove, with an elevation change of approximately 700 feet from the parking lot trailhead to the Tall Trees Grove Loop Trail, can further the movement of soil. Much of the loose soil and debris go to Redwood Creek, and fill the creek bed, or transported downstream and deposited on alluvial flats such as Tall Trees Grove.

Geology

The Franciscan Complex underlies most of Redwood National Park. The complex was laid down on the ocean floor as deposits of sand and mud 150 to 100 million years ago. These deposits were carried eastward and uplifted to create the Coast Range.[171] The bedrock of this complex is mostly composed of sedimentary graywacke sandstone, mudstone, and metamorphic schist. The relatively high level of precipitation of the area, paired with the insecure geology placed by the coastal uplift of the Franciscan Formation lead to debris slides, block falls, landslides, and earthflows.[172]

The predominant soil type within the Tall Trees Grove boundary is the Bigriver complex. Found along alluvial flats and floodplains at elevations between 0 to 745 feet, Bigriver soil is 80% sandy loam, and 20% minor components. It has a slope of 2% to 5%, a south to northeast aspect, is well drained with low

[169] U.S. Dept. of the Interior, *Environmental Assessment: Management Options for Redwood Creek, Redwood National Park* (San Francisco, CA: National Park Service, Western Regional Office, 1975), pp. 2-41.
[170] U.S. Dept. of the Interior, *Environmental Assessment: Management Options for Redwood Creek, Redwood National Park* (San Francisco, CA: National Park Service, Western Regional Office, 1975), pp. 2-41.
[171] U.S. Dept. of the Interior, *General Management Plan: Redwood National and State Parks, Humboldt and Del Norte Counties* (San Francisco, CA: National Park Service, Western Regional Office, 1998), pp. 155.
[172] Sid Covington, "Redwood National and State Parks Geological Resource Management Issues Scoping Summary," (Crescent City, CA: Redwood National and State Parks, Geological Resources Division, August 27, 2014).

runoff, and is composed primarily of alluvium.[173] The soil upslope of the alluvial flats is udic and derived from mudstone, sandstone, and schist.

Hydrology

Tall Trees Grove is approximately 10 miles south of the Redwood Creek estuary and located along the east bank of Redwood Creek, the southernmost of the three large river ecosystems in Redwood National Park (Figure 22). The area receives approximately 79 inches of rain annually.[174] The Grove is on two alluvial flats and the creek occasionally floods. The most recent major event was the 1964 Christmas Flood from December 21 to January 7, 1965, with peak flows of 50,500 cubic feet per second.[175] During this event, Redwood Creek reached a height of 23.27 feet, with flood stage at 19 feet.[176] The flooding also caused log jams which changed the flow of water throughout the watershed.[177] The greatest damage caused by the flood, according to John DeWitt, Assistant Secretary of the Save-the-Redwoods League at the time, was the large amount of silt deposited on the redwood forest floor.[178]

Fog, especially during the drier summer, plays an important role in coast redwood trees. The trees can absorb the moisture of the fog and can also contribute to soil moisture, adding 25% to 50% of the annual water inputs in a redwood ecosystem.[179] The fog also provides nitrogen, phosphorus, and other minerals that help nourish the ecosystem.[180]

Ecology and Vegetation

Tall Trees Grove is a notable example of alluvial coast redwood groves (Figure 22). The ample sunlight and water in alluvial flat ecosystems allow for redwoods to grow incredibly tall (Figure 23). In this setting, the coast redwood comprises much of the canopy, with shorter trees occupying the understory, and shrubs and other small plants on the forest floor (Figure 24).[181]

Redwood forests can only be found in a narrow band along the California coast, from southern Oregon to Monterey County, California. Their bark, which can be up to a foot thick, is fibrous and has tannin, which makes the tree very resistant to fire, rot, and insects. Mature coast redwoods average 200 feet tall and 16 to 20 feet wide at breast height. The average age for coast redwood is between 500-700 years,

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[173] U.S. Dept. of Agriculture, *Soil Survey of Redwood National and State Parks, California* (Washington, D.C.: Natural Resources Conservation Service, 2008), pp. 44-45.
[174] Mary Ann Madej, "Changes in Channel-Stored Sediment, Redwood Creek, Northwestern California, 1947 to 1980: Geomorphic Processes and Aquatic Habitat in the Redwood Creek Basin, Northwestern California," U.S. Geological Survey Open-File Report 92-94.
[175] U.S. Dept. of the Interior, *General Management Plan: Redwood National and State Parks, Humboldt and Del Norte Counties* (San Francisco, CA: National Park Service, Western Regional Office, 1998), pp. 155; "Natural Features & Ecosystems, Rivers and Streams." Redwood National and State Parks.https://www.nps.gov/redw/learn/nature/naturalfeaturesandecosystems.htm#CP_JUMP_132579 (retrieved 24 July 2018)
[176] Fisher, Hugo et. al, *Flood! December 1964 - January 1965*, Department of Water Resources, Bulletin No. 161 (January 1965), https://archive.org/stream/x5flooddecember196161calirich#page/40/mode/2up, pp 40.
[177] U.S. Dept. of the Interior, *Environmental Assessment: Management Options for Redwood Creek, Redwood National Park* (San Francisco, CA: National Park Service, Western Regional Office, 1975), pp. 2-43.
[178] "Redwood Parks Left in Ruins by Recent Floods." *Chico Enterprise-Record*, January 9, 1965.
[179] Michael Barbour et. al, *Coast Redwood: A Natural and Cultural History*, (Los Olivos, CA: Cachuma Press, 2001), pp. 12.
[180] Michael Tennessen, "Clearing and Present Danger? Fog That Nourishes California Redwoods Is Declining," *Scientific American* (December 9, 2010).
[181] Michael Barbour et. al, *Coast Redwood: A Natural and Cultural History*, (Los Olivos, CA: Cachuma Press, 2001), pp. 39.

although some trees have been dated to 2,200 years.[182] While conclusive dating has not been conducted, the oldest trees in the grove are believed to be around 1,500 years old.[183] Coast redwoods are also known for the range of life they can support within their canopies. Soil builds up in the treetops, hosting Leather ferns (*Polypodium scouleri*) and numerous other diverse flora and fauna including insects, earthworms, salamanders. Researchers from Humboldt State University have discovered up to 5,200 pounds of soil in one redwood tree.[184]

Other tree species include western hemlock (*Tsuga heterophylla*), grand fir (*Abies grandis*), tanoak (*Notholithocarpus densiflorus*), red alder (*Alnus rubra*), California bay laurel (*Umbellularia californica*), and a notable stand of bigleaf maple (*Acer macrophyllum*) (Figure 25). These maples are thought to be 100-120 years old and of remarkable size.

The dense canopy of coast redwoods forests allows little direct sunlight through. Plants that grow with in the redwood understory must thrive on the speckled light. Ferns thrive in cooler, shaded areas, so sword ferns (*Polystichum munitum*), bracken ferns (*Pteridium aquilinum*), lady ferns (*Athyrium filix-femina*), deer ferns (*Belchnum spicant*), and leather ferns (*Polypodium scouleri*) densely inhabit most of the ground area. In areas where more sunlight becomes available when a fallen tree creates a clearing, rhododendron (*Rhododendron macrophyllum*), huckleberry (*Vaccinium ovatum & parvifolium*), salmonberry (*Rubus spectabilis*), and young coast redwoods can opportunistically grow very quickly to fill in the space. Other plants in the Grove include salal (*Gaulthoria shallon*), redwood sorrel (*Oxalis oregano*), redwood violet (*Viola sempervirens*), trillium (*Trillium chloropetalum*), rhododendron (*Rhododendron macrophyllum*), Azalea (*Rhododendron occidentale*), clintonia (*Clintonia andrewsiana*), inside-out flower (*Vancouveria hexandra*), coffee berry (*Frangula californica*), Douglas iris (*Iris douglasiana*), coltsfoot (*Petasites frigidus*), hooker's fairybells (*Disporum hookeri*), Smith's fairybells (*Disporum smithii*), and candy flower (*Claytonia sibirica*).[185]

Old-growth redwood forests also support fauna species such as Pacific salamanders (*Dicamptodon tenebrosus*), flying squirrels (*Glaucomys sabrinus*), and marbled murrelets (*Brachyramphus marmoratus*) which are dependent on old-growth forests. Large mammals such as the Roosevelt elk (*Cervus canadensis roosevelti*) and black-tailed deer (*Odocoileus hemionus*) can also be found in the area, as well as California black bears (*Ursus americanus californiensis*) and mountain lions (*Puma concolor*). Smaller mammals, such as California ground squirrels (*Spermophilus beecheyi*), redwood chipmunks (*Tamias ochrogenys*), and red tree voles (*Arborimus longicaudus*), play a large role in the ecology of old-growth redwood groves by spreading spores of fungi that grow symbiotically on tree roots and trunks.

Climate

Tall Trees Grove is located within a Mediterranean coastal climate with temperature range averaging between 40 to 60°F year-round with mild winters and dry summers. Annual rainfall in the region ranges from 60 to 140 inches per year, with most precipitation occurring in November through April. The Grove receives very little snowfall but receives an abundance of coastal fog, especially during the summer months.[186]

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[182] *North Coast Master Plan*, 1965, Redwood National Park, p. 14.
[183] John Montague (Save-the-Redwoods League Volunteer) in email correspondence with Kevin McCardle, 12 July 2018.
[184] Emily Burns, "Redwood Canopy: A Research Frontier," *Save The Redwoods League Newsletter*, 14 March 2014.
[185] Stassia Samuels (Plant Ecologist) and Jason Teraoka (Forester), Conversation with Nicole Rehnberg and Jacob Torkelson, 24 July 2018.
[186] U.S. Dept. of the Interior, *Environmental Assessment: Management Options for Redwood Creek, Redwood National Park* (San Francisco, CA: National Park Service, Western Regional Office, 1975), pp. 2-24.

Summary

Tall Trees Grove Historic District's establishment is a result of the grove's natural systems and features. A combination of geomorphology, geology, hydrology, ecology, and climate allow for some of the world's tallest coast redwood trees to thrive and is a critical character defining feature of the Tall Trees Grove Historic District.

Natural Landscape Characteristic Graphics:

Figure 22. *Tall Trees Grove is located along the western banks of Redwood Creek.* [NPS 2018].

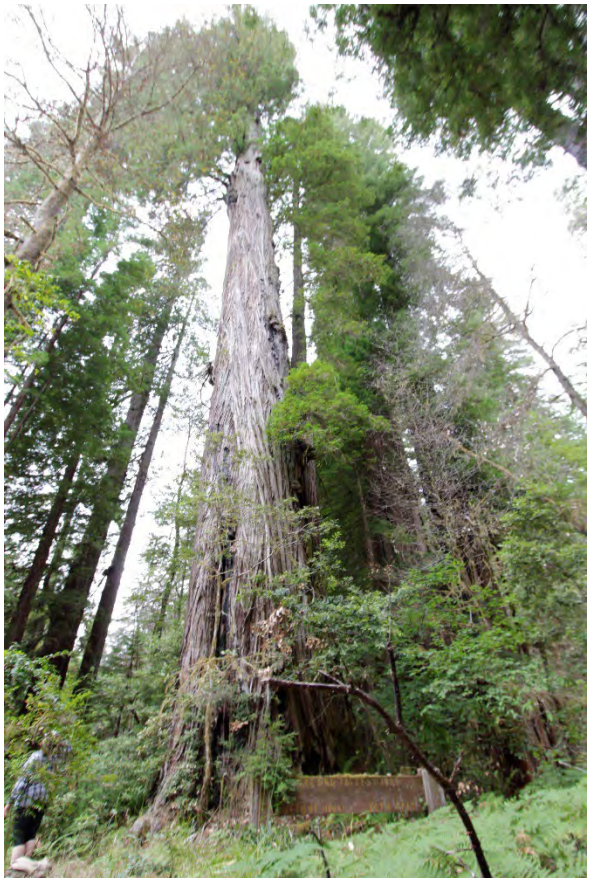

Figure 23. *The second tallest tree recorded in 1963 in the northern grove. Note the sign at the base was installed by Arcata Redwood Company* [NPS 2018].

Figure 24. *Typical groundcover within the coast redwood forest of the Grove.* [NPS 2018].

Figure 25. *Big leaf maple stand next to Redwood Creek.* [NPS 2018].

Spatial Organization

The spatial organization within a historic property refers to the three-dimensional organization of physical forms and visual associations in the landscape, including the articulation of ground, vertical, and overhead planes that define and create spaces.

The Tall Trees Grove Historic District consists of two discontiguous groves on two relatively narrow alluvial flats on the east bank of Redwood Creek. Redwood Creek flows roughly north in a steep valley, west of the Grove. The two groves are less than a mile apart and each is defined by the steep hillsides to the west and east. The northern grove is about 1 acre compared to the larger 19-acre southern grove. The southern grove is somewhat crescent shape due to a bend in the creek. The steep hillsides next to the meandering creek enclosed the Grove to the north and south.

Within the groves, large trunks of old-growth redwood are spaced throughout the grove with occasional tight clusters of three to six trees together (Figure 26). The high, closed tree canopy of the redwoods creates a distinct overhead plane, enclosing the space (Figure 27). Shrubs and understory range from 3-feet to 10-feet high, often enclosing the immediate view to the side of the visitor and directing views up to the canopy and massive trunks around the grove.

Tall Trees Loop Trail generally follows the perimeter of the southern grove. The trail along the Redwood Creek bank is less enclosed and occasionally open to the creek, allowing light in, but the steep western bank provides an enclosure beyond the creek. Big leaf maples are found at the north end of the southern grove. The canopy here is also continuous provides patches of soft-green and yellow light which allows pockets of more varied and denser vegetation. When visited in 2021 the northern grove appeared to have recently lost two or three redwood trees to an unknown disturbance, possibly movement of the hillside to the east, and eliminated numerous smaller trees when they fell, creating light-filled areas within the small grove. It is expected these areas will become dense with new growth in the next year.

Summary

The grove's spatial organization are principally determined by natural topography and vegetation. The Grove is made of two nearby groves on alluvial flats of Redwood Creek with steep hillsides to the west and across the creek to the east. The groves are characterized by large redwood trunks and a continuous canopy enclosing space.

Spatial Organization Graphics:

Figure 26. *Large redwood trunks, understory trees, and forested hillside to the right provide a sense of enclosure. . Light is coming in from Redwood Creek on the left* [NPS 2018].

Figure 27. *High overhead canopy in the Grove creates a sense of enclosure and defined space. Seen here is the "Tallest Tree" as of 1963* [NPS 2018].

Land Use

Land use is the principal activities in the landscape that have formed, shaped, or organized the landscape. Indigenous peoples travelled through and harvested resources in the Grove and Redwood Creek prior to the arrival of European Americans. Beginning in the 1850s the Trinidad Trail, a path based on a previous Native American route, allowed supplies to reach gold mines on the Klamath River from Trinidad. The trail location is marked by two redwood stumps on the riverbank cut with axes where the two trees were felled to act as bridges across Redwood Creek.

Bert Robinson, an Orick resident, used the Grove as a fish camp in the 1920s and 1930s. He constructed a brine vat in a hallowed redwood log, and a smokehouse out of a goosepen stump. A photograph of the smokehouse appeared in the 1964 National Geographic article and labeled a "home in a tree." Others also used the site for similar purposes and built what was described as a hunting cabin or lean-to but no longer exists.[187] The smokehouse stump remains, but other constructed features have been lost.

After World War II technology and economic demand made logging more remote locations potentially profitable and multiple large-scale commercial logging operations began operating in the Orick area.[188] The terrain and lack of roads made Redwood Creek and area around the Grove less appealing for logging, but these characteristics appealed to park advocates like the Sierra Club looking for larger, intact watersheds. Arcata Redwood Company owned the Tall Trees Grove (which they referred to as the Glen of Giants) and the land east of Redwood Creek but did not begin logging in the watershed until the late 1950s. The National Geographic Society surveyed the Grove in 1963, and found it contained the first, second, third, and sixth tallest trees in the world. With the July 1964 National Geographic publication of these finds, the Grove gained national public awareness and popularity.

Logging never occurred within Tall Trees Grove, in fact the company pledged to save the tall trees after they were identified, erected signs at the bases, and opened them up to limited public access (Figures 5 and 6). However, logging practices upslope and upriver of the Grove led to sediment filling Redwood Creek that many feared would lead to flooding in the Grove that would destroy it as earlier flooding at Bull Creek had done to the Rockefeller Grove.

After Redwood National Park was created in 1968 and later expanded in 1978, trails were created for visitors to access the grove. Recreation is now the primary land use of the grove (Figure 28).

Summary

Tall Trees Grove was originally used by indigenous groups to travel through and harvest resources. Following a native route, European Americans built the Trinidad Trail which connected Trinidad to the gold mines on the Klamath River. Later, the Grove was also used as a place for fishing, hunting, and associated uses. While logging did not occur in the Grove, the area felt the effects of logging practices in surrounding lands. After the discovery of the tall trees, the Grove became a recreation space, first with the Arcata Redwood Company on a limited basis, then as Redwood National Park in 1968.

[187] Steve Viers and Jim Milestone, "National Park Service In-House Status Report Concerning the Past and Present Condition of Redwood National Parks Tall Trees Grove, With Emphasis on Management Alternatives for the Protection of Alluvial Flats Bordering Large Rivers," Resources Management and Research Redwood National Park, February 10, 1978.
[188] U.S. Dept. of the Interior, *Environmental Assessment: Management Options for Redwood Creek, Redwood National Park* (San Francisco, CA: National Park Service, Western Regional Office, 1975), pp. 2-15.

Land Use Graphics:

Figure 28. *Today, visitors use the grove to recreational hiking to witness some of the tallest trees in the world.* [NPS 2018].

Topography

Topography refers to the manipulation of the natural topography and landscape that occurred during construction phases within the grove. Most of the topographic manipulation occurred during the construction of the Tall Trees Trail and Loop Trail. The Loop Trail is relatively level and required minimal manipulation of the natural grade. Some of the trail down the slope originally followed an earlier Arcata Redwood Company access road to the river from the C Line Road, near the present parking lot, but there is no evidence of this road within the Grove and it likely accessed Redwood Creek to the south where logging companies dug out river rock for road construction. Segments of the trail were rerouted in 2010 and abandoned most of the former road.

Summary
There has been minimal modification of topography within the grove and has been limited to trail construction on level ground. Trails as they exist today were constructed after the park expansion of 1978.

Vegetation

Vegetation in a cultural landscape usually refers to the trees, shrubs, vines, and herbaceous plants planted or modified by humans. No formal plantings were made in the Tall Trees Grove Historic District. However, there was a conscious decision to preserve the natural vegetation and coast redwoods by establishing the national park and including the Tall Trees Grove within that boundary (Figure 29). Additionally, the trees identified as the first, second, third, and sixth tallest trees in 1964 are specific resources in the grove. The native vegetation is described in greater detail under "Natural Systems."

Summary
While no formal plantings have occurred, the grove is significant because of its natural vegetation. Because of the grove's location and setting in an old growth redwood forest, aspects of association and feeling remain. The natural significance of the vegetation in this location helped to establish the national park.

Contributing, Non-contributing, and Undetermined Features

Feature:	1964 Tallest Tree
Feature Identification Number:	
Type of Feature Contribution:	Contributing
IDLCS Number:	
Feature:	1964 Second Tallest Tree
Feature Identification Number:	
Type of Feature Contribution:	Contributing
IDLCS Number:	
Feature:	1964 Third Tallest Tree
Feature Identification Number:	
Type of Feature Contribution:	Contributing
IDLCS Number:	
Feature:	1964 Sixth Tallest Tree
Feature Identification Number:	
Type of Feature Contribution:	Contributing
IDLCS Number:	

Vegetation Graphics:

Figure 29. *The tall coast redwoods in the grove helped to establish Redwood National Park.* [NPS 2018].

Circulation

Circulation refers to the spaces, features, and applied material finishes which constitute systems of movement in a landscape. Circulation within the Grove is solely in the south grove and consists largely of Tall Trees Grove Loop Trail, and the small segments of the Redwood Creek Trail, and Tall Trees Trail that connect to the loop. The Grove is accessed by visitors on a 2-mile hike from the Tall Trees Trail parking lot, or by an 8-mile hike along Redwood Creek Trail. Seasonal bridges cross the creek during the summer. Until the park expansion in 1978 the Redwood Creek Trail was the only way to access the Grove. There are no circulation features in the northern grove.

Tall Trees Trail from the parking lot was constructed sometime after 1978 when Redwood National Park was expanded, following portions a former road down to the grove from the C-Line Road (Figure 32).[189] The trail was repaired and re-routed in 2010 to improve drainage and visitor safety. In so doing, they repaired approximately 2,300 linear feet, installed water-bars, and re-routed the first half of the trail (starting at the parking lot trailhead) descending to the grove.[190] It is a native soil trail with a 700-foot elevation drop over 2 miles. There are several interpretive signposts and benches along the descent.

The Tall Trees Loop Trail is a 5 to 6 feet wide, 1-mile rustic native soil trail that follows the perimeter of the southern grove (Figure 33). The Loop Trail was likely constructed in 1978. The Loop Trail was also modified and rerouted in 1988 to move further away from the tall trees and install numbered interpretive signposts and the split-rail fence to mitigate visitor-caused damages to the trees. The Tall Trees Grove Loop Trail also has signs directing visitors to the trailheads for both Emerald Ridge Trail and Redwood Creek Trail. In addition, there is an interpretive sign and a split rail fence at the “Tallest” tree and a bench near the Tall Tree Trail junction.

The C-Line Road is a former logging road from the mid-1960s that visitors drive from Bald Hills Road to Tall Trees Grove parking. Visitor use began when the area above the Grove was included in 1978 and is the primary route visitors use today. Limited permits are obtained on-line, and visitors are given a code to unlock a gate located at the intersection of Bald Hills Road and C-Line Road. It is a 7-mile-long, two-way, gravel road, and is generally 20 to 30 feet in width (Figure 30).

At the end of C-Line Road, there is a dirt parking lot for about 40 vehicles (Figure 31). A wooden pavilion at the trailhead parking lot was the former Tall Trees Shuttle shelter. The shuttle was first operated by the Twoomey Brothers North Coast Redwood Tours of Trinidad (1979-1987) followed by Green Valley Motel and Exxon of Orick (1988-1989). From 1990, small shuttles were operated by park staff until the shuttle service was suspended in 1996 due to the decline in passengers after visitors were able to drive their own vehicles to the parking lot.[191]

Past Circulation

To access the Grove before 1968, visitors drove down a logging road along the east bank of Redwood Creek and crossed just upstream of the south grove. ArCo visitor information guides to the Grove indicate a trail within the south grove, but it is not known if anything was constructed, or was informal, and it was in a different location than the Tall Trees Loop (see Figure 6).[192] No evidence of this trail was found in field investigations. When the park was created in 1968, visitors hiked the logging road along Redwood Creek from a trailhead parking lot close to the intersection of Bald Hills Road and U.S.

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[189] Steve Veirs (Research Scientist, Redwood National Park), Conversation with Kevin McCardle.
[190] Michael R. Peterson, Archeological Survey for the Repair Tall Trees Trail, National Park Service 2009, pp. 8-12.
[191] “The Tall Trees Shuttle - Justification for Discontinuance.” National Park Service Memo, March 6, 1996.
[192] Lawrence E. Davies, “Redwood Country: Conservationists Intensifying Efforts to Save Giant California Trees, (*The New York Times*, April 24, 1966).

Highway 101. Although some segments have been rerouted, the current Redwood Creek Trail generally follows this route.

The Trinidad Trail was used from the 1850s to the 1890s connecting the town of Trinidad to the mines along the Klamath River and crossed Redwood Creek at Tall Trees Grove. Beginning in Trinidad Bay, it turned inland, eventually descending to Redwood Creek at the Tall Trees Grove. The crossing is marked by two axe-cut stumps which were likely cut to bridge the creek. This route followed a Native American path connecting to inland villages and other locations used seasonally.

Contributing, Non-contributing, and Undetermined Features

Feature:	Redwood Creek Trail
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	
Feature:	C-Line Road
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	
Feature:	Parking Lot
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	
Feature:	Tall Trees Grove Loop Trail
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	
Feature:	Tall Trees Trail
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	

Circulation Graphics:

Figure 30. *C-Line Road provides access to the Tall Trees Grove from Bald Hills Road. It was a logging road created by the Arcata Redwood Company in the mid-1960s.* [NPS 2018].

Figure 31. *Gravel parking lot at the Tall Trees Grove trailhead. The roof of the former shuttle shelter is seen to the right of center* [NPS 2018].

Figure 32. *Evidence of the previous trail along Tall Trees Trail that followed portions of an Arcata Redwood Company road off C-Line Road.* [NPS 2018].

Figure 33. *View of Tall Trees Trail loop trail looking north in the south grove.* [NPS 2018].

Buildings and Structures

Buildings refer to the elements primarily built for sheltering any form of human activities, while structures are the functional elements constructed for other purposes than sheltering human activity.

The Grove does not contain any existing buildings or structures and is largely undeveloped. There are two small buildings associated with the Tall Trees Grove, but outside the historic district boundary. In the Tall Trees Grove parking lot and trailhead is a 16-foot by 20-foot large comfort station (Figure 34). The comfort station is constructed using a rustic style of brown and tan painted concrete, brown metal doors, and a concrete roof, all intended to blend into the natural landscape. The second building is a wooden pavilion, also in the parking lot., that was used as a shelter for the shuttle service that drove visitors between Orick and the tall trees until 1996 (Figure 35).

Summary
There are no buildings or structures located in the grove.

Contributing, Non-contributing, and Undetermined Features

Feature:	Shuttle-stop Shelter
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	
Feature:	Comfort Station
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	

Buildings and Structures Graphics:

Figure 34. *Wooden shuttle waiting shelter located at the Tall Trees Trail parking lot off C-Line Road.* [NPS 2018].

Figure 35. *Concrete comfort station located at the Tall Trees Grove parking lot off C-Line Road.* [NPS 2018].

Views and Vistas

Views and vistas within a cultural landscape are important because they allow visitors to see the broader context of a cultural landscape beyond or focus on key features within the site. These are often presented in ways that are aesthetically pleasing or memorable. Views are can be expansive, or panoramic, prospect of a broad range of vision which may be naturally occurring or deliberately contrived. Vistas are the controlled prospects of a discrete, linear range of vision, which can also be deliberately contrived. Views and vistas can also be static, when it is seen from a fixed point, or continuous, when it is seen while moving along a trail or road. The Grove is within a forest and enclosed by steep forested hillsides on all sides which limit distant or panoramic views. There are vistas within the Grove of the trees, nearby creek, and surrounding forest.

The Tall Trees Grove Trail follows the perimeter of the southern grove to the first, third, and sixth tall tree as recorded in 1963 (Figure 36). The most prominent vista is the close, static vista of the tallest tree from the interpretive sign near the base. It is a vista of the massive trunk that disappears into the canopy high overhead. The other tall trees have similar vistas from the trail but are not marked.

There are also continuous vistas of redwoods throughout the grove, particularly upwards following the redwood trunks towards the tree canopy. Although understory vegetation can limit views to the sides of the trail, this also has the effect of directing eyes above the understory to the trunks and canopy. On the east side of the Loop Trail are continuous views of the fern-covered hillsides disappearing into the distance. On the west side of the Loop Tail are occasional views out to the sunlit creek (Figure 37). These are not formal views, but a product of natural variation in growth and the proximity of the trail to the edge of the river terrace. The dappled sunlight of the bigleaf maples contrasts the darker redwood grove (Figure 38).

Summary
The Tall Trees Grove Trail was designed to take visitors around the south grove to see the tall trees that became famous. The trail comes near to the three tallest trees in the south grove. Contributing vistas include the vista at the first, third and sixth tallest tree as identified in 1963; continuous views throughout the grove of the redwood trunks and canopy; continuous views of the fern-covered hillsides; and occasional widows through vegetation to the creek.

Contributing, Non-contributing, and Undetermined Features

Feature:	View of first, third and sixth tall trees from Tall Trees Trail
Feature Identification Number:	
Type of Feature Contribution:	Contributing
IDLCS Number:	
Feature:	Continuous views in redwood forest
Feature Identification Number:	
Type of Feature Contribution:	Contributing
IDLCS Number:	
Feature:	Continuous views of Redwood Creek
Feature Identification Number:	
Type of Feature Contribution:	Contributing
IDLCS Number:	

Views and Vistas Graphics:

Figure 36. *View of one of the sixth tallest tree as recorded by National Geographic in 1963.* [NPS 2018].

Figure 37. *View of Redwood Creek and north grove from gravel bar on the west bank.* [NPS 2018].

Figure 38. *Less dense canopies of bigleaf maple trees allow sunlight to filter through and provide views to Redwood Creek.* [NPS 2018].

Small-Scale Features

Small-scale features are the elements which can provide aesthetic detail and diversity as well as functional needs in the landscape. The general character of the cultural landscape of Tall Trees Grove is one of rustic seclusion and the general lack of a built and small-scale features. Existing small-scale features were added after the period of significance. One small-scale feature that was identified in 2018 as contributing was an Arcata Redwood Company sign on the northern part of the district noting the second tallest tree soon after the trees were first identified (Figure 39). However, the site was revisited in 2021 and a tree had since fallen on the sign and destroyed it.

Non-contributing Features

Split-Rail Fence

Along the trail at the "Tallest Tree" is a split rail fence to keep visitors away from the base of the tree (Figure 40). In 1981, park staff recommended a fence to protect the bark and roots of the tree from visitor impact, as well as graffiti and other vandalism that had been occurring. The fence consists of fourteen sets of split-wooden posts. Between each set of posts is one rustic-cut wooden rail, each measuring approximately 4 inches by 4 inches, that is stacked on top of its neighbor in an interlocking fashion. The overall length of the fence is 112 feet, and the height is 3 feet.

Interpretive Signs

There are two types of interpretive signs in Tall Trees Grove. The first is a series of numbered, keyed posts made of split wood that are 48 inches tall that correspond to an interpretive brochure (Figure 41). There are a total of 19 numbered posts along Tall Trees Trail and Tall Trees Loop Trail first installed in 1988. Locations of the posts have changed as interpretive content changed. The other type of interpretive sign is one traditional park service angled sign board depicting the National Geographic Society's survey measuring "The Tall Tree" (Figure 42). It is approximately 48 inches tall and the top, where the sign is attached, slants backwards. The resin sign is encased in brown, painted, metal tubing that is attached to two rectangular posts that rest in the ground.

Trail Signs

Throughout the grove are 5 brown painted wooden trail signs with routed letters and arrows painted white (Figure 43). Each indicates the name of the trail, what direction it is in, and a general distance in miles. These range in size, depending on the amount of content that is included, but vary from 26 inches by 9 inches and 48 inches tall to 31 inches by 11 inches and 48 inches tall. Each sign is affixed with two bolts to a wooden post that is either painted brown or natural wood, the top of which is chamfered, and each is set directly into the ground.

Benches

Within the boundary of the south grove are two benches. One 7-foot-long wood and metal bench was likely installed in 1988 when most other small-scale features were built (Figure 44). It is composed of four slats of dimensional lumber for the seat and two for the back. These wooden slats are attached with bolts to a metal superstructure that consists of two square, metal tubes with an attached welded metal beam, to which the seat slats are attached. Three flat bent metal strips are welded to the base and the wooden slats for the back are attached with bolts to them. The wooden back has splintered and there is a small amount of graffiti on the bench. Similar benches, in similar states of repair, can be found along the Tall Trees Trail to the parking lot. Recently, a chair seat was carved from a fallen tree stump by park staff sometime in 2020 near the "Tallest Tree."

Summary

The only small-scale feature that was built during the period of significance was the "Second Tallest Tree" Arcata Redwood Company sign in the northern grove. This sign has since been destroyed. Small-scale features in the historic district were constructed after the period of significance include a split-rail fence, interpretive signs, trail signs, and a bench. While these features non-contributing, they are all small in nature and spread-out through the grove and do not impact the historic character of the grove.

Contributing, Non-contributing, and Undetermined Features

Feature:	Split Rail Fence
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	
Feature:	Interpretive wooden posts (19)
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	
Feature:	"Tall Tree" signboard
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	
Feature:	Trail signs (5)
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	
Feature:	Bench (2)
Feature Identification Number:	
Type of Feature Contribution:	Non-contributing
IDLCS Number:	

Small-Scale Features Graphics:

Figure 39. *Sign noting the second tallest tree put up by the Arcata Redwood Company. This sign is no longer extant as of 2021.* [NPS 2018].

Figure 40. *Split rail fence constructed around one of the tall trees in the grove to protect it from effects of visitation.* [NPS 2018].

Figure 41. *One of many numbered wooden interpretation posts found throughout the grove and trail down to the grove that correspond to an information brochure.* [NPS 2018].

Figure 42. *Interpretive sign located near the tall trees explaining the history and discovery of the trees.* [NPS 2018].

Figure 43. *Typical brown painted wooden trail sign found in the grove to direct hikers.* [NPS 2018].

Figure 44. *One of the benches located in the grove. Similar benches are located on the Tall Trees Trail while this one is located just inside the grove.* [NPS 2018].

Archeological Sites

Archaeological sites are the ruins, traces, or deposited artifacts in a landscape, evidenced by the presence of either surface or subsurface features. Evaluation of these sites and features under Criterion D is outside of the scope of this study. A complete archeological investigation was not conducted as part of this document. The locations of archaeological sites inventoried by the CLI are not disclosed.

Contributing Features

Previous archeological surveys have been conducted in the grove.[193] This investigation revealed remnants of the Trinidad Trail, including two axe cuts stumps that are the likely remains of two redwoods felled as bridges to cross Redwood Creek.

Other undocumented sites include a goosepen smokehouse and a brine vat for curing fish carved from a sump, both circa 1920. The location of the smokehouse was photographed as part of the 1964 National Geographic article about the tall trees. The goosepen was found to contain remains of milled wood, likely the wooden door, and wire strung overhead. The brine vat was destroyed by a fallen tree, but remnants remain.

Since the initial field survey, the Arcata Redwood Company sign at the "Second Tallest Tree" was destroyed by a fallen tree. The sign was constructed of redwood boards and words routed into the boards. It was 42 inches tall and 10 feet long. The two posts were each made of two 3-inch by 12-inch boards with the sign boards in between and bolted through. The sign boards were two 3-inch by 10-inch boards with the words "SECOND TALLEST TREE HEIGHT (1964) 367.4 FEET" routed in.

Summary

The contributing archeology of the Grove reflects the diverse uses including a Native American and European American transportation route of the 19th century and earlier, a fish camp in the early 20th century, and a sign from a lumber company that marked what became a nationally known tree.

Feature:	Second tallest tree sign, Arcata Redwood Company (undocumented)
Feature Identification Number:	
Type of Feature Contribution:	Contributing
IDLCS Number:	
Feature:	Trinidad Trail
Feature Identification Number:	
Type of Feature Contribution:	Contributing
IDLCS Number:	
Feature:	Smokehouse (undocumented)
Feature Identification Number:	
Type of Feature Contribution:	Contributing
IDLCS Number:	
Feature:	Brining vat (undocumented)
Feature Identification Number:	
Type of Feature Contribution:	Contributing

[193] Michael R. Peterson, Archeological Survey for the Repair Tall Trees Trail, Western Region National Park Service 2009.

Archeological Sites Graphics:

Figure 45. *Smokehouse tree within southern grove. See also Figure 20.* [NPS 2018].

Condition

Condition Assessment

Condition Assessment: Good

Assessment Date: 7/14/2021

Condition Assessment Explanatory Narrative:
Through the analysis and evaluation of landscape characteristics and features, it is determined the proposed Tall Trees Grove is in "good" condition. The inventory unit shows no clear evidence of major negative disturbance or deterioration of contributing features. No immediate corrective action is required to maintain its current condition. Some non-contributing small-scale structures, like benches, are in need of maintenance and should be repaired or removed.

The recently destroyed "Second Tallest Tree" sign is going to be recovered and archived as appropriate at Redwood National Park Archives.

Impacts

Type of Impact: Erosion
External or Internal: External
Impact Description:
A significant amount of erosion occurs in the redwood forest along the steep graded slopes. A combination of visitation, weather, and topography can contribute to erosion in the grove.

Type of Impact: Flooding
External or Internal: External
Impact Description:
Flooding of Redwood Creek poses threats to the character of the grove. Historically, flooding in the area has deposited large amounts of sediment n the grove, even impacting the status of the tall trees.

Type of Impact: Soil Compaction
External or Internal: Internal
Impact Description:
As visitors continue to walk through the grove, the soil beneath compacts. This limits the amount of space that roots have underground to stabilize the vegetation.

Stabilization Measures

Vegetation
Tall Trees Grove
- Remove woody vegetation to better define the historic clearing and improve the visitors' perception of the space.

Trail Maintenance
Tall Trees Grove Trail

- Continue to maintain trails and control run-off.
- Signage and small-scale features should be kept minimal to the extent practical along the trails within the grove. Parking area is a preferable area to display visit planning information. Existing non-contributing features, such as benches, in poor condition should be repaired or removed.

Treatment

Approved Treatment: Undetermined

Approved Treatment Completed:

Approved Treatment Document Explanatory Narrative:
Text

Approved Treatment Document:

Approved Treatment Document Date:

Bibliography and Supplemental Information

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Redwood National Park Establishment Papers, REDW 15826

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Construction Plans

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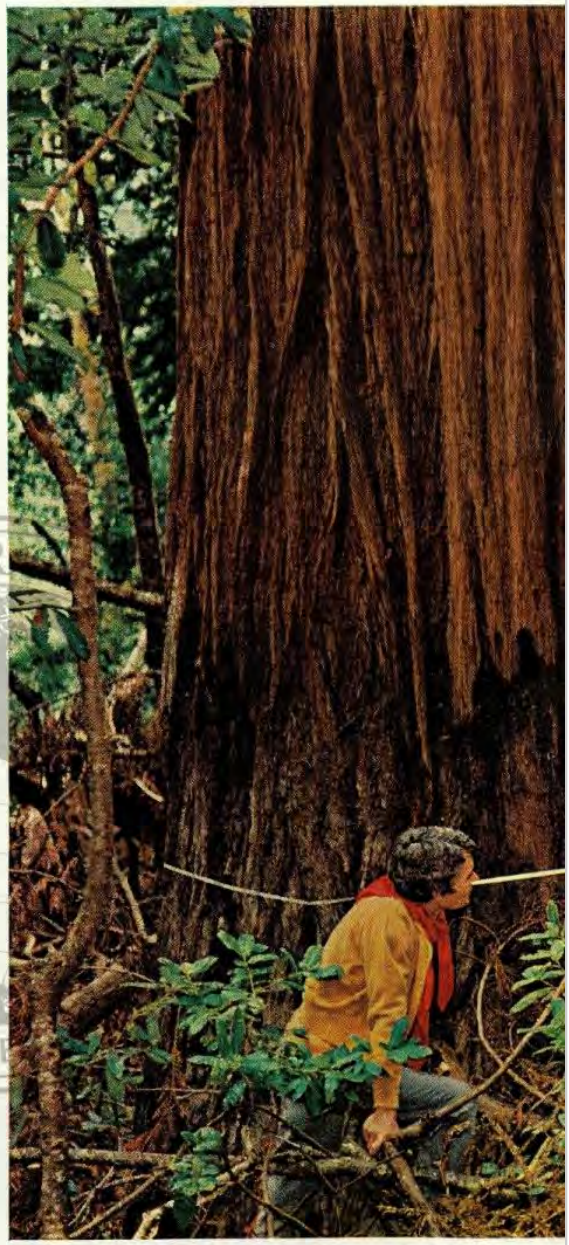
Supplemental Information

Title: Appendix A

Description: ***National Geographic Magazine*** **" Finding the Mt. Everest of All Living Things," by Paul A. Zahl, PhD., July 1964**



Massive girth of the tallest redwood measures 44 feet. Chester C. Brown of the National Park Service (center) and Dr. Paul Zahl pull a tape around the tree at breast height while Mrs. Brown watches. National Geographic Society support has enabled the Park Service to study factors involved in preservation of California's coast redwoods.

Finding the Mt. Everest of All Living Things

By PAUL A. ZAHL, Ph.D.
National Geographic Senior Staff (Natural Sciences)

Photographs by the author

I STILL WONDER what lured me to the hidden valley of Redwood Creek. Was it a hunch or plain curiosity?

Whatever the reason, I knew the moment I beheld the tantalizing little stream that eventually I must explore it. But I had no idea I would spend many memorable weeks going into and out of that wilderness—nor could I possibly know that the valley would yield a fascinating discovery: the world's tallest known living things.

I first glimpsed Redwood Creek from a logging road that twisted through patches of steep forest and past slopes of partially logged land. From a ridge behind me I had seen the shimmering blue Pacific. Now, atop an inland height, Clarence A. (Casey) Casebier stopped the pickup for a long look eastward.

"You see the trees down in the valley? Great timber!" exclaimed Casey. "But those big ones aren't on our land. Everything east of the creek belongs to the Arcata Redwood Company." Casey spoke with authority as a logging superintendent for the Georgia-Pacif-

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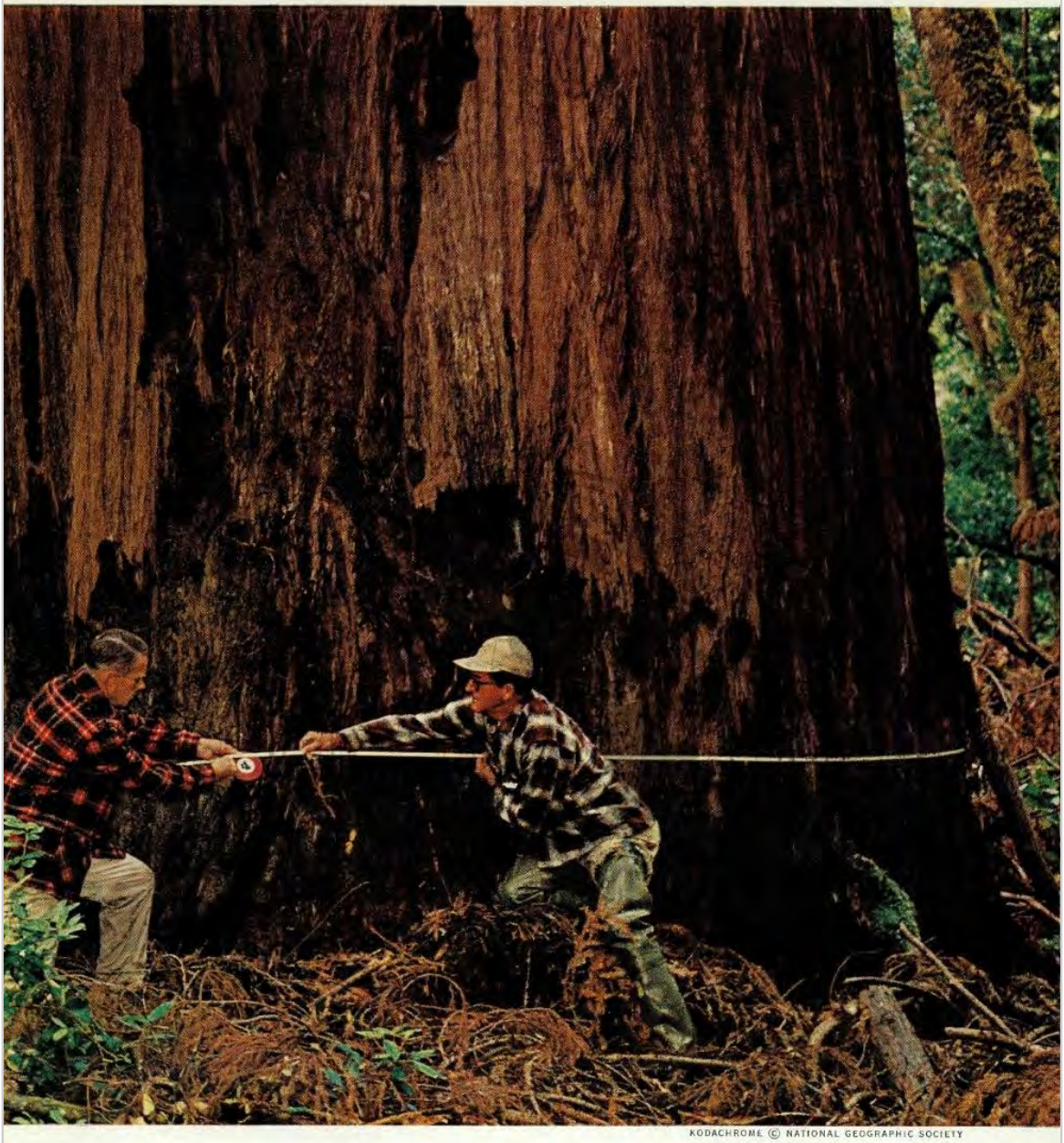

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ic Corporation, along whose logging road we were driving. Heavy trucks grinding through these private domains make travel dangerous for the uninitiated; outsiders can enter only with permission. Generously, Georgia-Pacific had sent Casey with me as a guide.

"Is there any way to get down there?" I asked him.

"There's no road at all beyond Redwood Creek," he said. "The only way to get into that grove is on foot."

Casey's words jogged my memory. I had heard vague references to the coast redwoods in this secluded valley. But no one knew much about those wilderness trees. Their isolation had protected them.

Now, gazing into the sunlit valley, I promised myself, "I'll come back."

Big Trees Influence Life's Career

My personal interest in redwoods began longer ago than I can recall, when I was a boy in California. My father loved the redwoods, and he made no distinction between the giant

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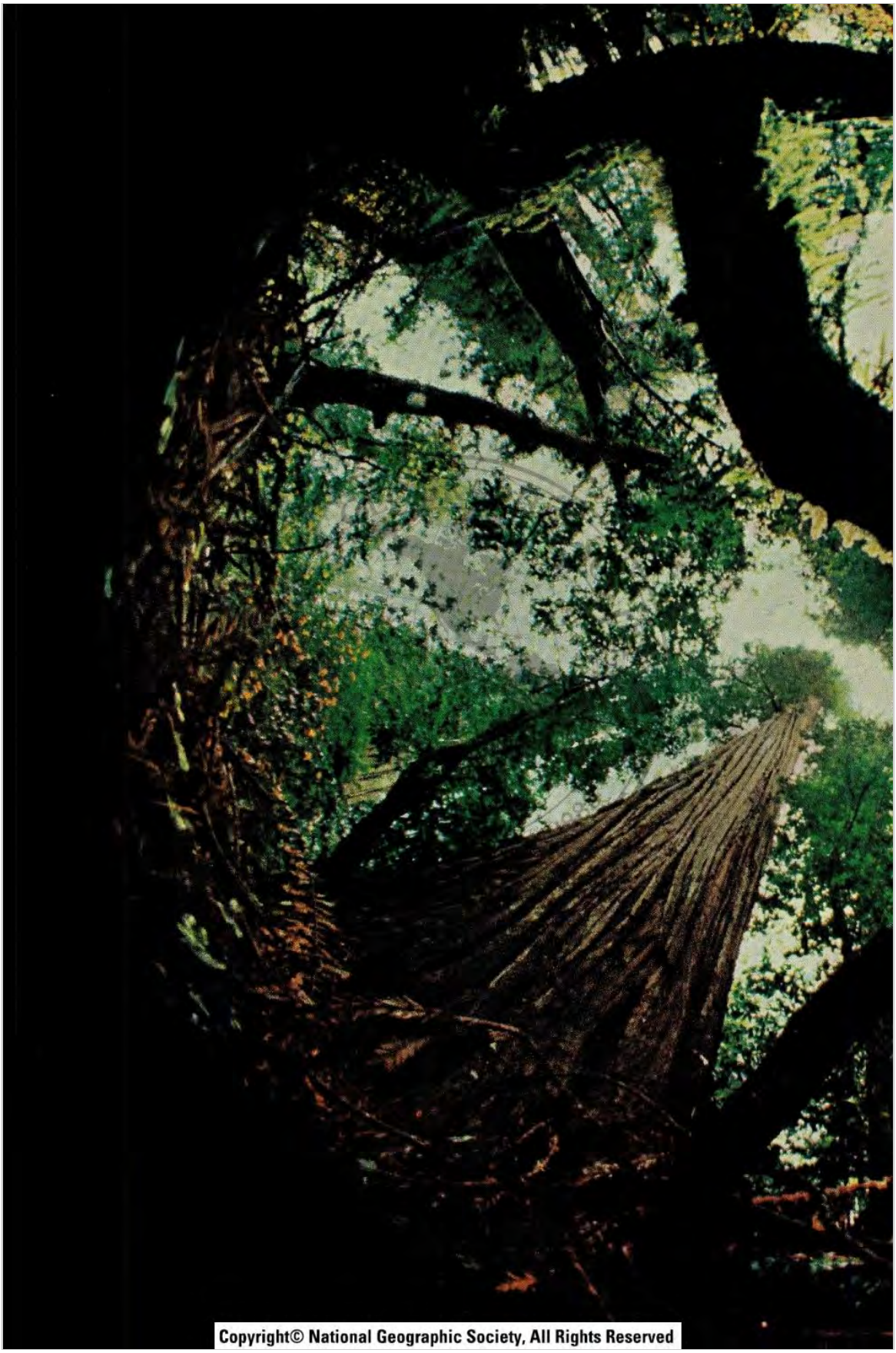

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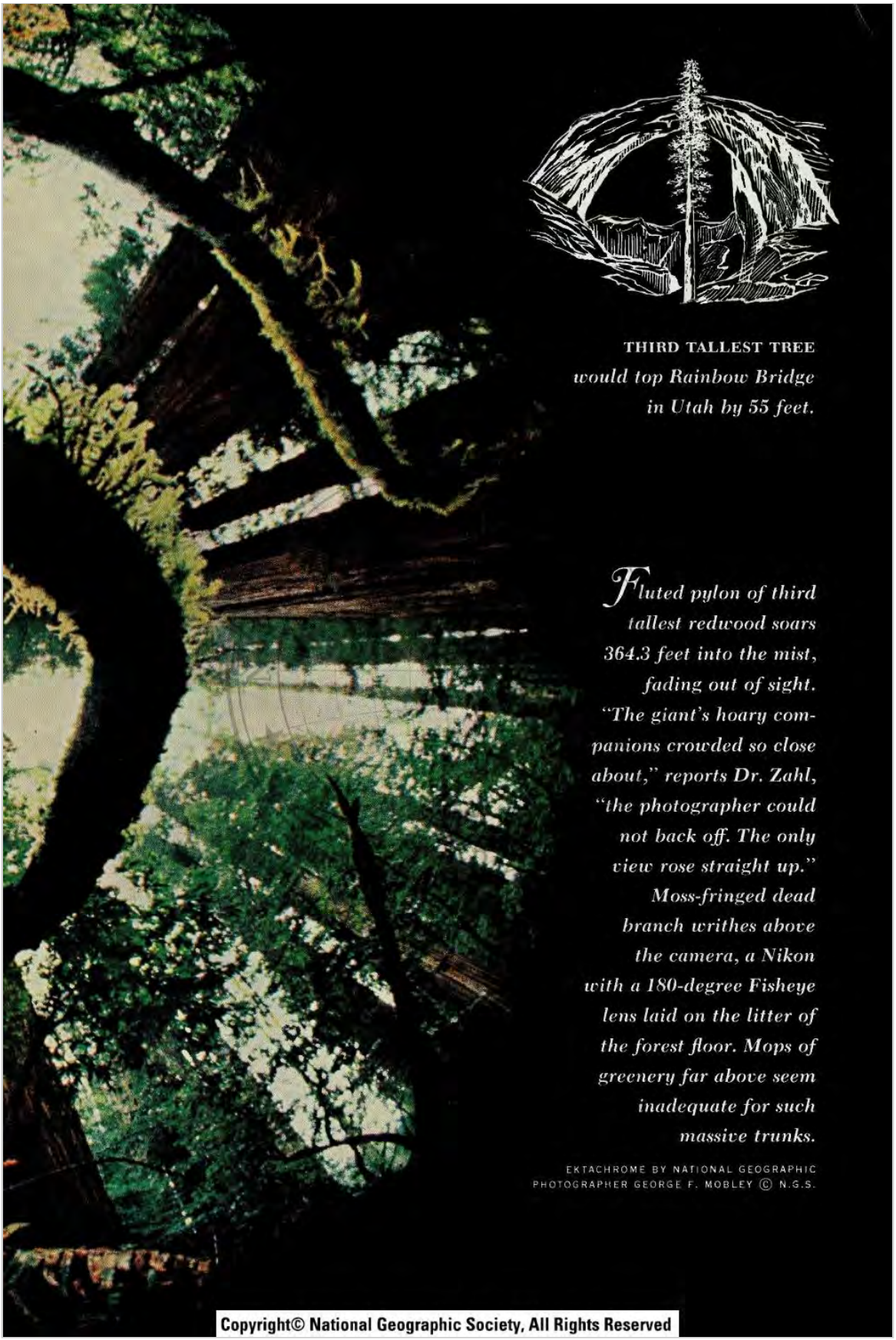

THIRD TALLEST TREE
would top Rainbow Bridge in Utah by 55 feet.

Fluted pylon of third tallest redwood soars 364.3 feet into the mist, fading out of sight. "The giant's hoary companions crowded so close about," reports Dr. Zahl, "the photographer could not back off. The only view rose straight up." Moss-fringed dead branch writhes above the camera, a Nikon with a 180-degree Fisheye lens laid on the litter of the forest floor. Mops of greenery far above seem inadequate for such massive trunks.

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Bright-orange "banana slug" *(Ariolimax columbianus)* glides over the moist, mossy floor of the forest. It protrudes and retracts bulbous eyes set on fleshy "horns." A relative of snails, the slug appears here life-size.

sequoias and their taller cousins, the coast redwoods. To him, they were all more or less the same—and all magnificent. On family outings I played among the great reddish-brown surface roots and stared upward with wonder along trunks that touched the sky.

Certainly those boyhood trips to redwood forests influenced me strongly in later years to become a biologist and naturalist. And though my work took me far from California, those pleasant memories made me want to introduce my own children, Paul and Eda Kristin, to the redwoods.

Big Timber Built California Towns

For years we talked about our family redwood expedition without actually making it. Yet I knew that with each passing year there were fewer trees to visit.

Large numbers of redwoods used to stand nearly within the ocean's spray in such coastal counties as Marin and Mendocino. Pioneers and loggers leveled many of these trees in the mid-to-late 1800's to build San Francisco and northern California towns.

Then motorized equipment enabled loggers to reach more deeply inland. The National Park Service estimates that, of two million virgin acres of coast redwoods that once ranged from Monterey Bay to southern Oregon, 15 percent remains. Of these 300,000 acres, only about 50,000 acres lie within public parks and groves.

Nor is the trend encouraging: At the current rate of logging, all the available virgin growth may be cut half a century from now.

Furthermore, the whining chain saw is not the only hazard to the stately redwoods. During the late 1950's, floods softened the earth and high winds toppled thousands of tall trees. Many foresters have wondered if the unchecked runoff from logged-over hillsides is not at least partly responsible for the floods. Since the greatest trees are found in the river flats, the choice groves are exposed to the greatest danger.

These were the conditions that prompted Conrad Wirth, former Director of the National Park Service, to ask the National Geographic Society for a grant to study coast redwoods. Chester C. Brown of the Park Service would head this research, much of it concerned with ecology—the interrelationships of the trees with their environment. I was curious to look in on his work and also to take some photographs of forest life that

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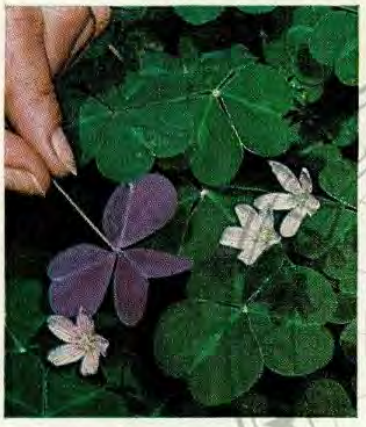
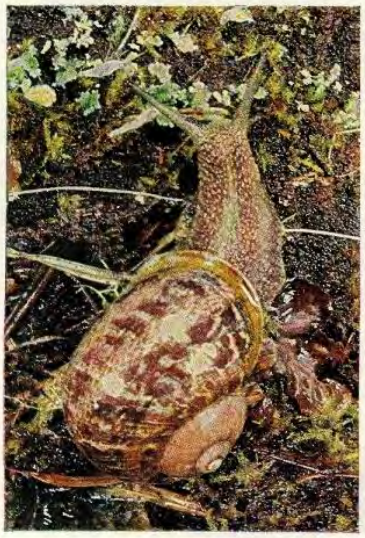
Sugar-scoop *(Tiarella unifoliata)* nods a bloom only about a fifth as wide as seen in this picture.



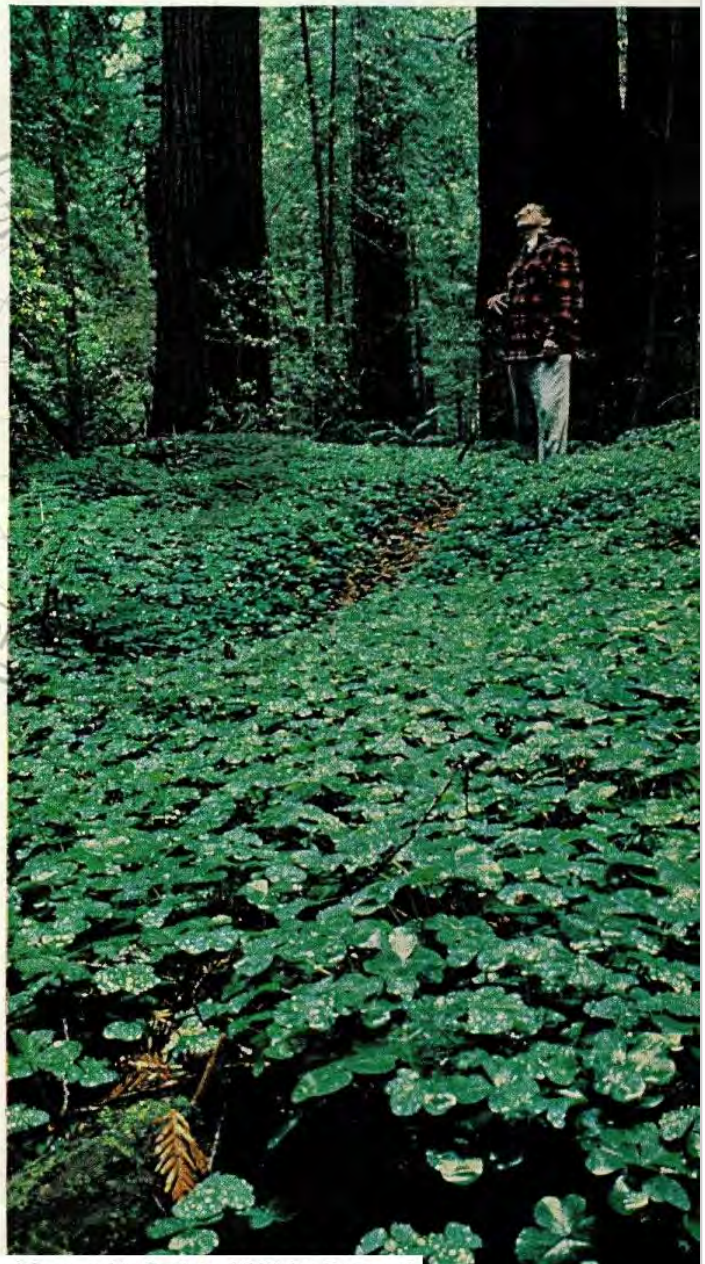
Oxalis wears a violet undercoat.

European garden snail *(Helix aspersa)* drags its shell over a mossy course. This Old World immigrant has spread across North America.



FAR BELOW THE REDWOODS' whispering tops lies a world of small things. Across the darkened forest floor animals and insects creep, crawl, and fly; mosses and lichens cling; and plants hide miniature blooms among massive trunks.

Magnificent Pepperwood Grove still stands intact beside the Redwood Highway. The Pacific Lumber Company, despite high taxes on uncut timber, has refrained from cutting the glorious trees. Save-the-Redwoods League hopes through gifts to buy and preserve Pepperwood for the Nation. Its leafy carpet of oxalis wilts in sunlight but revives in the grove's accustomed shade.



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WORLD'S TALLEST KNOWN TREES

ONLY California and a pocket in southern Oregon produce earth's tallest living things—the coast redwoods, *Sequoia sempervirens*. Trees grow in a belt 500 miles long and hardly more than 30 miles wide. Largest untouched stands flourish in northern California's Humboldt and Del Norte Counties.

In order of height, the top six trees are:

HEIGHT IN FEET	LOCATION
367.8	Redwood Creek grove Humboldt County, Calif.
367.4	Redwood Creek grove
364.3	Redwood Creek grove
356.5	Rockefeller Tree, Humboldt Redwoods State Park, Calif.
352.6	Founders Tree, Humboldt Redwoods State Park, Calif.
352.3	Redwood Creek grove

Forest monarchs of three other species grow in Pacific coast states and in Tasmania and Australia. They include a 324-foot Douglas fir *(Pseudotsuga taxifolia)* at Ryderwood, Washington; a 322-foot *Eucalyptus regnans* in the Styx River Valley of Tasmania; a 305-foot tree of the same species in Victoria, Australia; and two *Sequoia gigantea* in California—the 291-foot McKinley Tree and the 272-foot General Sherman, both in Sequoia National Park.

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might illustrate the broad subject. Such a trip seemed ideal for the whole family.

And so it was that we loaded our car to browse California's 500-mile-long coastal belt, known as the Redwood Empire. All four of us—my wife Eda; daughter Eda Kristin, 15; and son Paul, 12—had a marvelous summer, and none of us had any notion of making serious explorations. Yet, in retrospect, one barely remembered incident pointed in the direction of discovery.

We were following a forest footpath in California's Humboldt Redwoods State Park, 240 miles north of San Francisco. Unconsciously we lowered our voices. On all sides of us stretched a forest floor covered with fallen needles and cones, leaves and twigs, patches of sorrel, fern, moss—an acoustical matting that quieted this grove to the reverent hush of a cathedral (pages 24-5).

Child's Remark Proves Prophetic

We drew near a great redwood surrounded by tourists as silent as we. My eyes traveled upward. Layered by coarse, deeply furrowed red-brown bark, and splotched here and there with yellow lichens, the trunk was bare of limbs for about 200 feet; above, branches formed a verdant headdress now partly obscured by the morning mists.

A neat wooden plaque described Founders Tree: circumference at chest level, 40 feet; diameter, 12.7 feet; height 346.1 feet. Recent measurements show this tree has grown; its present height is 352.6 feet, making it the fifth tallest tree.

Age was unspecified, for only after a redwood tree is cut and its rings are counted can its life span be accurately determined. We know, however, that a tree of this size could have been well along at the time of the Magna Carta, A.D. 1215, a seedling perhaps even before the birth of Jesus.

I explained to the youngsters that Founders had been accepted as the world's tallest tree —until 1957. Then a rival was discovered in nearby Rockefeller Forest, a tree measuring 359.3 feet (page 35). Surveys indicate this "world's tallest" tree has lost height, possibly by storm damage to its crown. It now measures 356.5 feet, giving it fourth rank after the three new discoveries on Redwood Creek.

"But all the redwoods still aren't measured," said one of the children. "Maybe someone else will discover a new world's record."

Prophetic as the remark now seems, it was purely casual that day. And even now not one of us remembers who said it. For the duration

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Stopping in a gigantic bole, the Zahls look up at forking boughs that inspired the Chandelier Tree's name. Fungus and fire began the tunnel; man completed it. The tree stands in Underwood Park, a private development on the Redwood Highway.

Taxation of uncut timber makes it costly to keep private groves. The National Park Service estimates that little of the original two million acres of virgin redwood will remain unlogged half a century from now if cutting continues at the current rate. Public parks and groves preserve 50,000 acres.

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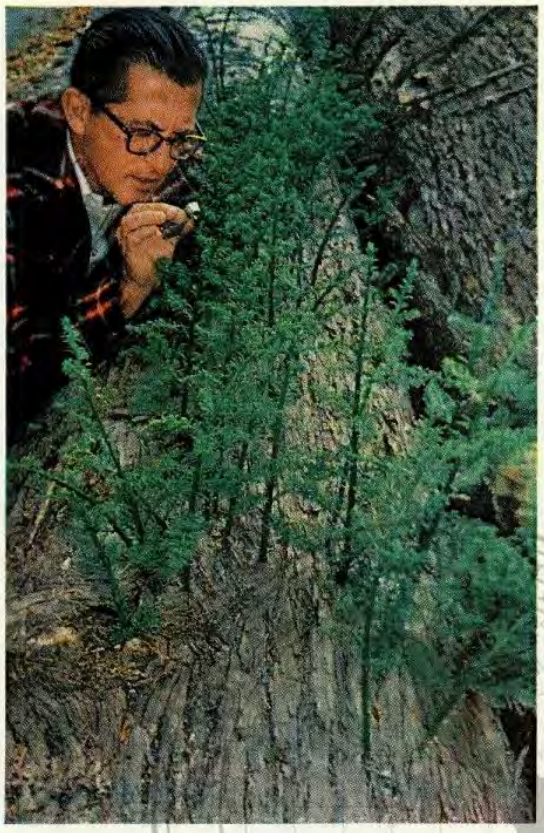


Redwoods never die, it would appear, considering the myriad green plumelike sprouts on this fallen trunk. Such new growth, rising from the long trunk of a downed tree, occasionally produces straight colonnades of redwoods.

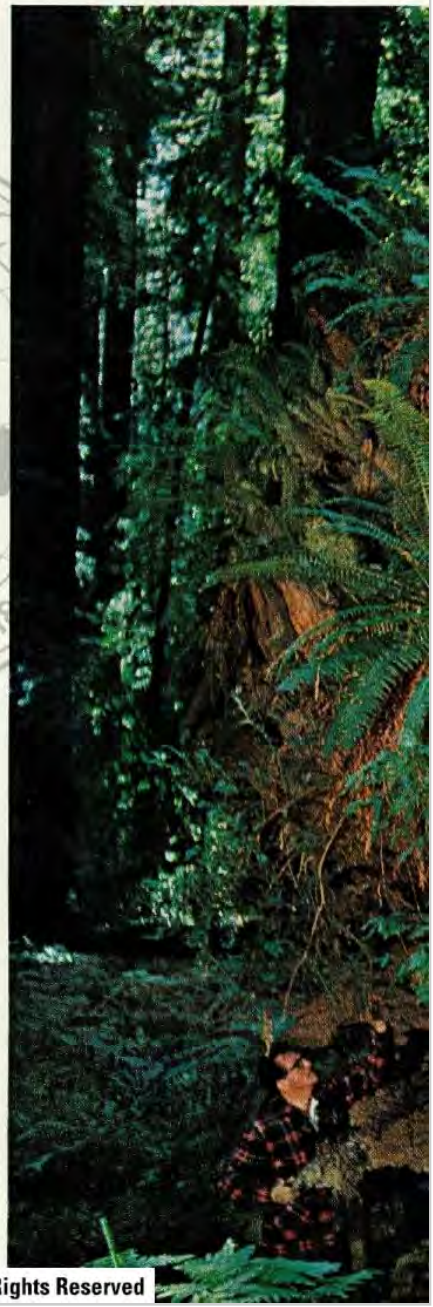
Losing its footing, this behemoth toppled in a high wind. Ferns spring from its bared roots. With huge trunks rising from broad, shallow root systems, redwoods resemble gigantic nails standing on their heads.

Flat leaves grow green on a redwood's low branches; its top produces short needles that often turn rust color.

KODACHROMES © N.G.S.

of the summer we continued to marvel at the height of the redwoods, like every other traveling family. Beneath these mighty trees the imagination falters.

Even the great Galileo thought such heights impossible for trees. Of course, when the Italian astronomer lived four centuries ago, he did not know about the existence of redwoods. Instead, Galileo conjectured that "an oak 200 cubits



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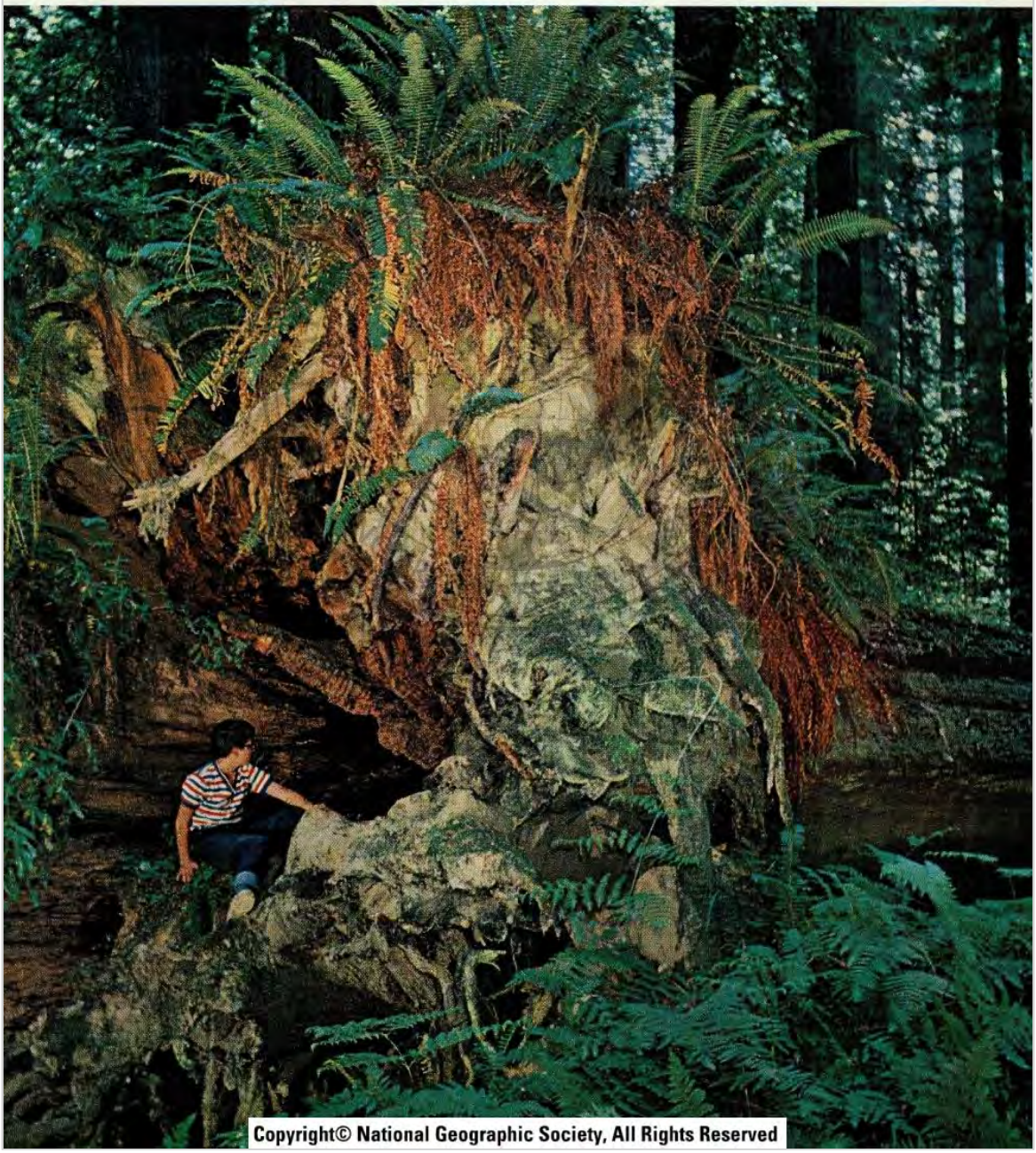
high"— 300 feet—"would not be able to sustain its own branches if they were distributed as in a tree of ordinary size."

His statement was vague, but if Galileo thought a tree's height could be limited by the hydrostatics of sap transport, then the astronomer was wrong. The amazing fact is that the redwood can lift tons of water hundreds of feet with no pumps of any sort.

Modern plant physiologists know that the vertical movement of sap is due mainly to the extraordinary cohesive properties of the water molecule: As the molecule moves, it tugs its neighbors along.

Within the wood's sap tissues, water-filled capillaries extend from the lowest rootlets to the highest foliage. The capillaries end there in minute openings on the surface of leaf or needle, where water constantly evaporates. As one molecule vaporizes, another replaces it from below; in other words, because of the forces of molecular cohesion, the entire water column moves upward by the volume of one molecule. If trillions of molecules evaporate,



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as in fact they do, the water column rises correspondingly.

So what limits the height of a tree? Why don't we find trees 1,000 feet tall? No one knows precisely, but mechanical factors surely are involved. For example, the higher the structure, the more massive its base needs to be. If wood were stone, a tree conceivably could outscale the Washington Monument; if iron, the Eiffel Tower. But wood is neither stone nor iron and must adapt to its own intrinsic properties. Also, there is the matter of wind and air turbulence encountered high above the ground. Throughout every redwood forest one sees trees "topped" by such forces, and indeed often laid flat.

Tenting Has Problems in Big Grove

Our first campsite taught the youngsters an important lesson in redwood structure. Surrounded by *Sequoia sempervirens,* we fastened one of our tent lines to a giant at least eight feet in diameter. As our son Paul drove a stake into the ground for another line, he struck a heavy root. Shifting locations, he pounded again and again, only to encounter more subterranean timber.

I am sure Paul will never forget his tent-stake experience. *Sempervirens* has no deeply sunken tap root; it must depend for stability solely on the holding power of surface roots spreading widely around the base.

Such underpinning proves quite adequate within the shelter of a grove but not in an exposed location. In a clearing not far from our camp we saw an example of a redwood that had crashed to earth not many decades before. Its root disk, now at a right angle to the ground, had become a perfect trellis for vines, ferns, and mosses. A similar monarch lies sprawled in Humboldt Redwoods State Park (pages 18-19).

A fallen trunk eventually disintegrates, but it may leave a legacy of sprouting burls to carry on. Burls are humps of germinative tissue on the redwoods, and they explain the occasional woodland sight of giant trees growing in a line as straight as the trunk of the parent tree that fell to the forest floor.

The casual visitor to the redwood forest tends to gaze upward. It is a paradox in this world of giants that the little things are also fascinating. When we lower our sights for a moment, we discover a microcosm with a splendor of its own.

Oxalis Hides From Sunshine

One afternoon in Pepperwood Grove I photographed little patches of sorrel *(Oxalis oregana),* whose emerald leaves suggest clover (page 15). From high overhead, a beam of light filtered through the forest canopy; where it struck, the oxalis leaves drooped. Then, as the sunbeam passed, the leaves returned to normal. The nature and purpose of this reaction is not known, although the conservation of moisture may well be a factor.

The soil from which the sorrel grew was a blend of twigs, needles, and general forest litter. Here and there lay small cones, each no larger than an olive—last year's redwood seed bearers. The previous autumn, millions of them, maturing both in the upper and lower branches of the trees, had released their diminutive tissue-edged seeds to scatter far and wide on the winds as they drifted down to earth. Each tiny seed has the potential to produce a colossus (page 6).

I was on my knees photographing an oxalis cluster when I spotted something easing straight toward me—a so-called banana slug, bright-orange and as long but not quite as thick as its namesake (page 14). Common in the humid redwood forest, this creature is too interesting and colorful to be repulsive. It feeds on plant tissue, leaving a path of glistening slime as it inches along.

I shifted my position to avoid the slug, then picked up a twig bristling with redwood needles, or, in more correct botanic usage, leaves. The needles were about three-quarters of an inch long and arranged with linear precision along the stem; each contained millions of chlorophyll-bearing cells in which the chemi-

Spared From Saw and Ax, Brown-ribbed Trunks Lift Their Vertical Poetry

Majestic aisles lead through Rockefeller Forest, part of Humboldt Redwoods State Park. This grove, named for John D. Rockefeller, Jr., whose generosity saved the monarchs, contains Rockefeller Tree, now the fourth tallest. Of California's titans, poet Edwin Markham said: "These great trees belong to the silences and millenniums. They seem, indeed, to be forms of immortality, standing there among the transitory shapes of time."

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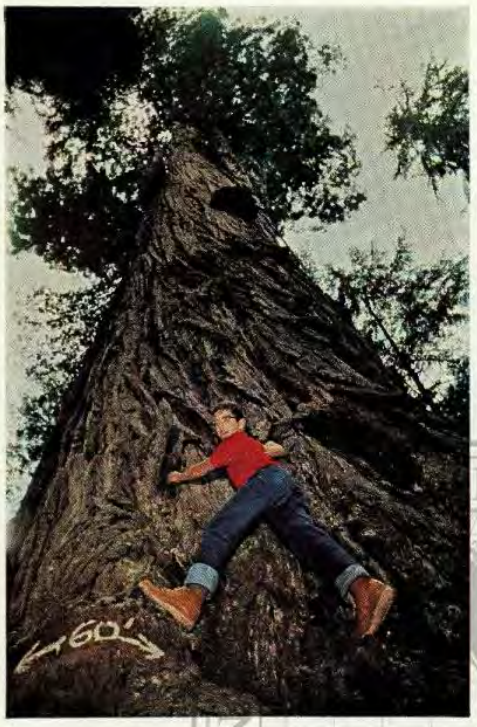
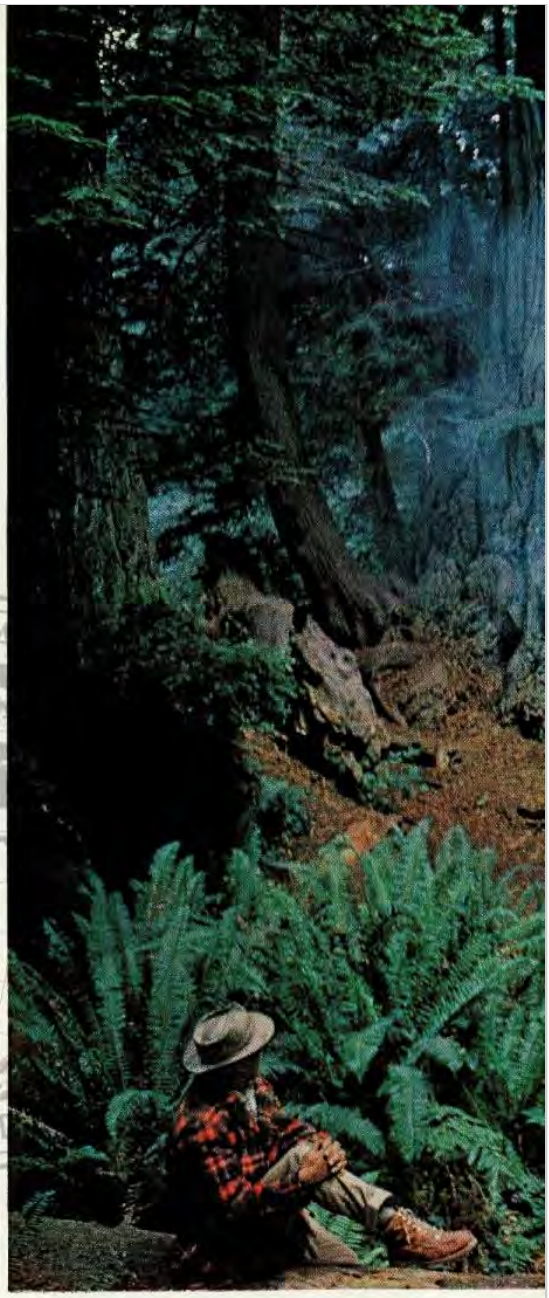


Like Jack the Giant Killer, 12-year-old Paul Zahl tackles the 253-foot Arco Giant near Orick. The trunk measures 60 feet in circumference.



Spice of evergreens and tang of frying bacon pervade a family room walled by nature in Prairie Creek Redwoods State Park. Floor of intertwining roots made it difficult for the Zahls to drive pegs for their tent. Sword ferns provide a natural decor of greenery.

After breakfast the travelers devote their day to hiking, fishing, exploring, or simply relaxing, "lost in worship of those lordly trees," as Stanton A. Coblentz wrote in *Songs of the Redwoods*.

cal transformations by photosynthesis take place to produce the staggering tonnage that makes up each redwood titan. Oddly, those growing in the redwood's heights are short and scalelike, while those on the lower branches are distinctly bladelike (page 18).

Handsome ferns of many species, together with luxuriant mosses, lichens, and liverworts, flourished everywhere here on the damp forest floor. Basic moisture was provided by rain. But there was another important source of water—the fog that so frequently sweeps in from the nearby ocean. Fly over Humboldt County almost any morning and the valleys are half-hidden by a low-hanging mist (pages 50-51). The extent and pattern of the fog's inland penetration—some 30 miles—correspond almost precisely to the areas occupied by coast redwoods.

This fact leads some authorities to suspect a correlation between the trees and fog. But other scholars point out that redwoods have not always been limited to coastal zones. In times past, there were as many as ten distinct

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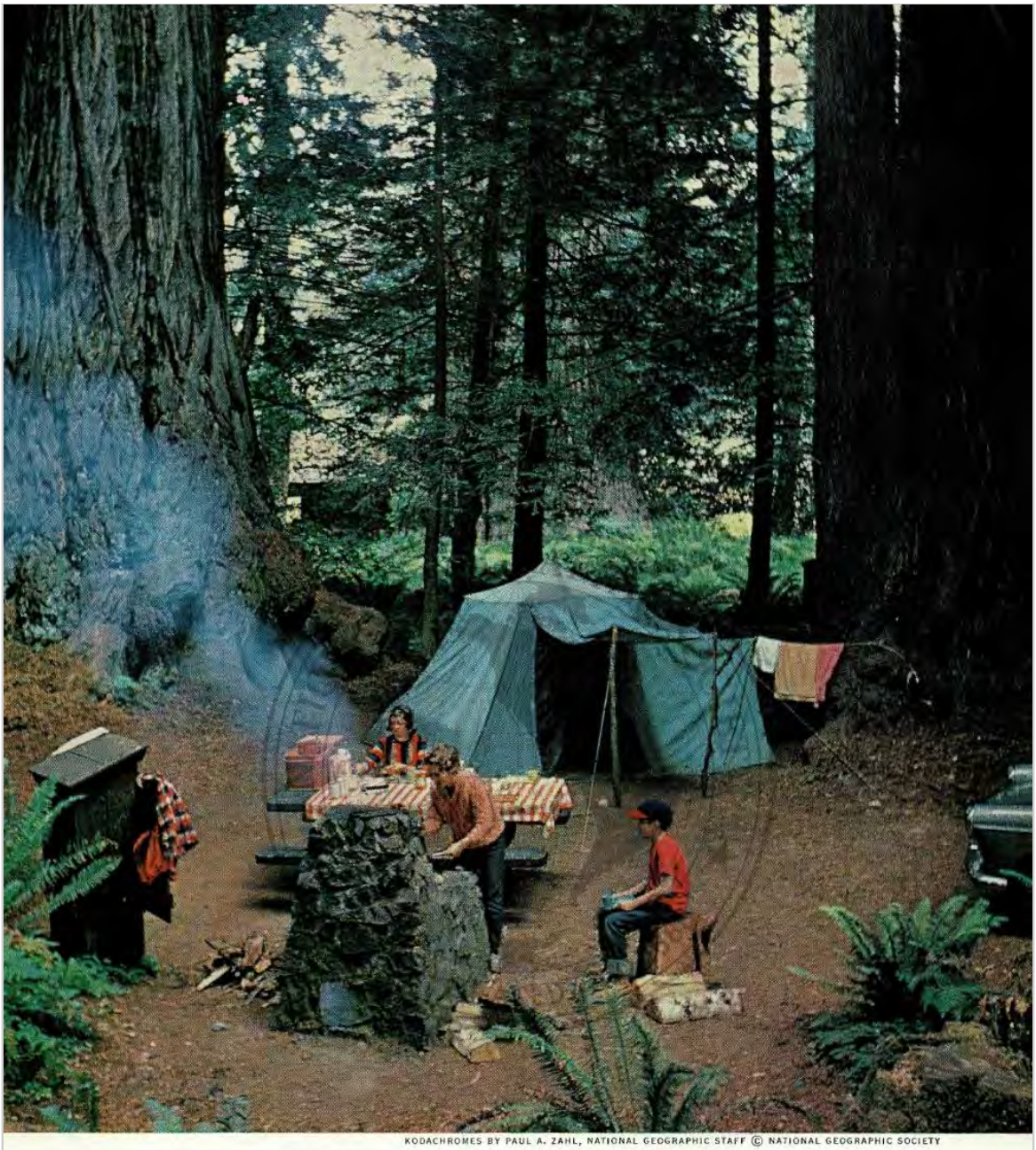

KODACHROMES BY PAUL A. ZAHL, NATIONAL GEOGRAPHIC STAFF © NATIONAL GEOGRAPHIC SOCIETY

sequoia species, some in Alaska and Labrador, others in Europe and Asia. Only the two California species survive: the massive *Sequoia gigantea** of the High Sierras (some botanists prefer to call it *Sequoiadendron gigantea)* and the taller *sempervirens* (evergreen) of the northern coastal mountains. Both species have been in California for 40 million years, a testimonial to their hardihood.

*See "Giant Sequoias Draw Millions to California Parks," by John Michael Kauffmann, NATIONAL GEOGRAPHIC, August, 1959.

Sylvan sanctuary in Humboldt Redwoods State Park recalls William Cullen Bryant's words: "The groves were God's first temples." Afternoon sun, like light streaming through cathedral windows, dapples an oxalis-carpeted forest. With their mother, the Zahl children marvel at these "majestic brothers," as Walt Whitman called the trees.

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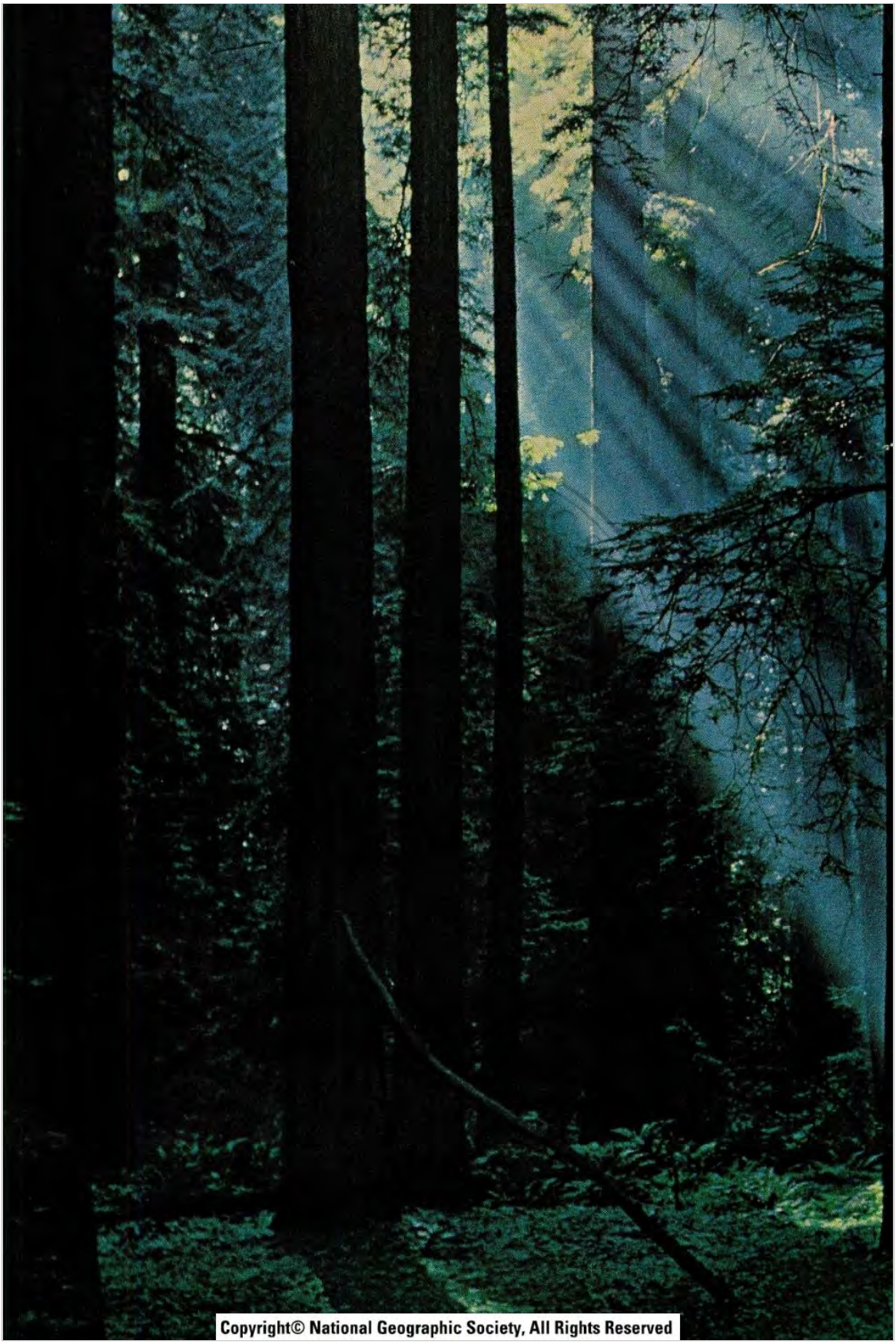

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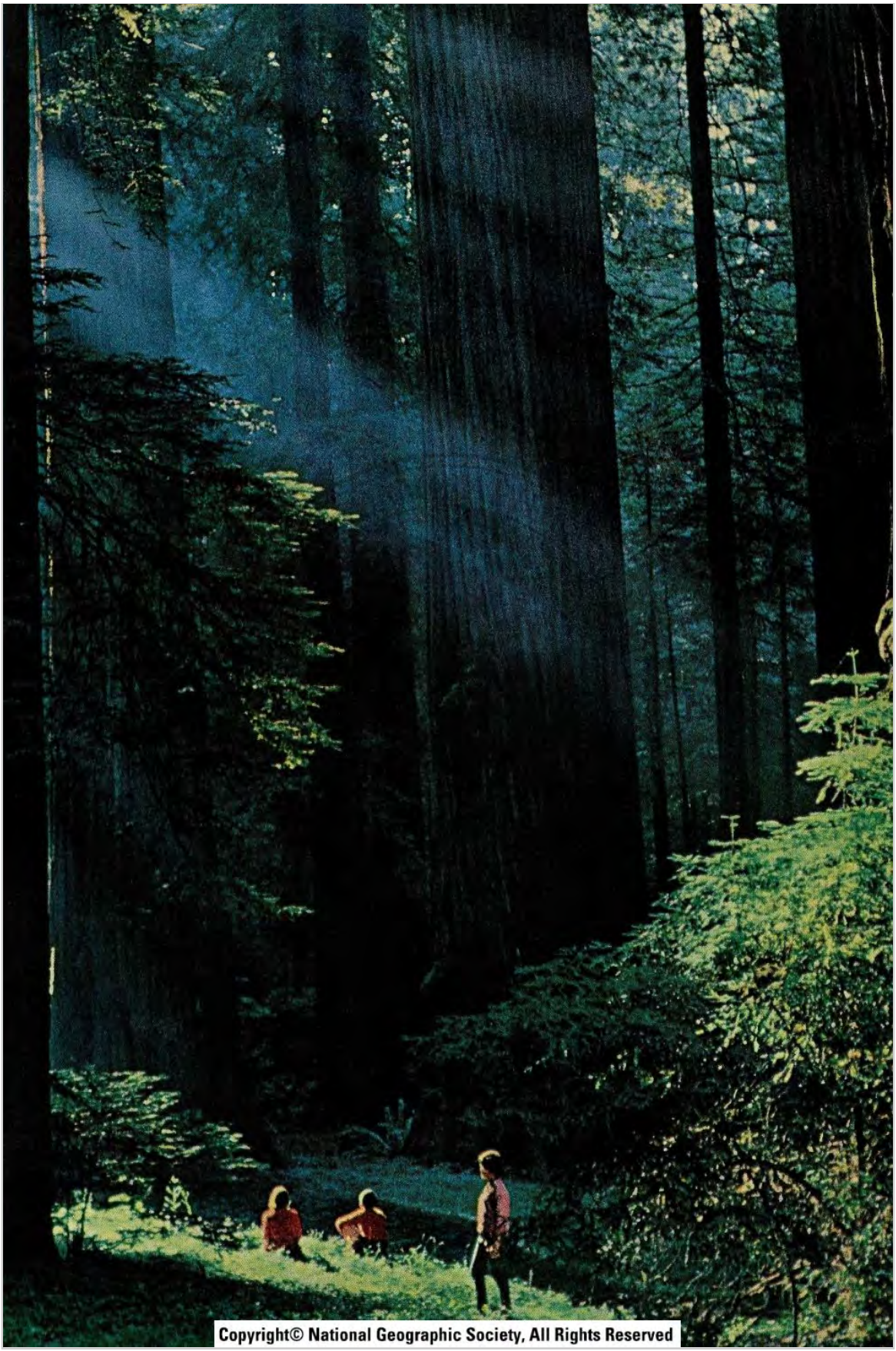

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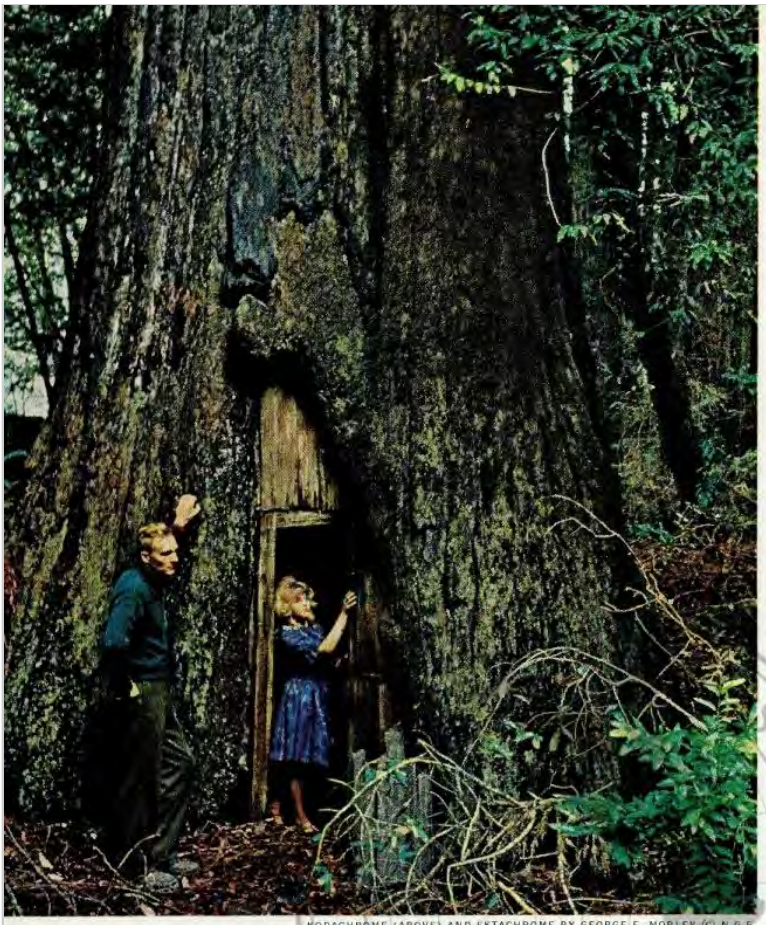

KODACHROME (ABOVE) AND EKTACHROME BY GEORGE F. MOBLEY (C) N.G.S.

Home in a tree near Redwood Creek leaves no clue to the identity of its long-departed occupant. Chicken-wire ceiling catches falling debris.

Roosevelt elk, wet from rain, rests in a reseeded area. Foresters say that the elks' taste for seedlings seriously hampers redwood regrowth.

The "dawn redwood," or *Metasequoia,* a related and perhaps ancestral form, survives in China.

Irises, trilliums, ginger, and a host of other wildflowers grow widely, although not profusely, in the deep redwood forest. But along the fringes and in clearings, where the light is strong, floral decorations are often lavish, especially in spring and early summer. In July, throughout Humboldt County, I found stands of rhododendron, azalea, and iris, brilliant with blooms; also columbine, bleeding heart, salal, huckleberry, and wild rose.

Learning Humboldt Lore

As the summer passed, I photographed this variegated life of the redwood forests all along California's Redwood Highway, U. S. 101. About 200 miles north of San Francisco, the redwood scenery grows truly spectacular: Richardson Grove State Park, with its superb trees lining both sides of the highway like closely placed monoliths; Humboldt Redwoods State Park, with its famed Avenue of the Giants and its more than 50 commemorative groves; Pepperwood's vaulting forests; Prairie Creek Redwoods State Park, with its dramatic campsites, herds of Roosevelt elk, and glass-clear streams; and finally, near the Oregon line, the ruggedly imposing Del Norte Coast and Jedediah Smith Redwoods State Parks.

For two weeks we settled in the little logging town of Orick in colorful Humboldt County, only a mile and a half inland from the crashing Pacific. There we stayed in a motel owned by Lowell and Jean Hagood and ab-

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sorbed some of the local lore.

Fray Juan Crespi, chronicler of the Gaspar de Portola expedition to upper California, first recorded seeing redwoods in 1769. He wrote of "very high trees of a red color," but his giants were hundreds of miles from Humboldt County.

The Spanish, in fact, hardly penetrated the Humboldt area, and so it is that the names of geographic features date mostly from the gold rush in the mid-19th century.

To Humboldt County came Capt. Ulysses S. Grant to pacify Indian tribes, and here Bret Harte wrote his first newspaper stories and got his first impressions of western local color.

Yet the dramatic development of the area waited for loggers. To this day, lumber remains the basic industry of Humboldt County, and the outdoor traditions of the logger give towns like Orick their zest. When Lowell Hagood talks about the magnificent timber in the roadless valleys here, the visitor does well to remember.

Road Leads Into Wilds

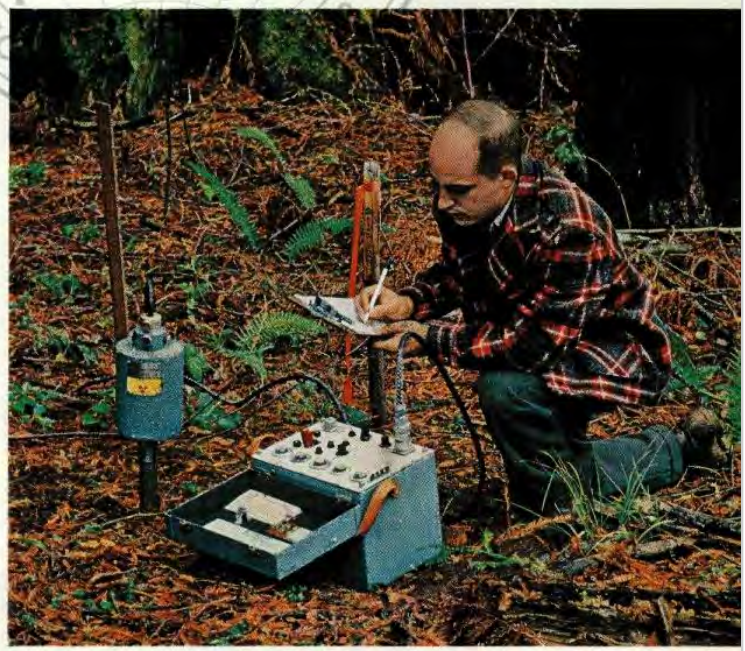
While Eda and the youngsters fished for trout in the creek, I visited some of the forest hinterlands. North of Orick about six miles I found an old logger's road that passed through state parkland, then twisted up a hillside to emerge in a logged-over wilderness. Along this road I could observe every phase in the rise and fall of *Sequoia sempervirens,* every aspect of its growth, harvest, and regrowth.

Within the parkland I often left the car to wander through the pathless forest. Shafts of misty light pierced the superstructure, here and

KODACHROMES BY PAUL A. ZAHL, NATIONAL GEOGRAPHIC STAFF © N.G.S.

Each bloom a bouquet, pink rhododendrons fringe a tall-tree grove.

Study of water runoff from a cut-over redwood forest absorbs Dr. Peter E. Black of Humboldt State College, Arcata. His neutron meter accurately measures moisture in the soil. Dr. Black was one of a team of experts conducting the National Park Service–National Geographic Society survey of the conditions coast redwoods need for survival.



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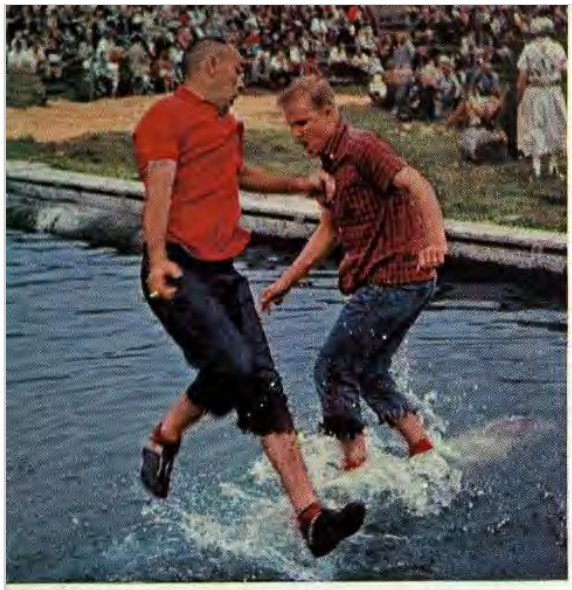
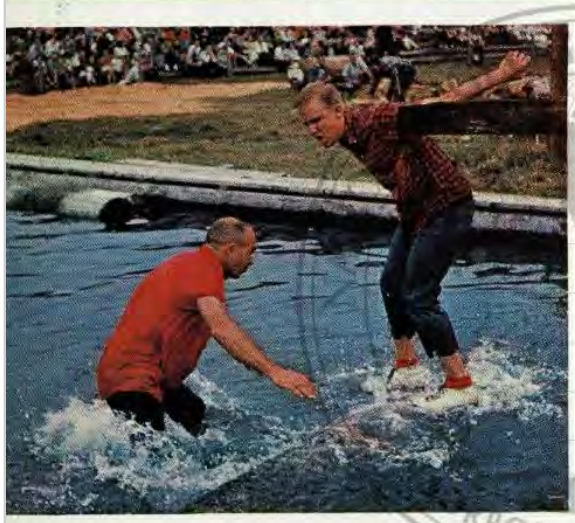
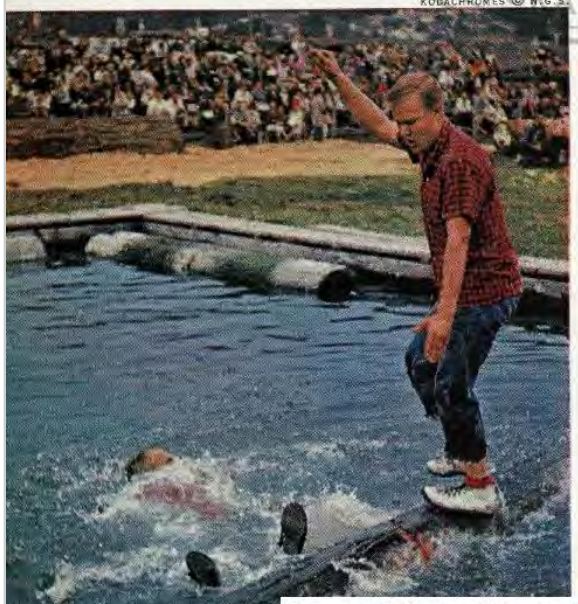


Round and round, faster and faster, goes the log in the water sport known as birling. The contest enlivens the Loggers' and Lumbermen's Jubilee held every July at Arcata, California. At its climax Jack Culver takes a ducking while John Wickheim holds the log. Lumberjacks with spiked poles still ride logs in millponds, herding them to the saw.





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Green wall of redwoods enhances Johnson's Beach on the Russian River in Guerneville, California. Cut nearly a century ago, the forest grew anew, mainly from sprouting stumps. Many trees now tower well above 100 feet. The grove shades private resorts.

there splashing brightly on the otherwise somber forest floor.

I needed no logger's eye to tell me that these trees—many approaching heights of 300 feet—had enormous market value. A single giant might yield 40,000 board feet of top-grade lumber—enough to build five modest homes. The wood of *sempervirens* is highly regarded for reasons other than quantity. It has strength, straight grain, a satiny luster when polished, and, most important, is extraordinarily resistant to rot and insects—qualities possessed in like measure by few other woods, not even that of the Sierra Big Trees.

The harvesting of *sempervirens* remains an important source of prosperity to California and the Nation. Logging in itself does not alarm conservationists. But early in this century they realized that if logging continued at random and unchecked, all the giants would soon fall. By 1918 certain individuals had banded together, not in opposition to the lumber industry, but to preserve for the people of the Nation some of California's most impressive redwood groves. Relying on private donors and organizations for financial help, this group emerged in 1919 as the Save-the-Redwoods League. Since then, its members have raised $10,000,000—more than half the funds needed to establish northern California's four main redwood state parks.

People around the world owe a debt of gratitude to the Save-the-Redwoods League for its efforts to safeguard America's giant trees. To preserve private groves still standing along the Redwood Highway, contributions (tax deductible) are desperately needed. Send your gifts to:

Save-the-Redwoods League
114 Sansome Street
San Francisco 4, California

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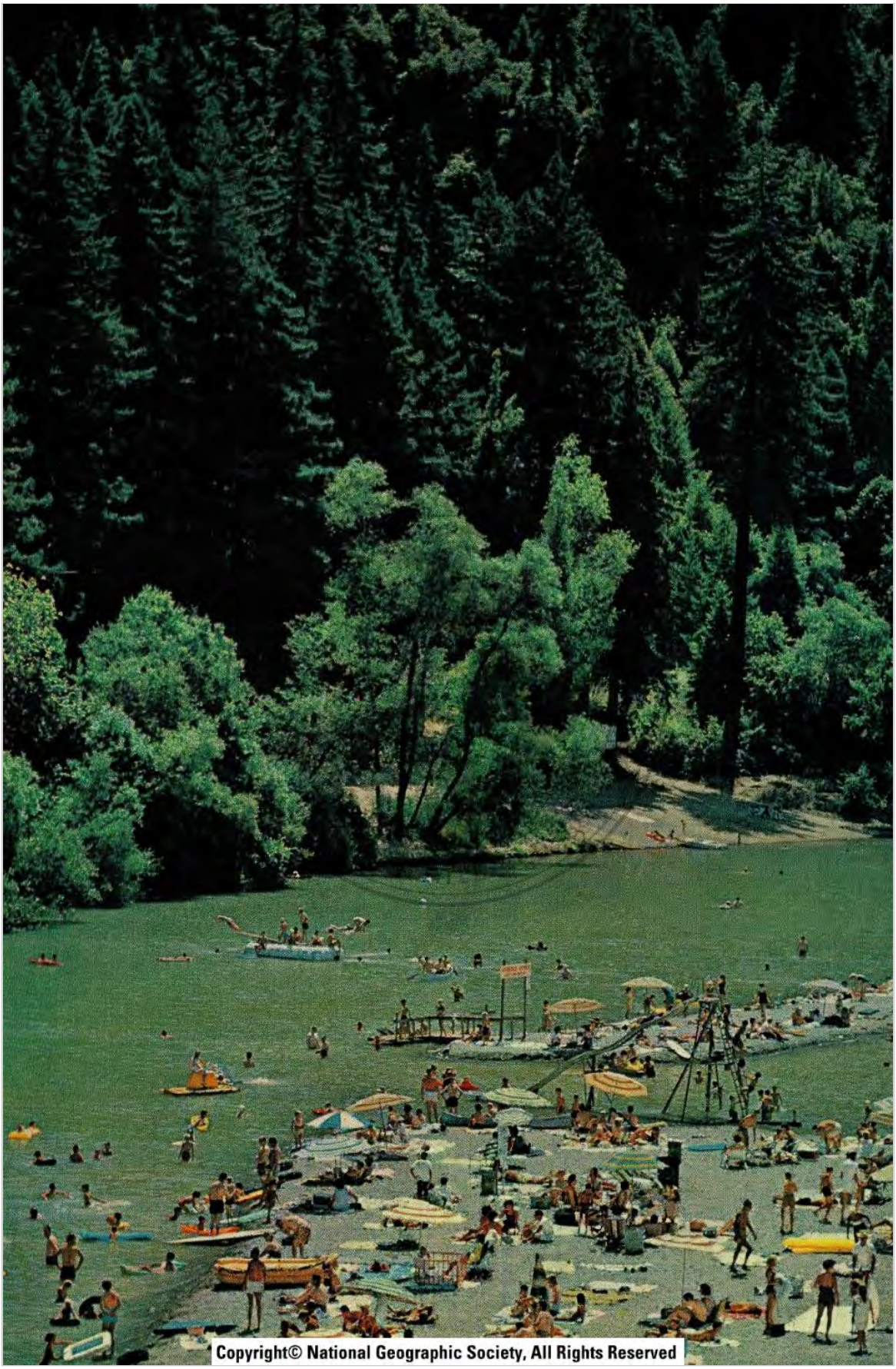
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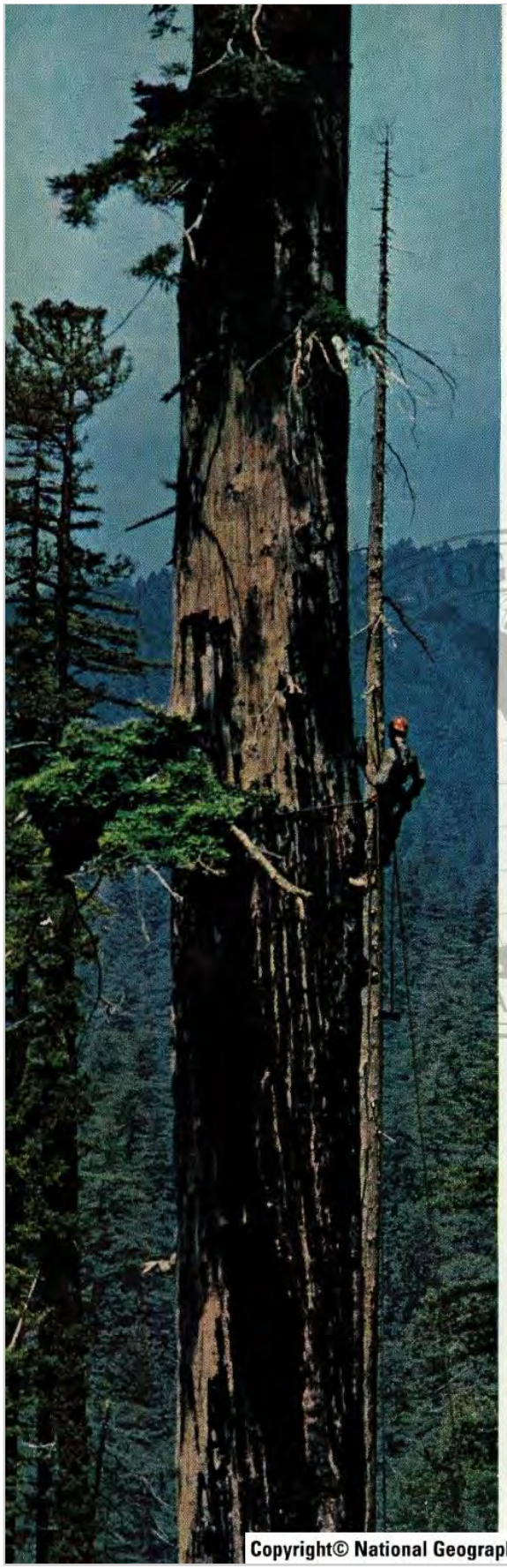
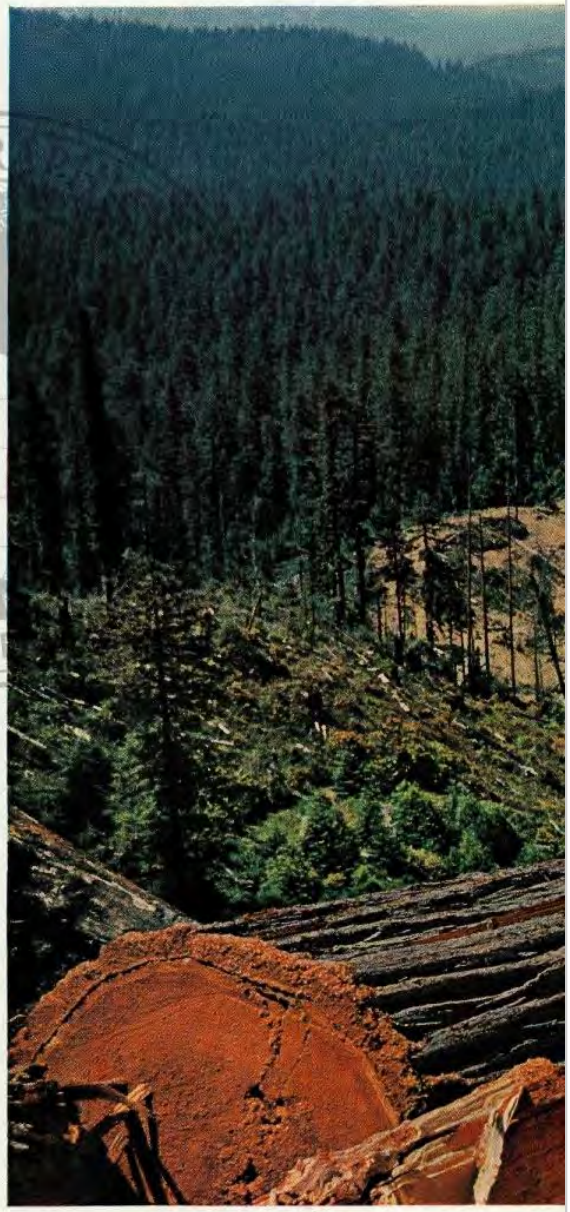


Above 90 feet of nothing, a "high climber" hangs a pulley on a redwood that leans downhill. Cable to a tractor will guide the tree's fall uphill onto a bed of soft dirt, lest it crash to a lower slope and splinter.

Felled giant comes apart under the chain saw. Seed trees on near slopes were spared by Arcata Redwood Company loggers in the 1950's. Scores blew down and had to be removed, damaging young trees. When the company logged the far hillside in 1960, it cleared all but a few trees. Now redwood stumps sprout among Douglas fir seedlings.



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Farther up the ridge, in privately owned forest, I passed a scene that was, on first sight, depressing: miles of stumps . . . areas deeply rutted by tractors . . . the dross of logging.

Yet a closer look showed a cycle of renewed growth already under way. Most of the stumps were luxuriantly bushy, revealing a most fortunate characteristic of *sempervirens*. I climbed up on one stump almost big enough for a dance floor. Around its edge were dozens of healthy sprouts three to six feet high. These shoots grow at a phenomenal rate, taking advantage of the still viable parent root system, which affords them far more nutrient than a seedling could get.

A totally logged-over area is a thriving forest again in 40 or 50 years. In fact, I saw in Eureka's city park second-growth redwoods that were three feet in diameter. Yet they had grown to that enormous size within the memory of living men.

Many of the larger lumber companies here call their holdings "tree farms." They practice sustained-yield logging: One area produces a crop while another fosters regrowth. But logging men are in agreement that it takes at

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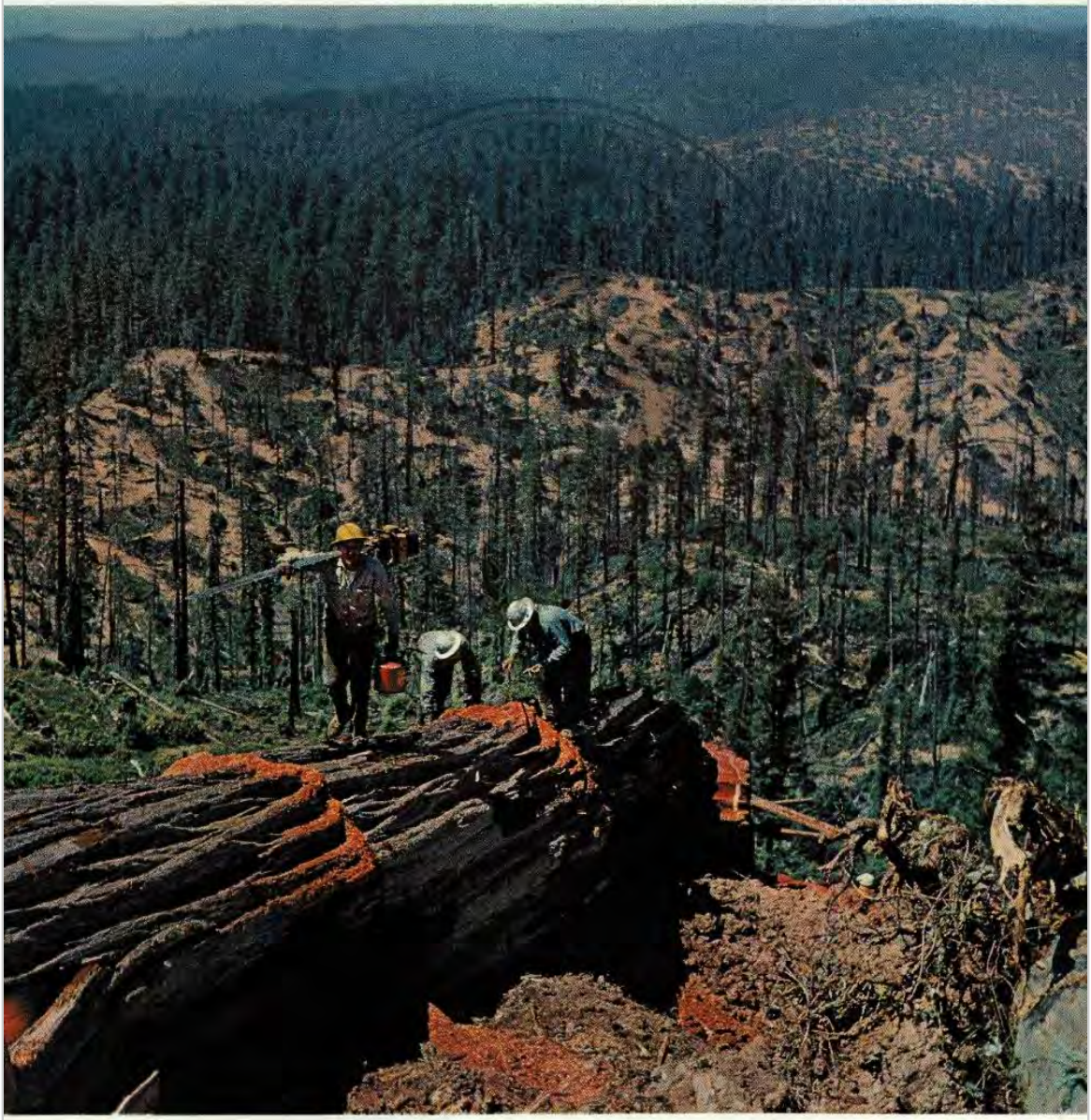

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least 500 years to produce a giant. "We're in the lumber business, of course," said forester Gene Hofsted of Arcata, "but that doesn't mean we are blind to our responsibilities in regard to conservation. There are practical reasons—we want to be in business 50 years from now."

He explained the two chief logging procedures: selective logging, which leaves about 50 percent of the trees as a seeding source; and clean logging, which takes everything.

Hofsted believes in the latter, especially as it applies to the region around Orick, where high winds often sweep the forests. Trees left standing for seeding purposes in a partially logged area, he explains, are frequently blown down. During one two-hour windstorm in 1959, for example, Arcata lost 10 million board feet of timber. Fallen trees create a summer fire hazard and require removal.

"Better to take everything the first time, smooth the soil, and reseed. Then we needn't send in 'cats' to tear up the land again," says Hofsted.

Lumbermen are not only concerned that new forests shall rise where old ones have been cut. Private industry has in many instances served the public interest by saving particularly magnificent groves in the Redwood Empire. Eventually, they hope, these stands can be bought and preserved.

Georgia-Pacific, for example, has left virgin trees in key spots along the Van Duzen River; Pacific Lumber Company has guarded the unspoiled beauty of Pepperwood Grove, adjoining the Avenue of the Giants; and Simpson Timber Company still keeps its loggers out of scenic tracts alongside Jedediah Smith Redwoods State Park.

Bed Cushions the Fall of a Titan

One day I joined a team of timbermen to witness the fall of a redwood giant. A normal tree on level ground can be felled easily; not so the tree that leans downhill or toward a gully. Falling down a slope or across a ravine can splinter the timber—a big loss to the mill.

The tree I was about to see cut had a downhill lean. Like surgeons in consultation, the logging superintendent and his crew studied its lean, the position of its neighbors, the slope, problems of cutting and removal—even wind velocity.

Now, like an insect on a stalk, a "high climber" wearing iron spurs scales the giant. About 100 feet above the ground, he attaches a steel cable (page 30). Below him other crewmen clear small trees and shrubs from a corridor: the line of fall. Earth-moving equipment roars in and quickly converts the corridor into a soft, loamy bed to cushion the impact.

Sawyers with double-bitted axes and 7½-foot chain saws cut a wedge out of the trunk only a few feet above the ground. The wedge must be precise, for on its size and shape will depend the exact di-

Mighty tusks of a LeTourneau log stacker reach for steaming, rain-wet timbers at an Arcata Redwood Company mill. The machine

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can lift 35 tons of timber, run it up its 20-foot boom, and stack it on a pile. Men with chisel-tipped iron bars strip fibrous bark from logs. Once discarded as saw-clogging waste, the bark now goes into building insulation, mattress stuffing, roofing felt, and oil filters.

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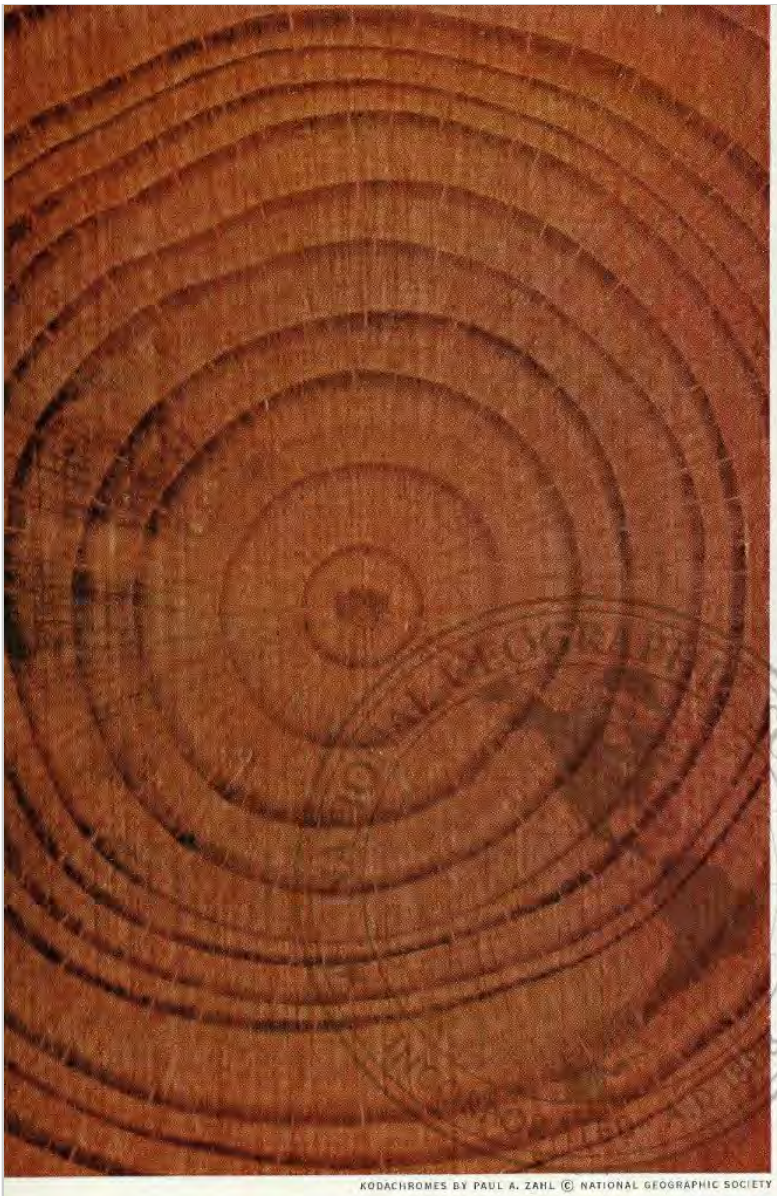

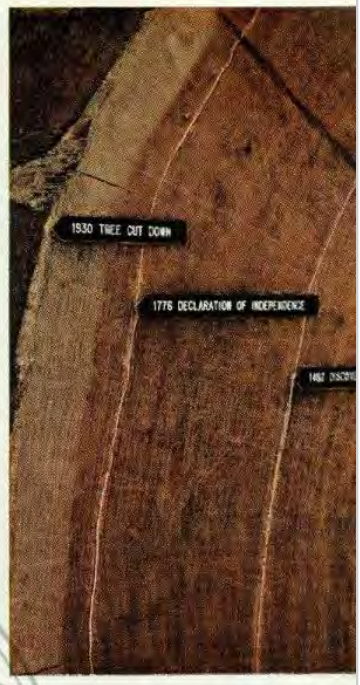

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Growth rings

ADDING one ring each 12 months, the redwood sapling cross section at left (enlarged four times) records 13 years of varying growth.

Some species have laid down accurate weather calendars for centuries past. Building dates of southwestern Indian ruins have been pinpointed by growth rings in their pine beams, a technique

rection of fall; if the tree deviates only a fraction of a degree, thousands of board feet of quality redwood may in one instant be reduced to splinters.

At last the foreman signals, and a heavy tractor waiting well out of range tugs at the cable. Crack! The tree angles ever so slowly at first, then gaining momentum, sweeps down, and with a low, thunderous thud lands on the prepared bed. A cloud of dust and debris is the patriarch's only requiem.

Once, as I scouted the forest, I heard the whir of Chet Brown's chartered Cessna on a reconnaissance flight. I was eager to talk with Chet and the National Park Service planners and other specialists making the Society-supported study of redwood ecology. In fact, I hoped to make some field trips with them.

The fall term of school was starting. So I interrupted my redwood projects long enough to take my family home and return alone. Then I visited Chet to ask him what he knew about the trees along Redwood Creek.

"Yes, we've flown over that area, and walked it, too," said Chet. He added that he was familiar with the Georgia-Pacific road used by Casey Casebier and me.

Chet unfolded a map to point out details of the terrain. The Cessna had flown too high for the men aboard to get more than an impression, but the forest there on the east slope looked spectacular, so it was marked for exploration on foot. One member of the party thought the trees on the creek flats

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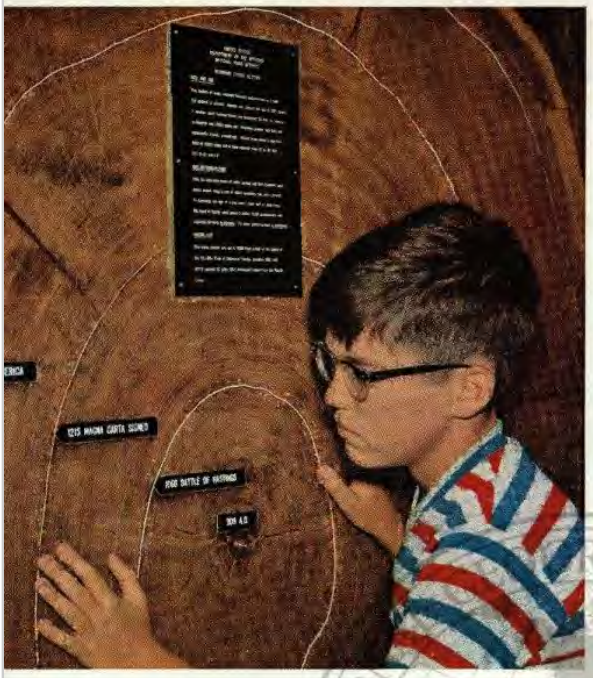

B. H. MEANS BREAST HEIGHT (APPROXIMATELY 4 1/2 FEET).

tell a tree's life history

developed with National Geographic Society backing.

Young Paul Zahl in Muir Woods, near San Francisco, counts the rings of a giant that was 583 years old when Columbus reached America. Determining the ages of uncut monarchs, such as the Rockefeller Tree at right, poses a problem; rain, drought, shade, and crowding vary yearly growth rates, and corings from trunks prove difficult to obtain and interpret. Stumps 12 feet across have shown ages ranging from 550 to more than 2,200 years, the oldest coast redwood on record. Recent measurements show the Rockefeller Tree has lost 2.8 feet off its top.

seemed exceptionally tall, even for redwoods.

I recalled what Lowell Hagood had told me in Orick about those trees. He, too, had described them as "great timber." Lowell had never seen the trees himself, but he knew logging lore. He had pointed to dense ridges rising like walls east of town: "The valley behind that ridge is real virgin country. Too bad there's no road."

But now, as a result of my trip with Casey, I knew there *was* a road. Curiosity gnawed as I prepared for my first lone visit to the valley of Redwood Creek.

The sun was shining brightly that October day as I drove eastward off U. S. Highway 101 (map, page 16). About ten miles inland, the road descended into the valley; Redwood Creek flowed northward, bright and blue. I parked by the stream's gravelly bed and took my bearings. Rising several hundred feet to the left was a ridge recently logged. To the right, eastward beyond the stream as far as eye could see, lay a forest of virgin redwood, towering, richly dense (foldout, pages 2-4).

Rain had been sparse, and the creek at this point was only knee deep and 100 feet across. The tracks of elk, deer, and even bear were scattered along the water's edge, and fighting to get upstream against the rapids were several big steelhead trout. To complete the picture of authentic wilderness, a flock of merganser ducks sped low over the water, veering sharply as they saw me.

I hiked half a mile or so downstream, then

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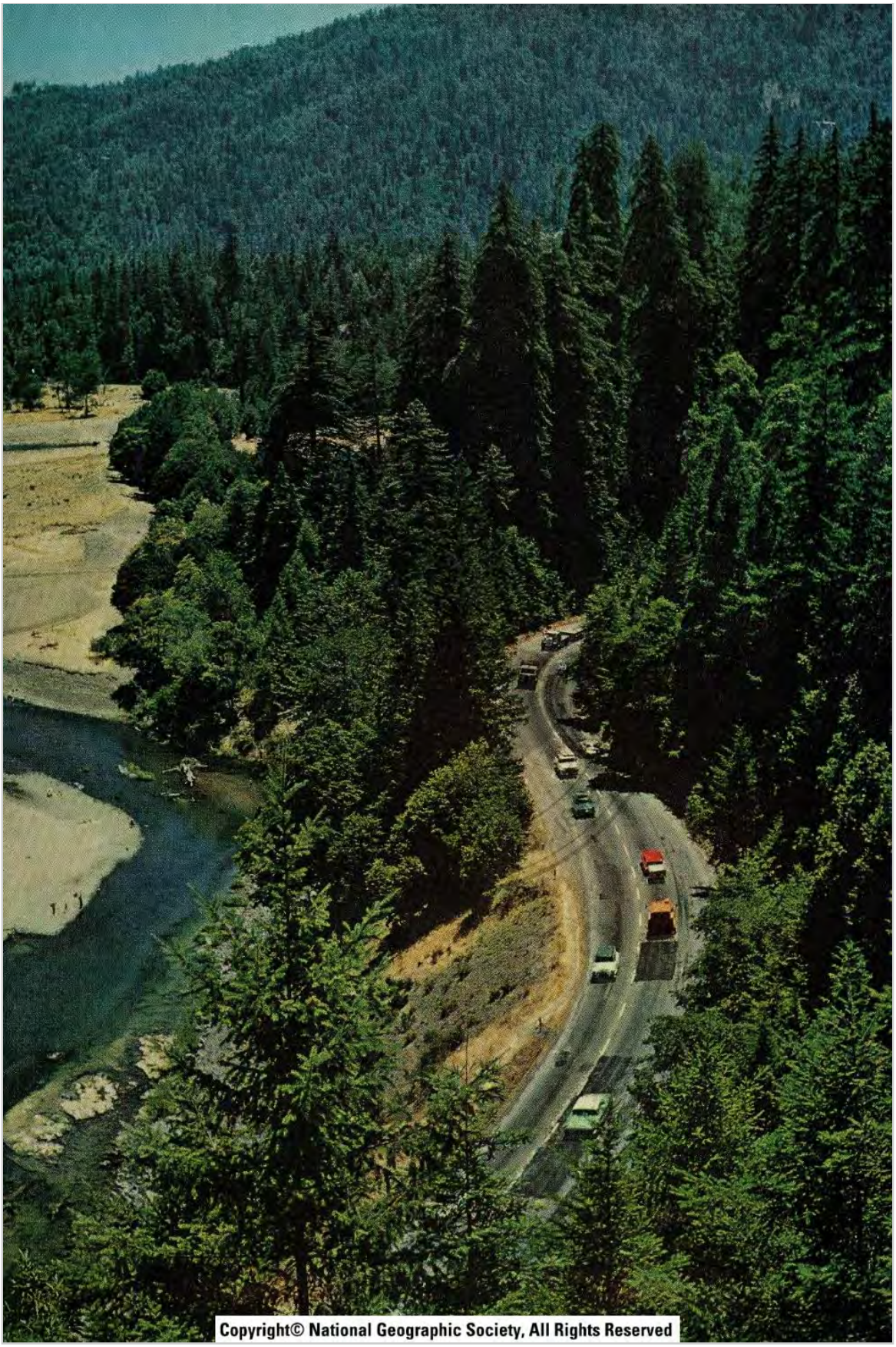
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back, wading when necessary. At one point where the stream seemed shallowest, I forded it to enter the woods. I was immediately enveloped by deep shade. Massive trunks crowded round me as I moved over a centuries-old accumulation of forest litter. There was no sound, except for my own almost inaudible footfalls.

Columns Loom on Every Side

I stopped in a small clearing and, pivoting slowly, counted the number of great trees visible from that single spot: 30 with trunks at least ten feet in diameter, some perhaps 14, even 16 feet. From my earlier vantage point across the creek, I had seen that they were sky-piercingly tall—just how tall I had no idea. But I determined to find out.

On my next visit to this spot I brought an Abney level, a small sighting instrument for determining the height of anything, from a tree to a skyscraper. To be sure, figures indicated by this simple device are only approximate, but they are useful in preliminary measurement. For absolute precision, a surveyor's transit, chain, and book of tables are, of course, essential.

On the 12th of October, anyone hovering in a helicopter over Redwood Creek Valley about seven miles southeast of Orick would have seen a lone man there on the gravel bars, pounding in stakes, attaching twine, sighting through an instrument, wading the stream, disappearing into the woods, reappearing, writing in a notebook—then repeating the whole routine at other points along the stream. I had already spotted at least half a dozen trees that should be among the tallest in California's Redwood Empire.

But in a redwood forest, one's senses play strange tricks. Scale and comparisons are missing, and it is hazardous to guess tree height without the support of an instrument. My Abney figures indicated that some of the spires rising there on the flat before me, as well as some farther downstream, were about 320 feet high; several were of the order of 335 feet; and one even seemed to reach 350 feet—still nearly ten feet short of the great tree in Rockefeller Forest, then thought to be a record 359.3 feet high.

Even so, this was a forest I devoutly hoped would never hear the ring of an ax.

I returned to the spot again and again. Then one afternoon I set out to climb the partially logged ridge west of the stream, hoping to make some pictures to document the little-known grove. The going was not easy, what with the steep incline, the stumps, brambles, and logging debris. Every so often I turned to photograph the great grove to the east where the trees stood so tall. Finally, when I had climbed about 300 feet above the valley floor, I felt tired. Fortunately, I decided to sit down—otherwise I might have missed the discovery altogether.

Record Tree Soars Above Rivals

While catching my breath, I scanned the treetops before me—then suddenly started. One particular redwood rose above the others like a giant candle. I had already measured its companions—all of them about 320 feet tall. But this great tree stood somewhat inland—and that explained my missing it earlier: From the stream it had looked no taller than its neighbors. Hastily I sketched its position on a piece of paper, then hurried down the bank to get my level and measuring line.

I tried to take careful readings but ran at once into difficulties. In triangulating with an Abney level, it is essential to take an accurate measure of the distance from one's sighting position to the tree's base. For this job I had a 300-foot length of heavy twine. I attached one end to the trunk, then stretched it taut across Redwood Creek to a stake on the far bank. Naturally, the twine got soaked in the stream. Had this changed its length?

After several readings from different points, I came to an astonishing figure. Much as I wanted to believe my rough computation, I

Traffic Curves Into Lofty Arcades of Greenery Along the Eel River

For 400 miles in California, U. S. 101 bears the name Redwood Highway. The route often tunnels among trees so tall and dense they cloak the roadway in twilight, even at midday. Here traffic flows below Inspiration Point in Richardson Grove State Park.

Proposed freeways through redwood country pose a threat to publicly owned groves, notably this and Prairie Creek State Park. Governor Edmund G. (Pat) Brown, a champion of the trees, has declared: "As long as I am Governor in California, none of the state's redwood groves will be destroyed or cut down in order to build freeways."

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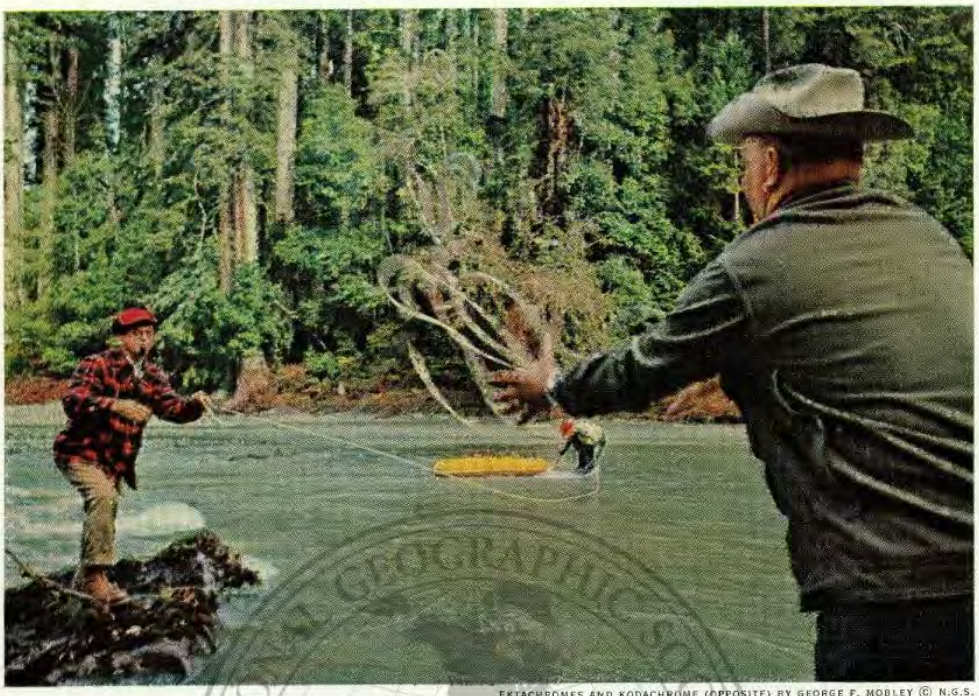
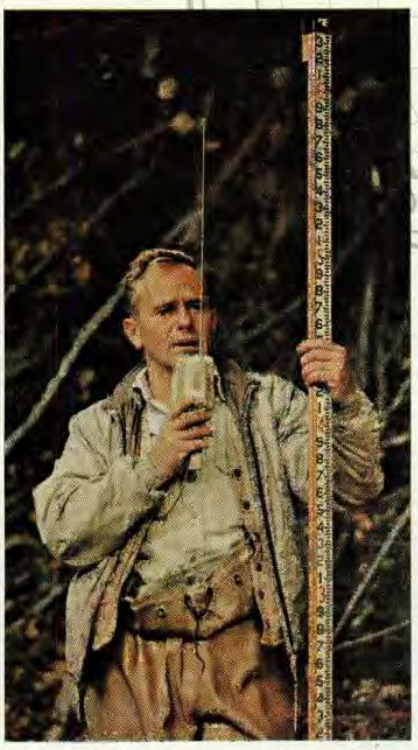


EKTACHROMES AND KODACHROME (OPPOSITE) BY GEORGE F. MOBLEY © N.G.S.

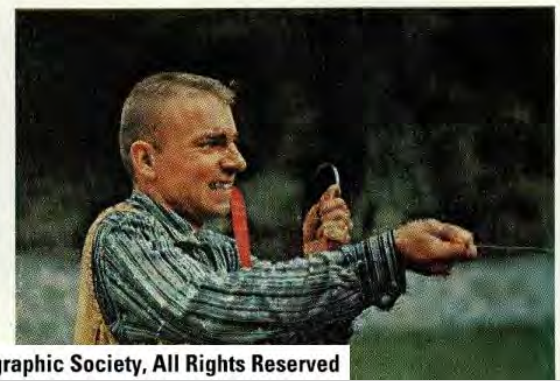
Measurement of colossi calls for a team



BESIDE the chill current of Redwood Creek, pipe-smoking Dr. Zahl and Paul Fritz (right) of the National Park Service pull a rubber raft across the stream. Rodman William L. Hebard (left) uses a two-way radio to discuss the proper placement of his surveyor's rod.

Holding steel tape taut, Jarrold B. Cone establishes his base line from a tree to a sighting point. By establishing a triangle, the men determine the big tree's height. Cone's red ribbon will mark a surveyor's stake.

Leaning Tower of Pisa would rise just above the mid-point of the sixth tallest tree, a 352.3-foot pillar seen in the center of the page opposite.



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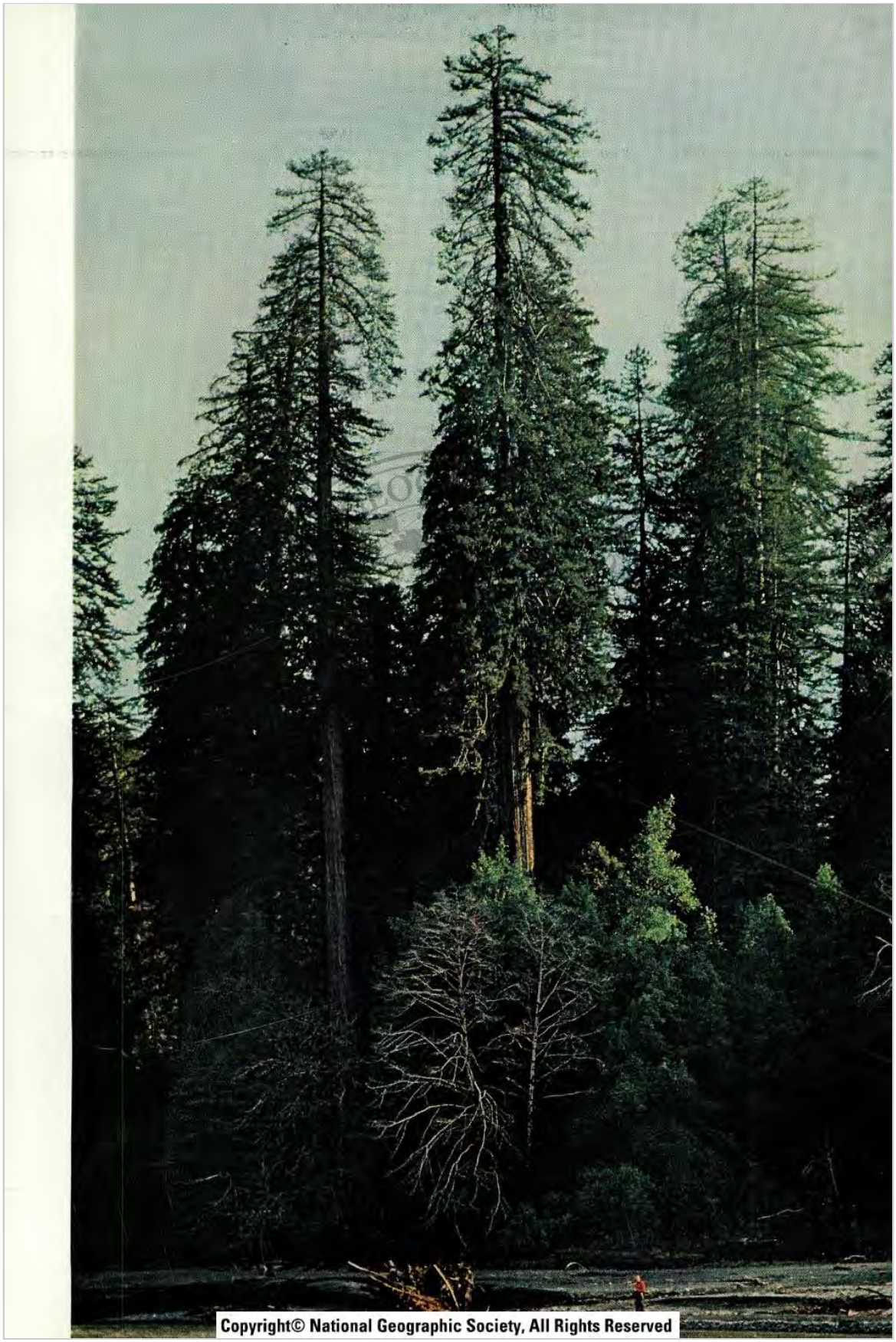

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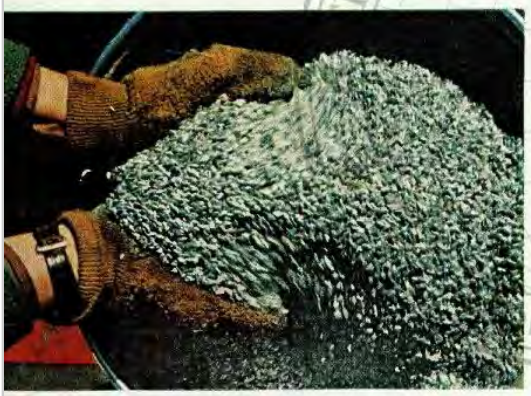
EKTACHROME (UPPER) AND KODACHROMES BY GEORGE F. MOBLEY © N.G.S.



Planting time: Helicopter pilot Robert Griffith whirls above redwoods en route to his low-flying job of broadcasting redwood, Douglas fir, and spruce seeds over a lumber company's tree farm.

Douglas fir seeds, treated with rodent repellent, will drop onto logged redwood lands that require a quick cover to hold the soil. Redwoods grow more slowly, but the two thrive in mixed groves.

Copter swoops across a logged-out tract seeded three years previously. Many seedlings and sprouts have already reached five to six feet and in another five years will blanket the slope.

simply could not: According to the Abney level, this was easily the world's tallest known tree—about 370 feet!

My misgivings increased when I drew a tape around the massive trunk. Four and a half feet above the ground, where circumference is measured, the tape showed 44 feet —and several trees in this very grove had a greater girth (pages 10-11).

I stepped back and sighted straight up the trunk. It was a strange-looking tree. About 14 feet above ground, the trunk divided into two spires, one rising perhaps 250 feet, the other soaring far higher. For symmetrical beauty, this tree was not queen of the forest, yet this specimen—for reasons known only to nature—had shot up through the woods and left its thicker, sleeker brothers far behind.

Why had no one bothered to measure it before? It had been accessible only to loggers and timber cruisers, men more interested in the board-foot content than in records of height. Furthermore, any logger or early trapper could only have noticed this tree's towering nature from the high, opposite hillside.

I took other readings. Each came close to the same 370 feet. True, my level could give only approximate height; and possibly the creek water had affected my measuring twine. But even allowing for a wide margin of error, I was convinced that this redwood must be a contender for the title of the tallest tree.

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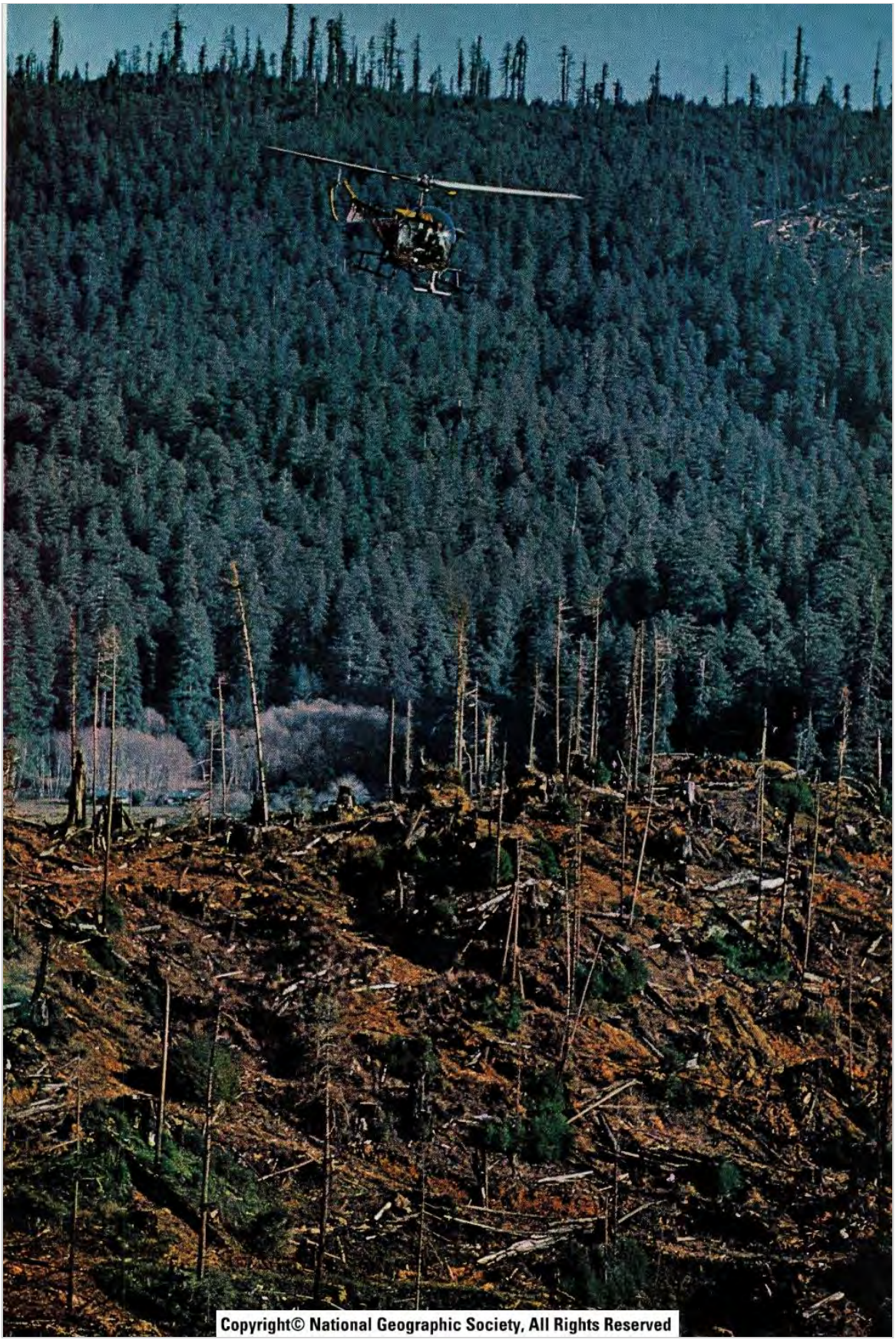
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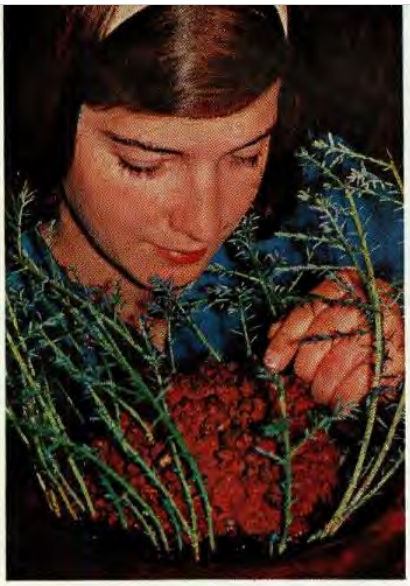
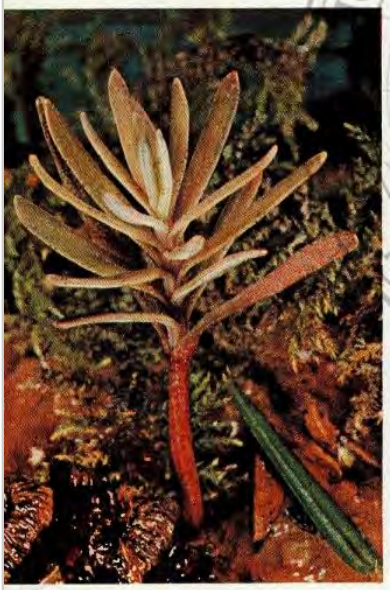


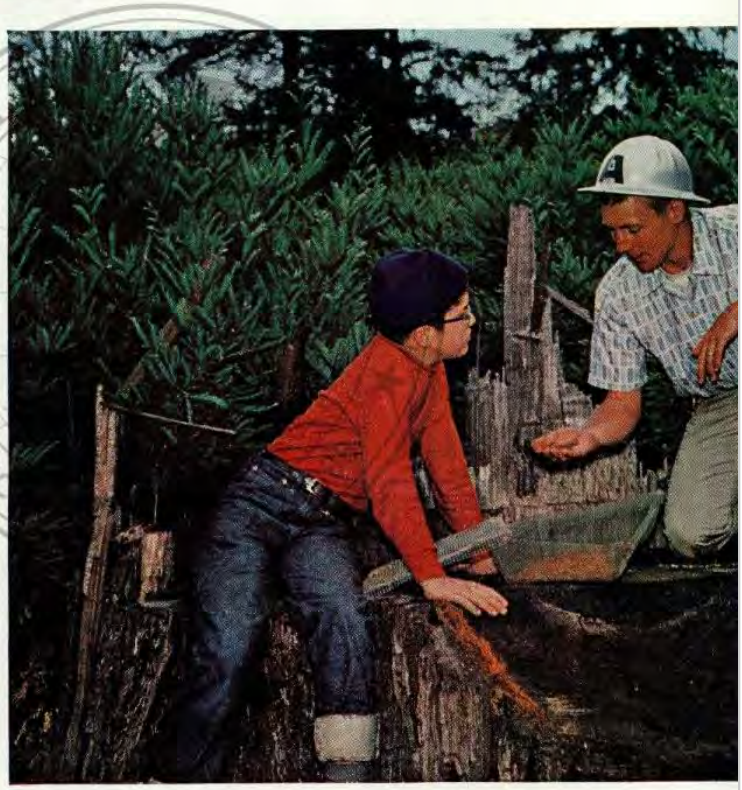
KODACHROMES BY PAUL A. ZAHL © N.G.S.

Like crocuses popping up in spring, redwood sprouts grow from a burl that Dr. Zahl soaked in water for three weeks.

Feathery shoots of a burl tickle the chin of Eda Kristin Zahl. Planted burls can become giant-size trees.

Bushy seedling, less than a year old, grows in wet humus.





There was only one thing to do. I would hire professional surveyors to check my figures. And so, representatives of Kleiner and Nilson of Arcata, California, and the Beed Engineering Company of Eureka, came to the creek bottom. Their findings were by no means final; a slight lean of the tree would have to be reckoned for, along with a correction for base-line angle. But perhaps my own early measurements were not too far afield.

With growing excitement, I met Chet Brown in the lobby of his Eureka motel. Handing him the sheet of preliminary figures, I watched him read. He whistled softly.

Next day, Chet accompanied me back into the valley where we spent the day inspecting various trees I had singled out. Within just a few acres we counted more than a hundred

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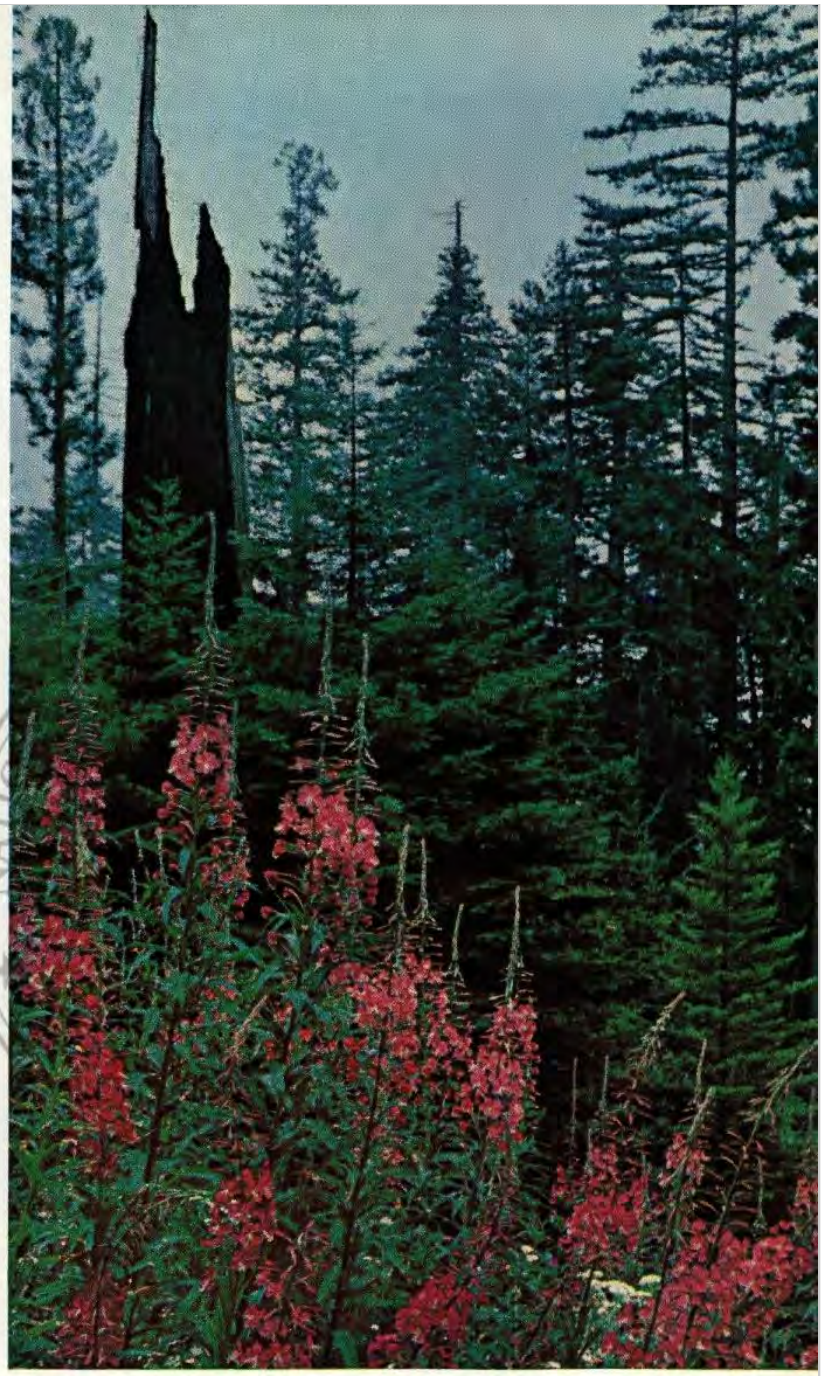
New generation, growing from stumps, replaces a grove logged 20 years ago. Beyond blossoming spikes of fireweed, a jagged snag testifies to fire which foresters believe occurred three and a half centuries earlier.



Wire-mesh trap collects the natural fall of redwood seeds. Thus foresters can estimate the number of offspring likely to result. Chuck Bender and the author's son count seeds in a trap set on a sprouting stump to prevent curious elk from trampling it.

giants ten feet or more in diameter—most of them at least 300 feet high. In this grove of giants there might be other trees even taller than the contender I had found.

I was unable to join Chet when he and associates Paul Fritz and Richard Youse went back to the grove for further study. They took Abney readings on other high trees and marked them for measurement by surveyors.

By this time I had called National Geographic Society headquarters with word of the spectacular grove. Melville Bell Grosvenor, the Society's President and Editor, responded with typical enthusiasm: He stepped aboard a California-bound plane so that he could be on hand the day the surveyors made final measurements.

The big, dynamic President of Arcata

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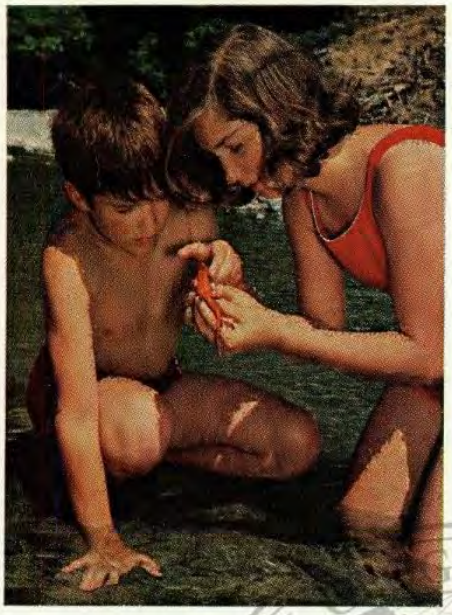
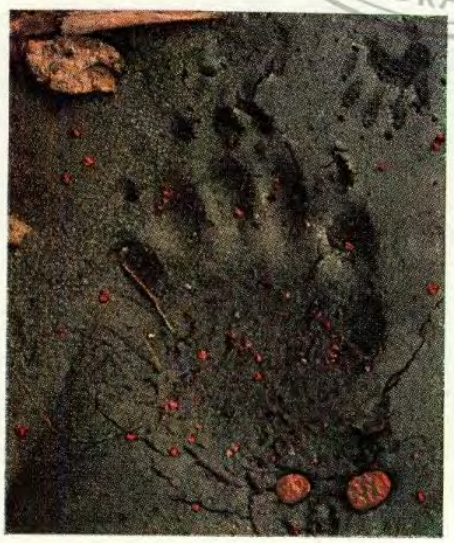


Three swimmers get acquainted. Zahl children found the newt *(Taricha granulosa)* under a rock in glass-clear Eel River (page 36).

Green plumes of five-finger fern billow from perpendicular walls of Fern Canyon, near Prairie Creek Redwoods State Park. The canyon carries runoff from some 100 inches of rain in winter. The Save-the-Redwoods League hopes to preserve this green bower.

Sandy calling cards, footprints of a black bear and her cub lie near Redwood Creek within a hundred feet of the tallest tree. Seeds and cones sprinkle the ground.



Redwood Company, Howard A. Libbey, had a similar reaction. Grinning broadly, he placed long-distance calls to timberlands manager Harry W. Wier and the company's chief forester, Gene Hofsted.

"I've just heard we've got some very tall trees on our property," he said. "We're going out for a look tomorrow. Try to be here."

Surveyors Tackle a Difficult Task

With Chet and his Park Service colleagues, our party numbered 14 men—"Probably the largest crowd of palefaces ever assembled in this grove," someone observed.

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EKTACHROME (OPPOSITE, LOWER) BY GEORGE F. MOBLEY AND KODACHROMES BY PAUL A. ZAHL © N.G.S.

But on this particular day the most important members of our party were Oscar G. Larson, a surveyor for Arcata, and the surveyors I had retained earlier. We were asking these men to perform a difficult task: to measure accurately some of the world's tallest trees, to arrive at precise figures, and to issue a joint affidavit.

Each surveyor had his professional pride and reputation at stake. Chet and I felt even more personally involved. Would these trees really be close contenders—or champions?

It was a slow, careful process. The surveyors sighted treetops, read angles, measured base lines, consulted books of tables—and then went through the whole procedure again. Finally, the three men compared their computations—and the figures agreed.

Giants Sweep Win, Place, and Show

Their agreement would completely change the tree world's hall of fame. The four tallest trees in this grove—as attested by the surveyors' jointly signed statement—showed heights of 367.8 feet, 367.4 feet, 364.3 feet, and 352.3 feet. These trees would rank as the first, second, third, and sixth tallest living things known on earth (list, page 16).

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London's Big Ben would fall short of the second tallest tree, 367.4 feet high.

Rain-drenched second tallest tree spears above its companions. Redwood Creek surges through a misty canyon of green.

Leafy crown in this air view hides the monumental trunk of the second tallest tree (center). Far below, a yellow raft lies beached beside Redwood Creek.

Riding the current, Paul Fritz and the author splash downstream to the highway near Orick. The voyage gave them a chance to appraise other groves along Redwood Creek.

KODACHROME (LEFT) AND EKTACHROMES BY GEORGE F. MOBLEY © N.G.S.

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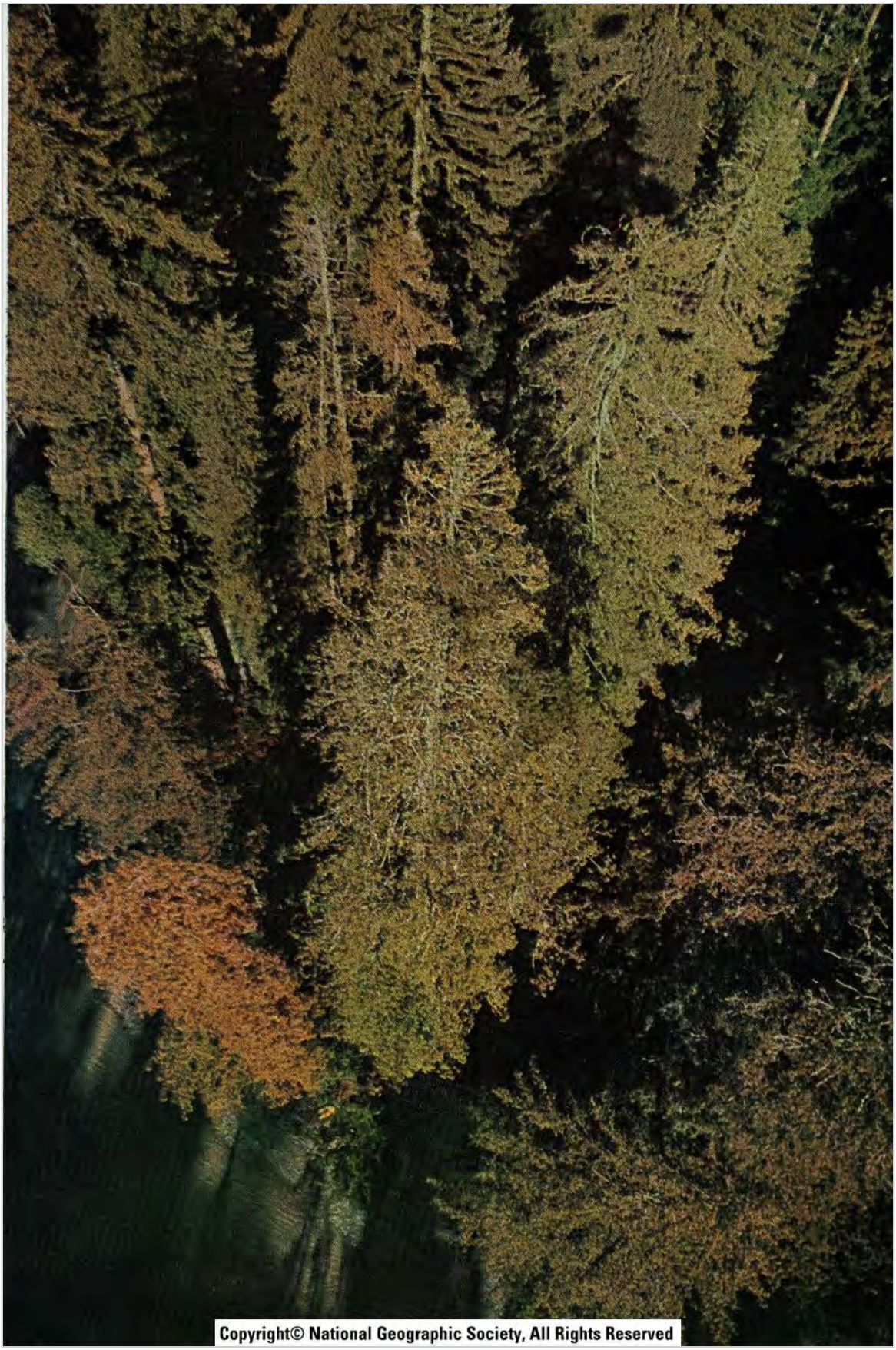

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Running salmon lure shoals of fishermen

IN BLUE-GRAY MIST on an August morning, anglers flock to the Klamath River, only 20 miles from the newly explored redwood grove. Salmon and steelhead trout by the hundreds of thousands run the gantlet to upstream spawning grounds. At the run's height, the small-boat fleet covers the river.

Regrowth redwoods on surrounding hillsides hide cabins of summer visitors, many escaping from the heat of California's central valley. Town of Klamath lies two and a half miles away, beyond the ridge at right.

Lucky angler, calling it a day, uses a hefty pole to carry his catch. Larger of the two Chinook salmon weighs about 40 pounds.

KODACHROMES BY PAUL A. ZAHL © N.G.S.

The second and third trees were among those that Chet and his men had pointed out. Less than five inches of height separated my find, the champion, from No. 2.

"Wouldn't it be marvelous," mused Dr. Grosvenor that evening, as some of us discussed the day's events, "if that grove could be preserved for the American people?"

That, of course, lay in the future. For the moment, Mr. Libbey of the Arcata Company had assured us that no lumbering would be done in this vicinity for an indefinite period.

Meantime, I had one more field trip to make. I had still not seen the seven miles of Redwood Creek downstream from the big grove. What if another champion lay just beyond the next bend of the creek?

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With the announcement of a new world's record, I knew that other redwood enthusiasts would begin searching for a new and even taller champion. Perhaps quite soon someone would find a greater tree—and perhaps, down Redwood Creek, we ourselves might make that discovery.

"Has anyone ever gone down Redwood Creek by boat?" I asked Paul Fritz of the National Park Service.

"Not that I know of," he replied. In fact, old-timers had cautioned against such a trip. In wet weather, waters can rise suddenly and dangerously; we would also have to watch out for swirling rapids.

But what's the point in exploring if there aren't a few unknowns?

George Mobley, NATIONAL GEOGRAPHIC photographer, joined us on the bright, dry day when we set out in two inflated life rafts. On the first bend we learned how to use our little aluminum oars; we whirled like tops until we had the hang of it.

Paul Fritz shared my raft, and since he weighs somewhat more than 200 pounds, our gunwales were frequently awash. Thanks to the dry fall weather, the stream was at its seasonal low (page 46).

Walls of Green Form Canyon

We floated with the current down this evergreen canyon, sometimes becalmed in long stretches of slow water, sometimes whirled suddenly around hairpin bends into

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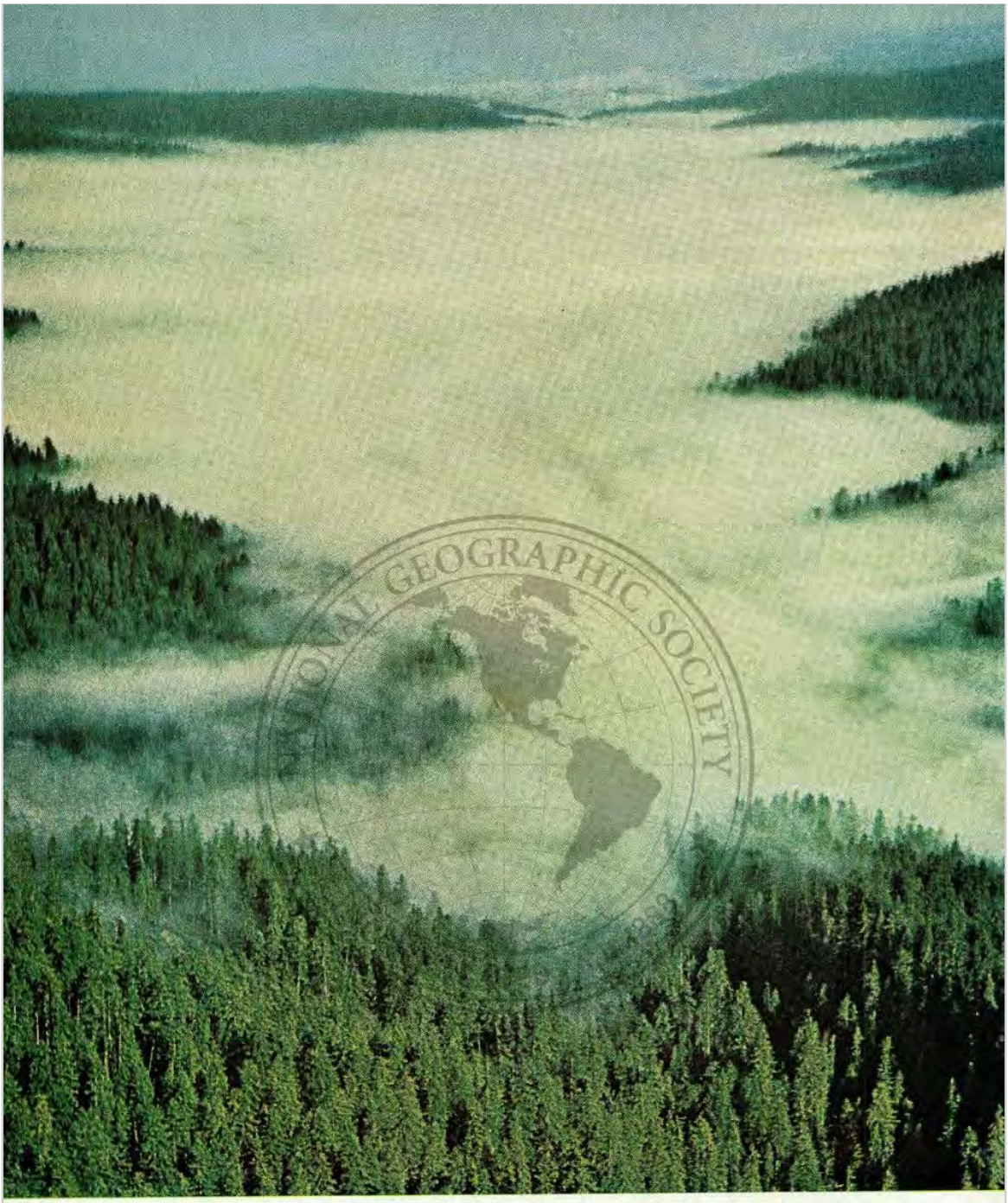

swift rapids. Struggling with the oars, we managed to prevent swamping.

Twice we had to make portages. But the scenery lightened these mild difficulties. Alternately deep and narrow, wide and shallow, the creek carried us between sheer walls of towering redwoods, past broad flats rich with maple, oak, alder, and man-high bracken.

On a reconnaissance sortie ashore, we came upon one of the thickest trunks I had seen anywhere in the valley—almost 20 feet. But, alas, some years or decades back it had been snapped off clean 70 or 80 feet above the ground. What a tree that must have been!

During the greater part of our journey, as we drifted past line after line of redwood treasure, we saw no sign of human intrusion. This was certainly one of the few remaining

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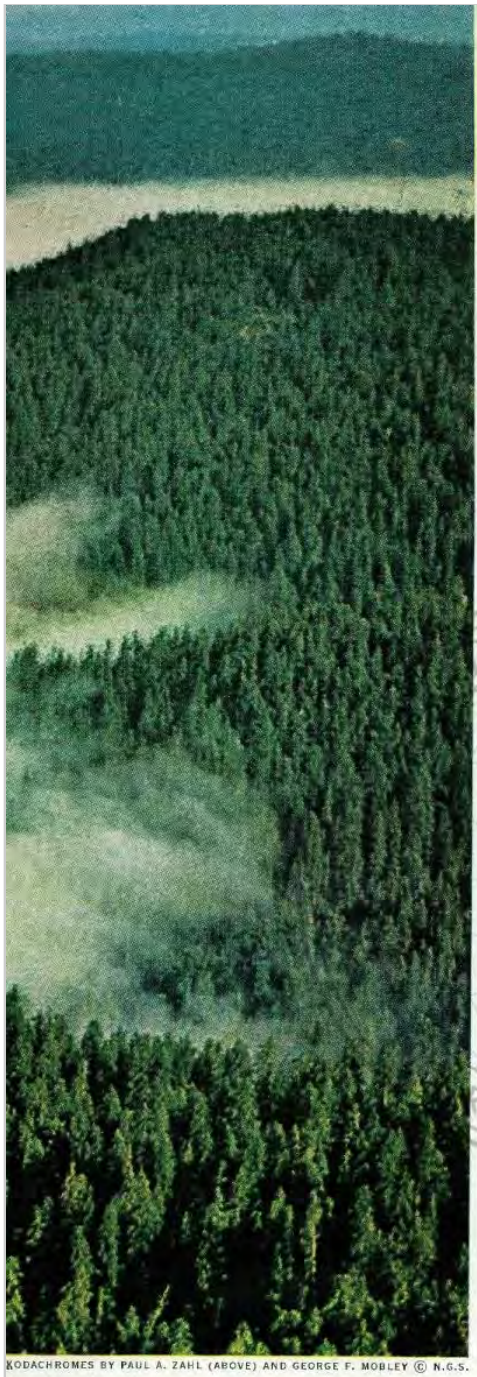

Sunset over the Pacific silhouettes a seed tree that loggers spared to start a new stand of redwoods.

KODACHROMES BY PAUL A. ZAHL (ABOVE) AND GEORGE F. MOBLEY © N.G.S.

Rolling mists nourish trees

Tongues of fleecy fog off the ocean fill the fingers of a valley north of Eureka. All up and down the Redwood Empire this scene repeats itself day after day. Mists blanket glades, drip from evergreen needles, and veil spiky branches. Largest stands of timber thrive where the fog prevails, suggesting that mist-borne moisture spurs coast redwood growth.

redwood wildernesses neither protected within public preserves nor yet scheduled for logging. If we saw no giants to challenge our new champions, we still saw some of the most extraordinary scenery in the world.

Paul Fritz was especially caught by it. A talented landscape architect, Paul knows what to do with extraordinary scenery. Once, when we pulled our rafts up on a gravel heap, I listened to him think aloud. He considered the planning that would be required to give access to the magnificent redwoods. He talked of the protection they would need.

"These are things we could do for the public," he said. "They should be able to view these trees forever."

I wondered whether those were words of prophecy. I hoped so. THE END

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