United States
Department of
Agriculture

Forest Service

Pacific
Southwest
Region

Sequoia National Forest Land and Resource Management Plan

Chapter 7

FEIS APPENDICES

A-M, O-Q

VOLUME 1

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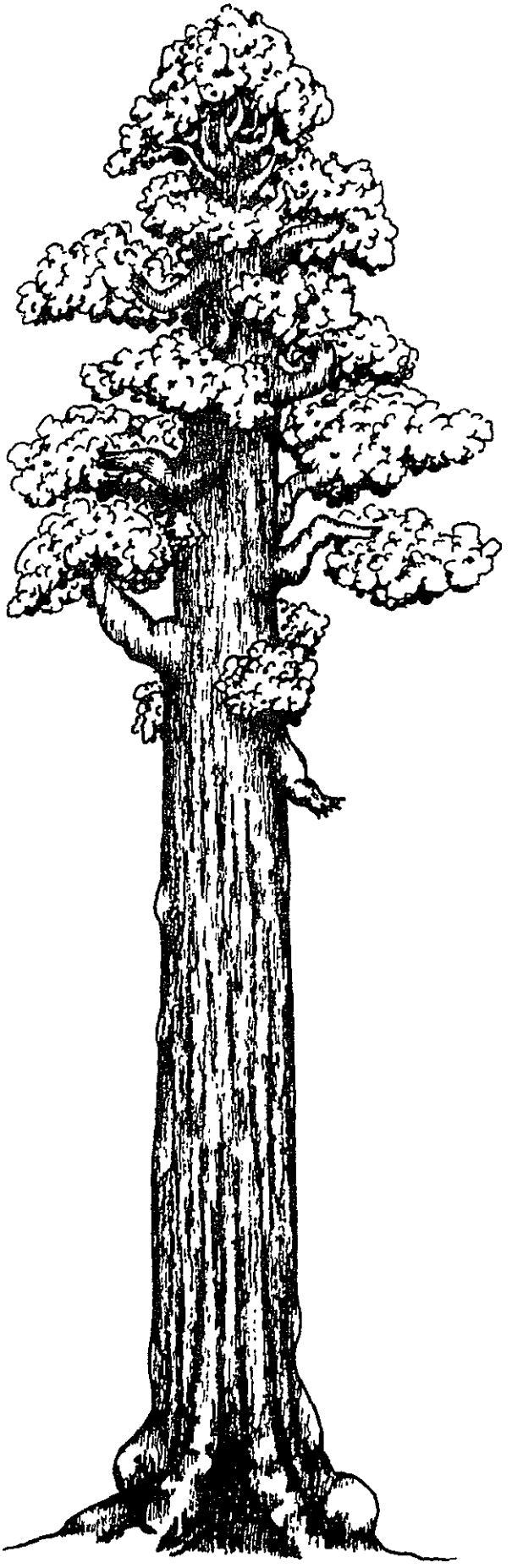


Appendix A

ISSUES, CONCERNS AND OPPORTUNITIES

APPENDIX A

ISSUES, CONCERNS, AND OPPORTUNITIES

I. Issues, Concerns, and Opportunities Identification Process

The following is a summary of the steps completed by the Forest to identify issues, concerns, and opportunities (ICO's). A more detailed description of the process follows in narrative form. Full documentation is located in Forest planning records in "Documentation of the Issues Identification Process Used by the Sequoia NF for Land Management Planning" - October 8, 1980. Further documentation is in the FEIS Appendix N "Summary of Public Response" to the Draft Plan and DEIS which summarizes critical issues.

SUMMARY OF THE SEQUOIA
ISSUE IDENTIFICATION PROCESS

1. Preliminary issues package is developed by the Planning Team (PT) with Ranger/Staff review.

2. News releases made public, employee meetings held, and the issues package is distributed to obtain public input.

3. PT organizes and IDT reviews public comment on the preliminary screening criteria to provide final criteria.

4. PT organizes and makes preliminary analysis of public input on issues and questions.

5. IDT analyzes public input (as organized by PT) to revise the issues and questions and to produce preliminary Forest issues list.

6. PT organizes "identified" issues from public input and adds to IDT's preliminary Forest issues list.

7. The package from Step 6 is sent to Rangers/Staff for review and the addition of management concerns.

8. PT organizes management concerns and aggregates them with package from Step 6 to produce an issues and concerns package for IDT screenings.

9. IDT uses final screening criteria for screening issues and concerns package and produces draft Sequoia issues and questions.

10. IDT uses final screening criteria for screening draft issues and questions and produces Sequoia issues.

11. Sequoia issues sent to Rangers/Staff for final review and comment.

12. IDT considers Rangers/Staff comments and Sequoia issues package is recommended to the Forest Supervisor.

13. Forest Supervisor recommends issues to Regional Forester.

14. Regional Forester approves issues.

15. Rescoping of eight non-wilderness areas because of Ninth Circuit Court decision.

16. Responses reviewed by IDT and no new issues passed screening criteria.

17. Forest Supervisor recommends original issues without change.

18. Regional Forester approves original issues without change.

19. Public response on Draft Plan and DEIS.

20. Responses reviewed by Resource Specialists.

21. Forest Supervisor recommends the addition of two issues "Budget" and "Pesticides".

22. Regional Forester approves the two additions.

A. Narrative Description of the Scoping Process

Scoping for the planning process was formally started November 1, 1979, when a Notice of Intent (NOI) to prepare an environmental statement for the Forest Plan for the Sequoia National Forest was published in the Federal Register. At that time the nation-wide RARE II (Roadless Area Review and Evaluation) FEIS had been completed and the selected plan implemented. When scoping for Forest planning, the Forest Service was directed in 36 CFR 219.17 (September 30, 1982) that non-wilderness designated areas would be managed for uses other than wilderness. Because of the initial scoping done in late 1979 and through mid-1980, the Sequoia NF assumed that non-wilderness areas would be managed for non-wilderness uses and would not be considered in Forest planning as being available for possible Wilderness recommendation. This direction was subsequently changed in 1983 and rescoping was necessary. (This rescoping will be described in detail later in this section.) A schedule of four public meetings were included with the primary purpose of encouraging public participation in the initial identification of issues, concerns and opportunities.

The State Clearing House was sent 15 copies of the NOI on October 24, 1979, for distribution to State agencies. The Board of Supervisors in Kern, Tulare and Fresno counties were mailed the NOI on November 13, 1979. The Chairman of the Tule River Indian Reservation was mailed the NOI on November 13, 1979. The NOI was also mailed on November 13, 1979, to 12 additional persons representing the Native American Community within the Forest zone of influence. The names of these individuals are contained in the planning records.

In November 1979, the Sequoia NF Land Management Planning mailing list of approximately 1,000 people was screened by post cards and was updated in an effort to maintain contact with those who wished to participate in Land Management Planning.

The Forest was preparing, concurrently, a Preliminary Issues booklet from knowledge of public issues expressed during earlier planning activities. This booklet listed eight preliminary issues, preliminary screening criteria, a description of the overall planning process (with time schedule), an overview of the Forest, and a public response form. (A copy of this booklet is located in Forest planning records.) The booklet was mailed to the updated Land Management Planning mailing list on December 3, 1979. The public was asked to reply by January 7, 1980.

In November 1979, the scheduled public and employee meetings were publicized in the local newspapers and in the Forest newspaper "The Sequoian". To facilitate public participation, five evening meetings were held as follows:

November 26, 1979 - Porterville;
November 27, 1979 - Valencia;
November 28, 1979 - Bakersfield;
November 29, 1979 - Visalia; and
December 6, 1979 - Kernville.

Similar meetings were held for employees at six locations as follows:

November 26, 1979 - Porterville;
December 11, 1979 - Kernville;
December 12, 1979 - Hot Springs;
December 12, 1979 - Springville;
December 13, 1979 - Pinehurst; and
December 14, 1979 - Bakersfield.

The Forest Planner attended scoping meetings held on adjacent Forests as follows:

November 27, 1979 - Angeles National Forest; and
April 16, 1979 - Sierra National Forest.

Other sessions held to facilitate scoping participation and input were:

December 10, 1979 - California Department of Fish and Game in Fresno;
January 22, 1980 - California State Resources Agency in Fresno;
May 5, 1980 - Kern County Planning Department;
May 8, 1980 - Sequoia and Kings Canyon National Parks at Ash Mountain;
May 9, 1980 - Tulare County Planning Department; and
May 28, 1980 - Bureau of Land Management, Bakersfield District.

As comments were received, the response was acknowledged by mail. Each respondent was given a unique identifying number which was assigned to their respective letter.

Meetings were held with the following native American groups to explain the scoping process and to facilitate input:

June 23, 1980 - Kern Valley Indian Community (Tubatulabal, Paiute, Shoshone);

July 1, 1980 - Tule Indian Reservation Tribal Council; and
August 8, 1980 - American Indian Council (Paiute. Kawaiisu).

The Forest received 97 written responses from the mailing of approximately 1,000 Preliminary Issues booklets, and from the 11 public and employee meetings held. Comments received were of the following types: comments on preliminary issues, proposed new issues or concerns, suggestions for resolving issues, comments on preliminary criteria, and many general or miscellaneous comments.

The comments received on the preliminary screening criteria were organized by the Planning Team (PT) by simply grouping the comments under their respective criterion. This grouping was done to speed up the review by the Interdisciplinary Team (IDT).

Public responses on the preliminary issues were first grouped by the PT under the eight issue headings contained in the Forest Issues package. Those not falling under the preliminary issues were either grouped into another potential issue topic or placed into a "miscellaneous" suggested issues or comments category. The PT then further grouped the responses under each preliminary issue into groups of similar ideas for ease in analysis.

The PT. during meetings held on April 7-10 and April 15-17, 1980, reviewed the public responses. The objective for the meetings was to provide to the IDT a complete first-cut list of Forest issues and questions based on public input. It was apparent in looking at the responses that many people tried to answer or comment on the questions listed under the issues of the issues package rather than suggest new ideas or questions which would help to resolve the preliminary issues or create additional issues. In general, public responses were used to:

1) form a new issue;
2) validate or modify one of the preliminary issues or questions;
3) develop a new question under one of the preliminary issues; or
4) provide comments to be considered in answering issue questions.

The steps taken above were documented directly on the conference paper which was retained as a planning document. Those public responses that provided suggestions for the solution of "Questions to be considered" were summarized and listed beneath the questions as "Public comments to be considered." This was done on conference paper and later incorporated into the April 23, 1980, revised issues package. These comments were to be retrieved when needed in future planning steps and used as public suggestions on how to resolve the issues.

After the PT had completed their preliminary processing of public input; the IDT (in meetings held on April 11 and 18, 1980) reviewed and modified the PT effort based on their evaluation of the public response. Several new issues were generated during these meetings. The IDT product was a list of potential issues and questions to be addressed in the Forest Plan.

During the April 18th IDT meeting, a determination was made that although all public responses had been used in developing the Forest Issues, those

responses suggesting or listing specific issues that the Forest should consider should be subjected to screening by applying the final screening criteria (as opposed to screening only those issues developed by the PT and IDT). Therefore, the PT sorted through all public input to identify and list those responses that were issues. These issues were appended to the IDT's list of issues. This package was then provided to the District Rangers and S.O. Staff for review. They were asked to submit any management concerns during that review.

The PT organized the Management Concerns that were submitted by employees, placing them in the same issue categories that were previously identified. Those concerns were then aggregated with the April 23rd Issues package to provide an Issues and Concerns list for final screening by the IDT.

On March 25, 1980, the IDT - after considering public responses - approved the issue screening criteria to be applied to the suggested issues and concerns.

The screening criteria are:

1) Include issues [1/] which are significant [2/] and require-prompt resolution (within this 10-year planning period).

2) Include issues where knowledge and technology will allow resolution, or is sufficient to initiate a positive course of action towards resolution.

3) Include issues which can be resolved at the Forest level (i.e., rather than be resolved through laws, regulations, policies and direction given in higher order planning document such as RPA and the Regional Plan).

The IDT (in meetings held on May 27, 29 and June 25-27, 1980) screened all of the "Additional issues specifically identified by the public" and the Management Concerns. This resulted in the modification of some of the previously identified issues and their associated questions, Most of those issues and concerns passing the screening criteria were considered to be facets of the various questions associated with the issues. Therefore, these issues and concerns were listed under the respective question for use later in the planning process as point of focus on the questions. Those issues and concerns failing the screening criteria were grouped into one document.

1/ "A subject or question of widespread public interest relating to management of National Forest System Lands, identified through public participation." (NFMA)

2/ In applying this criterion, the IDT recognized and discussed "significance" in terms of context, intensity, the geographic area, implications at other planning levels, and current validity (these aspects of "significance" were specified in FSM 1920.81b).

Based on earlier discussions and a review of all responses received during the issue identification process that were related to Riparian Zones and to Diversity, the IDT (in a meeting on July 21, 1980) decided that both topics were of enough significance to warrant issue status. The comments received pertaining to these two new issues which had been scattered under several of the earlier developed issues; and were, therefore, separated out and grouped together for reconsideration in developing the content of the questions to be formed under the new issues.

A final draft of Sequoia Issues developed from the previously described issues identification process was reviewed and subject to the screening criteria during an IDT meeting held on July 23, 1980. The product was an IDT recommended list of Forest Issues and their respective questions to be considered during the development of the Forest Plan. This list was sent to District Rangers and S.O. Staff for review and comment. The IDT acted on proposed changes and comments during a meeting on September 19, 1980.

As a last task prior to finalization of the Sequoia Issues package, a brief analysis was made of the relationship between the Regional Issues and those developed for the Sequoia NF.

In an IDT meeting held on September 26. 1980, a review was made of the entire Sequoia Issues package for final concurrence prior to its submission to the Forest Supervisor for his recommendation to the Regional Forester for approval.

The Forest issues were approved by the Regional Forester on February 5, 1981.

In 1979 the State of California challenged the adequacy of the RARE II Environmental Statement prepared as the basis for making the decisions for the allocations of the roadless areas to either Wilderness or non-wilderness use. In October 1982, the United States Court of Appeals for the Ninth Circuit affirmed a lower court decision which applied specifically to 46 roadless areas in California. As a result of the October decision, all roadless areas allocated to non-wilderness or wilderness in the RARE II FEIS were to be reevaluated. For the Sequoia this meant that rescoping was necessary for 12 non-wilderness allocated areas. Areas that were rescoped between June and December 1983, were: Staff, Black Mountain. Slate Mountain, Cannell, South Sierra, Jennie Lakes, Rincon, Domeland Additions II, Chico, Lyon Ridge, Mill Creek, and Greenhorn Creek.

The Forest intent to reevaluate roadless areas was published in the Federal Register June 2, 1983. Between July 21 and August 20, 1983, the mailing list was updated by sending post cards to those on the existing LMP mailing list. On September 6, 1983, an information packet was mailed to the updated mailing list of about 400. It contained an introductory letter explaining why the material was being sent and that comments should be received by October 21, 1983. A meeting was announced for October 6, 1983, to answer questions. The Notice of Intent, the schedule of public involvement, Sequoia Issues identified previously. and maps and descriptions of each of the 12 roadless areas were included in the mailing.

As a result of the above, the Forest received 45 written responses. Only one response suggested a new "issue". That issue was subsequently found not to qualify as an issue by the IDT during a meeting held on November 28, 1983. The Forest used the issues unchanged from those approved by the Regional Forester on February 5, 1981.

Other information which was received on wilderness attributes, resource values which might be foregone, suggestions on logical boundaries, and conflicting or nonconforming uses would be incorporated and/or considered as planning progresses.

The PT and IDT meeting notes and the publication, "Documentation of the Issues Identification process used by the Sequoia NF for Land Management Planning" - October 8, 1980, (which are available for review at the Forest Headquarters) provide a detailed record of the entire Issues Identification Process.

See FEIS Appendix N for summary of process of determining critical issues and the addition of two issues resulting from public responses to the Draft Plan and DEIS.

11. Consultation With Others

A. Other Agencies and Indian Tribes

The following agencies and Native Americans were consulted during the planning process. The primary purpose for each contact is briefly stated.

Bureau of Land Management Contacts

Bakersfield Dist.	- 1/16/80	- Discussion of handling of Cypress joint study.
Bakersfield Dist.	- 2/20/80	- Cooperative Agreement signed and sent to BLM.
Bakersfield Dist.	- 1/30/81	- Telecon on handling coordination on WSA's.
Bakersfield Dist.	- 3/3/81	- Telecon regarding meeting - Brown and Boles.
Bakersfield Dist.	- 5/7/81	- Letter to BLM, we have minerals information for Rockhouse from San Bernardino.
Bakersfield Dist.	- 5/8/81	- Telecon need resource information for BLM WSA's by 8/15/81.
Bakersfield Dist.	- 8/6/81	- Telecon Jerry Magee is our contact for Wilderness & Wilderness Study Areas (WSA's).
Bakersfield Dist.	- 9/17/81	- Work planning - WSA's by 8/15/81.
Bakersfield Dist.	- 9/21/81	- Talked to Ed Lynch concerning the meeting for coordination.
Bakersfield Dist.	- 12/11/81	- Letter information on BLM-FS WSA coop. agreement.
Bakersfield Dist.	- 12/14/81	- Letter on BLM WSA acreage adjustment.

Bakersfield Dist.	- 1/12/82	- Letter to BLM sending our WSA writeups for their areas.
Bakersfield Dist.	- 2/2/82	- Letter from BLM on our WSA writeups for their areas.
Bakersfield Dist.	- 3/25/82	- Letter from BLM to coordinate Cypress.
Bakersfield Dist.	- 3/25/82	- Letter from BLM to coordinate acres in Rockhouse WSA.
Bakersfield Dist.	- 6/1/82	- Coordinate work planning.
Bakersfield Dist.	- 10/26/82	- Meeting on Hollister Resource Management Plan.
Bakersfield Dist.	- 1/7/83	- Meeting to coordinate Watt's WSA's decision.
Bakersfield Dist.	- 1/25/83	- Telecon to coordinate Watt-dropped WSA's.
Desert Dist.	- 1/25/83	- Telecon to coordinate WSA's dropped per Watt decision.
Desert Dist.	- 5/2/83	- Discussion of Condor Management Plan.
Sacramento	- 6/6/83	- Letter to minerals group on our adjusted schedule - Rockhouse.
Bakersfield Dist.	- 8/22/83	- Meeting to coordinate minerals input for BLM Rockhouse.
Bakersfield Dist. & BLM Sacramento	- 8/23/83	- Telecon to coordinate minerals input for BLM Rockhouse.
Bakersfield Dist.	- 9/27/83	- Meeting Ed Lynch on scheduling exchange and coordination.
Caliente R.A.	- 10/5/83	- Telecon on Black stain problem.
Bakersfield Dist.	- 11/23/83	- Status of their WSA writeups.
Bakersfield Dist.	- 11/28/83	- Copy of letter on Sequoia lead on South Sierra roadless area.
Bakersfield Dist. & Caliente R.A.	- 12/12/83	- Planning coordination meeting with District & R.A.
Caliente R.A.	- 12/28/83	- Letter to R.A. Manager requesting information on BLM WSA.
Bakersfield Dist.	- 8/13/86	- Discuss Draft Plan and DEIS

Sequoia-Kings Canyon National Parks

Ash Mountain	- 5/8/80	- Meeting to determine ICO's.
Ash Mountain	- 3/18/81	- Telecon John Palmer - Park Wilderness proposal.

Army Corps of Engineers

Sacramento Dist.	- 12/30/80	- Telecon coordination on planning.

State of California

Office of Planning & Research	- 1/22/80	- ICO identification meeting for Sierra, Inyo and Sequoia.
Mountain Home State Forest	- 6/25/80	- Meeting for ICO identification'.
California Dept of Fish & Game	- 2/1/82	- Received letter on review of Sierra EIS and Plan.
Whittaker Forest	- 4/5/82	- Telecon regarding their management plan.

California Dept of Fish & Game	- 4/8/82	- Received from Goss information on their review of new regulations.
California Dept of Fish & Game	- 8/27/82	- Sent Goss goals, standards and guidelines for planning.
California Dept of Fish & Game	- 10/19/82	- Rod Goss invited to MT meeting.
California Dept of Fish & Game	- 6/16 & 6/27/86	- Discuss Draft Plan and DEIS.

Native Americans

Tubatulabal, Paiute, Shoshone	- 6/23/80	- ICO meeting (Wermuth).
Tule Reservation	- 7/1/80	- Meeting with Tribal Council on ICO's (Alex Garfield et al).
American Indian Council	- 8/8/80	- ICO meeting (Carmen Peebles et al).
Kern Valley Indian Council	- 9/1/86	- Discuss Draft Plan and DEIS.

Tulare County

Planning Dept	- 5/9/80	- Meeting with County on Forest-County coordination.
Balch Park, Tulare County Park	- 6/17/80	- No Plan to review - ICO identification.
Planning Dept	- 8/13/81	- Letter asking for comments on planning.
Planning Dept	- 10/27/81	- Letter to us on our interface areas.
Planning Dept	- 1/29/82	- Letter sent census information to them.
Planning Dept	- 3/26/82	- Meeting to brief them on our planning progress.

Kern County

Planning Dept	- 5/5/80	- Los Padres, Sequoia, County joint meeting to discuss planning efforts.
Planning Dept	- 11/25/80	- Attended County public meeting on Sketch General Plan.
Planning Dept	- 9/10/81	- Record comments on interface areas.

Fresno County

Planning Dept	- 5/21/80	- Letter request asking for their comments on ICO's and need for meeting.
Planning Dept	- 1/22/82	- Recoordination with them.
Planning Dept	- 10/27/82	- Telecon coordination discussion on planning.

City of Porterville

Porterville City	- 3/7/78	- Meeting with planner, discussion of ICO's and general profile of City.

B. Describe Other Agency and Tribe Plans That Were Reviewed and How They Were Considered or Used During This Planning Process.

USDI Bureau of Land Management

California Desert Plan FEIS and Plan
Benton-Owens Valley Bodie-Coleville Study Area DEIS

Both plans propose wilderness adjacent to Forest and set management direction for adjacent roaded lands. This information considered during formulation of alternative plans.

Final Intensive Inventory Roadless Areas Outside CDCA

Unroaded lands identified will be included in BLM Management Plan EIS's and will be considered when alternative plans for Forest are formulated.

Draft EIS South Sierra Foothills Plan

Propose Roadless Areas for wilderness or non-wilderness adjacent to Forest. Coordination needed to ensure compatible management in both agency's FEIS's.

USDI Sequoia and Kings Canyon National Parks

Mineral King Land Acquisition Plan

Does not directly affect our planning.

Cedar Grove Development Concept Plan

Coordination needed to ensure compatible management of adjacent lands.

Natural Resource Management Plan

Knowledge of management is needed to ensure coordinated management.

Statement for Management

Knowledge of policy direction allows formulation of Forest management direction which is most compatible with Park's.

Lodgepole Valley, Grant Grove and Redwood Mountain Development Concept Plans

Knowledge of the Park's management direction allows formulation of Forest management direction that is most compatible with the Park's.

Backcountry and Meadow Management Plans

Knowledge of the Park's management allows formulation of Forest management direction that is compatible.

Corps of Engineers

Corps of Engineers Lake Isabella Master Plan

Knowledge of this plan will influence recreation components in Forest Alternative Plans. Also Corps direction will be considered when making recommendations on the South Fork of the Kern Wild and Scenic River which terminates at Lake Isabella.

State of California

"As Their Land Is." Office of Planning and Research

This information useful for scoping. This land ethic conference represents an expression of public wants and desires.

Recreation In California. Issues and Actions 1981-1985

This document describes recreation issues and problems. It suggests solution strategies - some of which relate to recreation on public land. These items were considered as a part of Forest issues, concerns, and opportunities.

Tule Indian Reservation

Reservation Plan (dated 12/73)

The Plan does not specifically identify opportunities to coordinate management but known opportunities include coordinating transportation planning and ensuring maintenance of water quality.

Range Conservation Plan (dated 1/79)

This Plan describes range management on the Reservation and does not specifically identify opportunities in the Forest.

Timber Management Plan and Forest Improvement Program (dated 10/77)

This Plan describes timber management opportunities specifically on the Reservation.

Fresno County

Fresno County Sierra-South Regional Plan

This regional plan reviewed to further coordinate management between private and Forest lands.

Tulare County

Tulare County General and Foothill Growth Management Plan

Will allow development of coordinated nonconflicting management direction for adjacent Forest land.

Kern County

Kern County General Plan

Knowledge of County plan will allow us to ensure maximum compatibility of direction on Forest land as it may affect private landowners.

Kern County Havilah and Pines of Havilah Specific Plan

Primarily reviewed for fire prevention and control compatibility with adjacent Forest land.

C. Other Consultations

Listed below are contacts other than general public involvement activities listed in chronological order.

Telephone calls to the Sierra and Inyo National Forests to coordinate planning are so frequent that no record is kept on a regular basis. On the average, the Forest has talked by phone with both Forests two or three times per month for the last four years. The same is true with calls to BLM's Bakersfield District. They have been contacted by phone about once per month for the past 3-1/2 years.

Mid 1979	Provided roadless area boundaries to Tehipite Chapter of Sierra Club.
7/11/79	Meeting with Sierra NF and Tehipite Chapter of Sierra Club in Fresno to discuss planning in general.
1/13/80	Meeting in Claremont of South Zone planners to coordinate planning.
1/15/80	Program presented to Tulare County Practicing Planners on Sequoia Planning process.
1/22/80	Meeting in Sacramento with State Resources Agency to hear their scoping concerns.
5/22/80	Sierra public meeting on their scoping document. Attended by Sequoia to coordinate with them and hear public comments.
5/28/80	Meeting with BLM Bakersfield District for scoping and coordination in handling roadless and WSA's.
6/17/80	Meeting with Mountain Home State Forest for scoping.

7/1/80	Meeting with Tribal Council representatives for scoping.
8/8/80	Meeting with American Indian Council for scoping.
8/15/80	Meeting with Sierra Club and Audubon Society representative at their request to brief them on planning process.
9/4/80	Meeting with BLM to discuss coordination with their Desert planning.
9/8/80	Meeting with South Zone planners to coordinate and identify common tasks.
10/28-29/80	Meeting with Central Zone Forest and Regional Office to discuss planning direction.
10/30/80	Meeting with South Zone planners to coordinate completion of common tasks.
11/25/80	Meeting with Kern County discussion of sketch map for general plan update.
1/13/81	Meeting with South Zone planners and Supervisors on identification of zonal resource information needs.
1/26/81	Meeting with BLM Bakersfield on information needed from them for WSA's.
2/3-4/81	Meeting with South Zone Forests to discuss incorporation of fire planning into Forest Planning.
2/5/81	South Zone Forests coordination meeting.
2/17/81	Meeting with Sierra Club representative at his request to explain planning progress.
2/18/81	Meeting with Eldorado NF to learn of their handling of transportation analysis for planning.
2/23/81	Meeting with Central Zone Forests to discuss capability area structure.
2/24-25/81	Central Zone Forests and Regional Office meeting to discuss planning direction.
3/17/81	Meeting with BLM Bakersfield to coordinate planning between agencies and discuss Interagency Agreement for planning effort.
3/26/81	South Zone specialists meeting in Ontario to coordinate resource information production.

4/1/81	South Zone planners meeting in Claremont to coordinate planning between adjacent Forests.
4/14-16/81	South Zone meeting and training in development of prescriptions.
4/28/81	Meeting of Forest and Regional Socioeconomists to discuss planning direction and IMPLAN.
4/30/81	Meeting of South Zone specialists to coordinate handling of Range, Wildlife and vegetation.
5/27/81	South Zone mineral group meets with Forest to discuss minerals information they provided.
6/1/81	Meeting with BLM Bakersfield to discuss handling of WSA's.
6/2-3/81	South Zone planners meeting for planning prescription training.
7/13-14/81	South Zone planners meeting for general coordination between Forests.
8/3-4/81	Meeting of South Zone planners to discuss planning prescriptions.
8/6/81	Meeting with Kern County, review of General Plan update.
9/15-16/81	Meeting of South Zone planners and Supervisors description of program and identification of coordination needs.
1/28/82	Meeting of South Zone planners on discussion of systems needs, resource information coordination and standards and guidelines.
2/2/82	Rod Goss from California Department of Fish and Game joins planning team on two-year assignment.
2/17-18/82	Meeting of planners with Regional Office personnel on LMP direction, support priorities and data bases.
3/9/82	Meeting in Fresno of Central Sierra Forest to discuss spotted owl management.
3/25/82	Meeting of South Zone planners and Supervisors. Discussed RPA link to planning, need for S.O. staff to R.O. Staff contact.
3/26/82	Meeting with Tulare County planners to brief them on our progress and discuss coordination of direction that could affect private land.
3/31/82	Meeting with Sierra Club representative at his request to discuss planning progress in general.

5/18/82	Meeting in San Bernardino to discuss handling of social assessment in planning.
6/22/82	Attended BLM public meeting in Fresno to discuss South Sierra Foothill planning.
7/7/82	Meeting with Inyo NF planning group in Ridgecrest to coordinate data gathering, data storage and retrieval, and handling of shared Roadless Areas.
7/15/82	Meeting in Sonora of Central Zone Forest to discuss handling of Fire Plan during Forest planning.
7/16/82	Meeting with Western Timber Association representatives at their request to review planning progress, constraints and production functions.
7/27/82	Meeting with Southern California Edison to discuss potential hydroelectric sites.
9/20/82	Meeting of Central Forest with Tahoe NF to discuss their planning and review their rough DEIS.
1/5/83	Meeting South Zone planners on update of progress document review procedure.
2/1/83	Meeting with Central Zone Forests in Fresno to discuss handling of spotted owls.
2/15/83	Meeting with Southern California Edison, discussion of planning progress in general.
2/22-23/83	Meeting of Forest planners with Regional planners. Discussion on handling of Roadless Areas, analyze requirements, and document review process.
3/18/83	Presentation of Forest planning process to Southern California Watershed Fire Council.
5/2/83	Meeting with Eldorado NF to discuss use and structure of FORPLAN for planning.
7/18-20/83	Meeting of Forest planning staffs with Regional Office (RO) planners. Discussion of what new planning direction will be and organization to carry it out. Discussed rescoping of Roadless Areas.
8/17/83	Meeting with Sierra Club representative at his request on planning progress in general.
8/23/83	Meeting with Regional Office wildlife group on wildlife constraints for planning.

9/27/83	Meeting of South Zone planners to discuss data matrix check procedures and to schedule for completion of document reviews. Agreed to exchange data on costs by activities.
9/28/83	Meeting with BLM representative to exchange information on planning and their participation.
10/18/83	Meeting with Klaus Barber on structure of Sequoia's FORPLAN model and opportunities to streamline it.
11/14/83	Meeting of Forest and Regional planners to review new planning direction.
12/2/83	Meeting with Sierra and Stanislaus to discuss handling modeling of wildlife in FORPLAN.
12/6/83	Meeting with CALTRANS to discuss possible extension of Highway 190 across Sierra Nevada.
12/7/83	Meeting of Central Zone Forests to discuss soil and water coordination.
12/14/83	Meeting with Central Zone Forests to discuss FORPLAN matrix for first check point.
1/11/84	Meeting with Central Zone Forests on FORPLAN matrix review.
1/12/84	Meeting with Central Zone Forests to discuss handling of watershed, soils and fishery resources for planning.
1/16/84	Meeting with Sierra and R.O. planners to agree on handling of shared Roadless Area.
4/10/84	Meeting with Western Timber Association to allow review of assumptions and values.
4/23/84	Meeting with Sierra Club representative to describe planning progress.
6/22/84	Meeting with Tulare County Planning representatives to discuss urban interface areas and our planning in general.
8/9/84	Met with Audubon Society representative to discuss Alternatives and planning progress.
8/14/84	Gave California Department of Fish and Game, Region IV, copy of plan alternatives and issues resolution paper for review and comment.
8/17/84	Discussion with BLM District Office on Rockhouse WSA and our EIS presentation.
8/27/84	Meeting with BLM Caliente District representatives to coordinate our handling of their WSA in planning.

10/25/84	BLM representatives attended Forest Management Team Meeting to review and discuss our handling of their WSA.
10/26/84	Sent BLM District Office our planning schedule and Further Planning and Wilderness Study Areas outline.
11/12/84	Send Inyo NF emphasis map and W&SR map for coordination purposes.
12/3/84	Talked to Inyo NF planner and discussed information sent 11/12 regarding coordination at boundary.
12/3/84	Meeting with Sequoia and Kings Canyon National Parks representatives to coordinate our planning. Wilderness Management, Fire Management, and W&SR recommendations were the primary subject.
12/4/84	Meeting with Western Timber Association and Industry Committee at their request. Benchmarks and alternatives were reviewed and discussed.
12/13/84	Talked to BLM District Office regarding prescriptions to use for alternatives on their WSA.
12/17/84	Talked to BLM District Office regarding the wilderness prescription to use for their WSA.

The Public Participation Process for release of the Draft Forest Plan and Draft Environmental Impact Statement began November 11, 1985. Subsequent involvement activities were:

11/85-9/86	Numerous meetings with a broad range of interests regarding their input.
11/18/85	News release of availability of Draft Plan and Draft EIS for public review and comment with comment period to March 28, 1986.
11/18/85	Mail out of Draft Plan and DEIS to those on LMP mailing list and libraries statewide. Subsequently, others requesting were sent copies also.
11/29/85	Notice of Availability of Draft Plan and DEIS published in the Federal Register.
11/29/85	Notice of Availability of Draft Plan and DEIS - article in Internal Sequoia National Forest newsletter to inform employees and retirees.
12/85	Held meetings on all Forest Ranger Districts and Supervisor's Office to brief employees about Draft Plan and DEIS.

1/7 - 3/5/86	Public meetings to present and discuss Draft Plan and DEIS: Kernville - January 7, 1986; Bakersfield - January 9; Palmdale - January 14; Porterville - January 16; Visalia - January 21; and Ridgecrest - March 5. News releases were also made just prior to each meeting.
1/30/86	Overview of LMP Program given to Lake Isabella Exchange Club.
1/31/86	Meeting with publishers of Kern Valley Sun to discuss LMP - Resource Management.
2/20/86	Meeting with California Department of Fish and Game officials to discuss LMP and Spotted Owl Management.
3/86	News release announcing extension of comment period to April 28, 1986 and Public Hearing dates.
3/86	Notice of extension and hearing dates in Federal Register.
3/86-6/86	Public response coding, analysis and synthesis.
3/11/86	Meeting with Kern County Cattlemen's Association to discuss Range Management and LMP.
3/21/86	Amendment to Notice of Availability of Draft Plan and DEIS and Notice of Public Hearings and dates - Published in the Federal Register.
4/86	Conducted Public Hearings: Visalia - April 10, 1986; and Kernville - April 17, 1986.
4/1/86	Meeting with Kern County Cattlemen's Association to discuss Range Management and LMP.
4/25/86	Meeting with Roy Ashburn, Kern County Supervisor.
4/28/86	Official public comment period on Draft Plan and DEIS ended. Each respondee received a postcard verifying receipt of their written comment.
5/1/86	Meeting with timber purchasers to discuss Timber Program and LMP.
5/7/86	Meeting with Pyles Boys Camp officials to discuss LMP issues.
6/1/86-11/7/86	Several Forest Management Team meetings to develop additional modified alternatives, finalize critical issues, and develop Preferred Alternative.

6/4/86	Meeting with Poso Cattlemen to discuss Range Management and LMP.
6/5/86	Field trip with Tulare County Board of Supervisors to discuss Forest Issues.
6/6/86	Field trip on Tule River Ranger District with Dwight Willard, Save-the-Redwoods League, to discuss management of giant sequoias and LMP.
6/7/86	Attend meeting of Sportsman Council of Central California and discuss Forest wildlife program and LMP.
6/16/86	Meeting with California Department of Fish and Game officials to discuss wildlife management and LMP.
6/27/86	Meeting with California Department of Fish and Game officials to discuss wildlife management and LMP.
6/28/86	Attended meeting of Kaweah Flyfishers Association and discussed fishery management and LMP.
7/31/86	Meeting with Pyles Boys Camp officials to discuss camp objectives and LMP.
8/18/86	Meeting with California Department of Fish and Game officials to discuss LMP issues.
8/21/86	Meeting with Kerncrest Audubon Society representatives to discuss LMP issues.
8/26/86	Meeting with Mining Group Interest representatives in Kern Valley at Kernville to discuss LMP issues.
8/27/86	Meeting with local timber operators to discuss LMP issues.
8/28/86	Meeting in Bakersfield with the Sierra Club and Native Plant Society representatives to discuss LMP issues.
8/28/86	Meeting with Kern Valley High Sierra Stock Users Association representatives and Equestrian Trail Inc. Corral representatives of Ridgecrest to discuss LMP issues.
8/29/86	Meeting with Kern Valley Wildlife Association representatives to discuss LMP issues.
8/31/86	Meeting with Kennedy Meadows Property Owners Association representatives to discuss LMP issues.
9/1/86	Meeting with California Off-Road Vehicle Association (CORVA) representatives to discuss LMP issues.

9/1/86	Meeting with Kern Valley Indian Council representative to discuss LMP issues.
9/13/86	Meeting with High Sierra Stock Users Association members to discuss LMP and volunteer projects.
10/31/86	Field trip on Tule River Ranger District with Kern Valley Wildlife Association and Sierra Club members to discuss timber management program, giant sequoia management, and LMP.
11/25/86	Tulare City Noon Lions Club meeting to discuss LMP and other Forest programs.
11/25/86	Executive review with Regional Forester of Forest Plan, Plan Issues, and Issue Resolution.
12/29/86	Meeting with Sierra Club representatives to discuss LMP and timber management program.

The Forest Supervisor met with representatives of the following organizations and discussed LMP on the dates indicated:

Forest Products Industries:	1/24/86; 2/14/86; 3/5/86; 3/25/86; 3/31/86; 6/10/86; 8/28/86; and 12/15/86.
Sierra Club:	2/20/86; 3/14/86; 4/25/86; 7/7/86; 9/18/86; 9/20/86; 11/20/86; and 8/28/87
Sierra Club	
Kern-Kaweah Chapter:	1/15/87
Joe Fontaine and Gordon Nipp:	1/16/87
Joe Fontaine:	6/26/87
Tulare County Supervisors:	2/20/86; 3/11/86; and 6/5/86.
Congressional Assistants to	
Congressman Thomas:	9/4/86;
Congressman Pashayan:	9/30/86.
Utility Company Representatives:	2/20/86; 4/24/86; and 5/21/86.
High Sierra Stock Users	
Assn Representatives:	2/20/86; 5/2/86; and 9/2/86.
Public Lands Committee:	1/5/87
Kaweah Flyfishers and Kings River Interests Representatives:	2/28/86; 6/28/86; and 8/12/86.
Kern Kaweah Flyfishers:	8/18/87

California Dept of Fish and Game Officials:	3/13/86; 5/30/86; 4/24/87; and 5/7/87
Trust for Public Lands:	6/24/86
BLM Area Officials:	8/13/86
Pyles Boys Camp Officials:	8/28/86
Board of Directors:	5/16/87
Kern Valley Wildlife Assn:	1/13/87; and 3/4/87
Representatives:	9/24/86
National Parks and Recreation Assn Representatives:	10/24/86
Interagency Members:	*12/1/86*
Cal-Poly Students at Cal-Poly:	2/9/87
Watershed Fire Council:	3/20/87
Coop Fire Meeting with Kern County, BLM, etc.:	*6/3/87*
Mountain Meadow Workshop (several other egencies):	*7/21/87*
At least two dozen discussions about LMP with County Boards and Congressional Delegations:	1/87 - 10/87

Forest Management Team - Land Management Planning Team

Reviewed monitoring plan, vision statements, FORPLAN runs and schedules:	1/15/87
Review Record of Decision:	2/12/87
Review results of executive review:	3/30/87
Spotted owl update, range of alternatives, schedules:	7/6/87
Analysis of effects spotted owl management on Forest management:	8/25/87
Reviewed analysis of PRF Alternative with various proportions of uneven-aged management:	9/28/87

Region 5 - Land Management Planning Meetings

RO - IDT technical review of (draft) final documents (FEIS, Plan, Record of Decision):	3/9-10/87
Executive review of (draft) final documents:	3/23/87
Met with RO Staff regarding revision of spotted owl network and modeling:	4/8-10/87

Delay of Land Mangement Plan announced

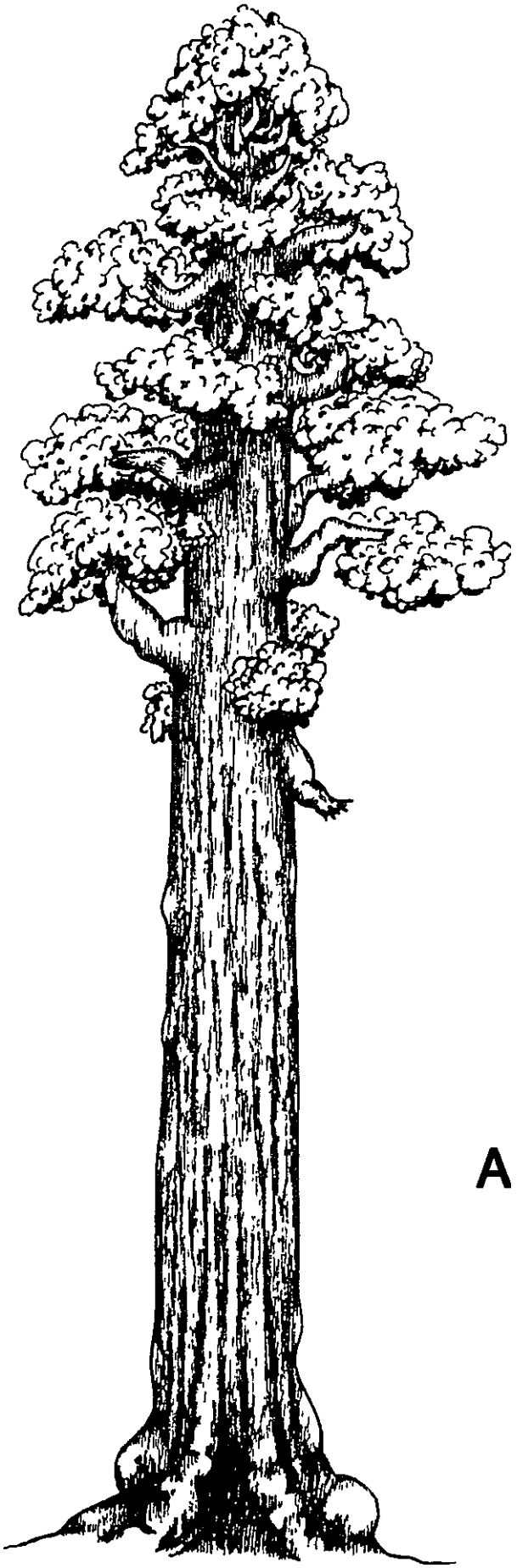
The Forest sent out a news release to the public announcing delay of the release of the Final Land Management Plan. Postcards were sent to people on the LMP mailing list on June 20, 1987.

III. The Selected Issues, Concerns and Opportunities

A. The list of selected Issues, Concerns and Opportunities can be found in Chapter 1.C. of the EIS.

B. The degree to which Issues, Concerns and Opportunities are resolved by the Alternatives can be found in Chapter 2.E.5 of the EIS.

C. A discussion of how Issues, Concerns and Opportunities were used to formulate Alternatives can be found in Chapter 1.C. and Chapter 2.B. and 2.E.4. of the EIS.



Appendix B

MOQELING

AND

ANALYSIS PROCESS

APPENDIX B

THE MODELING AND ANALYSIS PROCESS

I. INTRODUCTION

The purpose of this appendix is to present a technical discussion of the analysis process. The models used (including the basic assumptions, model components and inputs, modeling rules and methods, and the modeling constraints imposed along with their rationale and impacts) are described in detail. Information presented in this chapter supplements the broader and less technical descriptions included in the body of the FEIS. See Chapter 2 Section B for a description of the overall process; Chapter 2 Section C for the result of the benchmark analysis; and Chapter 2 Section E for additional discussion of the alternatives.

The analysis process revolves around the optimization model, FORPLAN (Johnson et al, 1980). FORPLAN guarantees the formulation of feasible and cost efficient alternatives and benchmarks, and performs detailed accounting work needed to construct the display tables in the FEIS. Additional simulation models are used to generate input data for use in FORPLAN. The National Fire Management Analysis System (FIREPLAN) generates fire management costs and resource effects associated with varying fire management organizations. Outputs from FORPLAN are used in habitat capability models to estimate effects on wildlife and fish populations. A more detailed description of each of these models is included in this appendix.

It should be kept in mind that neither FORPLAN nor any other model can perfectly represent the "real world". Therefore, results from the modeling process are only approximations of what to expect when alternatives are further developed into applied action plans. Since the objective of modeling is to provide insight and clarify knowledge, an approximation is fully adequate to compare alternative management strategies against one another. In this way a choice between alternatives can be made even though the model may lack precision in describing specific attributes within a given alternative.

11. FOREST PLANNING MODEL (FORPLAN)

A. Overview

FORPLAN is a specialized matrix generator and report writer for a standard linear programming algorithm (FMPS). Linear programming is a standard mathematical technique for solving simultaneous linear equations subject to a certain set of constraints and a particular objective function. In its simplest form this is expressed mathematically as:

Maximize: $z = c_1x_1 + c_2x_2 + \ldots c_nx_n$ (Objective function)

Subject to: $a_{11}x_1 + a_{12}x_2 + \ldots a_{1n}x_n \geq b_1$

(Constraint set) $a_{21}x_1 + a_{22}x_2 + \ldots a_{2n}x_n \leq b_2$

$a_{m1}x_1 + a_{m2}x_2 + \ldots a_{mn}x_n = b_m$

$x_j \geq o$

These mathematical expressions can also be shown in the following matrix:

	Column j=1	Column j=2	Column j=3	Column j=n	Constraint Type	Right hand side constraint
Obj. Function	c_1x_1	c_2x_2	c_3x_3	c_nx_n		maximize
Row i=1(Timber)	$a_{11}x_1$	$a_{12}x_2$	$a_{13}x_3$	$a_{1n}x_n$	$\geq$	b_1
Row i=2(Land)	$a_{21}x_1$	$a_{22}x_2$	$a_{23}x_3$	$a_{2n}x_n$	$\leq$	b_2
Row i=m	$a_{m1}x_1$	$a_{m2}x_2$	$a_{m3}x_3$	$a_{mn}x_n$	=	b_m
				x_j	$\geq$	o

In the FORPLAN formulation, the linear equations (rows) represent resource production functions, costs, and acreage or other types of constraints. For example, row 1 might represent timber production; row 2 might represent total cost; row m might represent acres burned by wildfire. The columns (j=1, n) represent the different activities (prescriptions) which can occur over time on specific units of land called analysis areas (represented by x_j). The a_{ij}'s in the matrix are the production, cost, or resource coefficients associated with each prescription/analysis area combination.

The b_i's are the right-hand-side constraints representing exact amounts (=) or upper ($\leq$) or lower ($\geq$) constraint levels that must be met. In the example above, if row 1 represented timber production, the interpretation of the constraint $a_{11}x_1 + a_{12}x_2 + a_{13}x_3 \ldots + a_{1n}x_n \geq b_1$ would be the total amount of timber produced from all prescription and analysis areas must be greater than or equal to the amount b_1,

The FORPLAN model was built by representing the production functions, costs, values, and resource supplies for the Forest in the mathematical format described above. For the Sequoia NF. the resulting model contained approximately 2,500 columns and 18.000 rows. Once the model was formulated, a number of test runs were made to check the model for reasonableness and to make additional calibrations. Land allocations, activity and

output schedules, costs, benefits, and present net value were developed by altering the objective function and constraint set to meet the theme of each alternative and benchmark and then running the model.

Unique constraint sets were developed to represent Minimum Management Requirements (MMR's), Timber Policy Constraints (TPC's), Minimum Implementation Requirements (MIR's), Forest specific requirements. specific land allocations, and output schedules needed for individual alternatives.

An iterative process was used to formulate these constraint sets prior to making final FORPLAN runs for the alternatives and benchmarks (*see* sections G, H, I, and J of this appendix).

FORPLAN was used to determine the cost efficient mix of goods and services that could be produced from the Forest given the objectives and constraints of each alternative. The trade-offs made among alternatives were examined and the costs and benefits associated with each objective or constraint measured. This analysis provided a way of indirectly evaluating the non-priced benefits by measuring the amount of present net value (PNV) foregone. The final criterion used to evaluate alternatives was net public benefits (NPB), which is the PNV plus consideration of nonquantifiable Forest resource benefits. Economic analysis of tentatively suitable timber lands required by CFR 219.14(b) is inherent in FORPLAN modeling design including the PNV objective function.

Management activities modeled in FORPLAN were identified by resource specialists and approved by the Interdisciplinary Team (IDT). This pre-FORPLAN analysis included:

1. The activities that could be applied to National Forest System lands.

2. Those activities that could be modeled in FORPLAN.

3. The kinds of land to which each activity could be applied.

4. The costs, outputs, and benefits which would result from the application of each activity to a specific type of land.

5. The compatibility of activities when applied to the same land area.

This provided the basis for a matrix of all possible management activities which could be modeled and their associated costs, outputs, and benefits.

Activities which were desired but were not modeled in FORPLAN required the use of additional constraints. The cost of doing these activities was the reduction in PNV caused by the application of the additional constraints.

B. Land Units

Capability areas are the smallest unit of land (or water) used in forest planning. They are discrete and recognizable units classified primarily according to biological (e.g., vegetation) and administrative (e.g., county lines, Forest boundary, Roadless Areas) factors. All land within a capability area is homogeneous in its ability to produce resource outputs and in its production limitations. The Sequoia NF has 19,000 capability areas.

Capability areas were developed by overlaying existing map information. The Wildland Resource Information System (WRIS) was used to calculate capability area acreages and to number each area for identification in the data base (Forest Planning File). The Forest decided what information was needed for each capability area to assess resource opportunities and public issues; and, then, collected that information about each area. Different resource attributes were determined for each capability area. (See Sequoia NF's Planning File for detailed discussion of resource data collected.) This information was entered into a computerized data base system at Fort Collins Computer Center. Once entered into the system, information on capability areas could easily be retrieved, sorted, aggregated, and analyzed.

Because of their large number, individual capability areas could not be used in FORPLAN. Use of such a large number of land units would be cumbersome, expensive, and would have exceeded the matrix size limits that can be utilized in FORPLAN. Analysis areas were created to handle this problem. Analysis areas are an aggregation of like capability areas with sufficiently similar physical, biological, and administrative conditions such that they would probably respond in a like manner to management activities. Each capability area was given an analysis area identifier so the data base could be queried for the land information needed to build the FORPLAN model.

The delineation of the analysis areas required several steps.

The analysis areas were defined using the physical and biological attributes proposed by the resource specialists as a level of stratification, or level identifier in FORPLAN. Because FORPLAN could accommodate only six level identifiers, the number of attributes initially selected by the resource specialists were greater than could be used. This forced the ID Team to select the most critical attributes necessary to address the planning problems and to consider the reliability of the data for making yield and cost estimates.

The selection of which resource outputs to monitor in FORPLAN was guided by the problems identified by the Forest issues, concerns, and opportunities.

The Sequoia identifiers are as follows:

Identifiers

*LEVEL1		**Issues** Areas "Forest ICO and Program Areas"	
NF	FOREST	NF:	Forest-Wide activity-Outputs (Area=Forest)
FP	FIR-PR	FP:	FFP Fire Program - Forest-wide
RP	RGN-PR	RP:	Range Program - Improvements
WP	WLF-PR	WP:	Wildlife Program - Improvements
RC	REC-PR	RC:	Recreation Program - Improvements
DS	DESIGN	DS:	Designated-Classified Areas Fix Allocations
AL	ALLOCA	AL:	Allocated (Fix) for the Alternative
DN	FP-DEN	DN:	Further Planning Area: Dennison
MS	FP-MOS	MS:	Further Planning Area: Moses
KR	FP--KR	KR:	Further Planning Area: Kings River W & S River
GF	GENFOR	GF:	General Forest - Open Allocation
H1	SOT-H1	-1:	HLRD SOHA-1, Group of 3 Spotted Owl Habitat Areas
H2	SOT-H2	-2:	HLRD SOHA-2, Individual Spotted Owl Habitat Area
H3	SOT-H3	-3:	HLRD SOHA-3. Individual Spotted Owl Habitat Area
H4	SOT-H4	-4:	HLRD SOHA-4, Individual Spotted Owl Habitat Area
H5	SOT-H5	-5:	HLRD SOHA-5, Individual Spotted Owl Habitat Area
T1	SOT-T1	-1:	TRRD SOHA-1. Group of 3 Spotted Owl Habitat Areas
T2	SOT-T2	-2:	TRRD SOHA-2, Group of 3 Spotted Owl Habitat Areas
T3	SOT-T3	-3:	TRRD SOHA-3. Group of 3 Spotted Owl Habitat Areas
S1	SOT-S1	-1:	HSRD SOHA-1, Group of 3 Spotted Owl Habitat Areas
s2	SOT-S2	-2:	HSRD SOHA-2, Group of 3 Spotted Owl Habitat Areas
G1	SOT-G1	-1:	GRD SOHA-1. Group of 2 Spotted Owl Habitat Areas
G2	SOT-G2	-2:	GRD SOHA-2. Group of 2 Spotted Owl Habitat Areas
G3	SOT-G3	-3:	GRD SOHA-3, Group of 3 Spotted Owl Habitat Areas
C1	SOT-C1	-1:	CMRD SOHA-1, Group of 2 Spotted Owl Habitat Areas
c2	SOT-C2	-2:	CMRD SOHA-2, Group of 3 Spotted Owl Habitat Areas
C3	SOT-C3	-3:	CMRD SOHA-3. Group of 3 Spotted Owl Habitat Areas
C4	SOT-C4	-4:	CMRD SOHA-4, Group of 2 Spotted Owl Habitat Areas
C5	SOT-C5	-5:	CMRD SOHA-5, Individual (Burton)
SO	OWLNET		Spotted **Owl** Network Aggregate
M3	REGEN2	M2:	Model 2 Transfer **AA's**
--	-----	--·	Not one of the above (Null)
*AGGREGATE LEVEL1			
90	ACRES-GF DS AL	*90:*	Acres (Non-Duplicating **or** Overlapping)
*LEVEL2		-Econ_	Zones *Economic Zones & ICO Overlaps*
Z1	ECN-Z1	Z1:	Economic Zone #1 Unroaded
Z2	ECN-Z2	Z2:	Economic Zone #2 Partial Roaded
Z3	ECN-Z3	z3:	Economic Zone #3 80-% + Roaded
PR	PRANGE	PR:	Primary Range Lands
SC	SRANGE	SC:	Secondary Range Lands
WN	BUCK-L	WN:	Bucks Lake Wilderness
WR	WILDRV	WR:	North Fork of American Wild River (95-625)
SU	SP-Use	SU:	Special Use Permitted Areas Greater than 20-Acres
DR	DEVREC	DR:	Developed Recreation Sites (Non-Skiing)
SK	SKIING	SK:	Existing Ski Areas Under Permit
SO	-SOMA-	SO:	Spotted Owl Management Areas
--	-----	--·	Not **One** of the Above **(Null)**

*AGGREGATE LEVEL2			
9D	ALLDEV DR SK	9D:	Developed Rec Areas
*LEVEL3		-Suit--Type • TBR Suitability & Type of AA*	
MI	MILES-	MI:	Miles
CP	CAPCTY	CP:	Percent Capacity Used
PR	PROGRM	PR:	Program - Projects - Etc.
NA	NOTAVL	NA:	Lands not Available for TM Harvest
US	UNSUIT	US:	Lands not Suitable-Capable for TM Harvest
NS	NONSTK	NS:	Conifers Sites not Stocked (Brush or Hwd)
T1	CCSWTH	T1:	Lands Suitable for CC-SW-TH-uE
T2	CCSW--	T2:	Lands Suitable for CC-SW-uE
T3	sw--uE	T3:	Lands Suitable for SW-UE
T4	UE----	T4:	Lands Suitable for UE-Extensive Mgnt Only
T5	EXT-SP	T5:	Lands Suitable for Special Treatment RX's
TS	TR-SEL	TS:	Lands Stratified for Tree Selection
--	------	--·	Not One of the Above (Null)
*AGGREGATE LEVEL3			
92	T1&&T2 T1 T2	92:	AGG T1-T2
93	T1T2T3 T1 T2 T3	93:	AGG T1-T2-T3
94	T1==T4 T1 T2 T3 T4	94:	AGG T1 through T4
9N	AGGUNS NA US	9N:	Lands Unsuitable or Not Capable for TBR MGNT
9T	TMSUIT T1 T2 T3 T4 NS TS	9T:	Timber Suitable & Available Lands
9A	ALLCOL US T4 NS NA	9A:	Allocated Acres to Reg Class III or Less
*LEVEL4		Forest-Type- *Vegetational Types*	
XX	--XX--	XX:	AGG Types
MC	--MC--	MC:	Mixed Conifer Type
PP	PP--JP	PP:	Ponderosa-Jeffrey Pine Type
EP	E-PINE	EP:	Eastside Ponderosa-Jeffrey Pine Type
EM	E-MXCN	EM:	Eastside Mixed Conifer Type
RF	--RF--	RF:	Red Fir Type
DF	--DF--	DF:	Douglas-Fir Type
SA	SUBAPL	SA:	Subalpine Types (WWP-MH-ETC)
LP	-LPP--	LP:	Lodgepole Pine Type
GS	--GS--	GS:	Giant Sequoia Type - Groves
HW	--HW--	HW:	Hardwood Type on Conifer Site
BR	CHAPRL	BR:	Brush-Chaparrel
GR	GRASS-	GR:	Grass-Rangeland
NF	NONFOR	NF:	Non-Forested Lands - Less 5%Forested
RT	-FR&T-	RT:	Forest Roads and Trails Mgnt
DS	-SITE-	DS:	Dev Recreation and Other Improved Sites
--	------	--·	Not One of the Above (Null)
*AGGREGATE LEVEL4			
90	OWTYPE GS MC PP HW RF	go:	Suitable Forest Types for Spotted Owls
9L	LIVFOR EP GR	9L:	Types Suitable for Forage Production
9M	GS&&MC	9M:	Mixture of GS and Mixed Conifer

	GS MC	
9G	GRSELT	9G: Types Suitable Group Selection
	MC RF EP LP GS	
*LEVEL5		-COND- Class *Condition Class or Structure
PL	RGN-PL	PL: Regeneration Plantations - Even-Aged Mgnt
TS	RGN-TS	TS: Regenerated Tree Selection or Groups
GS	RGN-GS	GS: Regenerated Tree Selection or Groups
IR	IN-RGN	IR: In the Process of Regeneration
BR	--BR--	BR: Brush
HW	--HW--	HW: Hardwood Stands
P1	--P1--	P1: Plantation less 10 Yrs - Disp Opening
P2	--P2--	P2: Plantation Greater 10 Yrs - Disp Not Opening
1X	--1X--	1X: Seeding (Not Plantations)
2P	--2P--	2P: Saplings < 40-% Crown Closure
2N	--2N--	2N: Saplings > 20-% < 40-% Crown Closure
2G	--2G--	2G: Saplings > 40-% Crown Closure
2X	--2X--	2x: Saplings : All Crown Closure
3s	--3S--	3s: Small Sawtimber < 20% Crown Closure
3P	--3P--	3P: Small Sawtimber >20 - < 40% Crown Closure
3N	--3N--	3N: Small Sawtimber >40% - <70% Crown Closure
3G	--3G--	3G: Small Sawtimber > 70% Crown Closure
3X	--3X--	3x: Small Sawtimber > All Crown Closure
4P	--4P--	4P: Large Sawtimber < 40% Crown Closure
4N	--4N--	4N: Large Sawtimber >40% - <70% Crown Closure
4G	--4G--	4G: Large Sawtimber > 70% Crown Closure
4x	--4X--	4x: Large Sawtimber > All Crown Closure
6G	--6G--	6G: Large Sawtimber In Multi-Store Stands
XG	--XG--	XG: Sawtimber in Moderate to Good Stkgd Stands
XP	--XP--	XP: Sawtimber in Poorly Stocked Stands
XX	AGG-CC	XX: Aggreated Condition Class (Size Density)
NF	--NF--	NF: Non-Forested
SN	UNSTKG	NS: Nonstocked Suitable Timber Lands
03	DBH<5"	03: Uneven Strata - DBH Group 0.0" - 4.9"
08	D:5-10	08: Uneven Strata - DBH Group 5.0" - 10.9"
13	D11-14	13: Uneven Strata - DBH Group 11.0" - 14.9"
18	D15-20	18: Uneven Strata - DBH Group 15.0" - 20.9"
25	D21-28	25: Uneven Strata - DBH Group 21.0" - 28.9"
34	D29-38	34: Uneven Strata - DBH Group 29.0" - 38.9"
45	DBH39+	45: Uneven Strata - DBH Group 39.0"+
Ex	EXT-AR	Ex: Existing Sites or Areas
PT	POT-AR	PT: Potential Sites or Areas
RH	REHBED	RH: Rehabed RVD's
ST	STRUCT	ST: Construction of Wildlife Structures
HB	HBTIMP	HB: Wildlife Habitat Improvement
--	------	--: Not one of the Above (Null)
*AGGREGATE LEVEL5		
9P	ALPLNT	9P: All Plantation & Seeding Stages
	P1 P2 1X PL TS GS	
9M	MATTBR	9M: Mature Timber Strata Available in Period '1'
	XP 3P 3G 4P 4G 6G	
9-	POORSK	9-: Poor and Spare Stocking Stands
	2P 3P 4P XP 3x	
9Q	Q-SOHB	9Q: Spotted Owl Habitat Strata
	6G 4G 3G 2G 4P XX PL XG	

90	OWLHBT 6G 4G 3G 2G XG	90:	Tbr Strata for Owl Nesting/Core
9G	AGG-XG 4G 3G 2G XG	9G:	AGG Condition Class - Good Stocking
9S	AGG-XP 4P 3P 2P XX	9S:	AGG Condition Class - Good Stocking 4X 3X XP
*LEVEL6		-LAND-	CLASS *LAND CLASSES - SLOPE & SITE CLASSES*
<4	SLP<40	<4:	Slopes Less Than 40-%
>4	SLP>40	>4:	Slopes Greater Than 40-%
AS	AGGSLP	AS:	Aggreated Slope-Site
S1	SITE-1	S1:	Dunning Site Class '1'
S2	SITE-2	S2:	Dunning Site Class '2'
S3	SITE-3	S3:	Dunning Site Class '3'
S4	SITE-4	S4:	Dunning Site Class '4'
S5	SITE-5	S5:	Dunning Site Class '5'
NC	NONCOM	NC:	Noncommercial or Non Capable Lands
--	------	--:	Not One of the Above (Null)
*AGGREGATE LEVEL6			
9L	SUIT-F <4 AS NC	9L:	Suitable for Livestock Forage Production
*LEVEL7		-MGNT--EMPH-	'Management Emphasis*
XX	-NULL-	XX:	Null
ML	MLV---	ML:	General Minimum Level of Mgmt
GA	FOR-A0	GA:	Forest-wide Activities & Outputs Above Minlvl
WP	WLF-PR	WP:	Forest-wide Wildlife-Fishery Projects
TF	TM-FUL	TF:	Timber Reg. Class I: Full Yields
TS	TS-SEL	TS:	Timber Reg. Class 11: Int. Uneven-aged Mgnt : Tree Selection
GS	GS-SEL	GS:	Timber Reg. Class 11: Int. Uneven-aged Mgnt : GR Selection
TR	TM-RED	TR:	Timber Reg. Class 11: Reduced Yields & Specialized RX's
TM	TM-MRG	TM:	Timber Reg. Class 111: Timber Yields Marginal
SS	SALVGE	SS:	Sanitation-Salvage
Tu	TM-UNS	Tu:	Timber Reg. Class IV: Unsuitable - Not Needed
SP	-SPNM-	SP:	Primitive or Semi-Primitive without Roads (Backcountry)
RN	--RN--	RN:	Roaded Natural
XW	X-WLDN	XW:	Existing Wilderness Mgmt Program
NW	+-WLDN	NW:	New or Expanded Wilderness Mgnt
TE	TE-DES	TE:	Designation of Areas to Threatened-Endangered Species
SD	SP-DES	SD:	Designation of Areas to Special Classification E.G. RNA'S
RR	RECRIV	RR:	Designation of Areas to Recreation River
SR	SCNRIV	SR:	Designation of Areas to Scenic River
WR	WLDRIV	WR:	Designation of Areas to Wild River
XD	XDVREC	XD:	Existing Developed Recreation Site (Non Skiing)
PD	+DVREC	PD:	Potential Developed Recreation Site (Non Skiing)
FC	FP:CUR	FC:	Current Level of Fire Program (FFP)
FS	FP:AIR	FS:	Air Attack Emphasis Program (FFP)
FA	FP:ATK	FA:	Initial GR Attack and Prevention EMPH (FFP)
FF	FP:FUE	FF:	Fuel Mgnt Fire Program (FFP)
CH	CHAPRL	CH:	Chaparral (Brush) Management

TD	TR+DSP	TD: New Trail Construction in 'RN' Areas
TW	TR+WLD	TW: New Trail Construction in Wilderness Areas
TP	TR+SPN	TP: New Trail Construction in 'SPNM' Areas
PF	RXFIRE	PF: Prescribed Fire
26	OWL-26	26: Mgnt of Owl Habitat by Even-Aged
20	OWL-20	20: Mgnt of Owl Habitat by Ext-Uneven-Aged
16	OWL-16	16: Mgnt of Owl Habitat by No Scheduled Harvest
TC	TM>RGN	TC: Timber to Range Type Conversion
LB	LVSTGB	LB: Range Mgnt Strategy-B : Some Livestock
LC	LVSTGC	LC: Range Mgnt Strategy-C : Extensive Livestock
LD	LVSTGD	LD: Range Mgnt Strategy-D : Intensive Livestock
--	------	--: Not One of *the* Above (Null)

*AGGREGATE LEVEL7

91	REGCL1 TF SS	91: Regulation Class #1 - Full Yields
92	REGCL2 TR GS 26 TS	92: Regulation Class #2 - Reduced-Modified Yields
93	REGCL3 TM 20	93: Regulation Class #3 - Marginal-Incidential Yields
9E	EVENAG TF TR 26	9E: Even-aged Timber Mgmt
9I	REG1&2 TF TR 26 TS	9I: AGG of Reg Classes 1 & 2
9J	REG-AC TF TR TM GS 26 TS 20 TC	9J: Regulated Timber Acres
9L	LIVFOR LB LC LD	9L: Livestock Forage Production - All Strategies
9M	AGG-MT TU 16 ML	9M: AGG Stand Maintenance with Mortality
M1	AGG-MI TU 16 ML TM 20	M1: Model -1- Rx's Aggregate
9O	OWL-MG 26 20 16 TS	9O: AGG of Mgmt Schemes for Spotted Owl Habitat Areas
9R	REGLTD TF TR TM GS 26 TS 20 TC SS	9R: Regulated Timber Harvest
9U	UNEVEN TM 20 TS	9U: Uneven-aged Tbr Mgmt Except for Group Selection
9V	ALL-UE TM GS 20 TS	9V: All Uneven-aged Tbr Mgmt
9X	EA-YLD TF TR GS 26 TC	9X: Yields Derived for Evenaged Table
9Y	VIEW-Y TR GS	9Y: Yields Derived for Partial Retention View Areas
9B	-FUEL- PF LD FF --	9B: AGG Fuel Management Program
9S	ALL-TS TS	9S: All Tree Selection Tbr Mgmt
CE	CAC-EV TF TR TM TU 26	CE: -CAC- All Me Associ with Even-Aged CAC
CG	CAC-GS GS TM TU	CG: -CAC- All Me Associ with Group Selection

*LEVEL8		-MGNT--INTY-	*Management Intensity*
FW	FOREST	FW:	General Administration - Forest-Wide A&O
MN	MAINTS	MN:	Min Level - Stewardship - Maintenance (No Develop.)
HB	ISLAND	HB:	Min Level: Wildlife-Snag Habitat Islands in Regen Units -5%-
BR	BR-HAR	BR:	Burned Plantation Mortality
SS	INTMED	SS:	Sanitation-Salvage of Mature Existing TBR
SV	SALVGE	SV:	Salvage from Catastrophic Mortality (Fire, Insects, Etc.)
SM	ST-MTN	SM:	Stand Maintenance
GS	GS-HAR	GS:	Group Selection (Units <5-Acres) with Plant on 100% of Acres
NR	NATRGN	NR:	Natural Regeneration - Planting on < or = 20-% Acres
TS	TS-HAR	TS:	Individual Tree Selection - Uneven-aged Mgmt -
CC	CC-HAR	CC:	Clearcut Harvest
SW	SW-HAR	SW:	Shelterwood Harvest
CT	CT-HAR	CT:	Thinning Followed by Clear Cut Harvest
ST	ST-HAR	ST:	Thinning Followed by Shelterwood Harvest
OC	OWL-EV	OC:	Specialized CC & SW RX's of Spotted Owls
OD	OWL-OD	OD:	Mgnt of Owl Habitat by Dedication -
OT	OWL-TH	OT:	Specialized RX's of Spotted Owls with Thin
OS	OWL-TS	OS:	Specialized Tree Selection Spotted Owl RX's
OU	OWL-ou	OU:	Specialized RX's of Spotted Owls by Stand Maint.(Uneven)
OG	OLD-GR	OG:	'Old-Growth' Management (Untreated)
TC	TYPECV	TC:	Type Convert to Timber
RC	PP>>GR	RC:	Type Convert to Range
EA	EA-HAR	EA:	Regen Even-Aged Management - Final Harvest Only
ET	ET-HAR	ET:	Regen Clear-cut with Thinning - Odd Yr Cycles
TE	TE-HAR	TE:	Regen Clear-cut with Thinning - Even Yr Cycles
ES	Es-HAR	ES:	Reg Shwd Even-Aged Management is 'Required'
LS	LOWSTD	LS:	Low Standard Mgnt of Rec. Areas
SD	FULSTD	SD:	Full Standard Mgnt of Rec. Areas
RH	REHABT	RH:	Rehabt of Recreation Sites-Areas from Low to Full
NC	NCONST	NC:	New Construction of Sites
-4	-40*$$	-4:	Reduction in Fire Program Budget
-2	-20*$$	-2:	Reduction in Fire Program Budget
CR	CUR*$$	CR:	Current Budget for Fire Programs
+2	+20*$$	+2:	Increase in Fire Program Budget
+4	+40*$$	+4:	Increase in Fire Program Budget
RW	VOL-RW	RW:	Right-of-way Timber Volume - Regulated RX's
XX	XX-CAP	XX:	Excessive Capacity
FC	FACLTY	FC:	Facilities Management
--	------	--:	Not One of the Above (Null)
*AGGREGATE LEVEL8			
9A	ALLHAR	9A:	All Regul Harvest
	CC SW EA CT ST ET ES OC OS OT		
	TS RW SV		
9C	ALL-CC	9C:	All Clearcutting or Clearing
	CC CT EA ET TE RC TC		
9F	ALFHAR	9F:	All Regul Harvest from Final Harvest
	CC SW EA OC ES TC GS OS RC TS		

	RW SV		
9R	RVD-RH	9R:	All RVD RX's Less Rehbt.
	LS SD NC		
9S	ALLOWL	9S:	All Suitable Habitat with in 'Owl Territory'
	QT QIL QS QD QC		
9T	ALLTHN	9T:	All Regul Harvest from Thinning
	CT ST ET TE OT SS		
9U	ALL-UE	9U:	All Uneven-Aged Mgmt Regimes
	GH OU TS SM OS		
9X	TI-RPA	9X:	Timing Limited to RPA Planning Horizon (50-Yrs)
	SW SV		

ANALYSIS AREA GROUP AND ZONE AGGREGATES

ZN#1	PROGRAM	RG1	RG2	RC1	RC2	RC3	RC4	WF1	FP1	GF1
A535	AA#535	535								
A536	AA#536	536								

QUALIFIERS

D	D:STAND	DBH	N O

TREATMENT TYPES

+	TIME IMPLMT	N	N	N	N	N	N	N	N	N	Y	N
&	AGE IMPLEMT	Y	Y	Y	N	Y	N	N	N	N	Y	N
U	TREE SELECT	Y	Y	Y	N	Y	Y	N	Y	Y	Y	N
E	CC&RW HV(EX)	Y	Y	Y	N	Y	Y	N	Y	Y	Y	N
R	CLEARCUT(RG)	Y	Y	Y	N	Y	Y	N	Y	Y	Y	N
T	THIN(PLANT)	N	N	N	Y	N	N	N	N	Y	Y	N
I	INTERMD(MAT)	N	N	N	Y	N	N	N	N	Y	Y	N
S	SANT-SALVAGE	N	N	N	Y	N	N	N	N	Y	Y	N
M	MORT-BRPL	Y	Y	Y	N	Y	Y	N	Y	Y	Y	N
N	NONSIKG CNVT	Y	Y	Y	N	Y	N	N	Y	Y	Y	N
W	INVENTORY	N	N	N	N	N	N	N	Y	N	N	N
P	PERM RGE CON	Y	Y	Y	N	Y	N	N	N	N	Y	N
1	1ST SHWD(SD)	Y	N	N	N	N	N	Y	N	Y	Y	N
2	2ND SHWD(OV)	N	N	Y	N	Y	N	Y	N	Y	N	N
G	GR-SEL(UE)	Y	Y	N	N	N	N	Y	N	Y	Y	N
D	TREE SL(P)(	Y	Y	N	N	N	N	Y	N	Y	Y	N
L	REGN LAG (UE)	N	N	Y	N	Y	N	Y	N	Y	N	N
X	PLANT>TR-SEL	N	N	N	Y	N	N	N	N	Y	Y	N

The need to maintain the geographic identity of some individual capability areas limited the amount of aggregation that could occur. The Sequoia National Forest data base has a total of 321 analysis areas, based on actual National Forest System acres and three analysis areas not representing real acres (comprising combinations of wildlife habitat improvement projects, facilities management, fire programs, dispersed recreation, watershed improvement, and road obliteration).

Management areas are units of a single vegetative type, except for recommended designated areas (Wilderness, Special Interest Areas, Wild and Scenic Rivers, and Research Natural Areas), which are allocated to the same management emphasis. Management areas relate to analysis areas in that management areas are delineated by combinations of analysis areas or portions of analysis areas. The management area boundary and its associated management emphasis may vary by alternative based upon each alternative's theme. Management areas are not necessarily contiguous but

each contiguous unit is large enough to facilitate plan implementation and administration. Designated areas may contain several vegetative types but all types within an area are managed with the same emphasis.

C. FORPLAN Prescriptions

A Management Prescription is the set of management practices and the schedule for their application on a specific area of land to achieve desired objectives. These Management Prescriptions were developed by the Interdisciplinary Team to represent a broad range of management emphases and intensities which would respond to issues, concerns, and opportunities

(see the Forest's planning records for more detail). Management Prescriptions represent the most cost efficient mix of practices to achieve the objectives of each management emphasis.

A difference exists between FORPLAN prescriptions and prescriptions applied to management areas. The activities in Management Prescriptions have standards and guidelines, while FORPLAN prescriptions have no built-in constraints. Spacially Management Prescriptions are determined either as a result of delineating FORPLAN solutions or by allocating specific lands within the FORPLAN model to a Management Prescription and its associated practices.

FORPLAN prescriptions were developed by the Interdisciplinary Team to allow consideration of the full range of management activities physically possible on the respective analysis areas. A minimum level prescription was created for each analysis area to allow a range of choices from full intensive management for a particular resource through no active management. The choice of prescriptions identified for each analysis area was limited only by technical feasibility. For example, mechanical treatments of vegetation was not allowed on slopes over 40 percent, while prescribed burning was available for all slope classes.

A summary of FORPLAN prescriptions is listed below with additional information included in the FEIS Chapter 2 and in the planning records. The large majority of these deal with vegetation treatments while a lesser number deals with recreation activities and fire management options. These prescriptions are varied over space and time in the FORPLAN model to achieve resource objectives as defined by the alternative themes and the associated Management Prescriptions.

Vegetation treatment can be accomplished by practices such as thinning, shelterwood and clearcut regeneration, individual or group tree harvesting, prescribed fire, mechanical and hand treatments. Reforestation cultural treatments include mechanical, chemical and hand methods. The type of treatment(s) available vary depending on the type of vegetation, its age, density, and slope of the land.

Recreation prescriptions involve combinations of dispersed and developed emphases with the following intensities: low standard management, standard management, rehabilitation, construction, and shutdown.

The fire organization prescriptions vary in emphasis and intensities. The emphases are built around budget levels and different mixes of programs. They include: minimum level, current or base 1982 program, current minus 40 percent, current minus 20 percent, current plus 20 percent, current plus 40 percent, and various program mixes emphasizing prevention, attack, aerial suppression, and fuel treatment.

FORPLAN Prescriptions

Vegetation Management

MLV---	Minimum level of management. No active management practices occur except as needed at the custodial level. Only background outputs occur. The fire program is at a level necessary to protect private and other agency lands from fire.
ST-MTN	Stand maintenance. This low level of intensity is used in riparian areas, old growth retention areas, etc. No specific rotation is implied and minimal volume results.
SW-HAR	Shelterwood regeneration cutting system. This is a two to three decade process allowing natural replacement to occur (supplemented by planting and cultural treatments). Thinning of stands prior to regeneration can occur.
GS-HAR	Intensive Group Selection
TS-HAR	Intensive Tree Selection with diameter control
CC-HAR	Clearcut regeneration system. This is a one decade process with intensive planting and cultural work. Thinning of stands prior to regeneration can occur.
CT-HAR ST-HAR	Heavy thinning (up to 40 percent of standing inventory removed on first entry) followed by a regeneration cut after four decades is a special prescription available for regenerated stands.
REJUVN SM-BRN SB-BRN	Aerial prescribed burn of brush lands.
HVREVM	Mechanical crushing, ball and chain clearing followed by prescribed burning on non-timbered lands.
TYPECV SB-CHG CP-CHG TYP-CV	Removing existing vegetation and permanently reglacing it with another type of vegetation.
CP-HNC	Handcutting of firewood as a wildlife habitat

HB-HNC	improvement tool to open dense stands of hardwoods and noncommercial softwoods.

Wildlife

STREMS	Instream projects designed to improve habitat for fisheries.
LK-FUD	Projects in existing lakes designed to improve habitat for fisheries.
GM-FUD	Projects designed to improve habitat for terrestrial game species.

Watershed

RESTOR	Projects designed to rehabilitate degraded watersheds.
OBLTR8	Abandoned road obliteration projects.
NVNTRY	Watershed needs inventory costs.
ERA	Describes on-site impacts in terms of the equivalent number of roads that would produce an equal amount of impact.

Fire

FP*1-2 FP***3 FP**4+	The most efficient program mixes at budget levels of current, down 40 percent, down 20 percent, up 20 percent, and up 40 percent were the available options for the fire program and were implemented in three separate time frames: periods one and two; period three; periods four plus.

Recreation

LW-SID	Existing facilities would be open at a level (low standard) such that the willingness of the user to pay is less than at the standard level.
RE-HAB	Facilities at low standard condition are rehabilitated to the standard level resulting in outputs at the standard level.
SH-DWN	Closing of an existing developed recreation shutdown facility.
STDREC	Facilities can be built on certain lands at new standard level.

WLDNS- Wilderness prescriptions corresponding to the prescribed burn and dispersed recreation standard management described above are available to be applied to the roadless areas if they are recommended for wilderness.

Table B.1 - Prescriptions Used in Analysis

FORPLAN Prescription	Description	Analysis Areas to which the prescription applies (AA's)	Management Area Prescription Codes that contain this FOFPLAN prescription as a choice
MLV---	Represents no active management other than to provide for health and safety	All	All
The following Prescriptions apply to Non-wilderness AA's only			
ST-MTN CC-HAR SW-HAR CT-HAR ST-HAR GS-HAR TS-HAR	Timber harvest under a variety of silvicultural systems ranging from sanitation to clearcutting	All forested AA's	CF1, CF3, CF5, CF6 CF7, CF8
DEERRX	Timber harvest with modified regeneration practices and resulting reduced yields in order to provide wildlife forage and cover	AA's or portions of AA's representing key deer summer areas	CF5
REJUVN	Mixed chaparral treatments ranging from aerial prescribed burning to type conversion	All mixed chaparral AA'S	MC1, MC2 MC5, MC6, MC8
TYPECV		mixed chaparral ≤ 10%slope	MC1, MC5, MC6, MC8
HVREVM		mixed chaparral ≤ 40%slope	MC1, MC2, MC5, MC6
SB-BRN	Prescribed burning and type conversion of sagebrush and desert transition brush	Sagebrush and desert transition brush AA's	PS1, PS5, PS6
		Sagebrush and desert transition brush ≤ 10% slope	PS5
SMBRN	Montane chaparral prescribed burn	All montane chaparral AA's	CF1, CF5. CF6, CF7

Table B.l - Prescriptions Used in Analysis (Continued)

FORPLAN Prescription	Description	Analysis Areas to which the prescription applies (AA's)	Management Area Prescription Codes that contain this FORPLAN prescription as a choice
CP-CHG	Pinyon-Juniper type conversion	Pinyon-Juniper AA's that have road access	PS5
CP-HNC	Pinyon-Juniper firewood cutting		PS1, PS5, PS6
HB-HNC	Black oak fuelwood cutting	Black oak AA's that have road access	OW1, OW2, OW5, OW6
WLDNS-	Wilderness prescriptions	Existing and recommended wilderness AA'S	WF4, WC4
TYP-CV	Site preparation and planting to timber	Capable. available and tentatively suitable non-stocked timber lands	CF7
MEC-SN	Crush and burning for forage productions		CF1, CF3, CF5, CF6, CF7
STDREC	New developed recreation facility construction	Potential campgrounds and ski areas	All except: B06, MC6, OW6, PS6
LW-STD	Low standard management of existing recreation facilities	Existing recreation facilities	All
RE-HAB	Rehabilitation of existing recreation	Existing recreation facilities	All
SH-DWN	Closure of existing recreation facilities	Existing recreation facilities	All

Table B.l - Prescriptions Used in Analysis (Continued)

FORPLAN Prescription	Description	Analysis Areas to which the prescription applies (AA's)	Management Area Prescription Codes that contain this FORPLAN prescription as a choice
FP*1-2 FP***3 FP**4+	Time periods in which fire programs and options can be implemented	Fire Program AA	All
STREMS	Stream fisheries habitat improvement projects	Wildlife structural habitat improvement AA	All
BK-FUD	Existing WFUD's		
LK-FUD	Lake fisheries habitat improvement projects		
GM-FUD	Terrestrial wildlife habitat improvement projects		
ERA	A standard by which a range of impacts are measured against to account for varying levels of disturbance.	All watershed affected by management activities	All
RESTOR	Watershed restoration project costs	Watershed improvement and mitigation AA	All
OBLTR8	Road obliteration costs		
" TRY	Watershed inventory costs		
FALCON	Peregrine falcon recovery costs	Threatened and Endangered Species AA	N/A
LKGT--	Little Kern Golden Trout Management Plan costs		
CONDOR	California condor recovery costs		
MATNCE	Existing roads and facilities maintenance costs	Maintenance AA	All

D. Time Periods

The planning horizon in FORPLAN is 160 years. It is divided into 16 decades with data displayed for each of the first five decades using average annual data per decade.

E. Outputs

Outputs used in FORPLAN are classified as either scheduled or nonscheduled outputs. Both types depend on the prescriptions chosen for each analysis area, but only scheduled outputs depend on the timing of the prescriptions. It is not possible to schedule all outputs through FORPLAN because of modeling limitations, but it is essential to include those that are closely related to the activities being modeled and have significant impact on PNV. Other outputs are calculated outside the model based on the results of the FORPLAN solution. Listed below are the scheduled outputs tracked in the planning process. The scheduled and nonscheduled outputs and those calculated outside FORPLAN are listed in Table B.2.

Outputs are estimated with the use of yield coefficients. In FORPLAN these coefficients define the outputs arising from the application of specific prescriptions to specific analysis areas. For outputs tracked outside FORPLAN, they describe the relationship between a particular output and various factors. The factors may have been, but are not necessarily, generated by FORPLAN. The process used by the Planning Team to develop the yield coefficients for each output is summarized below.

output	Process
Livestock Grazing	There are two types of rangeland: permanent and transitory. Permanent rangeland consists of grass or brush strata on less than 40 percent slopes. These lands are managed at various intensities. The AUM per acre coefficient varies with intensity and land productivity. The percentage of land by intensity varies with the theme of the benchmark or alternative. Transitory range is tied to timber harvest by regeneration cutting. AUM's are generated for the first decade after harvest.
Water	Background water yield data was determined from stream gage data converted to a per acre basis. Yield increases were estimated by reviewing the literature cited in the Bibliography and modified to Sequoia conditions. Prescribed burning and mechanical treatment of chaparral produces increases for less than a decade. Type conversion of chaparral to grass produces a permanent increase. Regeneration removal of timber produces increased yields which varies by timber type.

Water-Meeting Quality Standards	Realizing that without intensive water quality monitoring or simulation, water-meeting quality standards (goals) for the entire Sequoia NF can be nothing more than a very rough estimate. To make this estimate of water-meeting quality standards, a simple equation was used. This equation took into account varying amounts of road obliteration, watershed restoration, and Streamside Management Zones by alternative.
Cumulative Watershed Effects	Cumulative Watershed Effects are defined as the additive or synergistic effects of land management activities to water quality and beneficial uses as transmitted to the fluvial system. Cumulative Watershed Effects were analyzed using the procedures outlined by Paul Seidelman, a Forest Service geologist, and Dennis Harr, a researcher in Oregon. Harr's research has shown that when a watershed is impacted beyond a certain percent, deterioation of the watershed is likely [1]. Using this premise, Seidelman developed a rational, reproducible procedure to evaluate watersheds, their relative resistance to impacts, and their present level of disturbance [2]. This procedure identifies and tracks impacts levels within a watershed and compares the disturbance with an estimated permissible threshold of concern. The cumulative effects model is designed to analyze the impacts of management activities. Although the implementation of Best Management Practices minimize impacts of specific activities. the risk of significant adverse impacts increases as a watershed approaches its threshold of concern. This methodology assumes that a watershed which exceeds its threshold has a higher probability of significant cumulative effects occurring than a watershed that remains below threshold.

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[1] Harr, R.D., 1976, Forest Practices and Streamflows in Western Oregon. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, General Technical Report, PNW-49.

[2] Seidelman, P.J., 1981, Methodology for Evaluating Cumulative Watershed Impacts. Watershed Management Staff, Pacific Southwest Region, USDA Forest Service, 17p.

Cumulative Watershed Effects (con't)

Stream systems vary as to the amount of disturbance that can occur prior to the occurrance of significant Cumulative Watershed Effects. Existing channel condition must be evaluated to determine sensitivity. To assess channel condition, channel stability evaluations were performed using the method described by Dale Pfankuch[3]. Monitioring water yield increases with respect to watershed disturbance on several National Forests has indicated that stream systems in specific stability regimes can tolerate a percentage of increased water yield relative to channel condition prior to significant Cumulative Watershed Effects occurring.

Sequoia National Forest watersheds on average indicate a moderate sensitivity and can tolerate approximately 10 percent increase in water yield. This was calculated based on 106 stream evaluations taken on the Sequoia National Forest. The average rating revealed that streams on the Forest have a high to moderate sensitiviy rating and can tolerate a 10 to 12 percent increase in water yeild without exceeding carrying capacity. For purposes of this analysis, the more conservative 10 percent figure was used. Based on this acceptable increase in water yield, a Forest-wide threshold of disturbance was calculated by multiplying watershed acres by a sensitivity index of .10.[4] The product becomes the permissible upper limit of acres of disturbance, beyond which significant Cumulative Watershed Effects are likely to take place if mitigation measures are insufficient to reduce those effects below the upper limit. This procedure was adapted for FORPLAN modeling purposes by aggregating each watershed's threshold, attributable to tentatively suitable timberland, to form a Forest-wide threshold of disturbance for those lands.

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[3] Pfankuch, D.J., 1975, Stream Reach Inventory and Channel Stability Evaluation. USDA Forest Service, North Region, 26p.

[4] This average is used only for planning purposes. Cumulative analysis on project level will include site-specific evaluations and channel stability ratings., This site-specifc data will be used for calculations of Cumulative Watershed Effects for each drainage impacted by a specific activity.

Cumulative Watershed Effects (con't)

Each management activity in the FORPLAN model was assigned a coefficient of disturbance that equated all disturbances back to a common base, "roaded acre", for analysis purposes. The coefficient assigned is the Equivalent Roaded Acre (ERA) for the given management activity. Aggregating the ERA's for a given alternative and comparing them to the permissible limit acres of disturbance provided a means to assess the percent of threshold level approached by the various alternatives.

Use of this methodology to assess Cumulative Watershed Effects is based on several assumptions:

1) An upper limit of total watershed disturbance exists. The risk of initiating significant Cumulative Watershed Effects is greatly increased as this upper limit is approached and exceeded.

2) Control of the physical size, shape, and distribution of land disturbing activities will be exercised to minimize the potential for adverse effects on soil disturbance, associated erosion, and sedimentation.

3) Best Management Practices (BMP's) will be implemented to mitigate adverse on-site effects of management activities on soil disturbing management activities providing for the protection and improvement of water quality.

Recreation

All developed and dispersed recreation activities utilize the same formula to determine Recreation Visitor Days per acre or mile for the yield table. The formula is found in ROS Users Guide USDA, Forest Service (Chapter 25.32 pg 35).

The Formula:

$$RVD's = \frac{PAOT \times MS \times PU \times LOS}{12}$$

MS = Managed season of use in days (180 days).

PU = Pattern-of-Use or the relationship between the average weekend use and average weekday use of sites and/or areas.

	PAOT = Persons-at-one-time - carrying capacity.
	LOS = Average length of time in the area or site is occupied in hours. (If not known base upon local knowledge or experience)
Recreation (con't)	12 = The constant for 12 hours/RVD.
	RVD = Recreation Visitor Day
ROS Class	Acres of Recreation Opportunity Spectrum (ROS) class were based on the existing physical setting, scheduled recreation development, timber harvesting and road and trail construction and/or obliteration. Administrative setting (i.e., OHV restrictions) was also considered.
Trails	Trail inventories and plans, augmented by local knowledge, were used to estimate the miles of new trail that could be built.
Accost	All costs not directly associated with a single resource. Costs were developed by Resources Staff Officers using past records. Costs for FFP, fixed costs, deferred road maintenance and facility maintenance costs are included here.
Wilderness RVD's	Coefficients were developed - using historical use patterns of the areas prior to designation - from the existing Golden Trout and Dome Land Wildernesses and the old High Sierra Primitive Area (now part of the Monarch Wilderness). Future projections of use were made with population projections and participation rates.
Timber	Yield coefficients for timber were developed using actual Forest data collected in 1978 and updated to 1985 and the RAM-PREP timber model. This model predicts yields over time for each timber stratum based on existing volume, age and growth rate.
Animal Numbers	The projected yield for number of animals was derived from projections of habitat capability. Using current habitat estimates and current animal populations, projections could be made for increase or decrease in animal numbers as acres of favorable habitat increase or decrease.
Wildlife Use	WFUD's are a subset of dispersed Recreation

(WFUD's) Wildlife Use (Con't)	Visitor Days. A base amount of WFUD's are calculated from RIM estimates and projected to remain at the current proportion of total dispersed RVD's over time based on existing management levels. Coefficients used to predict additional WFUD production are based on the relationships between acres of habitat and animal numbers. The effects of vegetative treatments, road closures, AUM levels, structural habitat improvement projects, and standards and guidelines associated with special habitat needs were used to predict additional habitat capability.
Diversity	Using existing vegetation, estimates of changes in seral stages over time were tracked as a function of age and treatment from the FORPLAN allocations.
Firewood	Yields of cordwood were developed based on figures known to be achievable targets based on historic outputs. Attempt was not made to project increases due to salvage operations from fire or disease since they would be intermittent and temporary.
Net Energy Potential	Net energy potential was determined by calculating energy consumption and/or yield components of significant activity groups such as: timber, biomass, range, recreation, water, minerals, roads, and fire.
Wildfire by Intensity Class	Wildfire acres are calculated by FORPLAN and change with the objective function and the change in vegetative treatment acres. Wildfire is a function of vegetative fuel model, age class and RVD's. Intensity is derived from the FIREPLAN model.
Roads and Facilities	Road construction and reconstruction is a by-product of vegetative manipulation in the conifer zone. Road construction and reconstruction is a function of timber harvest and varies by the number of acres accessed and their existing road density. Road maintenance is a function of the miles of road existing and projected for construction coupled with one of three maintenance levels: 1) minimal maintenance required to protect resources on closed roads: 2) maintenance required to protect resources on roads open for administrative use only: and

Roads and Facilities (Con't)	3) maintenance required to protect resources and keep roads open for public use while providing for comfort and convenience.
Effective Alteration (EFFALT)	Visually altered acres are calculated by assigning decay functions to all regeneration harvest prescriptions and a cumulative impact threshold for each VQO. The decay functions account for regrowth and the threshold limits alterations to meet the VQO. A detailed accounting of EFFALT is included in the planning records.
Total Budget	The total dollar expenditure and average annual expenditures are calculated by FORPLAN based on costs and levels of outputs within each alternative.
Fuels Treatment	The primary objective of fuel reduction treatments is to lower the intensity of wildfires that may occur between treatments. Areas selected for treatment are those fuel types with the greatest risk of a conflagration wildfire that would threaten high resource (timber) values and public and private improvements. For the most part, this situation is limited to the mixed chaparral, timber harvesting slash, and tree plantations on the Sequoia. Fuels related to timber management are treated as part of timber harvesting operations. Acres of chaparral to be treated annually fuel reduction purposes were determined by: - Treatments are needed at 30-year intervals. - Areas presenting the greatest threat receive priority. - Emphasis of Plan alternative - Coordination with other resource treatments (i.e., range, wildlife, watershed). - Anticipated savings in protection and suppression costs.
Dispersion	Measure when'an area is considered an "opening" after even-aged regeneration harvest.
Spotted Owl	Acres of habitat for spotted owl are calculated by FORPLAN based on site potential, age, and type of vegetation. Fragmentation of habitat was not considered in the model. A further analysis was completed to determine the sensitivity of the FORPLAN model to a full range of timber management prescriptions capable

Spotted Owl (Con't)	of maintaining or creating suitable owl habitat in the network of 40 Spotted Owl Habitat Areas. This range included the following prescription types: 1) Prescriptions in which no timber harvesting is scheduled or allowed: 2) Even-aged timber management prescriptions; and 3) Uneven-aged timber management prescriptions (includes group selection). The size of the SOHA and rotation schedule varied according to the management prescription selected. For prescriptions in which no timber harvesting was scheduled or allowed, 1,650 acres of habitat was modeled for each SOHA. This 1,650 acres included 1,000 acres of currently suitable habitat plus 650 acres managed for replacement purposes. Under this prescription the implied rotation was 380 years. For even-aged timber management prescriptions, 2.650 acres of habitat was modeled for each SOHA. This acreage included 1,000 acres of currently suitable habitat plus 1,650 acres managed for replacement purposes. Under this prescription, the implied rotation was 240 years with no management taking place within the core area for the current plan period. This management prescription was further constrained to insure that a reasonable amount of regulation had occurred (harvest occurs in reasonable increments and acreage over time). For uneven-aged timber management prescriptions, 2,000 acres of habitat was modeled which included 1,000 acres of currently suitable habitat and 1,000 acres to be managed for replacement purposes. Under this prescription the implied rotation was approximately 300 years.
Diversity	Acres of seral stages are calculated based on site potentials, management activities, and age of the vegetation.
Road Obliteration	These were taken from an inventory of unneeded roads that need to be ripped and revegetated to maintain or improve soil productivity and water quality.

Watershed Inventory	These are the acres examined to update watershed improvement needs inventory and to determine cause and effects. This is based on the amount of watershed improvement.
Watershed Improvement	These were taken from the 1980 watershed improvement needs inventory which includes meadows. roads, trails, trailheads. and helicopter pads that need rehabilitation to maintain or improve soil productivity and water quality.
Long-Term Sustained Yield (LTSY)	The long-term sustained yield is the maximum timber harvest level that can be maintained indefinitely. It is calculated as a nonscheduled output, based on the highest sustained yield shown for each regeneration class and timber type in the regeneration yield tables produced by the RAMPREP model.
Ending Inventory	The ending inventory is the amount of timber that is left standing at the end of the planning horizon. This is the inventory necessary to meet the LTSY. It is calculated as a nonscheduled output, based on the contribution shown for each regeneration class and timber type in the regeneration yield tables produced by the RAMPREP model.

Table B.2 - Outputs Used in Analysis

output	Unit of Measure	Scheduled	Non Scheduled	In FORPLAN	Outside FORPLAN
Timber	MCF	X		X	
LTSY	MCF		X	X	
Ending Inventory	MCF		X	X	
Firewood	Cords				X
Net Energy Potential	BTU's				X
Accost	cost	X		X	
Livestock Grazing	AUM	X		X	
ROS Class	Acres				X
Dispersed	RVD	X		X	
Developed	RVD	X		X	
Downhill Ski	RVD	X		X	
Wilderness	RVD	X		X	
Wildlife and Fish Use	WFUD	X		X	
Diversity	Acres				X
Animal Numbers	Animals				X
Spotted Owl Habitat	Acres	X		X	
Road Obliteration	cost	X		X	
Watershed Inventory	cost	X		X	
Water	AC-Fl'	X		X	
Water Quality	AC-FT	X			X
Watershed Improvements	Acres	X		X	
Cumulative Watershed Effects	ERA'S	X		X	X
Road Construction	Miles	X		X	
Road Maintenance	Miles	X		X	
Trail Construction/ Recreation	Miles				X
Wildfire Loss	Acres	X		X	
Fuels Treatment	Acres				X
EFFALT	Acres	X		X	
Dispersion	Acres	X		X	
Total Budget		X		X	

F. Economics in FORPLAN

Economics is discussed in Chapter 2 of the FEIS in the alternative development process and displayed in various tables, in Chapter 3 of the FEIS in the economic environment. In Chapter 4, the economic consequences are discussed. Appendix D outlines how economics are used in the entire document. Demand analysis is presented in the Recreation section of the Affected Environment, Chapter 3. Demand cutoffs are used for both Dispersed and Developed Recreation Visitor Days.

Most of the economic efficiency analysis was conducted with the use of the FORPLAN model. Economic data and assumptions incorporated into the FORPLAN are described below and include economic analysis requirements of tentatively suitable timber lands described in 36 CFR 219.14(b).

DISCOUNT RATE

An interest rate of 4.0 percent was used to determine the present value of future benefits and costs. This rate approximates the long-term cost of capital in the private sector as meas red by the return on AAA corporate bonds after adjustment for inflation.' For sensitivity testing, a discount rate of 7-1/8 percent was used. This is the rate that was used for water resources evaluation by the U.S. Water Resources Council in 1980 and was also adopted for use in the 1980 RPA. Use of the 7-1/8 percent discount rate decreased PNV from that obtained with a 4.0 percent rate. Data on PNV for each alternative using the 7-1/8 percent discount rate is available in the planning records.

BASE YEAR FOR DOLLAR VALUES

All dollar values are expressed in 1982 dollars. The following factors based on the implicit price deflator for gross national product were used to adjust values from other years to 1982.

Year	Factor
1978-82	1.39
1979-82	1.28
1980-82	1.18
1981-81	1.08

REAL COST AND PRICE TRENDS

The real cost and price trends used for timber are shown below:

	Decade				
	1	2	3	4	5
Timber price increase, average annual percent	4.78	1.09	2.06	1.57	1.84
Timber cost increase, average annual percent	3.10	2.40	1.90	1.60	1.60

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[5] Row, Clark, Fred Kaiser and John Sessions., "Discount Rate for Long-Term Forest Service Investments". Journal of Forestry, June 1981, for a complete discussion of the rationale for the discount rate.

These timber price trends are projections from an econometric model of National and Regional timber markets.[6] The timber cost trends are based on projections of per capita disposable personal income because timber management cost increases have historically been highly correlated with increased in per capita disposable income.[7]

Other resources do not have an extensive history of long-term price and cost increases comparable to those of timber.

BENEFITS

The dollar values for outputs used to calculate PNV are the prices that consumers would be willing to pay for forest outputs, whether or not such prices are actually collected by the Federal Government. At present it is National policy to provide most forest outputs either at no charge to consumers or at a charge less than the willingness to pay price. This is shown in the following tabulations in Table B.2.

For outputs used off-site, benefits are based on the value of the outputs as they leave the land or production site. For outputs used on-site, benefits are valued when use takes place. However, in cases where it is easier to derive values after the output leaves the production site, costs incurred and profits earned after the output leaves the site were deducted from the values at later production stages.

Timber values are average stumpage prices developed from Forest sale records for the period 1979-1982.

Grazing values are the average amount that Sequoia NF permittees are willing to pay for grazing on the Forest as estimated from ranch livestock budgets developed by the USDA Economic Research Service.

Recreation and Wildlife and Fish user day values are the estimated average amount that recreationists are willing to pay at the site. These values are based on a national survey of travel cost and contingent value recreation studies conducted by the Forest Service for the 1985 Resource Planning Act (RPA) evaluation.[8]

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[6] Haynes, Richard W., Kent P. Connaughton and Darius M. Adams, "Stumpage Price Projections for Selected Western Species", USDA Forest Service Research Note PNW-367, November 1980.

[7] USDA Forest Service, "An Assessment of the Forest and Range Land Situation in the United States", January 1980.

[8] USDA, Forest Service, Draft Environmental Impact Statement 1985-2030 Resources Planning Act Program. Appendix F, January 1984.

Water values are the estimated amount that water users are willing to pay for water at the point of use. Values are based on the marginal value of water in irrigation use - the primary water used in California - determined from studies surveyed by the Forest Service for the 1985 FPA.[9]

COSTS

The costs used for production of outputs and to calculate PNV were in most cases calculated from historical data specific to the Sequoia NF. Where this data were lacking, Regional cost estimates were used. All costs were included in FORPLAN including the cost associated with timber, grazing, recreation, roads, wildlife, fish, fire, soils, watershed, facilities, and general administration.

Costs were checked for reasonableness by comparing the first decade costs for the Current Alternative developed with use of FOFPLAN against actual expenditures for N 1982.

All costs for benchmarks and alternatives were included in the model. Approximately 22 percent ($3.6 Million) of the cost represented fixed costs which are not allowed to vary in any benchmark or alternative.

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[9] Ibid

Table B.3 - Benefits Used in the FORPLAN Analysis

output	Unit	Average Actual Cash Receipt Per Unit	Average Willingness to Pay Value Used
Existing Timber			
All Harvest Types			
0-40% Slopes			
Low site mixed conifer	MCF	491.	491.
Eastside pine	MCF	523.	523.
Lodgepole pine	MCF	334.	334.
Red fir	MCF	293.	293.
High site mixed conifer	MCF	581.	581.
41%+ slopes			
Low site mixed conifer	MCF	346.	346.
Eastside pine	MCF	361.	361.
Lodgepole pine	MCF	N/A	N/A
Red fir	MCF	157.	157.
High site mixed conifer	MCF	441.	441.
Regenerated Timber			
Intermediate Harvest			
0-40% Slopes			
Diameter Class 10			
Mixed conifer	MCF	308.	308.
Eastside pine	MCF	284.	284.
Lodgepole pine	MCF	179.	179.
Red fir	MCF	151.	151.
Intermediate Harvest			
0-40% Slopes			
Diameter Class 13			
Mixed conifer	MCF	329.	329.
Eastside pine	MCF	350.	350.
Lodgepole pine	MCF	224.	224.
Red fir	MCF	198.	198.
Intermediate Harvest			
0-40% Slopes			
Diameter Class 18			
Mixed conifer	MCF	408.	408.
Eastside pine	MCF	433.	433.
Lodgepole pine	MCF	276.	276.
Red fir	MCF	253.	253.

Table B.3 - Benefits Used in the FORPLAN Analysis (continued)

output	Unit	Average Actual Cash Receipt Per Unit	Average Willingness to Pay Value Used
Intermediate Harvest 0-40% Slopes Diameter Class 22			
Mixed conifer	MCF	452.	452.
Eastside pine	MCF	496.	496.
Lodgepole pine	MCF	307.	307.
Red fir	MCF	277.	277.
Intermediate Harvest 0-40% Slopes Diameter Class 26+			
Mixed conifer	MCF	485.	485.
Eastside pine	MCF	507.	507.
Lodgepole pine	MCF	323.	323.
Red fir	MCF	290.	290.
Regenerated Timber Final Harvest 0-40% Slopes Diameter Class 13			
Mixed conifer	MCF	364.	364.
Eastside pine	MCF	386.	386.
Lodgepole pine	MCF	246.	246.
Red fir	MCF	198.	198.
Final Harvest 0-40% Slopes Diameter Class 18			
Mixed conifer	MCF	427.	427.
Eastside pine	MCF	454.	454.
Lodgepole pine	MCF	290.	290.
Red fir	MCF	269.	269.
Final Harvest 0-40% Slopes Diameter Class 22			
Mixed conifer	MCF	466.	466.
Eastside pine	MCF	496.	496.
Lodgepole pine	MCF	316.	316.
Red fir	MCF	287.	287.

Table B.3 - Benefits Used in the FORPLAN Analysis (continued)

Output	unit	Average Actual Cash Receipt Per Unit	Average Willingness to Pay Value Used
Final Harvest			
0-40% Slopes			
Diameter Class 26+			
Mixed conifer	MCF	491.	491.
Eastside pine	MCF	517.	517.
Lodgepole pine	MCF	329.	329.
Red fir	MCF	293.	293.
Regenerated Timber			
Intermediate Harvest			
41%+ Slopes			
Diameter Class 10			
Mixed conifer	MCF	217.	217.
Eastside pine	MCF	194.	194.
Lodgepole pine	MCF	N/A	N/A
Red fir	MCF	82.	82.
Intermediate Harvest			
41%+ Slopes			
Diameter Class 13			
Mixed conifer	MCF	231.	231.
Eastside pine	MCF	241.	241.
Lodgepole pine	MCF	N/A	N/A
Red fir	MCF	107.	107.
Intermediate Harvest			
41%+ Slopes			
Diameter Class 18			
Mixed conifer	MCF	287.	287.
Eastside pine	MCF	299.	299.
Lodgepole pine	MCF	N/A	N/A
Red fir	MCF	137.	137.
Intermediate Harvest			
41%+ Slopes			
Diameter Class 22			
Mixed conifer	MCF	318.	318.
Eastside pine	MCF	331.	331.
Lodgepole pine	MCF	N/A	N/A
Red fir	MCF	150.	150.

Table B.3 - Benefits Used in the FORPLAN Analysis (continued)

Output	Unit	Average Actual Cash Receipt Per Unit	Average Willingness to Pay Value Used
Intermediate Harvest			
41%+ Slopes			
Diameter Class 26+			
Mixed conifer	MCF	342.	342.
Eastside pine	MCF	349.	349.
Lodgepole pine	MCF	N/A	N/A
Red fir	MCF	156.	156.
Regenerated Timber			
Final Harvest			
41%+ Slopes			
Diameter Class 13			
Mixed conifer	MCF	257.	257.
Eastside pine	MCF	266.	266.
Lodgepole pine	MCF	N/A	N/A
Red fir	MCF	120.	120.
Final Harvest			
41%+ Slopes			
Diameter Class 18			
Mixed conifer	MCF	301.	301.
Eastside pine	MCF	313.	313.
Lodgepole pine	MCF	N/A	N/A
Red fir	MCF	145.	145.
Final Harvest			
41%+ Slopes			
Diameter Class 22			
Mixed conifer	MCF	329.	329.
Eastside pine	MCF	342.	342.
Lodgepole pine	MCF	N/A	N/A
Red fir	MCF	154.	154.
Final Harvest			
41%+ Slopes			
Diameter Class 26+			
Mixed conifer	MCF	346.	346.
Eastside pine	MCF	361.	361.
Lodgepole pine	MCF	N/A	N/A
Red fir	MCF	157.	157.

Table B.3 - Benefits Used in the FORPLAN Analysis (continued)

output	Unit	Average Actual Cash Receipt Per Unit	Average Willingness to Pay Value Used
Grazing APC			
Livestock grazing	AUM	1.86	8.24
Recreation			
Dispersed, standard	RVD	0	11.30
Dispersed, low standard	RVD	0	5.99
Developed, ski	RVD	.40	11.20
Developed, standard	RVD	.40	11.20
Developed, low standard	RVD	.27	5.94
Wilderness, standard	RVD	0	13.75
Wilderness, low standard	RVD	0	7.29
Wildlife and Fish			
Resident fish use	WFUD	0	12.
Big game use	WFUD	0	30.
Other game use	WFUD	0	18.
Nongame use	WFUD	0	25.
Recreation use	WFUD	0	18.
Other elements			
Water			
Water quantity	AC-FT	0	59.

DEMAND CUTOFFS FOR BENEFIT VALUES

Benefit values are applied only where there is a demand for the output by Forest users. Outputs that exceed demand are given a benefit value of zero, while those that are produced at or below the quantity demanded by consumers are assigned the benefit value described in the previous section. This is handled with the use of a demand cutoff. Most of the outputs from the Sequoia NF are consumed in National and regional markets where the quantity demanded is many times larger than the productive capacity of the Forest (see Chapter 3 for a resource by resource description of the demand situation). For this reason demand cutoffs were needed for Developed Recreation Visitor Days (RVD's) (including a separate cutoff for Ski RVD's) and Dispersed RVD's. including a separate cutoff for Wildlife and Fish User Days (WFUD's). For these resource outputs, demand is more localized and less than the productive capacity of the Forest in early time periods.

Decade	1	2	3	4	5-16
Developed Cutoff (M RVD's)	937.0	1,043.5	1,082.0	1,213.0	1,279.0
Downhill Ski Cutoff (M RVD's)	297.0	320.0	419.0	547.0	708.0
Dispersed Cutoff (M RVD's)	1,900.0	2,158.0	2,438.0	2,712.0	3,000.0
WFUD Cutoff (M RVD's)	335.0	379.0	432.0	487.0	548.0

G. Constraints

Each of the resources discussed in 36 CFR 219.13 through 219.26 must be addressed by Standards and Guidelines, Management Prescriptions, or other Management Direction in the Forest Plan. Regional resource direction which Forests are expected to follow is in the Regional Planning Direction.

Some management requirements can be translated into modeling constraints and can be simulated or proxied in FORPLAN. Constraints are quantifiable limits placed on the linear program model to ensure that minimum or maximum acres or dollars are used or that specific minimum or maximum amounts of outputs are produced. Constraints override the objective in linear programming analysis. Thus, where a predetermined level of output, minimum physical condition, or Management Prescription is entered as a constraint, it is always achieved (or no feasible solution is found). The Interdisciplinary Team tried to formulate constraints that met objectives with the lowest cost and least effect on other outputs. In most cases this required the formulation and testing of several alternative sets of constraints to determine the most cost-effective set (in terms of PNV) that would meet the objectives (for more information, see the Planning Records). For Forest planning purposes, constraints can be divided generally into five categories which are discussed in the next section.

H. Constraints Common to all Alternatives

1. Technological constraints. Constraints needed to make the model work and to ensure technical implementability of the results. These are applied to all benchmarks and alternatives. Limiting the prescription set for an analysis area to only those activities for which the land is tentatively suitable is one type of technological constraint. Other types are project and demand cutoffs for fish and wildlife habitat development, and developed and dispersed recreation RVD's. The following technological constraints were used specific to the Sequoia:

   a) Project cutoffs for fish and wildlife habitat development to prevent exceeding projected demand.

b) No clearcut harvesting on south and west facing slopes in red fir. This was done to insure regeneration success through other harvest methods.

c) Cutoffs to limit the number of RVD's per decade those specified by demand projections.

2. Minimum Management Requirements (MMR's). The Minimum Management Requirements are taken from 36 CFR 219.27. They generally represent requirements that are outside of Forest Service-authority-to change. They are based on statutes and regulations in contrast to manual direction or agency policy (see Chapter 2 for more information on direction and intent). Procedures for modeling the *MMR's* were specified by the Pacific Southwest Region. MMR's are applied to all benchmarks and all alternatives.

A discussion of the modeling rules and associated impacts for each MMR follows:

a. Capable, Available, and Suitable Land (CAS). Tentatively Capable, Available, and Suitable lands for timber management were placed in analysis areas and were given a range of appropriate prescriptions. By definition (36 CFR 219.16). these lands are those not withdrawn from production by Congress or the Chief of the Forest Service and those lands which are capable of producing crops of industrial wood. In addition these lands can be restocked to Region 5 standards within five years of final harvest. Non-CAS lands were placed in other analysis areas where timber prescriptions were not an option. A detailed discussion of the timber suitability criteria is contained in the planning records.

The effect of limiting the land base to CAS land only establishes the maximum land base available for sustained yields of timber.

b. Threatened and Endangered Species. The bald eagle is a federally-listed endangered species. As a management indicator species on the Sequoia NF, it represents a species that requires open, uneven-aged forest near lakes and large rivers. The Sequoia NF currently does not have a wintering population of bald eagles located on the Forest. There is no target in the Bald Eagle Recovery Plan for the Sequoia to have any nesting pairs. There are, however, many documented cases of bald eagles wintering just outside Forest boundaries.

The California condor is a federally-listed endangered species. The current management direction is to protect the existing population by placing controls on resource activities at the habitat site. In this analysis, 2,229 acres were managed for condor habitat and costs for agency coordination were modelled. This acreage is the amount established in the Condor Nest Management Plan completed in 1986. Single-tree selection or no harvest were the allowed prescriptions.

The Little Kern golden trout (LKGT) is a federally-listed threatened species. The current direction is to implement the existing Management Plan for the Little Kern golden trout. Costs to implement the Forest Service's part of the management plan were modelled.

The peregrine falcon is a federally-listed endangered species. There are no peregrine falcons currently nesting or roosting on the Forest. The Sequoia NF portion of the Peregrine Falcon Recovery Plan calls for the introduction of two pairs within the next decade. Costs for this program were included in the FORPLAN model.

c. Viable Populations.

Goshawks - Habitat for goshawks, a sensitive species, was not modeled in FORPLAN since most of the known nests were found to occur in habitat that was provided with other MMR's. Standards and Guidelines provide the necessary direction to ensure habitat protection for at least 21 nesting pair. This minimum of 21 pair is based on a Forest network which insures sufficient habitat for viable interaction between pairs. Information used to develop these Standards and Guidelines and network came from the Wildlife and Fish Habitat Relationships Program (WFHR), the associated Habitat Capability Model for Goshawks in the Southern Sierra and the Regional Guide and LMP Direction.

Snag-dependent Species - An average of 1.5 snags per acre per timber compartment is required through Standards and Guidelines to insure continued viability of snag dependent species. The Sequoia National Forest currently does not have an inventory of existing snags. The RAMPREP timber yield tables and a 20-year thinning cycle were used in FORPLAN to account for natural mortality that is used as a proxy for snag recruitment.

Species Dependent Upon Dead and Down Material - In order to insure continued viability of these species, Standards and Guidelines calling for retention of these materials have been developed for the Sequoia National Forest (see Chapter 2).

Spotted Owls - The Minimum Management Requirement for spotted owl viability is to provide habitat capable of supporting an adequate number of reproductive pairs, well-distributed across the existing geographic range of this species on the planning area. The MMR is met by the network of 40 spotted owl habitat areas established on the Sequoia NF. The number and spatial distribution of these habitat areas was determined through application of the network concept described in Appendix H of the Regional Guide EIS.

In this final EIS, based on analysis of several factors (described below), the Forest Management Team selected management of the network spotted owl habitat areas through prescriptions involving no schedulted timber harvest for each alternative presented in detail. Each network habitat area consists of approximately 1650 acres, which includes 1000 acres of currently suitable habitat (or as much suitable habitat as exists plus sufficient potential habitat to total 1000 acres) plus approximately 650 acres of replacement habitat. The replacement habitat will be present in every time period of the planning horizon and also beyond the planning horizon (see planning records).

During the analysis, the use of scheduled timber harvest (utilizing even- or uneven-aged timber harvest prescriptions) to create and/or maintain

suitable spotted owl habitat was considered but not recommended. FORPLAN modeling of scheduled timber harvest prescriptions with the network spotted owl habitat areas showed that no significant gain in the amount of nesting habitat would be realized until the tenth decade. Also, the possibility of implementing scheduled timber harvests to maintain or enhance quality spotted owl habitat over a 10-decade was not considered feasible with regard to the physical arrangement of timber types suitable for harvest on the Sequoia NF, and the associated logging and road systems that would be needed. In addition. the intensity and duration of scheduled timber harvesting that would be necessary to produce additional nesting habitat within the Sequoia spotted owl network would involve an increased risk of disturbance to the existing spotted owl population.

Based on this analysis of conditions on the Sequoia NF, the Forest management Team believes that management of the spotted owl network with no scheduled timber harvest will pose the least risk to spotted owls, will be the most effective and efficient means of implementing and monitoring resource activities within the network habitat areas, will have essentially no impact on the allowable sale quantity of timber (this is because the timber harvest levels in the alternatives are well below the production capability for the Forest), and will provide for future flexibility in management of the network.

In the draft Plan and EIS, the estimated habitat capability was 140 pairs, based on FORPLAN outputs. The habitat capability estimates were revised for the Land Management Plan and EIS tables because FORPLAN does not take habitat fragmentation into account. The Forest has. instead, estimated habitat capability based on the presence of suitable habitat in approximately 1000 acre areas or larger, local vegetation conditions, and past population surveys. In tables found throughout these documents the estimated habitat capability decreases over time due to Forest management activities which fragment this habitat, making some of it unsuitable for supporting pairs of spotted owls.

d. Diversity. In order to maintain plant and animal diversity over the planning area, a minimum of five percent of each existing vegetation type-seral stage combination was required to be maintained in each decade. FORPLAN constraints were explicitly not imposed to meet this requirement since it was "naturally" achieved. (FORPLAN solutions were monitored to assure achievement of the requirement.)

e. Riparian Areas. The MMR's (36 CFR 219.27e) are to

a) protect streams, streambanks, shorelines, lakes, wetlands, and the plants and animals dependent on these areas:

b) prevent adverse riparian area changes in water temperature, chemistry, sedimentation, and channel blockages: and

c) give emphasis to riparian-dependent resources.

As a minimum. riparian areas are defined to be:

a) areas a 100-foot horizontal distance from the edge of standing bodies of water:

b) areas a horizontal distance of 100 feet on each side of perennial stream channels: and

c) all wetlands.

These requirements were modeled in FORPLAN by allowing only stand maintenance within 100 feet either side of perennial streams and *lakes*. This affected 12.850 acres of suitable timber land. Forest standards and guidelines assure additional protection of riparian areas as well as ensure that emphasis is given to riparian-dependent resources.

f. Soil and Water Productivity. To assure conservation and prevent significant or permanent impairment of soil and water productivity all of the Forest land on over-steepened slopes (24,000 acres) were not scheduled for any land disturbing activities in FORPLAN.

3. Timber policy constraints (TPC's). As required by 36 CFR 219.14, 36 CFR 219.16, and 36 CFR 219.27c, FORPLAN constraints were needed to ensure that timber harvest meets sustained yield, Culmination of Mean Annual Increment, and dispersion requirements. Therefore the timber Policy Constraints are: rotation length and Culmination of Mean Annual Increment (CMAI): sustained yield requirements: harvest flow requirements: dispersion: and growth requirements.

a. Rotation Length and Mean Annual Increment. Direction was needed to assure that all even-aged stands scheduled to be harvested would have generally reached Culmination of Mean Annual Increment of growth. In addition, it was necessary to provide a range of rotation ages or timing options for the analysis of present and future stands. Minimum ages were established for merchantability and 95 percent of culmination of mean annual increment based on RAMPREP yield tables for the major forest types. These are displayed in Table B.4.

Table B.4 - Rotation Lengths

Ages in Periods (10 years)

Conifer Type/Activity	Merch.	95%CMAI
Mixed conifer		
without thinning	6	6
with thinning	6	9
burned plantation	a	8
Red fir		
without thinning	7	7
with thinning	7	9
burned plantation	9	9
Eastside pine		
without thinning	I	7
with thinning	I	9
burned plantation	9	9
Lodgepole pine		
without thinning	4	4
with thinning	4	5

b. Sustained Yield Requirements. Each alternative was formulated to 3nsure that a "perpetual" timber harvest at the long-term sustained yield level, defined for each alternative, will result by the end of the planning horizon. In addition, it was desirable that the portion of the CAS land managed under even-aged regimes be generally regulated. An inventory constraint and a growth goal were used to meet the sustained yield requirements. This forced the model to insure regulation on at least 90 percent of the managed forested area by the end of the Planning Horizon.

c. Harvest Flow Requirements. Each alternative was formulated to maintain community stability by preventing erratic flows of timber ouputs between decades. A constraint was applied to timber output for decades after the first which did not allow a fluctuation of more than 25 percent, plus or minus, from the previous decade.

d. Dispersion. The Minimum Management Requirement is to prevent regeneration units which are still openings from being adjacent to each other and to disperse units in such a way as to leave logical harvest units between openings for future management. Requirements in the final Regional Guide for the Pacific Southwest Region were also followed. These requirements were modeled so that analysis areas, liquidated in periods one, two, or three in the HW unconstrained benchmark, were limited by the accessibility constraint in all other benchmarks and alternatives to spread their scheduled regeneration over the first four decades.

4. Minimum Implementation Requirements (MIR's). Constraints needed to ensure that alternatives are minimally acceptable and implementable on the ground. Procedures for defining MIR's were specified by the Region. They are within agency control but there is little discretionary control regarding their application at the Forest level, MIR's do not apply to benchmarks but they are applied to all alternatives.

a. Sensitive Plants. The MIR is to manage sensitive plants to ensure that species do not become threatened or endangered because of Forest Service actions. This was accomplished through the use of Standards and Guidelines.

b. Scenic Highways. As an MIR. because of past public expectations and commitments, the immediate foreground of officially designated California State and County Scenic Highways and eligible California State Scenic Highway System routes (as designated on the September 1970 Master Plan) are managed for Retention Visual Quality Objectives. The rest of the foreground and the middleground of the same routes are managed for Partial Retention. On the Sequoia NF, the affected routes are Highways 180 and 190 for a total of 56 miles within the Forest boundaries.

The Retention constraint prevents large openings and forces a rotation of about 240 years, or allows only selection type of harvest. This choice was open to FORPLAN and affected about 1,400 acres of immediate foreground, tentatively suitable land for timber management.

The Partial Retention constraint affects acres of suitable timber land and limits the amount of regeneration cutting per decade. This has the effect of lengthening rotations to an average of 140 years which in turn may reduce PNV over time. This Partial Retention constraint affected nearly 17,000 acres of CAS land.

c. Operational Constraint. Limits were placed on the amount of acres that could be clearcut in one decade. This was to reflect the technical and operational maximum capability to do slash disposal, site preparation, and tree planting all within limited seasonal opportunities each year. An 18 percent maximum constraint was applied to the suitable timber acres available for even-aged timber management that were allowed to be clearcut during any time period. This constraint was never binding.

5. Forest constraints common to all alternatives. Constraints needed to ensure implementability at the local level. They are based on Forest (rather than Regional) conditions which are in addition to MMR's. These constraints are not applied to all benchmarks but are applied to all alternatives except the Constrained Economically Efficient Alternative (CEE). Forest constraints unique to an alternative are discussed under alternative descriptions. On the Sequoia NF, insuring that the Peppermint Ski Area is built in the first decade and the Shirley Meadow Ski Area expansion is completed are the only Forest constraints common to all alternatives. These constraints did not affect the CEE Alternative as building these ski areas was freely chosen in the CEE solution.

III. SUMMARY OF THE CONSTRAINT ANALYSIS

For a detailed discussion of the constraint analysis by subtraction, refer to Chapter 2 of the EIS. The following Table B.5 displays the constraint's cost compared to the maximum PNV (FLW) and the individual cost's percent loss compared to the total loss. Refer to Chapter 2, Section 6, Economics Trade-offs Analysis of the FEIS for a detailed explanation of Table B.5.

The maximum PNV from the unconstrained benchmark (FLW) is 1,911 MM. The PNV from the alternative with all common constraints (CEE) is 1,871 MM or 92.8 percent of the total. The MMR's account for 76 percent of the change in PNV. with spotted owls being the major contributor. The timber policy constraints (TPC's) account for another eight percent with Dispersion contributing the most. The scenic corridor MIR contributed eight percent to the difference in PNV.

The individual constraints can only account for 88 percent of the difference in the PNV's. This is due to the overlap of constraints.

Table B.5 - Summary of Constraint Analysis

Constraints	Change in PNV (MM$)	Percent of Total Change in PNV (%)
Minimum Management Requirements		
T&E Species	2.8	0.8
Spotted Owls	20.8	56.8
Diversity	0.0	0.0
Riparian Areas	6.9	18.8
Soil & Water Productivity	.1	.0 (nominal)
Timber Policy Constraints		
CMAI	0.0	0.0
Sustained Yield	1.1	3.0
Dispersion	1.9	5.2
Minimum Implementation Requirements		
Scenic Highways	3.0	8.2
Operational Constraint	0.0	0.0

I. Benchmarks

This section presents the required benchmark's modeling specifications. For a complete discussion of the results of the benchmarks, refer to Chapter 2 of the EIS.

(MLV) - MINIMUM LEVEL OF MANAGEMENT-BACKGROUND ONLY

1. Theme

The purpose of this benchmark is to determine background[10] outputs and fixed costs associated with maintaining the Forest in Federal ownership.

2. Modeling Specifications

a. Objective

The model allocates resources to minimize costs.

b. Timber

The objective is to minimize costs. Timber is not produced. There is no background timber.

c. Livestock Grazing

AUM's are not produced. There are no background AUM's.

d. Water

Only background water is produced because there is no vegetative manipulation. Wildfire increases in water yield are a part of background.

e. Spotted Owls and Threatened and Endangered Species

This benchmark displays the maximum spotted owl capability. The estimated number of spotted owl plans is directly related to the number of acres of suitable habitat. Fragmentation of habitat is considered in the benchmark outputs. Threatened and endangered species recovery projects not are undertaken in this benchmark. Recovery is assumed to be complete. Costs associated with coordination with other agencies after recovery is complete are included.

f. Wildlife and Fish User Days

Only background WFUD's are produced. Background WFUD's were assumed to be a percentage of the 1982 RIM figure. Direct habitat improvement projects are not undertaken in this benchmark.

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[10] "background" in this context refers to outputs which are naturally occurring and not induced by management activities.

g. Developed Recreation

Developed site RVD's are not produced. There are no background developed site RVD's.

h. Dispersed Recreation

Only background dispersed use RVD's are produced. All background dispersed use RVD's receive low standard benefit values. Background dispersed recreation was assumed to be a percentage of the 1982 RIM figure and includes the background WFUD's.

i. Roads and Facilities

Forest roads are not constructed or maintained. Forest roads are assumed to be closed to the public. Facilities (office buildings, barracks, etc.) would be maintained at Level I.

(FLW) - UNCONSTRAINED MAXIMUM PNV ASSIGNED-WITH FLOW CONSTRAINTS

1. Theme

This benchmark displays the most economically efficient allocation of resources. It is intended to be neither legal or implementable. FLW provides a basis for evaluating the MMR's.

2. Modeling Specifications

a. Objectives

Resources are allocated to maximize PNV.

b. Timber

Minimum rotation is set at merchantable age, which on the Sequoia NF is equal to CMAI. The long-term sustained yield (LTSY) constraint provides for regulation of 90 percent of the managed forest by the end of the planning horizon. Other timber policy constraints are relaxed. Harvest flow constraints limit the variability in harvest from one period to the next to provide stability to the local economy.

c. Livestock Grazing

There are two types of range, Permanent and Transitory. Permanent range land is assumed to be brush and grass strata with less than 40 percent slope. These lands are managed at various intensities. The AUM per acre coefficient varies with intensity and land productivity. The percentage by intensity varies with benchmark or alternative theme. FLW has more land in high intensity management. Transitory range is tied to timber harvest by

regeneration cutting. AUM's are generated for the first decade after harvest.

d. Water

In addition to the background water (which is discussed under minlevel) additional water is produced in order of decreasing qualities, by regeneration, type conversion and burned acres. There is a decay function for induced water which reaches zero after several decades beyond the initiation of the activity.

Riparian areas (SMZ's) do not constrain timber management in this benchmark.

e. Spotted Owls and Threatened and Endangered Species.

The model is not constrained by protection of spotted owl nor constrained by protection of threatened and endangered species habitat.

f. WFUD's

There are four components to WFUD's: background which is naturally occurring and unrelated to management; existing, which is related to timber suitable acres; fisheries habitat improvements; and terrestrial habitat improvements. Timber suitable acres is the linkage which reflects KV work in habitat improvement. The terrestrial and fisheries habitat improvement projects are assumed to be focused on suitable land. There is an implementation constraint which applies to all the habitat improvement projects. There is no trade-off with any other resources and habitat improvements except when there is a budget constraint; this is because of the cost associated with the habitat improvement.

The benefit-cost ratio for fisheries habitat improvement projects is not as favorable as for terrestrial wildlife habitat improvement projects.

g. Developed Recreation

The model is free to choose production of RVD's from existing and potential developed sites and ski areas in the level and amount which maximizes PNV, not to exceed demand. Downhill ski areas are always managed at full standard. Developed sites are managed at one of three levels -- shutdown, low standard, and full standard.

h. Dispersed Recreation

Dispersed recreation production is constrained to be less than or equal to demand. This demand cutoff represents the summation of background WFUD's. background dispersed RVD's. wilderness RVD's, induced WFUD's, and other dispersed RVD's.

There are two management intensities for induced dispersed RVD's -- low standard and full standard. The management intensity chosen will obtain the best return to PNV.

i. Roads and Facilities

Road construction and reconstruction is a by-product of vegetative manipulation in the conifer zone. Road construction, reconstruction, and maintenance associated with timber harvest is a function of acres accessed. Road maintenance associated with recreation is related to keeping roads open for public use. There are no roads associated with downhill ski areas. The permittee is assumed to be responsible for road construction and maintenance. Facilities are managed at the least cost while meeting resource needs.

j. Protection

There are various fire management options and five budget levels which result in 12 combinations in addition to the minimum level fire management organization. The minimum level organization is only applicable to the minimum level benchmark. The model chooses the fire management option which minimizes the cost plus net value change, which is not necessarily the minimum. Net value change is represented by the effect of fire on water, timber, forage, and wildlife habitat. The effect of fire on these resources is negative or positive depending upon the intensity and fuel model. Acres of mature timber burned are supplied by the model and vary with the option. In addition to mature timber it is assumed that, based on existing probabilities, 1.9 percent of plantation acres will be burned each decade.

(MMR) - MAXIMIZE PNV-ASSIGNED VALUES WITH MMR'S. NDY, & CMAI

1. Theme

The theme of the MMR (Minimum Management Requirement) benchmark is to display outputs possible if management was constrained only to meet legal requirements.

The Minimum Management Requirements are specified by 36 CFR 219.27, National Forest Land Management Planning Direction.

2. Modeling Specifications

a. Objective

The model allocates resources to maximize PNV subject to constraints summarized below.

b. Timber

Timber Policy Constraints of CMAI, LTSY, NDY, and dispersion are applied. Other constraints concerning spotted owls, riparian

areas, sensitive soils, and T&E species habitat affect timber scheduling and yield.

c. Livestock Grazing

Forage lands and timber prescriptions produce AUM's. Discussion in benchmark HLW applies to MMR.

d. Water and Soil

The discussion in the HLW benchmark pertaining to the modeling of water yield applies to the MMR benchmark.

Riparian areas (SMZ) are modeled as Regulation Class III or minimum level. All riparian areas are assumed to be 100 feet wide on both sides of all perennial streams and lakes. This is to insure maintenance or improvement of riparian dependent resources (i.e., clean water, wildlife habitat, etc.).

Sensitive soils as defined in the working papers of the AMS are modeled so that not more than five percent of the sensitive area is accessed for management activities in any decade. This is done to prevent losses in soil productivity.

e. Spotted Owls and Threatened and Endangered Species

The model is constrained to provide approximately 35,000 acres managed for spotted owl habitat. The spatial requirements of Spotted Owl Habitat Areas are proxied in the model by forcing the minimum habitat acres to be allocated from existing management strata. This will insure habitat for a viable population of spotted owls is available throughout the planning horizon.

Bald eagle, Little Kern golden trout, and California condor habitat are protected by allocating it to Regulation Class III or minimum level. There are no WFUD's associated with T&E species. There is a cost in the model to account for introduction of two pair of peregrine falcon. There is a cost for condor associated with other agency coordination and for completion of LKGT Management Plan.

f. WFUD's

Same as HLW.

g. Developed Recreation

Same as HLW.

h. Dispersed Recreation

Same as HLW.

i. Roads and Facilities

Same as FLW.

j. Protection

The model selects the most cost-effective budget level and mix in each period. Same as FLW.

(MKV) - MAXIMIZE PNV-MARKET VALUES ONLY-WITH MMR's, CMAI, AND NDY

1. Theme

This benchmark demonstrates the sensitivity of the solution to nonmarket resources (water, fish, wildlife. and dispersed recreation) price assignments. Nonmarket outputs are valued and contribute to PNV after the solution is found and do not effect the allocation of market outputs (timber. developed recreation, livestock grazing).

2. Modeling Specifications

a. Objective

Resources are allocated to maximize PNV with only timber, range, and developed recreation being valued.

b. Timber

The discussion under the MMR benchmark applies to MKV; however, timber's value through its linkage to water is reduced because water is not valued until after the optimum allocation is determined.

c. Water and Soil

Same as MMR but water's value is not taken into consideration in determining the optimum allocation.

d. WFUD's

Same as HLW benchmark except WFUD's are not valued as part of the allocative solution.

e. Dispersed Recreation

Same as HLW except dispersed recreation RVD's are not valued prior to the solution.

All other objectives and constraints are as in MMR.

(TBR) - MAXIMIZE TIMBER FOR ONE DECADE WITH MMR's, CMAI AND ECONOMIC ROLLOVER

1. Theme

The theme of this benchmark is to define the maximum timber output possible for the first decade under the constraints of NDY, CMAI. and MMR. After determining the maximum yield under these constraints, it is used as a constraint in a second run which allocates resources to meet this goal and maximize PNV (Economic Rollover).

This benchmark provides a basis for analyzing the effect of CMAI and NDY on timber yield.

2. Modeling Specifications

a. Objective

The objective function of this run maximizes PNV subject to maximizing timber first. The constraints are identical to MMR.

b. Timber

Meet the timber outputs defined in the first run described above.

(TBD) - MAXIMIZE TIMBER FOR ONE DECADE WITH DEPARTURE FROM EVENFLOW FOR ONE PERIOD WITH MMR's, CMAI AND ECONOMIC ROLLOVER

1. Theme

The theme of this benchmark is similar to the TBR benchmark. In TBD, the Non-declining Yield constraint is relaxed in the first period. This benchmark displays the opportunity cost of the non-declining yield constraint in terms of timber yield. A comparison of yield with TBR provides a measure of the opportunity cost.

2. Modeling Specifications

a. Objective

The objective of this benchmark is to maximize PNV subject to maximizing timber and the constraints listed below.

b. Timber

Same as MMR except the non-declining yield constraint is relaxed and a one period departure is allowed, subject to the harvest flow constraints.

All other Timber Policy Constraints apply.

All other objectives and constraints are as in 13MMR.

(WLN) - MAXIMIZE PNV WITH MAXIMUM WILDERNESS - WITH MMR's and NDY

1. Theme

The theme of this benchmark is to display the opportunity cost associated with a maximum wilderness recommendation.

2. Modeling Specifications

The objectives and constraints are as in *MMR* with the additional stipulation that all inventoried Roadless Areas are recommended for wilderness.

(NON) - MAXIMIZE PNV WITH NO FURTHER PLANNING AND WILDERNESS STUDY AREAS TO WILDERNESS WITH MMR's and NDY

1. Theme

The theme of this benchmark is to display the opportunity cost associated with not allowing any WSA to be recommended for wilderness.

2. Modeling Specifications

The objectives and constraints are as in *MMR* with the additional constraint of not allowing any new wilderness recommendations.

(RNG) - MAXIMIZE LIVESTOCK GRAZING FOR FIVE DECADES WITH MMR'S, NDY and ECONOMIC ROLLOVER

1. Theme

The theme of this benchmark is to display the maximum capability of the Forest to provide commercial livestock grazing over five decades. The run is completed in two stages. In the first stage the resources are allocated to define maximum livestock forage potential. In the second stage, the production potential defined in the first stage is added to the model as a constraint and the model allocates resources to maximize PNV.

2. Modeling Specifications

The objective of the model is to maximize PNV subject to maximizing livestock forage first. The constraints of *MMR* Benchmark apply.

(H2O) - MAXIMIZE WATER YIELD FOR FIVE DECADES WITH MMR's, NDY and ECONOMIC ROLLOVER

1. Theme

The theme of this benchmark is to define the maximum capability of the Forest to provide water over five decades. The same process is used as

in RNG, with the difference being the theme of water yield instead of livestock grazing.

2. Modeling Specifications

The objective of this run is to allocate resources to maximize PNV subject to maximizing water yield first. The constraints of MMR benchmark apply.

J. Alternatives

For a complete discussion and display of the results of all the alternatives, refer to Chapters 2 and 4 of the EIS. Chapter 2 lists all constraints that apply to an alternative and displays the results. Chapter 4 discusses the Environmental Consequences of each alternative. This section lists only those constraints that were modeled in FORPLAN and describes how they were modeled.

ALTERNATIVES ELIMINATED FROM DETAILED STUDY

(CEE) CONSTRAINED ECONOMICALLY EFFICIENT

1. Theme

This alternative was formulated to represent the least constrained, legal and implementable management of the Forest to maximize PNV. It provides a measure of the opportunity cost of the scenic highway MIR when compared to the MMR benchmark.

2. Modeling Specifications

The model allocates resources to maximize PNV subject to the constraints described below.

All constraints that apply to benchmark MMR apply to this alternative with the addition of the MIR for scenic highways. Analysis areas were identified where scenic highways occurred. These lands were constrained so that highway immediate foreground was assigned to a Visual Quality Objective of Retention. The rest of the foreground and the middleground was assigned to a VQO of Partial Retention. These were modeled as Regulation Class III and II, respectively.

(WHE) FISH AND WILDLIFE HARVEST EMPHASIS

1. Theme

This alternative was formulated to emphasize production of high quality habitat for harvest wildlife species in order to increase opportunities for consumptive wildlife uses.

Dispersed recreational opportunities will be greatly expanded, with increases limited only by demand. desired user capacity, or to minimize wildlife habitat disturbance. Developed recreation opportunities will also be expanded but will be limited to minimize wildlife habitat disturbance. The timber program will be managed to provide high quality habitat for emphasized wildlife species. Livestock grazing will increase as new forage is created, but the intensity of grazing will be reduced to minimize conflicts with wildlife. Wildlife habitat improvements will provide increased habitat capability for harvest wildlife species and other wildlife species that are associated with these habitats. New wilderness designation is not recommended in order to facilitate access for habitat improvement projects.

2. Modeling Specifications

a. Objective

The model allocates resources to maximize PNV subject to meeting MMR'S, NDY, CMAI. MIR and the additional constraints listed below.

b. Timber

Available emphases are Regulation Classes II and III and no harvest. This provides for maintenance of habitat for species utilizing late-successional stages of timber.

A minimum of 1,600 acres per year are regenerated while retaining 50 percent of the area in forage producing species. This provides retention of high quality forage for deer in the summer range.

c. Livestock Grazing

In Chaparral, only 50 percent of allowable use of forage is for livestock production. This provides retention of additional high quality forage for deer in the winter range.

Reduce cattle use in meadows to 50 percent of 1982 level. This provides additional high quality forage for deer.

d. Soil and Water

Costs are included to rehabilitate deteriorated watersheds through restoration projects and abandoned road obliteration.

Riparian areas are modeled as no harvest. This provides high quality habitat for riparian dependent wildlife species.

e. WFUD's

WFUD's are produced up to demand through habitat improvement projects designed to increase habitat capability for harvest species.

A minimum of 2,500 acres of chaparral are prescribed burned each year to provide increased habitat capability. This is to provide additional habitat for wildlife species associated with early successional stages of chaparral.

f. Developed Recreation

Sherman Pass and Mitchell-Maddox potential ski areas are not constructed, but are managed for wildlife habitat improvement.

g. Dispersed Recreation

Piute and Scodie Mountains are managed for maximum dispersed wildlife associated recreation opportunities.

h. Roads and Facilities

Road maintenance costs are increased to maintain 50 percent of all local roads open for public use.

(13 CED) CURRENT, ECONOMIC, DISPERSED

1. Theme

This alternative was formulated to represent the most cost efficient method to produce a broad range of emphases and intensities. A mix of commodity and amenity benefits is produced to optimize net public benefits.

The Recreation emphasis is to produce a range of quality opportunities for dispersed recreation while providing for slow increases in developed recreation capacity. Potential developed sites are managed to maintain or enhance their recreation potential for future development. Visual quality will be protected or enhanced in high use dispersed areas and near recreation developments. Part of the BLM Rockhouse WSA is recommended for wilderness.

The timber program will produce at least current harvest levels.

Livestock grazing will be emphasized, with additional forage created through a coordinated chaparral management program.

Wildlife habitat emphasis is on species associated with early successional stages through the timber and chaparral programs with additional habitat improvement projects coordinated through these programs.

Riparian areas will be extended to include protection of intermittent streams to maintain additional acres of riparian vegetation.

2. Modeling Specifications

a. Objective

- The model allocates resources to maximize PNV subject to meeting MMR's. NDY. CMAI. MIR, and the additional constraints listed below.

b. Timber

- Except as indicated below, all timbered lands are available for all regulation classes.

- On the Piute Mountains, all timber land below 6,500 feet will be managed under long rotations (Regulation Class II) or by selection harvests (Regulation Class 111).

- Retention VQO is met in the foreground and partial retention in the middleground of Highway 180, 190, a portion of the Western Divide, the Generals Highway, the PCT. and heavily used trails into the wildernesses. Partial retention is met in the foreground of an additional 225 miles of roads and trails in the conifer zone. This is done to provide a high quality dispersed recreation experience.

c. Range

A limit on AUM production of 71,000 AUM's is applied in the first decade for the retention of additional forage for deer.

d. Soil and Water

- Costs for rehabilitation of degraded watersheds and abandoned road obliteration are included.

- Riparian areas are expanded to include 25 feet on each side of intermittent streams to maintain additional riparian vegetation.

f. WFUD's

- Terrestrial wildlife habitat improvement projects are used to increase WFUD's up to demand.

- Annually, in the first and second decades, 1,000 and 5,000 acres of chaparral are treated respectively to increase habitat capability for wildlife species associated with early successional stages.

g. Developed Recreation

- New construction and expansion of existing developed sites is limited to a 10% increase in RVD's in the first decade in order to emphasize dispersed recreation opportunities.

- Ski area expansion and new construction is allowed.

- In the first decade, rehabilitation of existing sites is limited to 50% of total in order to emphasize dispersed recreation opportunities.

h. Dispersed Recreation

- All dispersed recreation facilities are rehabilitated to standard level in the first decade. New construction occurs.

(13 LBU) LOW BUDGET

1. Theme

This alternative was formulated to estimate the benefits that could be provided if the current budget were reduced by 25%. Goods and services would be produced in the approximate mix as current, with emphasis on market goods of timber, range, and developed recreation.

No wildlife habitat work would be done except through coordination with other resources.

No expansion of recreation sites will occur and all recreation will be managed at the low standard level. Part of BLM Rockhouse is recommended for wilderness. Visual quality objectives, other than Preservation, will be lowered one level. All forms of recreation will be below demand after the first decade.

2. Modeling Specifications

a. Objective

- The model allocates resources to maximize PNV subject to meeting MMRs, NDY, CMAI. MIR, and the constraints listed below.

b. Timber

- A floor of 64 MMBF/year was used in order to help maintain community stability and emphasize market goods.

- Regulation Classes I. II, and III were available as appropriate to meet visual objectives which are reduced one VQO (except in wilderness) to help meet market resource objectives.

c. Range

- A floor of 59 MAUM's/year in the first decade, 50 MAUM's/year in the second decade, and 45 MAUM's/year thereafter was used to meet permit requirements and allow slow reductions to a base level of emphasis.

d. Soil and Water

- Riparian areas increase in size on Class I streams and include intermittent streams to maintain additional riparian vegetation for dependent resources.

- Watershed restoration costs are reduced 25% from current management in order to help meet market resource objectives.

e. WFUD's

- WFUD's are produced at existing levels.

- No projects are included to increase WFUD's in order to help meet market resource objectives.

f. Developed Recreation

- A floor of 660 MRVD's/year was used to provide this opportunity at a 25% reduction from current use.

g. Dispersed Recreation

- A floor of 790 MRVD's/year was used. This was used to prevent the budget reduction from eliminating this program.

h. Roads and Facilities

- Roads were maintained such that 10%are kept open for public use.

(13 WLI) WILDERNESS WITH CAPITAL INVESTMENT FOR MARKET RESOURCES

1. Theme

This alternative was formulated to portray high levels of both quality wilderness and market outputs. The objective is to portray the amount of market outputs that could be realized with a significant part of the Forest recommended to wilderness. Non-wilderness areas would be intensively managed to produce commodities in a cost efficient manner.

Both developed and dispersed recreation opportunities would be expanded greatly, with increases limited only by demand or planned user capacity. Livestock grazing would increase greatly, considering site capability constraints and minimum wildlife habitat requirements. Wildlife habitat management would increase, but would be achieved largely by coordination with other resource management activities and treatments.

2. Modeling Specifications

a. Objective

- The model allocates resources to maximize PNV subject to meeting MMR's, NDY, CMAI. MIR, and the following list of constraints.

b. Market Resources

- Floors for production levels of timber, range, and developed recreation were used in order to provide at least current amounts of market resources.

ALTERNATIVES CONSIDERED IN DETAIL

(PRF) PREFERRED ALTERNATIVE

1. Theme

This alternative utilizes both even-aged and uneven-aged silvicultural techniques. It was formulated to represent the most cost efficient method to produce a broad range of emphases and intensities that meet short-term needs while retaining long-range management options. A mix of commodity and amenity benefits is produced to optimize net public benefits.

The recreation emphasis is to produce a range of quality opportunities for dispersed recreation while providing for slow increases in developed recreation capacity. Potential developed sites are managed to maintain or enhance their recreation potential for future development. Visual quality will be protected or enhanced in high use and visually sensitive dispersed areas and near recreation developments. Part of the BLM Rockhouse Wilderness Study Area is recommended for wilderness.

The timber program will produce at Forest RPA target level for the planning period. Harvest will concentrate on high site lands to insure regeneration success. Harvest methods will include both even-aged and uneven-aged harvest methods. A quality mix of harvest species will be made available.

Livestock grazing will be emphasized, with additional forage created through a coordinated chaparral management program, including prescribed fire in wildernesses.

Wildlife habitat emphasis is on species associated with early successional stages through the timber and chaparral programs with additional habitat improvement projects coordinated through these programs.

Riparian areas will be extended to include protection of intermittent streams.

2. Modeling Specifications

a. Objective

The model allocates resources to quality owl habitat and long-term sustained yield of timber products and rollover to maximize subject

to meeting MMR'S, NDY, CMAI, MIR and the additional constraints listed below.

b. Timber

Except as indicated below, all available timbered lands are available for all regulation classes.

Harvest level for chargeable volume (ASQ) was set at 97.0 MMBF in the planning period. An additional 4.6 MMBF was added for non-chargeable volume.

Retention VQO is met in the foreground and Partial Retention in the middleground of Highways 180 and 190, a portion of the Western Divide, the Generals Highway, Sierra Way (County Road M-99 from Kernville to Johnsondale bridge), Highway 178, the PCT, and heavily used trails into the wildernesses. Partial Retention is met in the foreground of an additional 225 miles of roads and trails within the conifer zone. Uneven-aged management practices were also assigned to three visually sensitive viewsheds (Sherman Pass Overlook, Monache Meadows, and Big Meadows-Salmon Creek). This is done to provide a high quality dispersed recreation experience through visual resource management.

An area in the vicinity of Sirretta Peak was classified as SPNM and designated as not approved for timber management in favor of other nonconsumptive resource uses.

Thirty percent of volume in planning period was required to come from uneven-aged timber management activities.

c. Livestock Grazing

A limit on AUM production of 71,000 AUM's is applied in the first decade due to chaparral treatment and retention of additional forage for wildlife.

d. Soil and Water

Cost are included to rehabilitate deteriorated watersheds through restoration projects and abandoned road obliteration.

Riparian areas are modeled with only Regulation Class III timber management (incidental yields) within 100 feet either side of perennial streams.

Cumulative Watershed Effects were analyzed using ERA's. ERA's reflect impacted by various management activities such as road building and timber harvesting on the watershed. An ERA threshold was set as a constraint on these activities.

f. WFUD's

Terrestrial wildlife habitat improvement projects are used to increase WFUD's up to demand.

Annually, in the first and second decades, 1,000 and 5,000 acres of chaparral are treated respectively to increase habitat capability for wildlife species associated with early successional stages. Treat 30 miles of stream for increased fisheries habitat improvement.

g. Developed Recreation

New construction and expansion of existing developed sites is limited to a 10 percent increase in RVD's in the first period in order to emphasize dispersed opportunities.

Ski area expansion and new construction is allowed.

In the first decade, rehabilitation of existing sites is limited to 50 percent of total in order to emphasize dispersed recreation opportunities.

h. Dispersed Recreation

All dispersed recreation facilities are rehabilitated to standard level in first decade.

(CUR) CURRENT ALTERNATIVE (NO CHANGE ALTERNATIVE)

1. Theme

This alternative was formulated to estimate the expected outputs, services and consequences that would occur if current allocations, directions, policies, and practices were to continue. Forest goods will be provided at 1982 levels.

Recreation emphasis is for low standard management for both dispersed and developed recreation, except where permittees are 'involved (i.e., ski areas). Recreation opportunities will fall below demand after the first decade. Wildlife management will continue through coordination with other resource activities, focusing on meeting minimum requirements.

Timber harvest will remain at current levels with increased costs for production due to access difficulties.

The range program will continue at current levels. The chaparral management program will continue to burn 1,000 acres per year.

New wilderness will not be recommended.

2. Modeling Specifications

a. Objective

The model allocates resources to maximize PNV subject to meeting MMR'S. NDY, CMAI, MIR and the additional constraints listed below.

b. Timber

IVQO's are met. restricting land as follows.

Preservation - no harvest.

Retention - Regulation Class III, or no harvest.

Partial Retention - Regulation Class II, or no harvest.

Modification and Maximum Modification - Regulation Class I, II, 111, or no harvest.

Produce at least 95.1 MMBF per year.

c. Livestock Grazing

Produce 63.000 AUM's per year.

1,000 acres of chaparral are prescribed burned each year.

d. Soil and Water

Costs are included to rehabilitate deteriorated watersheds through restoration projects and abandoned road obliteration.

Riparian areas are modeled with only Regulation Class III timber management (incidental yields) within 100 feet either side of perennial streams.

Cumulative Watershed Effects were analyzed using ERA's. ERA's reflect impacted by various management activities such as road building and timber harvesting on the watershed. An ERA threshold was set as a constraint on these activities.

e. WFUD's

The existing WFUD's are maintained.

f. Recreation

Only low standard recreation is allowed.

Produce at least 1,580 dispersed MRVD's per year.

Produce 886 developed MRVD's per year.

g. Budget

A budget constraint of $16.3 million is used.

(RPA) 1980 RESOURCE PLANNING ACT PROGRAM

1. Theme

This alternative was formulated to emphasize both commodity and amenity values to meet 1980 RPA targets. Both developed and dispersed recreation opportunities will be greatly expanded, limited only by demand. Livestock grazing will be below current levels until the fourth decade and show a 27 percent increase in 2030. Wildlife habitat improvements will increase and goals will be reached through a mix of extensive habitat treatments and coordination with other resources. Timber harvest will increase slightly. Visual quality will be maintained or enhanced over the entire Forest. Watershed rehabilitation will increase.

2. Modeling Specifications

a. Objective

The model allocates resources to maximize PNV subject to meeting MMR'S, NDY. CMNI, MIR and the constraints listed below.

b. Targets

Meet (or approximate to the extent possible) RPA targets for timber, range, developed and dispersed recreation, visual quality, and wildlife and fisheries habitat improvement.

c. Timber

Harvests are restricted to meet visual RPA targets. Thirty percent of the volume harvested in the planning period was assigned to uneven-aged management.

d. Livestock Grazing

Stocking of cattle in treated chaparral is allowed up to 50 percent of allowable use in order to provide additional forage in deer winter range to meet the RPA target.

e. Soil and Water

Costs are included to rehabilitate deteriorated watersheds through restoration projects and abandoned road obliteration.

Riparian areas are modeled with only Regulation Class 3 timber management (incidental yields) within 100 feet either side of perennial streams.

Cumulative Watershed Effects were analyzed using ERA's. ERA's reflect impacted by various management activities such as road building and timber harvesting on the watershed. An ERA threshold was set as a constraint on these activities.

f. Recreation

Both developed and dispersed RVD's are produced at standard levels.

g. WFUD's

Treat 30 miles of stream for fisheries habitat improvement to meet RPA targets.

(AMN) AMENITY EMPHASIS

1. Theme

This alternative variation was formulated to emphasize a balance of high levels of amenity benefits. Wildlife habitat diversity, wilderness and dispersed recreation opportunities and visual quality will be emphasized. Other benefits will be produced at economically efficient levels, with all timber harvested utilizing uneven-aged silvicultural techniques.

Emphasis would be placed upon improvement and maintenance of wildlife and fish habitat diversity by prescribed burning of chaparral and regulation of activities in riparian, oak woodland. and conifer forest areas. Five new wildernesses would be recommended for designation. Dispersed recreation would be emphasized over developed recreation opportunities but both would complement wildlife and fish habitat management objectives. Livestock grazing would decrease below the current level, and would be regulated to provide high quality wildlife habitat.

Visual objectives are at least Partial Retention or higher over the entire Forest.

2. Modeling Specifications

a. Objective

The model allocates resources to maximize PNV subject to meeting MMR'S, NDY. CMAI. MIR and the following constraints.

b. Timber

All available timber lands receive uneven-aged silvicultural treatment.

c. Livestock Grazing

Livestock grazing would not occur in meadows, riparian areas or new wilderness. Grazing in treated chaparral is reduced to 50 percent of allowable use. These constraints provide for a high quality dispersed recreation experience and add additional forage for deer.

d. Soil and Water

Riparian areas are modeled with only Regulation Class III timber management (incidental yields) within 100 feet either side of perennial streams.

Cumulative watershed effects were analyzed using ERA's. ERA's reflect impacted by various management activities such as road building and timber harvesting on the watershed. An ERA threshold was set as a constraint on these activities.

e. Recreation

Developed recreation is produced at low standard levels in order to emphasize dispersed recreation opportunities.

Dispersed recreation is produced at standard levels.

Five areas are recommended to wilderness (with prescribed burning permitted) to provide maximum wilderness and further emphasize dispersed recreation opportunities.

f. WFUD's

Emphasis on nonconsumptive WFUD's up to demand.

Costs included at 2.5 times recovery level for peregrine falcon to maximize population level.

Treat 3,000 acres chaparral per year for wildlife habitat improvement.

Treat 50 miles of stream for fisheries habitat improvement.

(MKT) HIGH MARKET EMPHASIS

1. Theme

This alternative was formulated to estimate the costs and benefits from emphasizing high production levels of the market resources, timber, livestock grazing, and developed recreation.

Timber production is of highest priority, with at least a 25 percent increase over current levels in the first decade and a 30 percent increase by decade five. Livestock grazing and developed recreation increases approximate those of timber. Dispersed recreation is managed

at low standard levels. Nonmarket benefits are induced from market production or are at economically efficient levels.

2. Modeling Specifications

a. Objective

The model allocates resources to maximize PNV subject to meeting MMR'S, NDY. CMAI, MIR. and the following list of constraints.

b. Timber

Production floors of 125 MMBF per year and 130 MMBF per year were used in the first and fifth decades respectively.

d. Developed Recreation

A production floor of .978 MMRVD's and 1.1 MMRVD's was used in the first and second decades, respectively.

All RVD's are at standard level.

Three ski areas are developed.

e. Visual

Partial Retention was met in foreground and middleground of the Pacific Crest Trail.

f. Water and Soil

Costs are included to rehabilitate deteriorated watersheds through restoration projects and abandoned road obliteration.

Riparian areas are modeled with only Regulation Class III timber management (incidental yields) within 100 feet either side of perennial streams.

Cumulative Watershed Effects were analyzed using ERA's. ERA's reflect impacted by various management activities such as road building and timber harvesting on the watershed. An ERA threshold was set as a constraint on these activities.

(PRO) HIGH PRODUCTION EMPHASIS

1. Theme

This alternative was formulated to estimate the costs and benefits of meeting the 1980 RPA high timber target. Emphasis is placed at a lesser level on livestock grazing and developed recreation. Nonmarket resource levels are induced by market production or produced at economically efficient levels.

2. Modeling Specifications

a. Objective

The model allocates resources to maximize PNV subject to meeting MMR's, NDY, CMAI, MIR, and the constraints listed below.

b. Timber

A maximum timber objective with PNV rollover was used for the RPA planning period with harvest ceiling set at 1980 RPA high timber targets.

c. Soil and Water

Costs are included to rehabilitate deteriorated watersheds through restoration projects and abandoned road obliteration.

Riparian areas are modeled with only Regulation Class III timber management (incidental yields) within 100 feet either side of perennial streams.

Cumulative Watershed Effects were analyzed using ERA's. ERA's reflect impacted by various management activities such as road building and timber harvesting on the watershed. An ERA threshold was set as a constraint on these activities.

(WFV) WILDLIFE, FISH AND VISUAL EMPHASIS

1. Theme

This alternative was formulated to emphasize production of high quality habitat for game and nongame wildlife species in order to increase opportunities for wildlife uses, while emphasizing visual quality and reducing cumulative impacts.

Dispersed recreational opportunities will be greatly expanded, with increases limited only by demand, desired user capacity, or to minimize wildlife habitat disturbance. Developed recreation opportunities will also be expanded, but will be limited to minimize wildlife habitat disturbances. The timber program will be managed to provide high quality habitat for emphasized wildlife species. Livestock grazing will increase as new forage is created, but the intensity of grazing will be reduced to minimize conflicts with wildlife. Wildlife habitat improvements will provide increased habitat capability for wildlife species. New wilderness designation is not recommended to facilitate access for habitat improvement projects.

2. Modeling Specifications

a. Objective

The model allocates resources to maximize PNV subject to meeting MMR's, NDY. CMAI. MIR. and the additional constraints listed below.

b. Timber

Available emphases are Regulation Classes II and III and no harvest. This provides for maintenance of habitat for wildlife species utilizing late successional stages of timber, and provides a moderate level of visual quality.

A minimum of 1,600 acres per year are regenerated while retaining 50 percent of the area in forage producing species. This provides retention of additional high quality forage for deer in summer range.

A floor of 82 MMBF was used to help maintain community stability. (50 percent of the harvest was required to come from uneven-aged management prescriptions.)

c. Livestock Grazing

In chaparral, only 50 percent of allowable use of forage is available for livestock production. This provides retention of additional forage for deer in winter range.

Reduce cattle use in meadows to 50 percent of 1982 level. This provides additional high quality forage for deer.

d. Soil and Water

Costs are included to rehabilitate deteriorated watersheds through restoration projects and abandoned road obliteration.

Riparian areas are modeled with only Regulation Class III timber management (incidental yields) within 100 feet either side of perennial streams.

Cumulative Watershed Effects were analyzed using ERA's. ERA's reflect impacted by various management activities such as road building and timber harvesting on the watershed. An ERA threshold was set as a constraint on these activities.

e. WFUD's

WFUD's are produced up to demand through habitat improvement projects designed to increase habitat capability for wildlife species.

2,500 acres of chaparral are prescribed burned each year to provide increased habitat areas for wildlife species associated with early successional stages of vegetation.

Treat 50 miles of stream for increased fisheries habitat.

f. Developed Recreation

Sherman Pass and Mitchell-Maddox potential ski areas are not constructed, but are managed for wildlife habitat improvement,

g. Dispersed Recreation

Piute and Scodie Mountains are managed for maximum dispersed wildlife associated recreation opportunities through the use of only Regulation Class II and III harvest emphases.

Table B.6 - Constraints Specific to Each Alternative

CONSTRAINT	PRF	CUR	RPA	AMN	MKT	PRO	WFV
Campground RVD's Produced (M RVD's per year) • Period(s) in which constraint applies	1* ≤ 977 2+ Open	1-5 = 886 6+ Open	1 ≥ 978 2 ≥ 1110 3 ≥ 1170 4 ≥ 1370 5+ ≥ 1520	Open	1 ≥ 978 2+ ≥ 1107	1 ≥ 978 2-4 ≥ 1107	Open 5+ ≥ 1418
Developed Recreation Rehabilltation (% allowed)	1 ≤ 50% 2+ Open	1+ = 0	Open	1+ = 0	Open	Open	Open
Ski Areas Not Constructed (# Acres)	Open	Open	1	1	Open	Open	2
Olspersfd Recreation RVD's Produced (M RVD's per year)	Open	1+ ≥ 1582	Open	Open	Open	Open	Open
Dispersed Recreation Rehabilltatlon (% Allowed)	Open	1+ = 0	Open	Open	Open	Open	Open
Areas Recommended for Wilderness (# Areas)	Open	Open	Open	4	Open	Open	Open
M and MM VQO Allowed (M Acres Conifer)	1+ ≥ 250	1+ ≤ 100	1+ ≤ 78	1+ = 0	1+ ≤ 305	1+ ≤ 362.5	1+ = 0
PR VOO + (M Acres Conifer)	1+ ≥ 130	1+ ≥ 185	1+ ≥ 176	1+ ≥ 257	1+ ≥ 49	1+ ≥ 22	1+ ≥ 15
R VQO + (M Acres Conifer)	1+ ≥ 20	1+ ≥ 110	1+ ≥ 116	1+ ≥ 18	1+ 1 7	1+ ≥ 2	1+ ≥ 1
Peregrine Falcon Palr Costs (# Pairs)	Open	Open	Open	3	Open	Open	Open
Chaparral Prescribed Burning (M Acres per year)	1 = 1.0 2 = 5.0 3+ Open	1+ = 1.0	1+ ≥ 25	1+ 2. 3.0	Open	Open	1+ ≥ 2.5
Wet Meadow AUM Reduction (% Below Allottable Use)	Open	Open	Open	1+ 100	Open	Open	1+ = 50
Chaparral AUM Reduction (% Below Allowable Use)	1+ = 25	Open	1+ = 50	1+ = 50	Open	Open	1+ = 50
Forage Retention Regeneration Treatment (Acres per year)	Open	Open	Open	Open	Open	Open	1-5 = 1.6
AUM's Produced (M AUM's per year)	1 I 7 1 2+ Open	1-5 = 63 6+ Open	1 = 56.6 2 = 57.5 3 = 58.9 4 = 65 5 ≥ 80 6+ Open	Open	Open	Open	1 ≥ 60 2+ Open

Table 86 - Constraints Soecific to Each Alternative (Continued)

CONSTRAINT	PRF	CUR	RPA	AMN	MKT	PRO	WFV
WM Production Allowed in New Recommended Wildernesses (Yes/No)	Yes	Yes	Yes	No	Yes	Yes	Yes
Timber Volume Produced (MMBF per yearl	1+ ≥ 97	1+ ≥ 95	1 = 101.6 2 = 103.3 3 = 110.2 4+ 1110.2	Open	1–4 ≥ 125 5t ≥ 130	2+ ≥ 180	1+ ≥ 80
Timber Harvest Increase (% Increase Between Periods)	Open	Open	Open	Open	Open	Open	Open
Budget ($Million per year)	1+ ≤ 30	1–5 ≤ 16.3 6+ Open	Open	Open	Open	Open	1 ≤ 15 2+ Open
Red Fir Regeneration Allowed (Acres per year)	Open	Open	Open	Open	Open	Open	1 = 0 2+ Open
Lodgepole Pine Volume Allowed (MMBF per year)	Open	Open	Open	Open	Open	Open	1 = 0 2+ Open
Sequoia Volume Allowed (MMBF per year)	open	Open	Open	Open	Open	Open	1 = 0 2+ Open
Road Obliteration (Miles pwr year)	1+ = 6.5	1+ = 6.5	1 = 49 2+ = .5	1 = 25 2 = 24 3+ = .5	1 = 25 2 = 24 3t = .5	1 = 25 2 = 24 3+ = .5	1 = 25 2 = 24 3+ = .5
Watershed Restoration Costs (Acres per year)	1 = 140 2 = 100 3 = 50 4+= 30	1 = 140 2 = 100 3 = 50 4+ = 30	1 = 270 2 = 290 3 = 300 4 = 310 5+ Open	1 = 200 2 = 50 3t = 20	1 = 200 2+ = 50	1 = 200 2+ = 50	1 = 200 2 = 50 3 = 20 4+ = 10
Watershed Inventory Costs (Acres per year)	1 = 2,000 2 = 1,100 3 = 550 4+= Open	1 = 2.000 2 = 1,100 3 = 550 4+ = Open	1 = 2,400 2 = 3,000 3 = 3,500 4t = Open	1 = 6,000 2 = 1,000 3 = 400 4 = 400 5+= 200	1 = 6,000 2+ = 1.000	1 = 6,000 2+ = 1.000	1 = 1,000 2 = 1,000 3 = 500 4+= 100
Cumulative Watershed Effect (Threshold Level Constraining Timber Harvest [Yes/No])	No	NO	NO	No	Yes	Yes	NO
Fisheries Habitat Improvement (Miles of Stream for Decade 1)	30	0	30	50	0	0	50

IV. OTHER MODELS

A. Fire Management Analysis Process

The fire management analysis process [11] is comprised of four levels of analysis and a series of eight computer programs. Of the four levels of analysis, only two (described below) are used in the Forest planning process. The other two levels affect implementation and evaluation. The eight computer programs are simulators and report writers used to define the historical and current fire management situations and to evaluate candidate fire management fuels, prevention, detection, and suppression programs.

Fire Management Analysis Level I. An analysis of the historical and current fire management situation using fire and weather information, records of fire occurrences, and fire behavior (number of fires, acres burned by fire size and intensity). Some uses of Level I analysis are:

1. Display the general effectiveness and cost, including Fire Fighting Funds, of the current fire management program. This program cost may be used as a basis for estimating expected future costs where the fire program is relatively stable and will not vary significantly between prescriptions on a Forest-wide basis.

2. As a tool to aid the formulation and development of organizations in response to Forest plan alternatives and prescriptions. Level I analysis identifies areas which can be further analyzed in the areas of prevention, suppression, and fuels management areas.

Fire Management Analysis Level II. An analysis of various fire management program options (e.g., suppression mix versus prevention), budget levels (costs), and their effectiveness. This analysis is based upon the simulation of representative fires using varying fuel models, differing suppression resources, historical occurrence patterns, and by changing occurrence patterns based upon prevention efficiency. Some uses of Level II analysis are:

1. Evaluate fire program options appropriate for the principal Forest plan alternatives identified by FORPLAN to provide detailed resource output, effect value change, and program cost data for selection of the most efficient program level where fire program cost and effectiveness will affect the choice between these alternatives.

2. Evaluate the efficiency of fire program options for a number of alternative management prescriptions or Forest plan alternatives to provide general estimates of fire program cost and consequences for FORPLAN.

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[11] For a complete description of the fire management analysis process, see FSH 5109.19 (Fire Management Analysis, and Planning Handbook).

3. Evaluate the effectiveness of fire program options for a single Forest plan alternative within a constrained budget to establish the most effective program mix where the budget level is fixed.

From Fire Management Analysis Levels I and II, inputs by alternative to FORPLAN are:

1. Probability of acres burned.

2. Various program costs reflecting different fire management organizations.

3. Suppression costs reflecting the fire management organizational efficiency.

FORPLAN then predicts results by alternative for:

1. Acres burned.

2. Suppression costs.

3. Net value change for resources.

4. Optimum organization and budget level by period.

B. RAMPREP

RAMPREP is a PSW Region Timber Management model that is used to develop timber yield tables. RAMPREP timber yield tables are based on the Sequoia NF's 1980 Forest inventory data. RAMPREP summarizes the potential yields of the forest based on the 1980 inventory. For a detailed discussion of how RAMPREP calculates the potential yields, see The Region Five Timber Inventory Process, July 1981.

C. Regional Industrial Multiplier System (RIMS)

The U.S. Department of Commerce's Regional Industrial Multiplier System[12] (RIMS) was used to develop impact multipliers and employment and income estimates for the alternatives analyzed in the EIS. This system provides input-output multipliers for 56 industrial sectors for Bureau of Economic Analysis (BEA) Economic Area 166 (Fresno Area). Most of the economic activity associated with the Sequoia Nataonal Forest takes place within BEA Economic Area 166.

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[12] US Department of Commerce, Bureau of Economic Analyis, Industry-Specific Gross Output Multipliers for BEA Economic Areas. Regional Economic Analysis Division. Washington, D.C., January 1977.

Estimates of historical expenditures by sector associated with Forest outputs and purchases from the local economy with the RIMS input-output model multipliers were used to estimate employment and income effects of the alternatives.

A number of assumptions used in the input-output modeling technique must be kept in mind when interpreting the resulting income and employment estimates:

1. Historical transaction patterns associated with Forest outputs and purchases are assumed to hold in the future.

2. Transaction patterns (production functions) for industries in the local economy are assumed to be similar to those in the national economy and are assumed to hold in the future.

3. Income and employment impacts are assumed to occur in the same time period as the underlying changes in Forest outputs and purchases (no lagged effects are assumed).

As a result of these basic assumptions, employment and income effects estimated for the alternatives have relatively low reliability in absolute terms in future time periods. However, the income and employment estimates are reasonably accurate indicators of relative changes between the alternatives in the first decade.

D. Wildlife and Fish Habitat Relationships Habitat Capability Models

The Wildlife and Fish Habitat Relationships Habitat Capability Models (HCM's) are a management tool developed by planning biologists in the Pacific Southwest Region.[13] The HCM is a resume of biological information that describes the habitat requirements of a Management Indicator Species. This work was mandated by the Regulations of the National Forest Management Act (USDA 1979), which requires that each National Forest identify management indicator species to represent the significant habitat management issues for the Forest Land Management Plan.

Although the development of HCM's was related to Forest-wide planning, the models are detailed enough to apply to project work. Therefore, biologists and land managers may use this information both for large-scale planning and inventory and for site-specific habitat management within a single stand. Refer to Table 3.16, FEIS, for notations on sources of HCM's.

Because these models contain only biological information, they do not imply policy decisions. The tie to policy within the Forest Service will come as each Forest allocates land areas to high, medium, or low capability standards. This will be done in an interdisciplinary manner through the

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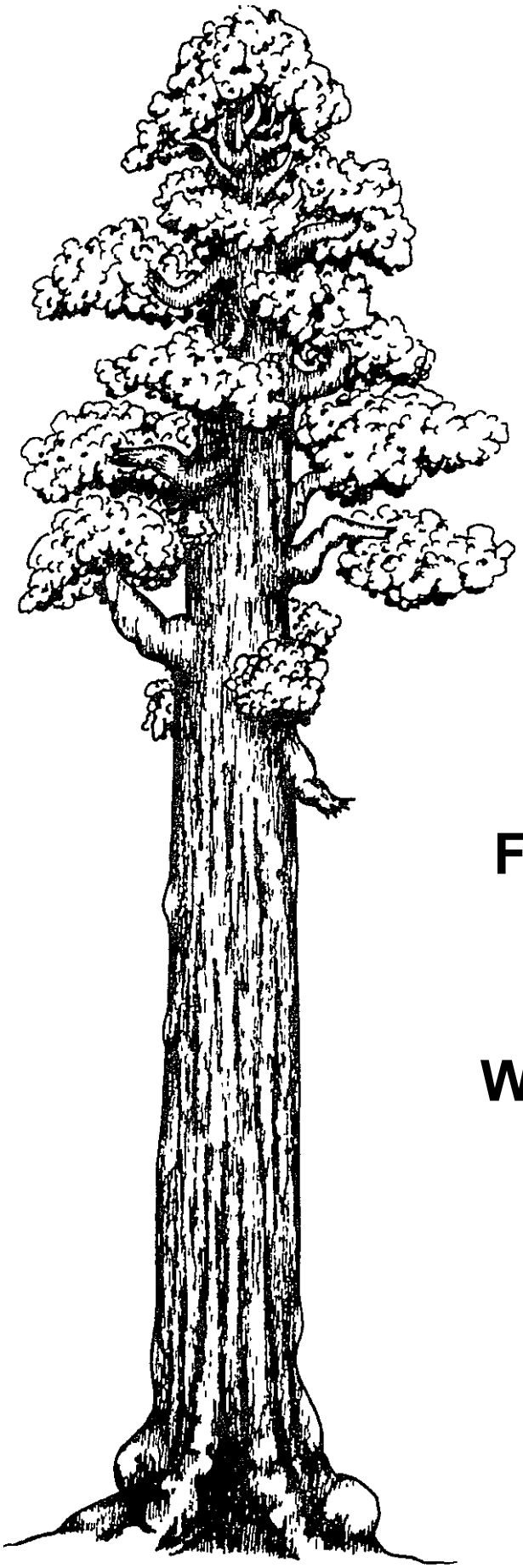
[13] Hurley, Janet F. et al, Wildlife Habitat Capability Models and Habitat Quality Criteria for the Western Sierra Nevada, Stanislaus National Forest. May 1981.

Forest Plan. However, the models provide appropriate information for biologists to establish goals for managing habitat quality through project work.



Appendix C

FURTHER PLANNING AND WILDERNESS STUDY AREAS

APPENDIX C
DESCRIPTION AND EVALUATION
FURTHER PLANNING AND WILDERNESS STUDY AREAS

The Further Planning and Wilderness Study Areas are displayed in numerical order in this Appendix. The list below is a quick reference to locate a specific area by name.

NAME	NUMBER	PAGE
BLM Rockhouse	0029	c-2
Kings River (Sequoia portion)	0198	
Oat Mountain	5197	C-11
Dennison Peak	5202	c-20
Moses	5203	c-31
Scodies	5212	C-44

A. FURTHER PLANNING AREA DESCRIPTIONS AND EVALUATION

INTRODUCTION

The second Roadless Area Review and Evaluation (RARE II) inventory identified 21 individual roadless areas on the Sequoia National Forest with a total of 517,274 net acres. The RARE II Final EIS recommended some of these areas for wilderness or non-wilderness. and suggested that other areas be subject to further planning before final recommendations were made. However, as a result of litigation over the RARE II recommendations, and the 1984 wilderness legislation, only four Further Planning Areas (FPA's) are being evaluated by the Sequoia NF for possible wilderness recommendation. These include the Oat Mountain, Dennison Peak, Moses, and Scodies Further Planning Areas. The BLM Rockhouse Wilderness Study Area (WSA) is also being evaluated for possible wilderness recommendation.

The entire Kings River Further Planning Area was analyzed by the Sierra NF in its DEIS. During this time, a considerable amount of legislative activity regarding Wild and Scenic River designation on the Kings River occurred. The end result was enactment of Kings River Wild and Scenic River Legislation in November 1987, which included this area as a Special Management Area. This action negates the need for additional consideration as a Further Planning Area. A plan for managing the Special Management Area will be prepared jointly between the two Forests within three years of the legislation enactment date.

1/ Deleted (See discussion in the Introduction which follows.)

One additional area, Cypress, has been evaluated by BLM. It has been recommended for non-wilderness use in their FEIS.

The following narratives describe individual Sequoia NF inventoried Further Planning Areas and the BLM Rockhouse Wilderness Study Area, analyze their wilderness values, address current and potential future uses, and examine the consequences of managing each area.

Each narrative contains five major subheadings: description, capability, availability, need, and environmental consequences. The annotated outline describes the kind of material included in each section, and defines the terms and abbreviations that might be found there.

BLM ROCKHOUSE area #0029 35,560 ACRES

DESCRIPTION

The Rockhouse Wilderness Study Area (WSA) is located in portions of Kern and Tulare Counties on the Kern Plateau. This area is administered by the Caliente Resource Area, Bureau of Land Management (BLM). The Rockhouse Area is actually split into two areas separated by an improved dirt road. The southern section is bounded on the south, east and north by the Canebrake/Long Valley-Rockhouse Basin Road, and on the west by the Sequoia National Forest boundary. The northern section is bounded on the north and east by section lines along the Kennedy Meadows Road, to the south by the Chimney Peak/Rockhouse Basin Road, and to the west by the Sequoia National Forest boundary. Access to the area is provided from Highway 178 to the Canebrake Road or Highway 395 up Nine Mile Canyon along Kennedy Meadows Road. It is approximately a 1-3/4-hour drive from Bakersfield to the southern portion of the Rockhouse Area and a 3-1/2-hour drive from Los Angeles.

The area is dominated by pinyon pine covered mountains. Rocky slopes, poor soil development and low precipitation limit vegetative growth and cover in many portions of the area. The southern end of the area in the Chimney Creek drainage contain massive granitic rock ridges and outcrops. Rockhouse currently receives a moderate amount of recreation use. Dominant recreation uses include hiking, equestrian use. off-highway vehicles (OHV's), and hunting. The entire Rockhouse WSA is within the watershed of the South Fork Kern River.

Archaeological evidence obtained from studies along the Pacific Crest Trail indicate the Tubatulabal Indians were the primary inhabitants in the Rockhouse WSA. These Indians relied heavily upon the local pinyon crop. Temporary hunting camps were also occupied throughout the pinyon season. Only one systematic survey for cultural resources has been conducted within the WSA. This survey, followed by limited excavation, was completed for construction of the Bear Mountain segment of the Pacific Crest Trail.

CAPABILITY

Outstanding opportunities for solitude and a primitive and unconfined type of recreation are prevalent throughout this unit. Rugged challenging

topography, perennial streams, variable terrain and vegetation all contribute to these opportunities. These opportunities are greatly enhanced by common boundaries with the Dome Land Wilderness to the west.

There are several primitive vehicle routes within the Wilderness Study Area. However, these routes do not distract from the overall natural character of the area. These routes, along with evidence of past fire suppression activities constitute the whole human influence on the area and are essentially unnoticeable. Thirty-six percent of the current recreation use is by OHV's and other users of motorized equipment. Dispersed recreation activities are challenging due to a lack of established trails. Scenic views from and within the Rockhouse WSA are excellent.

The mutual boundary of the WSA with the Dome Land Wilderness is not based on topographical features but section lines which form the administrative boundary between the two agencies. The other boundaries primarily follow roads and are easily recognized on the ground.

Opportunities exist to modify the existing boundaries to provide greater manageability for the Rockhouse area and the neighboring Dome Land Wilderness. Such modifications could reduce OHV conflicts with nonmotorized dispersed recreation users and reduce impacts on private land inholdings and mining activities. The first of these boundary modifications concerns the southern portion of the WSA and would recommend 5,270 acres to wilderness designation. A watershed boundary would bisect this section providing a topographical boundary that would enhance the manageability of the adjacent Dome Land Wilderness on the southeast corner up to Long Valley. The second modification adds an additional 4,440 acres north of Long Valley to the Rockhouse Basin Road. This boundary modification would recommend a total of 9,710 acres as wilderness and would adjoin to the Dome Land Wilderness boundary. The third boundary modification recommends most of the southern portion of the WSA as wilderness from Long Valley. This would place 12,650 acres in wilderness. The eastern boundary would follow the nearest ridge line within the WSA. The last boundary adjustment provides for more manageability of the northern portion of the WSA than the current "stair-step'' boundary near Kennedy Meadows Road. A watershed boundary line is proposed that would add an additional 6,290 acres to the first boundary modification for a total of 11,560 acres recommended for wilderness.

Special features for the southern portion of the WSA included isolated populations of two sensitive plants: Needles buckwheat (Eriogonum breedlovei var. shevockii) and Yosemite bitterroot (Lewisia disepala). Habitat occurs in the pinyon woodland for another sensitive plant, Nine Mile Canyon phacelia (Phacelia novenmillensis). In addition, the southern portion of Rockhouse WSA contains one of the largest concentrations of the yucca-like plant (Nolina parryi ssp. wolfii) for the southern Sierra Nevada. The nolinas, nearly 15 feet tall when flowering, are located on rocky exposed slopes.

AVAILABILITY

The Rockhouse WSA represents several trade-offs between wilderness designation and other resources and activities. Modified boundaries as

mentioned earlier could greatly reduce conflicts and improve not only increased manageability of the WSA, but the existing Dome Land Wilderness as well.

Air quality of the Rockhouse WSA is most likely influenced by air flow from the South Fork Kern River. The lower elevations of the WSA are subject to some days of poor visibility during summer months when inversion layers commonly trap stagnant air in the canyons and valleys. It is speculated that pollutants collected and generated in the Bakersfield area are sometimes swept up-canyon and transported long distances via the Kern River and its tributaries. The Rockhouse WSA may sometimes be impacted by this transported material. Significant emissions generated by new major industrial facilities in the area would be subject to review due to the Class I designation of the adjacent Dome Land Wilderness.

Adjoining the Sequoia NF, and Dome Land Wilderness, this area provides opportunities for primitive recreation experiences primarily in a pinyon pine/basin-sage environment. Current use occurs in the Roaded Natural Recreation Opportunity Spectrum (ROS) Class. Hunting, generally for deer and small upland game, is the dominant recreational pursuit in the area. Some pinyon nut gathering also occurs. In 1982, use was estimated at 4.260 RVD's. Assuming that present trends continue and if the area is not designated as wilderness, use is expected to reach 4,900 RVD's and 5,600 RVD's by 1990 and 2000 respectively. By 2030, use is projected to reach 8,400 RVD's, nearly three times present use. If the entire area were designated wilderness, use is projected to be lower than non-wilderness. However, if portions of Rockhouse were designated wilderness, some additional dispersed nonmotorized use would be generated since access to the area from the south via Canebrake Road is open nearly all year. Use to the Dome Land Wilderness from the east currently depends on the ability to ford the South Fork Kern River. Due to the relative aridity of this portion of the Kern Plateau, the area would attract visitors during the traditional "off-season" winter and spring months when most wildernesses in the Sierra Nevada are covered by snow. The Pacific Crest Trail crosses the northern section of the WSA for approximately three miles.

The WSA is completely within the Monache deer herd's spring and summer ranges. The southern portion near Long Valley is historically a critical wintering area for the deer herd. Water is adequate for wildlife with several perennial and intermittent streams and springs. These are supplemented by two stock watering troughs and three guzzlers located in the area. There are three vegetative study enclosures located on the periphery of the area to monitor habitat trends and successional changes. A deer herd management plan has been completed and approved for the Monache herd.

Potential for habitat improvement exists in portions of the WSA. Small scale type conversions of pinyon pine to grass and various shrubs used as browse have been shown to be successful on adjacent lands and could increase the species diversity of this WSA. These projects can be easily implemented if the area is designated non-wilderness. Key wildlife areas can also be effectively managed if the area was designated wilderness by providing in the management plan opportunities to permit lightning fires to burn, thus creating early successional stages of vegetation essential for

many wildlife species. There are no fisheries within the WSA. Threatened or endangered species are not known to occur in the area.

Estimated annual water yield for the study area is 6,900 acre-feet. The area is within the South Fork Kern River drainage which eventually empties into Lake Isabella. Most of the study area contains intermittent or ephemeral creeks. Average annual precipitation is 14 inches. Channels are mostly rocky and stable.

There are no commercial conifers for timber production within the WSA. Some opportunities exist for Christmas tree cutting of pinyon pines and for fuelwood.

Recent field studies have verified the existence of black stain disease in some pinyon stands. This fungus kills small groups of trees. Some silvicultural practices are available to keep the infestations from spreading. Pinyon pine mistletoe is rare to uncommon in the WSA and does not present a management concern at this time.

Grazing within Rockhouse WSA is limited because pinyon pine ecosystems generally provide poor forage for cattle. Currently 280 AUM's are produced among the three permittees for the area. Most of the cattle production is restricted to perennial and intermittent streamside riparian zones where grasses and other palatable vegetation can be obtained. Understory vegetation within the pinyon pine woodland is sparse. Most browse comes from various shrubs. There are two watering troughs in the area. Plans do not exist for additional improvement.

Potential for increases in production lies in type converting pinyon stands to grass. Depending on the intensity, frequency, and number of acres treated, production could be increased between 500 to 1,200 AUM's. However, much of the terrain is too steep or excessively rocky to increase forage for grazing.

The Rockhouse WSA is composed of an uplifted erosional surface of older metasedimentary rocks which have been intruded by a succession of younger granitic plutons. The metamorphic rocks occur as roof pendants or smaller xenoliths. The California Division of Mines and Geology has recently done a mineral potential study of the area. Nearly all occurrences of mineralization are confined to metamorphic rocks which are found in the northern section of the study area.

Three land use authorizations are recorded for the WSA. They are:

(1) Classification for Multiple-Use, R 617 (10/5/67);

(2) Public Land Order 2594 - National Cooperative Land and Wildlife Management Area (1/22/62); and

(3) Secretarial Order of April 8, 1935 - included land within' California Grazing District No.1.

There are three blocks of non-Federal lands with approximately 200, 480, and 40 acres for a total of 720 acres. The 40-acre parcel adjoins the Dome

Land Wilderness in Section 36, T23S, R35E. The land owner has the surface mineral rights. No development is known.

The 200- and 480-acre blocks are located in the northern section of the WSA and are accessed by unimproved dirt roads that are not maintained by Government funds. The U.S. Government retains the subsurface mineral rights on these two parcels. The acquisition of these lands is not being pursued.

NEED

The nearest designated area is the Dome Land Wilderness which is adjacent to the western boundary of the Rockhouse WSA. A portion of BLM study area #026 on the east-side of Rockhouse WSA has been recommended as suitable for wilderness in the Central California study areas DEIS.

The southern section of Rockhouse WSA is only a 1-3/4 hour drive from Bakersfield and can be reached from Los Angeles in approximately 3-1/2 hours. Access to the area is open nearly year-round.

The majority of public comments concurred with BLM findings that the area contained wilderness attributes. The extensive pinyon woodland ecosystem is not well represented in any established California wilderness. Several people stated that the area adjacent to the Dome Land Wilderness should be protected. Major roads and development areas were originally removed from the WSA boundary and do not significantly detract from the naturalness of the area.

ENVIRONMENTAL CONSEQUENCES

1. Designation: Wilderness
   Prescription: Full Fire Control & Suppression (WC4)
   Alternatives: See Table C.1.

Wilderness designation would maintain the attributes of solitude. natural appearance and natural integrity that are characteristic of Rockhouse Basin. Recreation use is light to moderate. Due to the relative aridity of this portion of the Kern Plateau, the area would attract visitors during the traditional "off-season" winter-spring months when most wildernesses in the Sierra Nevada are covered by snow. Expansion of the trail system would provide access to more of the area. Cultural resources, while largely unexplored, are known to abound. They would receive maximum protection.

Although there are three permittees who utilize this area for grazing, opportunities to increase forage production and additional water developments would be forgone. Current improvements would be retained. The existing wildlife population would remain status quo. Much of the vegetation is a uniform pinyon pine woodland.

Fire suppression action will be fast and aggressive. Vegetative diversity would not be maintained or enhanced without the opportunity to use prescribed fire. Air quality would remain unaffected by application of this prescription.

Social benefits would be primarily associated with increasing the amount of wilderness available. Economic costs would involve increased administration of wilderness regulations.

Large resource trade-offs requiring mitigation would not occur with wilderness designation.

2. Designation: Non-wilderness
   Prescription: General Dispersed Recreation (PS1)
   Alternatives: See Table C.l.

Wilderness attributes of natural appearance and integrity would not be affected by application of this prescription. Because of the arid climate, recreation use is not expected to change except through encouragement of OHV use, which would affect solitude. Cultural resources would be impacted (although minimally) both by project development and dispersal of users. These activities would require inventory, evaluation, and appropriate cultural resource mitigation/protection.

Grazing programs would remain basically unchanged although conflicts with OHV's would increase slightly. Air quality would remain unaffected by application of this prescription.

Social and economic benefits for the area would be few. The biggest cost would be loss of a formal wilderness designation.

Large resource trade-offs requiring mitigation would not occur.

3. Designation: Non-wilderness
   Prescription: Wildlife & Dispersed Recreation (PS5)
   Alternatives: See Table C.l.

Wilderness attributes would be little affected by the application of this prescription, except possibly in the immediate area of a project. Projects would be in small areas and primarily aimed at providing water developments and small scale vegetative conversions. Because of the arid nature of the country, a low-to-moderate increase in recreation use is expected. Cultural resources would remain reasonably protected, although project areas would require inventory, evaluation, and protection/mitigation.

Grazing programs would remain basically unchanged although some range improvement measures would be implemented. Air quality would remain unaffected by application of this prescription.

Social and economic benefits for the area would be few. The biggest cost would be loss of a formal wilderness designation.

Large resource trade-offs requiring mitigation would not occur.

4. Designation: Non-wilderness
   Prescription: Range (PS6)
   Alternatives: See Table C.l.

Wilderness attributes would be little affected by the application of this prescription, except possibly in the immediate area of a project. Projects would be in small areas and primarily aimed at providing water developments and small scale vegetative conversions. Because of the arid nature of the country, a low to moderate increase in recreation use is expected. Cultural resources would remain reasonably protected, although project areas would require inventory, evaluation, and protection/mitigation.

Grazing programs would be enhanced through range improvement measures. These measures would consist primarily of water development for better distribution and type converting pinyon stands to grass.

Air quality would remain unaffected by application of this prescription.

Social and economic benefits for the area would be few. The biggest cost would be loss of a formal wilderness designation.

Large resource trade-offs requiring mitigation would not occur.

5. Designation: Wilderness
   Prescription: Natural Role of Fire (WF4), Full Fire Control & Suppression (WC4)
   Alternatives: See Table C.1.

Wilderness designation would maintain the attributes of solitude, natural appearance and natural integrity that are characteristic of Rockhouse Basin. Recreation use is moderate. Due to the relative aridity of this portion of the Kern Plateau, the area would attract visitors during the traditional "off-season" winter-spring months when most wildernesses in the Sierra Nevada are covered by snow. Expansion of the trail system would provide access to more of the area. Cultural resources, while largely unexplored are known to abound. They would receive maximum protection.

Fire under prescribed conditions will be used to maintain long-term plant diversity in the wilderness. Air quality would restrict application of prescribed fire.

Although there are three permittees who utilize this area for grazing, opportunities to increase forage production and additional water developments would be forgone. Current improvements would be returned. The existing wildlife population would remain status quo. Much of the vegetation is a uniform appearing pinyon pine woodland. This trend would continue unless a program of applied fire management was allowed to create a more natural regime.

Fire suppression costs would increase over existing and prescribed fire costs would be high due to restrictions placed on types or use of equipment.

Social benefits would be primarily associated with increasing the amount of wilderness available. Economic costs would involve increased administration of wilderness regulations.

Large resource trade-offs requiring mitigation would not occur with wilderness designation.

Mineral exploration, location and development would be lost. Mineral potential is highest in the northern portion of the study area. Therefore, the loss of potential would be greatest in those alternatives where the northern portion goes to wilderness.

Table C.2 displays average annual outputs for the first and fifth decade for this BLM Wilderness Study Area.

TABLE C.1
BLM ROCKHOUSE WSA

ACRES (AND PERCENT) ALLOCATED BY ALTERNATIVE AND MANAGEMENT PRESCRIPTION

Management Prescription	Acres (%) PRF	CUR	RPA	AMN
PS1	0	0	22910(64)	0
PS5	23060(65)	35560(100)	0	0
PS6	0	0	0	0
WF4	12500(35)	0	0	35560(100)
WC4	0	0	12650(36)	0
TOTAL	35560(100)	35560(100)	35560(100)	35560(100)

Management Prescription	MKT	PRO	WAV
PS1	0	0	0
PS5	0	0	35560(100)
PS6	25850(73)	35560(100)	0
WF4	0	0	0
WC4	9710(27)	0	0
TOTAL	35560(100)	35560(100)	35560(100)

TABLE C.2

WILDERNESS STUDY AREA - BLM ROCKHOUSE
AVERAGE ANNUAL OUTPUTS
DECADES 1 AND 5

OUTPUT	DECADE	PRF	CUR	RPA	AMN	MKT	PRO	WFV
Recommended Wilderness Acres -		12.500	0	12,650	35,560	9,710	0	0
Non-Wilderness Acres		23,060	35.560	22,910	0	25,850	35,560	35.560
Total Developed Recreation	1	0	0	0	0	0	0	0
(MRVD)	5	0	0	0	0	0	0	0
Dispersed Recreation	1	2	3	2	0	2	3	3
(MRVD)	5	3	5	3	0	3	5	5
Wilderness Recreation	1	2	0	2	3	2	0	0
(MRVD)	5	3	0	3	5	3	0	0
Total Wildlife & Fish User	1	1,000	2,000	1,000	1,000	1,000	2.000	2,000
Days (WFUD)	5	3,000	3,000	3,000	2,000	3,000	3,000	3,000
Grazing (AUM)	1	400	280	280	280	600	600	500
	5	100	400	280	280	1,200	1,200	1,000
Suitable Timber Land	1	0	0	0	0	0	0	0
(Acres)	5	0	0	0	0	0	0	0
Timber Volume (MMCF)	1	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0
(MMBF)	1	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0
Mineral Potential Foregone	1	360	0	330	4,480	950	0	0
(Acres of high and moderate	5	360	0	330	4,480	950	0	0
using the BLM system)								
Gross Revenue (MM$)	1	39	40	39	39	40	40	40
	5	46	45	46	43	45	45	44
Net Revenue (MM$)	1	- 30	- 31	- 30	- 30	- 31	- 31	- 31
	5	- 37	- 35	- 37	- 34	- 37	- 35	- 35
Total Cost (MM$)	1	09	09	09	09	09	09	09
	5	io	09	09	09	10	09	09

DESCRIPTION

Oat Mountain Further Planning Area (FPA) lies in Fresno County on the Hume Lake Ranger District. This area is located along the main drainage of the Kings River immediately southeast of Pine Flat Reservoir. Oat Mountain is easily accessible from Fresno on a day-use basis. Paved roads provide access via Pine Flat Reservoir on the north of the FPA to campgrounds 4-1/2, 4, and Mill Flat. Forest Service dirt roads 12S19, 13S86, and 12S01 provide access from the south and east. The southwestern portion of the FPA borders private lands. This FPA is approximately a 45-minute drive from Fresno. the nearest city of over 250,000 people. It is approximately a 4-1/2-hour drive from Los Angeles and 3-3/4 hours from San Francisco.

The FPA is dominated by dense foothill woodland and chaparral communities on the steep north-facing slopes with a blue and black *oak* woodland along the summit of Oat Mountain toward White Deer Saddle. Elevations range from 1,000 feet along the north boundary adjacent to Pine Flat Reservoir to 4,300 feet along the summit ridge of Oat Mountain.

Terrain is generally steep throughout the study area. The heavily dissected areas that drain into the Kings River are rated as distinctive. Variety is increased by color, texture, and landform configurations. The dense vegetation is a fuels management concern because of steep topography and lack of access to the interior of the FPA.

Recreation use is primarily fishing, hiking, and hunting. The area contains about 11 miles of trail. Popular hunting locations are White Deer Saddle and the gentler slopes of the western portion of the study area.

The Kings River was identified in the National Rivers Inventory for additional study for suitability as a Wild and Scenic River. A portion of the Kings River lies adjacent to the Oat Mountain FPA. Enactment of legislation in November 1987 resolved questions on Wild and Scenic River status by establishing the Kings River Special Management Area with a specific determination that this section of the river would <u>not</u> be within the Wild and Scenic River system.

Five Native American groups inhabited portions of the Oat Mountain FPA. The Foothill Yokuts and Western Mono were perhaps the most important. A few villages were established along the Kings River. One is at the present day Mill Flat Campground.

CAPABILITY

Throughout the Oat Mountain FPA, human influence has not affected the ecological process or natural integrity of the area. The grazing improvements such as watering troughs, spring developments, and the three miles of drift fence have little effect on the area's apparent naturalness.

Oat Mountain provides some opportunities for solitude and for primitive recreation. It is possible to get away from human influence quickly in

much of the area. Long distance scenic views, however, are primarily influenced by human developments such as roads, Pine Flat Reservoir, and power lines. The area offers moderate opportunities for challenge and self-reliance. The area has no outstanding or special features. The boundary of Oat Mountain FPA is generally manageable with the river forming the boundary on the north and Forest Road 12S01 on the east. Part of the southern boundary follows the Forest boundary and the westernmost boundary is adjacent to the powerline.

A boundary change on the western portion of the area would eliminate the difficulty of surrounding the private lands and having the powerline as the western boundary. Using Lone Pine Canyon along the northern boundary and proceeding up the canyon to the summit of Oat Mountain would remove these conflicts.

AVAILABILITY

The Oat Mountain FPA represents few trade-offs between wildernness and non-wilderness uses. This FPA has a few areas that receive moderate recreation use. One popular area is located along the trail which follows the river and lakeshore to Keller Ranch. Campgrounds along the Kings River adjacent to the FPA serve as the base for much of these activities and uses. A four-wheel drive road provides access from private lands to White Deer Saddle and the summit of Oat Mountain.

Oat Mountain FPA lies within the Kings River airshed and it is assumed that existing concentrations of any regulated pollutants are transported primarily from the San Joaquin Valley from the Fresno area via this major air corridor. It is located on the northwesternmost portion of the Sequoia NF. Taking the position and location into account, it is suggested that higher concentrations of regulated pollutants might occur here as compared to higher elevations further east in the Kings River drainage. The lower elevations of the Oat Mountain FPA are especially vulnerable to low visibility days during summer episodes of inversions in the San Joaquin Valley. Forest Service activities such as prescribed fires in surrounding areas may have some temporary impacts on the present condition, but should be minimal compared to those pollutants transported into the area.

This planning area is comprised primarily of two major wildlife habitat types. These are chaparral and oak woodlands. More than 100 wildlife species may be found to inhabit the area during the year. The area is important to the Hume Deer Herd and there is considerable opportunity to improve the habitat requirements for the herd. This opportunity would be forgone if the area were allocated to wilderness.

Bald eagles, a federally listed endangered species, are known to winter in the vicinity of Pine Flat Reservoir.

Fishing is primarily concentrated along the river corridor and Pine Flat Reservoir. Few perennial streams are located in the Oat Mountain FPA.

Ecologically, the area is diverse. It contains chaparral, foothill woodland, and blue/black oak woodland ecosystems. In many areas, the vegetation is so dense that foot-travel is limited to the most challenging

recreationist. There are no conifer forests nor any known sensitive plants in this planning area.

Estimated average annual water yield for the study area is 4,000 acre-feet. The entire area drains into the Kings River and eventually into Pine Flat Reservoir. Average annual precipitation is 28 inches. Channels are primarily stable.

Oat Mountain currently produces 1,600 AUM's within three grazing allotments. The available forage is not being fully utilized. Type conversions and prescribed fire management of chaparral and foothill woodland communities offer a significant potential to increase grazing capacity. The area also serves as winter range for the Hume deer herd, which would also benefit from vegetative manipulative projects.

Mineral potential appears to be limited to the Davis Flat area in metamorphic material adjacent to the eastern boundary. The area is underlaid by quartz monzonite and quartz diorite. At the southwestern boundary, ultramafic rocks, primarily peridotite and serpentinite, intrude into granitic rocks. There are a number of mining claims, only two of which are patented. The Bureau of Mines concludes that mineral development potential is small.

A dam has been proposed at Rodgers Crossing, which is along the river immediately adjacent to this Further Planning Area. If constructed, this dam would inundate that portion of this area which lies immediately above the vicinity of Camp 4 1/2. Enactment of legislation precludes dam construction.

Under the existing Multiple-Use Plan direction, fire prevention and suppression in the Oat Mountain FPA averages $6.85 per acre.

Cultural resource surveys are yet to be completed on most of this FPA.

There are no non-federal lands within the Oat Mountain FPA.

NEED

The nearest designated area is the Monarch Wilderness. This area lies approximately 16 air miles east of Oat Mountain FPA. In 1982, use of the High Sierra Primitive area, which is now included within the Monarch Wilderness, was 1,400 RVD's.

Oat Mountain FPA is easily accessed from communities in the Southern San Joaquin Valley: the area is only 25 miles east of Fresno. The metropolitan areas of Los Angeles and San Francisco are 4-1/2 and 3-3/4 hours drive to Oat Mountain respectively.

The primary ecosystems of foothill woodlands, chaparral and blue/black oak woodlands are not located in any California wildernesses in the Sierra Nevada even though these ecosystems are relatively common along the western foothills of this range.

This FPA was recommended as a Further Planning Area by the RARE II Final EIS. Oat Mountain FPA has not appeared in any proposed wilderness legislation.
Public comment during the RARE II process shows a 50-50 split between those persons favoring wilderness and non-wilderness designation. Basic conflict between designation hinges on range interests and potential to increase grazing use. Another issue during RARE II was the possibility of constructing a dam at Rodgers Crossing adjacent to the northern boundary. Wilderness could affect the construction or reservoir capacity. Wilderness proponents desire a non-snow winter wilderness, adding targeted ecosystems currently lacking in the wilderness system, and protecting a portion of the scenic Kings River Canyon.

ENVIRONMENTAL CONSEQUENCES

1. Designation: Non-wilderness
   Prescription: Wildlife & Dispersed Recreation (B05, OW5, MC5)
   Alternatives: See Table C.3.

Wilderness attributes would be little affected, except for short-term impacts on natural appearance as a result of enhancement of wildlife habitat. There could be some slight increase in use of the area because of increased wildlife populations, although the area is steep and not easy to use. Therein, solitude will remain a high value. Access to the unit and throughout the area will limit people's ability to get around. Trails could be developed and/or improved to facilitate this access, including use by OHV's. Cultural resources would remain reasonably protected. Activities with potential for impacting cultural properties would require inventory, evaluation and appropriate mitigation.

Wildlife habitat would be improved through treatment. Vegetative and animal diversity would increase. This treatment would benefit grazing as well as fuel reduction programs. Prescribed fire would play a major role in vegetation and habitat management. The current range management program could increase slightly under this prescription, although grazing would be subservient to wildlife needs. Air quality would remain the same given the proximity to the San Joaquin Valley, except for periods when prescribed fire would add smoke to the airshed.

Economic and social benefits would be slightly increased in quantity due to increased human use. primarily hunting. Social costs would be a negligible loss of natural environment and a formal wilderness designation. Fire suppression costs would remain high due to limited access.

2. Designation: Non-wilderness
   Prescription: Water Yield (MC8, CF8)
   Alternatives: See Table C.3.

This prescription would be applied to a limited area of this Further Planning Area and would result in a major change from the existing vegetation structure. The use of prescribed fire would help to achieve age class diversity. This would have a short-term impact on wilderness integrity, but over the long-term enhance visual variety.

Recreation use is primarily water/fishing-oriented and so would remain low in areas where this prescription is applied because of steep terrain and limited access to the area. Solitude would not change appreciably. Cultural resources would remain reasonably protected. Activities with potential for impacting cultural resources would require inventory, evaluation and appropriate mitigation.

Wildlife habitat diversity would increase with conversions of brush to better age class distribution. Hence, wildlife populations would increase. Grazing capacities would also increase. Fuel reduction will occur. Air quality would be impacted during burning operations, otherwise it would remain as is given the area's proximity to the San Joaquin Valley.

Economic and social benefits would be slightly increased in quantity due to increased water production.

Stream channels are relatively stable. Water quality would decrease and sedimentation would increase in the short-run following treatment: then stabilization would occur and conditions remain good.

3. Designation: Non-wilderness
   Prescription: Range (B06, OW6, MC6)
   Alternatives: See Table C.3.

The wilderness attributes of natural appearance and integrity would be reduced and/or occasionally lost through the enhancement of grazing opportunities. This prescription would emphasize increases in grazing, including vegetative treatment and development of improvements for intensive management.

Recreation use is primarily water/fishing-oriented and would remain low because of steep terrain and limited access to the area, particularly across private lands outside the National Forest boundary on the south. OHV use on trails and roads associated with improvements could occur and could increase use; therein causing conflicts with grazing. Cultural resources would be impacted, both by increased grazing of animals and through development of improvements. Activities with potential for impacting cultural properties would require inventory, evaluation, and appropriate protection and mitigation.

Improving grazing would have spinoff benefits of improving wildlife habitat and/or diversity. Fuel reduction would be another benefit. Prescribed fire would play a major role in vegetation management. Air quality would remain the same given the proximity to the San Joaquin Valley, except when periods of burning would add smoke to the airshed.

Economic benefits would occur from increasing grazing opportunities. Economic costs would include those to implement improvements. Social costs would include the loss of the area as wilderness. Fire suppression costs will remain high due to limited access. Increased grazing would result in more animal use of existing stream/riparian zone areas. Even though stream channels are relatively stable, water quality would decrease and sedimentation increase proportionate with the increase in use.

4. Designation: Wilderness
   Prescription: Natural Role of Fire (WF4)
   Alternative: See Table C.3

Wilderness designation would maintain the wilderness attributes of the area. Recreation use is primarily water/fishing-oriented and overall, would remain low because of access to the area, particularly due to lack of rights-of-way across private lands outside the National Forest boundary on the south. Opportunities exist to improve trail access along the Kings River and Pine Flat Reservoir on the north side of the unit; this action would increase fishing use by only a minor amount, but will increase fire risk. Cultural resources are unexplored but will receive maximum protection. Views from the area are largely into areas where human activity is evident.

Because of its low elevation and proximity immediately adjacent to the San Joaquin Valley, low visibility will remain a factor, particularly during periods of inversion in the valley. Class I air quality is not attainable.

Vegetation currently has poor age class and mosaic distribution. Fire would be used to maintain or enhance vegetative diversity. This would produce visual diversity and increase the variety of wildlife in the area. Grazing would continue, but opportunities to increase grazing capacity and/or accomplish fuel reduction programs would be foregone: thus losses in these resources would occur over time.2/ Maintaining current AUM's could also be affected. Fire prevention and suppression costs would increase as compared to management under a non-wilderness designation. Application of prescribed fire would be costly and limited.

There are no known social or economic dependencies on the area except for grazing 1,600 AUM's within portions of three allotments. Wilderness designation is not expected to adversely affect maintenance of current improvements or AUM's. Management of these allotments would continue but be more restridtive under this designation, with constraint on further grazing improvements.

Large resource trade-offs requiring mitigation would not occur. Stream channels are relatively stable, and water quality and sedimentation would not change. Manageability and enforcement of wilderness regulations would be difficult and costly due to limited access and remoteness factors. Some OHV encroachment may occur.

2/ Under the Amenity Alternative, grazing would not be permitted in new wilderness. This would result in a complete loss of this opportunity with its resultant economic impacts. Recreationists would not experience conflicts with cattle in this alternative.

TABLE C.3
OAT MOUNTAIN FPA

ACRES (AND PERCENT) ALLOCATED BY ALTERNATIVE AND MANAGEMENT PRESCRIPTION

Management Prescription	Acres (%) PRF	CUR	RPA	AMN
WF4	0	0	0	12400(100)
BO5	0	0	600(5)	0
OW5	0	0	1900(15)	0
MC5	2500(20)	2500(20)	0	0
BO6	4400(35)	4400(35)	3800(31)	0
OW6	5500(45)	5500(45)	3600(20)	0
MC6	2500(20)	0	0	0
MC8	0	0	2500(20)	0
TOTAL	12400(100)	12400(100)	12400(100)	12400(100)

Management Prescription	MKT	PRO	WFV
WF4	0	0	0
BO5	0	0	4400(35)
OW5	0	0	5500(45)
MC5	0	0	2500(20)
BO6	4400(35)	4400(35)	0
OW6	5500(45)	5500(45)	0
MC6	2500(20)	2500(20)	0
MC8	0	0	0
TOTAL	12400(100)	12400(100)	12400(100)

Table C.4 displays the critical indicators (as explained in Section B) used to compare impacts of each alternative. Table C.5 displays average annual outputs for the first and fifth decade for this Further Planning Area by alternative.

TABLE C.4
OAT MOUNTAIN FURTHER PLANNING AREA

		-Indicators-		
Alternative	Decade	Acres of Habitat Improvement (M ac)	Increased M AUM's (Avg/Yr)	Acres of Water Yield Improvement (M ac)
PRF	1	5.0	.7	0
	2	0	.3	0
	4	0	.7	0
	5	0	.3	0
CUR	5	4.0	.4	0
RPA	1	0	0	2.0
	3	5.0	0	0
AMN	1	2.0	0	0
	2	3.0	.2	0
	4	2.0	0	0
	5	3.	.2	0
MKT	5	5.0	.7	0
PRO	5	5.0	.7	0
WFV	1	5.0	.4	0
	2	0	.1	0
	4	5.0	.4	0
	5	0	.1	0

TABLE C.5

FURTHER PLANNING AREA - OAT MOUNTAIN
AVERAGE ANNUAL OUTPUTS
DECADES 1 AND 5

OUTPUT	DECADE	PRF	CUR	RPA	AMN	MKT	PRO	WFV
Recommended Wilderness Acres	-	0	0	0	12.400	0	0	0
Non-Wilderness Acres	-	12.400	12,400	12.400	0	12,400	12,400	12.400
Total Developed Recreation	1	15	15	0	0	15	.15	0
(MRVD)	5	15	.15	0	0	15	15	0
Dispersed Recreation	1	3	3	.3	3	3	3	3
(MRVD)	5	6	6	6	3	6	6	6
Wilderness Recreation	1	0	0	0	01	0	0	0
(MRVD)	5	0	0	0	.01	0	0	0
Total Wildlife & Fish	1	30	30	30	30	30	30	30
User Days (WFUD)	5	60	60	60	60	60	60	60
Grazing (AUM)	1	1,803	1,600	1.387	1,432	1,905	1,923	1.520
	5	2,268	1,600	2,032	1,500	2.326	2,339	1,811
Suitable Timber Land	1	0	0	0	0	0	0	0
(Acres)	5	0	0	0	0	0	0	0
Total Volume (MMCF)	1	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0
(MMBF)	1	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0
Mineral Potential Foregone	1	0	0	0	0	0	0	0
(Acres of high and medium)	5	0	0	0	0	0	0	0
Gross Revenue (MM$)	1	2 02	1 22	2 05	36	2 01	2 01	1 25
	5	35	1 23	34	37	37	37	35
Net Revenue (MM$)	1	1 45	1 01	1 49	33	1 46	1 46	1 02
	5	32	10	32	32	32	32	33
Total Cost (MM$)	1	57	22	56	03	55	55	23
	5	02	23	02	04	05	05	02

DESCRIPTION

The Dennison Peak F'PA lies in the northwest corner of the Tule River Ranger District in Tulare County. The area is contiguous to the Sequoia National Park. Access into the Dennison Peak area is provided by Balch Park Road north of Springville and Forest Road 19S09 along the North Fork of the Tule River.

The area is very rugged with steep slopes. Chaparral vegetation covers the lower slopes, and canyon live and black oak woodlands make up nearly 50 percent of the vegetative cover. Only one trail bisects the western end of the FPA. The remainder of the area does not have developed access.

The boundary on the north is the same as the Forest boundary. The remaining boundary, a mid-slope, is not easily recognized on the ground. Elevation ranges from 3,600 feet near the North Fork Tule River in the southern corner of the area to the summit ridge north of Dennison Peak at 8,348 feet.

CAPABILITY

While opportunities for solitude and primitive recreation are high in the eastern three-fourths of the area, current use is very light. The highest scenic values lie in the center of the FPA east of Dennison Peak, though access is difficult.

Considered by itself, this Area's relatively small size, inaccessibility, and lack of special features do not provide a strong case for designation. However, it is adjacent to Sequoia and Kings Canyon National Parks of which portions were proposed for designation. The California Wilderness Act of 1984 did not designate the area as wilderness. The area will continue to be managed as a backcountry unit in a manner similar to wilderness.

The natural ecological integrity of the area has been adversely influenced to a low degree. Signs of human influence are located only in the western-most quarter of the FPA in the form of a fence running east-west and an OHV trail bisecting the area north-south.

The boundary to the north is the Forest and Park common boundary. To the west, manageability could be improved by a boundary modification to the north-south ridge through the center of Section 35, T18S, R29E, and Sections 2 and 11, T19S, R29E; and from there following the Blue Ridge Lookout road east and south to the Forest boundary. However, the boundary modification along the west end of the FPA would not eliminate all OHV conflicts.

AVAILABILITY

The primary recreational use is hunting. Travel is by OHV's along the western edge and otherwise is by foot. Dennison Peak FPA is quite steep

with less than 1,000 acres receiving recreational use at present. Virtually all recreational use occurs in the Roaded Natural ROS class.

In 1982, use was 60 RVD's. Assuming present use patterns and if the area were not designated, use is expected to increase to 260 RVD's and 460 RVD's by 1990 and 2000, respectively. If the area were to be designated, use would increase very little to 70 RVD's and 80 RVD's by 1990 and 2000, respectively.

The Tule and Kaweah drainages may individually or jointly influence the air quality of this area by providing an avenue for transported pollutants. Dennison Peak's proximity to the San Joaquin Valley and private inholdings near the lower elevations of the area provide the opportunity for existing pollutant concentrations to be somewhat higher than those areas east of the Western Divide. Concentrations can be directly influenced by fluctuating summer inversions that may adversely affect visibility, especially in the lower elevations of the FPA.

The Blue Ridge-Jack Flat areas are among the Tule River Ranger District's most rich game zones. The Dennison Peak FPA encompasses a portion of this wildlife area. It is part of the Tule River deer herd summer range: however, deer use is light.

California condors, a federally listed endangered species, have been seen sporadically in the area, and were reported as recently as 1985. These birds have used the area for feeding during July and August. The FPA is not included in the Condor Recovery Plan as critical habitat for the species. Both wolverine, a state rare species, and fisher are furbearers that have been sighted in the general area.

Potential for habitat improvement is good in the lower elevations of the Dennison Peak FPA. Although a variety of game species are present, quality habitat is limited. Much of the vegetation is in a more mature successional stage with little age class diversity.

Dennison Peak FPA contains two small stream fisheries in pristine condition. Dillon and Jenny Creeks flow through private property and are subject to logging. Potential exists to locate native fish stocks in these two streams. These streams are tributaries to the North Fork Tule River. Overall fisheries value is moderate with some potential for improvement.

Estimated average annual water yield for the FPA is 3,500 acre-feet. About 87 percent of the area lies in the Tule River drainage with the remaining 13 percent in the Kaweah River drainage.. Average annual precipitation is about 38 inches. Channels in the area are rocky, steep, and fairly stable.

Part of the FPA is leased to two grazing permittees. Livestock forage within this area has been classified as unsuitable. Potential for producing forage through more intensive management of the area is not practical because the terrain is too steep and rugged for domestic livestock to negotiate. Ordinarily, rangeland improvement is restricted to areas with slopes less than 40 percent. Designation of the area would not affect present livestock use.

There is a small amount of timber located in this FPA. The standing (board feet) inventory is estimated to be 81 million board feet. However, harvesting of 1.24 million board feet annual yield for the next 50 years appears to be not economical due to the rocky, steep terrain and low volumes per acre scattered across the FPA.

Vegetation is comprised of oak woodlands (47 percent), conifers (35 percent), and chaparral. (12 percent). Rock outcrops, prominent throughout the area, make up six percent of the area. To date, the FPA has not been surveyed for the presence of sensitive plants or their essential habitats.

The area is comprised almost entirely of granitic material. An inferred contact zone runs north-south in the western half of the area. Mineral potential is low. Recent information from the Bureau of Mines states that seven inactive claims were recorded in the early 1900's, but none had patented mining claims or mineral leases.

This FPA is located in the Foothill Yokuts' ethnographic territory. Prehistory of the Yokuts generally goes back at least 8.000 years. The Foothill Yokuts' technology relied heavily upon the use of stone prior to contacts with Europeans in the late 18th century. Archaeological surveys have not been conducted in this area. Archaeological sites have not been recorded to date. In historic times, the Dillon Mill operated from 1885-1914 in the vicinity of the FPA.

Under the existing Multiple-Use Plan directon, fire prevention and suppression in the Dennison Peak FPA averages about $4.50 per acre.

There is an underground pipeline in Section 1, T19S, R29E; and a pipeline in Section 17, T19S, R30E. There are no non-federal lands within this FPA.

NEED

The nearest designated wilderness to the Dennison Peak FPA is the Golden Trout. Use of the Golden Trout Wilderness was 101,900 RVD's in 1982. In addition, the adjacent Sequoia and Kings Canyon National Parks are proposed for designation as wilderness and are currently managed as such. The section of the Park adjacent to Dennison Peak FPA receives heavy use. However, the landscape of the Park area is of a character quite different than that of Dennison. Park use centers around available water and meadows which are either restricted or lacking in this FPA.

Dennison Peak FPA is approximately a four-hour drive from Los Angeles and two hours from Bakersfield.

This area has not been included in any of the various California Wilderness Bills proposed since 1980. The Dennison Peak FPA was recommended as a Further Planning Area in the RARE II Final EIS.

Public comments during the RARE II process indicate pro-wilderness responses at 43.9 percent and non-wilderness at 56.1 percent. Dennison Peak is an area of low controversy. Since 80-90 percent of the timber is unaccessible, both groups realize Dennison is not likely to be developed. Proponents of wilderness cite possible habitat for California condor as a

primary reason for designation. Opponents want to maintain the OHV use, even though extremely limited.

There are no ecosystems found in this FPA that are not located in other National Forest wildernesses.

ENVIRONMENTAL CONSEQUENCES

1. Designation: Non-wilderness
   Prescription: Wildlife & Dispersed Recreation (OW5, MC5, CF5)
   Alternatives: See Table C.6.

Wilderness attributes of solitude, natural integrity and appearance would be little affected, except for short-term impacts on appearance, during wildlife habitat projects. There would be no appreciable increase in use of the area because of the difficulty of the terrain and limited access. Improvement or expansion of trails to access the area is limited by steep slopes. Cultural resources would remain reasonably protected; although project areas would require inventory, evaluation, and protection of cultural resources.

Wildlife habitat would be improved through treatment. Vegetative and animal diversity would increase. This action would enhance grazing and also accomplish fuel reduction program needs. Prescribed fire would play a role in vegetation and habitat management. Air quality would remain the same given the proximity to the San Joaquin Valley, except for periods when prescribed fire would add smoke to the airshed.

Limited opportunities exist for timber management and would be foregone under this prescription because of high unit costs on difficult terrain.

Social and economic costs for this area would be few. The biggest social cost would be loss of a formal wilderness designation. Fire suppression costs would remain high due to limited access.

Large resource trade-offs requiring mitigation would not occur. Stream channels are relatively stable and would remain so. Water quality and sedimentation will not increase above current levels.

2. Designation: Non-wilderness
   Prescription: Range (OW6, MC6, CF6)
   Alternatives: See Table C.6.

The wilderness attributes of natural appearance and integrity would be only slightly reduced from existing situations due to the limited opportunity to do range betterment. This is due to the very steep slopes and limited range potential. Grazing levels would not increase.

Recreation use will remain low because of steep terrain and the very limited access throughout the area. OHV use will not be a problem. Cultural resources would remain reasonably protected. Activities with potential for impacting cultural resources would require inventory, evaluation, and appropriate mitigation.

Wildlife habitat and/or diversity would improve in areas where range betterment work is done. Fuel loading would also be reduced. Prescribed fire would be the tool used to accomplish habitat improvement projects. Air quality would remain the same, give the proximity to the San Joaquin Valley. except for periods when prescribed fire would add smoke to the airshed.

Economically marginal opportunities exist for timber management and would be foregone under this prescription because of high unit costs on steep terrain.

Social and economical costs for this area would be few. The biggest social cost would be the loss of a formal wilderness area designation.

Fire suppression costs would remain high due to limited access and steep terrain.

3. Designation: Non-wilderness
   Prescription: Water Yield (MC8, CF8)
   Alternatives: See Table C.6.

This prescription would be applied to approximately one-half of the total area, and would result in major change in the existing vegetative structure. The use of prescribed fire would apply to other than timber type areas, and help achieve age class diversity. In timber types, strip cutting to enhance snow accumulation and runoff patterns would be applied. This would change the natural appearance and integrity of the area from those desirable wilderness characteristics now present, and forego any future wilderness designation.

Recreation use would remain low because of steep terrain and generally limited access in the area. OHV use could increase slightly on travelways which were developed to accomplish vegetation modification work, resulting in more dispersion of recreation use. Cultural resources, if present, could be impacted. Activities with potential for impacting cultural resources would require inventory, evaluation. and appropriate mitigation.

Wildlife habitat diversity would increase with conversions, resulting from better age class distribution; hence wildlife populations would increase. Grazing is not expected to change with the application of vegetation manipulation under this prescription. Air quality would be impacted during burning, but would remain as is relative to the areas proximity to the San Joaquin Valley.

Timbered areas where strip cutting is applied would add some limited volume to the market, although costs due to small volumes and difficulty or operation would be high.

Social costs for this prescription would evolve around the loss of an area suitable for wilderness designation. On the benefit side, there would be increase in both social and economic factors associated with timber production and increased water production.

Stream channels are relatively stable. Water quality would decrease and sedimentation increase in the short-term following treatment; then stabilization would occur and conditions remain good.

Fire suppression costs would remain high under this prescription.

4. Designation: Non-wilderness
   Prescription: Timber (CF7)
   Alternatives: See Table C.6.

This prescription would apply to approximately 40 percent of the area which is timbered. It would result in a major change in the vegetative structure of the area, where harvest cutting would result in openings of various sizes. This would require road construction. It would change the appearance and integrity of the area from the present and forego any future wilderness designation.

Recreation use will remain low due to terrain limitations, although timber access roads would provide access into the area and opportunities for driving (including use of OHV's). Use would be more widely dispersed and the chances for solitude reduced. Cultural resources, if present, could be impacted by both management and the public. Activities with potential for impacting cultural resources would require inventory, evaluation, and appropriate mitigation.

Wildlife habitat diversity would increase with vegetative manipulation, resulting in better age class distribution and, subsequently, increasing populations. Grazing would not be changed with harvest of timber due to steep terrain. Air quality would be impacted during burning, but would remain as is relative to the area's proximity to the San Joaquin Valley.

Timber harvest will not be heavy, but will be economically marginal due to anticipated high operating costs. Fuelwood harvest would increase.

Social costs of this prescription would include the loss of an area suitable for wilderness designation and the high investments to accomplish outputs. There would be economic and social benefits from the timber production and increased recreation opportunity perspectives.

Stream channels are relatively stable. Water quality would decrease and sedimentation increase in the short-term following harvest and road construction. Stabilization would follow shortly thereafter and no long-term effects would result.

Fire suppression costs would remain relatively high, but there would be improved access to facilitate this activity, in case of a fire. The need for increased prevention activities/contacts and law enforcement could develop.

5. Designation: Wilderness
   Prescription: Natural Role of Fire (WF4)
   Alternatives: See Table C.6.

Wilderness designation would maintain the wilderness attributes of the area. Recreation use is primarily hunting and would remain low because of steep terrain, heavy vegetation, limited trail system, and limited camping sites. Opportunities to expand the trail system are few. Cultural resources are unexplored but will receive maximum protection. Views from the area would largely be on areas where human activities are evident.

Opportunities to manage timber would be eliminated.

Because of its proximity adjacent to the San Joaquin Valley, periods of limited vision will remain common in this area, particularly during inversion situations.

Although there are two existing allotments in the area at present, additional range development or improvement opportunities would be foregone due to the impracticability of more intensive management. Improvements do not exist.3/

Fire would be used to maintain or enhance vegetative diversity. This would produce visual diversity and increase the variety of wildlife in the area. Opportunities to undertake fuel reduction programs would be foregone; hence, there would be a program loss over time. Fire prevention needs would not increase appreciably over existing needs; but costs for this activity and suppression costs would be high as compared to management under a non-wilderness designation. Any application of prescribed fire would be costly and limited.

6. Designation: Wilderness
   Prescription: Full Fire Control & Suppression (WC4)
   Alternatives: See Table C.6.

Wilderness designation would maintain the wilderness attributes of the area. Recreation use is primarily hunting and would remain low because of steep terrain, heavy vegetation, limited trail system, and limited camping sites. Opportunities to expand the trail system are few. Cultural resources are unexplored but will receive maximum protection. Views from the area would largely be on areas where human activities are evident.

Limited opportunities to manage timber would be eliminated.

Because of its proximity adjacent to the San Joaquin Valley, periods of limited vision will remain common in this area, particularly during inversion situations.

3/ Under the Amenity Alternative, grazing would not be permitted in new wildernesses. This would result in a complete loss of this opportunity with its resultant economic impacts. Recreationists would not experience conflicts with cattle under this situation.

Although there are two existing allotments in the area at present, additional range development or improvement opportunities would be foregone due to the impracticability of more intensive management. Improvements do not exist.4/

Fire suppression action would be fast and aggressive. Fire would not be used to maintain or enhance vegetative diversity. This would result in visual uniformity over the long-term and reduce the amount and variety of wildlife in the area. Fire prevention needs would increase over existing needs, with costs for this activity and suppression costs high as compared to management under a non-wilderness designation. Opportunities to undertake fuel reduction programs would be foregone: hence, there would be a program loss over time.

There are no **known** social or economic dependencies on the area. The social implications include more available wilderness, costlier fire administration, and slightly fewer opportunities for habitat management.

Management and enforcement of wilderness regulations would be difficult because of the location of the west boundary not being tied to a geographic feature.

4/ Under the Amenity Alternative, grazing would not be permitted in new wildernesses. This would result in a complete loss of this opportunity with its resultant economic impacts. Recreationists would not experience conflicts with cattle under this situation.

TABLE C.6
DENNISON PEAK FPA

ACRES (AND PERCENT) ALLOCATED BY ALTERNATIVE AND MANAGEMENT PRESCRIPTION

Management Prescription	Acres (%) PRF	CUR	RPA	AMN
WF4	0	0	0	6700(100)
WC4	0	0	0	0
OW5	0	0	0	0
MC5	0	200(3)	0	0
CF5	2000(30)	0	2000(30)	0
OW6	3350(50)	3350(50)	3350(50)	0
MC6	840(12)	640(9)	840(12)	0
CF6	510(8)	510(8)	510(8)	0
CF7	0	2000(30)	0	0
MC8	0	0	0	0
CF8	0	0	0	0
TOTAL	6700(100)	6700(100)	6700(100)	6700(100)

Management Prescription	MKT	PRO	WFV
WF4	0	0	0
WC4	0	0	0
OW5	0	0	3350(50)
MC5	0	0	840(12)
CF5	0	0	2510(38)
OW6	3350(50)	3350(50)	0
MC6	0	0	0
CF6	140(2)	840(12)	0
CF7	0	2510(38)	0
MC8	700(10)	0	0
CF8	2510(38)	0	0
TOTAL	6700(100)	6700(100)	6700(100)

Table C.7 displays the critical indicators (as explained in Section B) used to compare impacts of each alternative. Table C.8 displays average annual outputs for the first and fifth decade for this Further Planning Area by alternative.

TABLE C.7

DENNISON PEAK FURTHER PLANNING AREA

Alternative	Decade	-Indicators- Miles of Road Constructed	Volume of Timber Harvested (MMBF)	Acres of Habitat Improvement (M Ac.)
AMN		(no outputs)		
WFV		(no outputs)		
PRF	1	0	2.0	0
	2	0	2.0	0
	3	0	2.0	0
	4	0	2.0	0
	5	0	2.0	0
CUR	1	0	0	.9
	2	0	0	0
	3	0	0	0
	4	0	0	0
	5	0	0	0
RPA	1	2.1	0	.8
	2	.7	0	0
	3	2.2	4.3	0
	4	0	0	0
	5	.3	.5	0
MKT	1	3.4	0	1.0
	2	1.2	2.1	0
	3	2.6	4.9	0
	4	0	0	0
	5	.7	.8	0
PRO	1	3.4	0	1.0
	2	1.2	2.1	0
	3	2.6	4.9	0
	4	.8	.7	0
	5	0	0	0

TABLE C.8

FURTHER PLANNING AREA - DENNISON PEAK
AVERAGE ANNUAL OUTPUTS
DECADES 1 AND 5

OUTPUT	DECADE	PRF	CUR	RPA	AMN	MKT	PRO	WFV
Recommended Wilderness Acres		0	0	0	6,700	0	0	0
Non-Wilderness Acres	-	6,700	6.700	6,700	0	6.700	6,700	6.700
Total Developed Recreation	1	0	0	0	0	0	0	0
(MRVD)	5	0	0	0	0	0	0	0
Dispersed Recreation	1	06	06	06	.06	06	06	06
(MRVD)	5	1.0	1 0	1 0	1 1	1 0	1 0	1 0
Wilderness Recreation	1	0	0	0	.00005	0	0	0
(MRVD)	5	0	0	0	0002	0	0	0
Total Wildlife & Fish	1	6	6	6	6	6	6	6
User Days (WFUD)	5	100	100	100	110	100	100	100
Grazing (AUM)	1	127	167	139	63	179	179	106
	5	159	167	139	63	167	167	127
Suitable Timber Land	1	2,211	0	1,740	0	2.150	2.150	0
(Acres)	5	2,211	0	1,740	0	2.150	2,150	0
Total Volume (MMCF)	1	0	0	0	0	0	0	0
	5	0	0	.055	0	078	0	0
(MMBF)	1	2	0	002	0	001	001	0
	5	2	0	357	0	507	001	0
Mineral Potential Foregone	1	0	0	0	0	0	0	0
(Acres of high and medium)	5	0	0	0	0	0	0	0
Gross Revenue (MM$)	1	07	23	26	23	23	23	23
	5	07	23		23	31	18	23
Net Revenue (MM$)	1	02	22	22	21	22	22	22
	5	.02	22	23	21	26	17	23
Total Cost (MM$)	1	05	01	01	02	01	01	01
	5	05	01	03	.02	04	01	01

DESCRIPTION

The Moses FPA is located in Tulare County in the Tule River Ranger District. It is split into two geographically separated areas. The eastern boundaries of both sections are contiguous to the Golden Trout Wilderness. Moses FPA can be reached from Springville by California Highway 190 up the Tule River Canyon and Wishon road from the south: and Balch Park and Bear Creek roads from the north and west. It is approximately a four-hour drive from Los Angeles, and two hours from Bakersfield.

Moses FPA is diverse in topographical and vegetational characteristics. The boundary contiguous to the Golden Trout Wilderness is "high country", being over 8,000 feet in elevation. The western boundaries are dominated by diverse stands of chamise chaparral.

Primary ecosystems in the area are chaparral (24 percent), oak woodlands (24 percent), mixed conifer (20 percent), giant sequoia (13 percent), Jeffrey pine (six percent), and red fir (five percent). Rock outcrops comprise seven percent of the FPA.

CAPABILITY

Natural integrity and apparent naturalness are high in the higher elevations of the Moses FPA. In lower elevations, these characteristics have been diminished by the introduction of unnatural features such as fuelbreaks, a series of range improvements, motorized vehicles on trails, and nonnative forage species.

The area does provide opportunities for solitude and primitive recreation, particularly at the higher elevations. In the eastern half of the southern portion and the eastern three-fourths of the northern section, opportunities for solitude and primitive recreation are considered excellent due to the varied topography and vegetation communities. These areas also correspond to the areas of highest scenic and fisheries values for the Moses FPA. In contrast, the western quarter of the northern section and western half of the southern section have few opportunities for solitude and primitive recreation. Scenic views are often influenced by human developments such as roads, power lines and/or urban developments. Overall, the area offers a variety of opportunities for challenge and self-reliance.

The boundary of the area is clearly defined only along the eastern portion of the FPA adjacent to the Golden Trout Wilderness. In both sections, the eastern boundary is a topographical feature, being the ridge dividing the North Fork from the Wishon Fork Tule River on the northern section, and the ridge dividing Wishon Fork Tule River and the Little Kern River on the southern section.

The remainder of the boundary is not easy to manage since it contains a "stair-step" boundary adjacent to Mountain Home Demonstration State Forest,

and the remainder cuts across drainages and is located mid-slope. Opportunities for increasing manageability of the FPA are limited, but some modifications would be an improvement over the current boundary.

One option would be to drop the dense impenetrable chamise chaparral area in the southern section of the FPA. The Wishon Fork would provide for a more logical boundary above Doyle Springs to the Mountain Home Demonstration State Forest boundary. This split would be easy to manage and the best opportunities for solitude and primitive recreation within the southern section of the FPA would be maintained. The northern section also has a few opportunities for boundary adjustments that would improve the manageability of the area. The northern section contains the rocky and rugged west-face of Moses Mountain. At 9,331 feet, this is the highest point for the FPA. A much more logical boundary would be to follow Pine Creek down from the southern end of Moses Mountain to the current western boundary. Of the two sections, the northern portion is the most primitive and rugged. Hence, another logical split would be to recommend just the northern section for wilderness.

Special features include two sensitive plant species: Kaweah fawn lily (Erythronium grandiflorum ssp. pusateri) and purple mountain parsley (Oreonana purpurascens); and a recommended Research Natural Area (RNA). The Moses Mountain RNA candidate is mostly within the Golden Trout Wilderness. The remaining 350 acres is within the Moses FPA. Designation as wilderness will not affect management of the RNA if it is established by the Chief. RNA status will ensure adequate protection regardless of wilderness status.

AVAILABILITY

Contiguous to the Golden Trout Wilderness, with high scenic values and opportunities for solitude and primitive experience, the FPA currently receives very light recreational use. Motorized recreation constitutes nearly 25 percent of the total use, much of it originating on adjacent private lands.

Over half of all use occurs in the Semi-primitive Non-Motorized ROS class. The few trails in the FPA are used today; however, they were important in the early years of the Forest. Completion of the current road system provides better access to trailheads into the Golden Trout Wilderness.

In 1982 recreational use in the Moses FPA totalled 480 RVD's. If the area is not designated as wilderness, and present trends continue, use is expected to reach 600 RVD's in 1990 and 760 RVD's by 2000. If the area is designated, use is expected to reach 760 RVD's by 2000.

Moses FPA lies at the eastern edge of the Tule River airshed. The southern portion of the area is on the ridge separating the Tule and Kern airsheds; while the northern portion is adjacent to the Kaweah airshed. It is most likely that the primary air flow influence of the area is the Tule airshed. Ozone concentrations measured at nearby Mountain Home Demonstration State Forest from 1977-1981 consistently experienced the least number of hours exceeding the California standard of 10 pphm (parts per hundred million) as compared to two other monitoring sites on the Forest. Any pollutants

transported into the Moses FPA will likely have the most impact in the lower elevations of the area. Concentrations would be weaker as one ascends into the higher elevations.

Forest Service management activities (prescribed fires, timber harvest, road construction) nearby may temporarily impact air quality but this impact should be minimal compared to transported pollutants. The private tract of Camp Wishon and Doyle Springs lies adjacent to the southern portion of the FPA. A small number of private homes are located here and may produce a light concentration of particulates from wood burning stoves. It is assumed that these emissions occur primarily in the winter months when the cold dense air most likely allows for slow dispersion, retaining the highest particulate levels in the canyon near the private tract.

The Moses FPA is quite varied in wildlife habitat types, ranging from chaparral to exposed rocky peaks. Approximately 3,000 acres of this area are designated as key winter range for the Tule River deer herd. The remainder of the FPA is summer or transition range. Black bear are common in the area. Both the rare wolverine and sensitive fisher are known in the area. A spotted owl habitat area is also located in the FPA.

Opportunities exist to increase wildlife habitat and diversity by selected prescribed burning projects in the chamise chaparral ecosystem.

The FPA has a significant number of pristine fisheries which provide excellent fishing-exploring experiences. Minimal access to these streams has protected the fisheries from damage and overutilization.

The FPA is part of four separate livestock grazing allotments, held by four permittees. The forage resource is mostly annual grass and shrubs with some meadow habitat in the higher elevations. There are six springs developed with 250 feet of pipe, six troughs, and one stock pond.

Current production is 430 AUM's per year. The area has potential for increased forage production through chaparral manipulation, type conversions and water developments. Total potential production could be increased to 600 AUM's.

The majority of the commercial timber is located in the east half of the southern parcel of Moses. Approximately 50 percent of the southern parcel contains commercial timber within the drainages of the Middle Fork Tule River, Burro Creek, and the North and South Forks of Alder Creek. The commercial timber in the northern parcel is located south and east of the private land at Dillonwood. Approximately 40 percent of this parcel contains commercial timber. The estimated acres of commercial forest land in the Moses FPA is 9,800 acres. The maximum annual average yield possible for the next 50 years would be about 6.53 million board feet. Standing volume is approximately 442 million board feet. About 1.08 miles of road would be constructed each year to allow harvest.

Ecologically, vegetation in the Moses FPA is diverse and appears healthy. The extensive chamise chaparral areas are overmature due to fire prevention and suppression activities. This ecosystem which is fire dependent needs

to be burned periodically to maintain species diversity of both plants and animals.

Estimated average annual water yield for the study area is 19,000 acre-feet. The study area is almost entirely within the Tule River drainage. About 34 percent is in the North Fork, 51 percent in the Wishon Fork and 15 percent in the Middle Fork sub-watersheds. A flume, traversing the southwestern part of the FPA, supplies water to Springville and provides water for hydroelectric generation at the Southern California Edison plant east of Springville.

Average annual precipitation is 33 inches. Channels in the northern part of the FPA are rocky and fairly stable. The remainder of the area contains channels mostly comprised of granitic or metamorphic alluvium with some susceptibility to degradation.

The Moses FPA is composed of over 50 percent granitic with the remainder being metasedimentary material. A recent Bureau of Mines study states that 155 currently inactive claims have been located in the area since 1899. The Powell Mine which produced silver, lead, copper, and zinc was the only recorded productive mine. Along with the Powell Mine, the King Solomon Prospect shows potential for silicified phyllite containing zinc, and the Helen-Joyce Prospect shows potential for silver and zinc. Most mineral potential is in the southern section.

This FPA was inhabited by the Yandanchi branch of the Foothill Yokuts. The antiquity of the Yokuts occupation in this area goes back at least 8,000 years. Foothill Yokuts' technology relied upon the use of stone prior to contact with Europeans in the late 18th century. Obsidian. granite, and quartz were the primary lithic sources. Cordage, bows, baskets, and pottery were common to the Yokuts. House types were conical dwellings 12-15 feet in diameter, which were sometimes excavated for a depressed floor. The Foothill Yokuts had a relatively complex social and religious organization.

Of historic interest is the Hubbs Sawmill (1885) which was the first sawmill to operate commercially in the North Fork Tule River area.

Due to the lack of archaeological surveys in the area, the prehistory of the Moses FPA is scarcely known.

Under the existing Multiple-Use Plan direction, fire prevention and suppression in the Moses FPA averages 58.00 per acre.

There are no non-federal lands within this area.

NEED

The nearest designated wilderness is the Golden Trout Wilderness which is adjacent to the Moses FPA. Use for the Golden Trout Wilderness was 101,900 RVD's in 1982. The northern boundary of the Moses FPA is also contiguous with Sequoia and Kings Canyon National Parks.

Moses FPA is approximately a four-hour drive from Los Angeles and two hours from Bakersfield.

The Moses FPA was recommended for further planning by the RARE II Final EIS. This FPA has not appeared in any proposed California Wilderness Bills since 1980.

A majority of public responses during the RARE II process favored non-wilderness (52 percent) over wilderness (48 percent) designation. The Tulare County Board of Supervisors filed a resolution opposing further wilderness in Tulare County. Those supporting wilderness designation feel that it would be a good addition to the Golden Trout Wilderness. However, this FPA does not add to the integrity of the Golden Trout Wilderness since it extends into another river drainage system and the southern portion would be especially unmanageable. Opposition to wilderness status centers in the southern portion. Timber industry sees an unnecessary loss of volume, and range interests may not be able to maintain investments in improvements and treating the chaparral to increase or maintain current AUM's.

During the creation of the Golden Trout Wilderness in 1978, Congress considered placing the Moses area in with the Golden Trout, but rejected it.

All ecosystems in the Moses FPA are represented in the National Forest Wilderness System.

ENVIRONMENTAL CONSEQUENCES

1. Designation: Non-wilderness
   Prescription: Wildlife & Dispersed Recreation (B05, OW5, MC5, CF5)
   Alternatives: See Table C.9.

Wilderness attributes of solitude, natural integrity and appearance would be little affected, except for short-term impacts on appearance during wildlife habitat projects. There would be no appreciable increase in use of the area because of the difficulty of terrain and limited access. Therein, solitude opportunities will remain high. Improvement and/or expansion of trails to access the area is limited by steep slopes. Cultural resources would remain reasonably protected, although project areas would require inventory, evaluation, and protection of cultural resources.

Wildlife habitat would be improved primarily via prescribed fire, therein, increasing both vegetative and animal diversity. Associated benefits to grazing could occur, although grazing would be subservient to wildlife needs. Air quality would be impacted during periods of burning, except in the lower portions of the FPA which are more affected by the San Joaquin Valley air quality and its associated pollutants.

Limited opportunities exist for timber management and would be available if done in conjunction with other timber harvests. Some fuelwood could be removed. Without this, opportunities would be foregone because of high

unit costs. Recreation needs would constrain timber harvest activities and increase costs.

Economic and social benefits would be slightly increased in quantity due to increased human use, primarily hunting. Social costs would include a reduction in negligible loss of natural integrity, designation of a wilderness, and some reduction in commercial timber harvest. Fire suppression costs would remain high due to limited access.

Large resource trade-offs requiring mitigation would not occur. Stream channels are relatively stable and water quality and sedimentation will not increase above current levels.

2. Designation: Non-wilderness
   Prescription: General Dispersed Recreation (BO1, OW1, MC1, CF1)
   Alternatives: See Table C.9.

Wilderness attributes of natural appearance and integrity would not be affected, although solitude might decrease slightly if OHV use was emphasized. While improvement and expansion of trail system opportunities are difficult and limited, this use could be encouraged via trail development. Cultural resources would remain reasonably protected, although trail project areas would require inventory, evaluation, and appropriate protection of cultural resources.

Wildlife habitat diversity and vegetative composition would remain static or continue to deteriorate; therein, wildlife populations could be expected to change over time. Grazing conditions would react in a similar fashion. Air quality would not be affected.

Limited opportunities exist for vegetative management in timbered areas and would be available if done in conjunction with other timber harvests. Some fuelwood could be removed. Without this, opportunities could be foregone because of high unit costs. Recreation needs would constrain timber harvest activities and increase costs.

There would be noticeable economic or social consequences from this action. The greatest social cost would be formal designation of a wilderness.

Fire suppression costs would remain high due to limited access. Large resource trade-offs requiring mitigation would not occur. Stream channels are relatively stable. Changes in sedimentation or water quality are not anticipated.

3. Designation: Non-wilderness
   Prescription: Range (BO6, OW6, MC6)
   Alternatives: See Table C.9.

The wilderness attributes of natural appearance and integrity would be moderately altered from existing situations via range betterment, including some type conversion and vegetation manipulation through use of prescribed fire and construction of improvements.

Recreation use is very light at present and would remain so, relative to steep terrain and limited access through the area. OHV use on trails and/or roads associated with improvements could occur and increase, therein conflicting with grazing. Cultural resources would be impacted both by increased grazing of animals and development of improvements. Activities with potential for impacting cultural properties would require inventory, evaluation, and appropriate protection/mitigation.

Improving grazing would have positive benefits by improving wildlife habitat and/or diversity. Fuel loading would also be reduced. Prescribed fire would be the major tool involved in habitat manipulation. This would periodically add smoke to the airshed. This would mostly occur in the lower reaches of the FPA which are more affected by the San Joaquin Valley air quality and its associated pollutants.

Economical benefits would occur from improved grazing opportunities, and costs from the funding necessary to implement improvements. Social costs would include the loss of the area as wilderness.

Fire suppression costs will remain high due to steep terrain and limited access.

The slight increase in grazing would result in a small increase in use of riparian areas. There would be no appreciable impacts on either water quality or sedimentation.

4. Designation: Non-wilderness
   Prescription: Timber (CF7)
   Alternatives: See Table C.9.

This prescription could apply to up to 75 percent of this FPA. It would represent a major change in the vegetative structure of the area, with harvest cutting resulting in openings of various sizes. Road construction would be required. It would result in visual alterations, therein changing the appearance and integrity of the area from its present condition and foregoing any future wilderness designation.

Recreation use would increase as access is provided into the area, although the steepness of the country will confine most users to areas on or near roads. Hunting pressures would likely increase, as will use of recreational vehicles, including OHV's. Use would be more widely dispersed and opportunities for solitude decreased. Opportunities for challenging experience would be reduced. Cultural resources, if present, could be impacted by both management and the public. Activities with the potential for impacting cultural resources would require inventory, evaluation and appropriate mitigation.

Wildlife habitat diversity would increase with timber harvest, resulting in better age class distribution and, subsequently, increasing populations. Grazing could increase slightly over existing within plantation areas once trees become reestablished. Air quality in the higher reaches of this FPA is good, not being impacted by the San Joaquin Valley; periods of burning would add smoke to the airshed.

Timber harvest will be fairly significant (up to three MMBF per year) under some alternatives. Fuelwood harvest would increase.

In terms of social consequences, the area would receive a higher investment to accomplish a full range of cost-effective outputs. wilderness characteristics would be reduced and ultimately eliminated as intensive management proceeds. Economic and social benefits would result from timber harvest/production and increased recreation opportunities for a higher percentage of the population.

Stream channels are relatively stable. Water quality would decrease and sedimentation increase with harvest and road construction activities.

Fire suppression costs would decrease from current levels with increased access. The threat of human-caused ignitions would increase. Subsequently, the need for increased prevention activities/contacts and law enforcement could develop.

5. Designation: Wilderness
   Prescription: Natural Role of Fire (WF4)
   Alternatives: See Table C.9.

Wilderness attributes of solitude, natural appearance and integrity would be maintained under this prescription, where they exist at present. It is difficult to get away from human influence in much of the area, particularly in the western portions of both units. This situation would remain. Recreation use. very light at present, would remain so and possibly decrease, since there is no outstanding feature to draw use to the area. Opportunities are limited by heavy vegetation, steep terrain, a limited trail system, and few suitable camping locations. Expansion of the trail system would be expensive. Cultural resources are unexplored but would receive maximum protection.

Opportunities to manage a fairly significant timber resource would be eliminated, including both commercial sawtimber and fuelwood. Timber stands would deteriorate over time.

Periods of limited visibility would continue to affect the air quality in the lower elevation, western portions of the area near the San Joaquin Valley.

The vegetation of the lower elevations has poor age class and mosaic distribution. Prescribed fire would be used to maintain or enhance vegetative diversity. This would enhance visual diversity and increase wildlife populations and variety in the area. This could have spinoff benefits on grazing in these areas. Application of prescribed fire would be costly and limited.

Grazing and current improvements would continue, but opportunities to increase grazing and/or accomplish fuel reduction programs would be

foregone: thus losses in these resources would occur over time.5/ Fire prevention and suppression costs would increase as compared to management under non-wilderness designation.

Social and economic dependencies known to exist in this area include grazing as part of four allotments with four individual permittees. Wilderness designation is not expected to adversely affect maintenance of current AUM's. Management of these allotments would continue status quo but be more restrictive under this designation, with constraints on further grazing improvements. Social implications include more wilderness and costlier fire administration. Manageability and enforcement of regulations, particularly the western portion of the south unit, would be difficult. Some enhancement by OHV's would occur.

Large resource trade-offs requiring mitigation would not occur. Stream channels are relatively stable and water quality and sedimentation would not change. A wilderness designation will not affect the current fisheries situation. Wilderness status would provide habitat/watershed protection from disturbances.

6. Designation: Wilderness
   Prescription: Full Fire Control & Suppression (WC4)
   Alternatives: See Table C.9.

This prescription is used on the northern portion (9,730 acres) in the LBU alternative only.

Wilderness attributes of solitude, natural appearance and integrity would be maintained under this prescription, where they exist at present. It is difficult to get away from human influence in much of the area, particularly in the western portions. This situation would remain.

Recreation use, very light at present, would remain so and possibly decrease, since there is no outstanding feature to draw use to the area. Opportunities are limited by heavy vegetation, steep terrain, a limited trail system, and few suitable camping locations. Expansion of the trail system would be expensive. Cultural resources are unexplored but would receive maximum protection.

Opportunities to manage a small timber resource would be eliminated, including both commercial sawtimber and fuelwood. Timber stands would deteriorate over time.

Periods of limited visibility would continue to affect the air quality in the lower elevation, western portions of the area near the San Joaquin Valley.

5/ Under the Amenity Alternative, grazing would not be permitted in new wildernesses. This would result in a complete loss of this opportunity with its resultant economic impacts. Recreationists would not experience conflicts with cattle under this situation.

The vegetation of the lower elevations would be retained in its present condition with poor age class and mosaic distribution. Fire suppression would be fast and aggressive and fire would not be used to maintain or enhance vegetative diversity. This would reduce visual diversity and result in decreased wildlife populations and variety in the area.

Grazing and current improvements would continue, but opportunities to increase grazing and/or accomplish fuel reduction programs would be foregone; thus losses in these resources would occur over time.6/ Fire prevention and suppression costs would increase as compared to management under non-wilderness designation or with opportunities to use fire as a management tool.

Social and economic dependencies known to exist in this area include grazing as part of four allotments with four individual permittees. Wilderness designation is not expected to adversely affect maintenance of current AUM's. Management of these allotments would continue status quo but be more restrictive under this designation, with constraints on further grazing improvements. Social implications include more wilderness, and costlier fire administration. Manageability and enforcement of regulations, particularly the western portion of the south unit, would be difficult. Some encroachment by **OHV's** would occur.

Large resource trade-offs requiring mitigation would not occur. Stream channels are relatively stable and water quality and sedimentation would not change. A wilderness designation will not affect the current fisheries situation. Wilderness status would provide habitat/watershed protection from disturbances.

Table C.10 displays the critical indicators **(as** explained in Section **B** Critical Indicators, amount and timing of anticipated change) used to compare impacts of each alternative. Table C.ll displays average annual outputs for the first and fifth decade for this Further Planning Area by alternative.

6/ Under the Amenity Alternative, grazing would <u>not</u> be permitted in new wildernesses. This would result in a complete loss of this opportunity with its resultant economic impacts. Recreationists would not experience conflicts with cattle under this situation.

TABLE C.9
MOSES RPA

ACRES (AND PERCENT) ALLOCATED BY ALTERNATIVE AND MANAGEMENT PRESCRIPTION

Management Prescription	Acres (%) PRF	CUR	RPA	AMN
B01	500(2)	500(2)	0	0
OW1	0	0	0	0
MC1	1300(5)	1300(5)	0	0
CF1	2200(9)	2200(9)	4500(19)	0
WF4	0	0	0	24360(100)
WC4	0	0	0	0
B05	0	0	500(2)	0
OW5	0	0	600(2)	0
MC5	0	0	2300(9)	0
CF5	0	0	0	0
B06	0	0	0	0
OW6	1360(6)	1360(6)	760(3)	0
MC6	3400(14)	3400(14)	2400(10)	0
CF7	15600(64)	15600(64)	13300(55)	0
MC8	0	0	0	0
CF8	0	0	0	0
TOTAL	24360(100)	24360(100)	24360(100)	24360(100)

Management Prescription	MKT	PRO	WFV
B01	500(2)	500(2)	500(2)
OW1	1360(6)	1360(6)	0
MC1	1300(5)	1300(5)	1300(5)
CF1	0	0	0
WF4	0	0	0
WC4	0	0	0
B05	0	0	0
OW5	0	0	1360(6)
MC5	0	0	3400(14)
CF5	0	0	17800(23)
B06	0	0	0
OW6	0	0	0
MC6	0	3400(14)	0
CF7	0	17800(73)	0
MC8	3400(14)	0	0
CF8	17800(73)	0	0
TOTAL	24360(100)	24360(100)	24360(100)

TABLE C.10

MOSES FURTHER PLANNING AREA

Alternative	Decade	Road Construction (Mi)	-Indicators- Timber Harvested (MMBF)	Habitat Improvement (M Ac)	Increased M AUM's (Avg/Yr)
PRF	1	18 0	io 6	1 8	1 3
	2	1 0	2 1	3 9	9
	3	4 0	9 7	0	7
	4	1 0	3 9	0	1 3
	5	0	1 4	3 9	9
CUR	1	1	0	1 9	0
	2	0	0	0	0
	3	0	0	0	0
	4	0	0	0	0
	5	2	5	4 7	6
RPA	1	17 8	1 1	6 0	0
	2	3 6	1 9	0	0
	3	3 4	9 4	0	0
	4	4 6	10 0	4 0	0
	5	9 4	18 0	0	0
AMN	1	0	0	0	0
	2	0	0	3	0
	3	0	0	0	1
	4	0	0	0	0
	5	0	0	3	0
MKT	1	20 1	7	1 8	0
	2	10 4	19 0	3 9	0
	3	11 4	21 6	0	0
	4	3 2	7 8	0	0
	5	2 9	3 0	3 9	6
PRO	1	20 4	8	1 8	0
	2	4 2	8 1	3 9	0
	3	11 4	22 6	0	0
	4	9 4	19 7	0	0
	5	2 9	4 1	3 9	6
WFV	1	12 0	0	5 5	3
	2	0	7	0	0
	3	0	0	0	0
	4	2 4	0	4 0	0
	5	2 4	13 4	0	1

TABLE C 11

FURTHER PLANNING AREA - MOSES
AVERAGE ANNUAL OUTPUTS
-DECADES 1 AND 5

OUTPUT	DECADE	PRF	CUR	RPA	AMN	MKT	PRO	WFV
Recommended Wilderness Acres	-	0	0	0	24,360	0	0	0
Non-Wilderness Acres	-	24.360	24,360	24,360	0	24,360	24.360	24,360
Total Developed Recreation	1	0	0	0	0	0	0	0
(MRVD)	5	0	0	0	0	0	0	0
Dispersed Recreation	1	5	.5	5	5	.5	5	5
(MRVD)	5	1 2	1 2	1 2	1.2	1 2	1 2	1 2
Wilderness Recreation	1	0	0	0	0005	0	0	0
(MRVD)	5	0	0	0	.0014	0	0	0
Total Wildlife & Fish	1	50	50	50	50	50	50	50
User Days (WFUD)	5	120	120	120	120	120	120	120
Grazing (AUM)	1	1.325	751	360	394	752	757	988
	5	918	745	274	335	1,301	1,301	785
Suitable Timber Land	1	9,648	99	7,693	0	9,526	9,577	7,732
(Acres)	5	9.648	99	7,693	0	9,526	9,577	7.732
Total Volume (MMCF)	1	1 1	0	111	0	075	076	0
	5	1	002	1 800	0	030	409	1 336
(MMBF)	1	6 9	0	721	0	487	494	0
	5	9	013	11 700	0	195	2 66	8 684
Mineral Potential Foregone	1	0	0	0	8,000	0	0	0
(Acres of high and medium)	5	0	0	0	8,000	0	0	0
Gross Revenue (MM$)	1	43	93	1 01	92	97	97	94
	5	04	94	2 83	94	1 12	1 27	2 62
Net Revenue (MM$)	1	05	88	81	86	84	83	90
	5	01	88	2 21	86	96	1 04	2 19
Total Cost (MM$)	1	49	05	21	06	13	14	04
	5	03	06	62	08	16	22	43

DESCRIPTION

The Scodies FPA constitutes the southeasternmost extremity of the Cannell Meadow Ranger District, of the Sequoia NF and the Sierra Nevada. Located in Kern County, it consists of steep granitic mountain faces rising out of the desert. The summit is almost plateau-like in appearance. Vegetation varies from a desert ecosystem of Mojave desert species through Joshua tree woodlands, desert chaparral, sagebrush, oak woodlands to an extensive pinyon pine woodland at the higher elevations. A few stringers of Jeffrey pines are located on the north-facing slopes. Very little free water is available in the Scodies and, therefore, is a severely limiting factor for biotic communities.

The area can be reached from the north and south by U.S. Highway 395 and California Highway 14 to Highway 178. Highway 178 also provides access to the area from the west. Several dirt roads allow access to various canyons and Forest Service four-wheel drive road 27S11 provides access across the summit. The Pacific Crest Trail bisects the Scodies FPA from Walker Pass to Bird Springs Pass. The nearest urban center is Bakersfield, approximately 1-3/4 hours drive.

Recreation use is estimated to be low compared with other areas on the Forest primarily because of the aridity of the area. OHV use and hunting are the dominant uses with hikers utilizing the Pacific Crest Trail. The highest peaks in the Scodies FPA provide scenic vistas. Views from Skinner Peak extend to the Dome Land Wilderness, the Kern Plateau and Mount Whitney to the north, east to desert mountain ranges, south to Mt. San Gorgonio and Mt. San Antonio near Los Angeles, and west to the Piute Mountains.

CAPABILITY

Throughout the greater part of the Scodies, human influence has not affected the ecological process or natural integrity of the area. However, a microwave tower located just outside the boundary can be seen from the Pacific Crest Trail on the north-face of Skinner Peak and also from a few prominent ridges. It cannot be seen from over 90 percent of the Scodies. A low standard four-wheel drive road approximately five miles long accesses the McIvers Spring cabin site north of the microwave tower within this area.

The Scodies contain many opportunities for solitude and for primitive recreation. The relatively gently sloping terrain of the plateau-like summit provides opportunity for cross-country travel for hikers and hunters. Scenic views are abundant and of significant value. The area is quite large. This fact, combined with its isolated location and low use by people, means that a person can easily get away from the sights and sounds of civilization. Dispersed recreation activities are challenging due to the lack of trails and extremely limited water supplies.

The boundary of the Scodies FPA follows the Forest boundary. This boundary does not follow any topographic features: instead it follows section lines.

Few opportunities exist to improve the manageability of the area. The boundary is adjacent to BLM lands on all sides. Access to the Scodies FPA is rather limited. Only a few areas would need control if the area were designated as wilderness.

AVAILABILITY

The Scodies FPA represents a few trade-offs between wilderness values and dispersed recreation OHV's. The area has no campgrounds, fishing or perennial streams. Projected RVD use is 1,140 and 1,480 in 1990 and 2000, respectively, with a slight decrease if the area remained non-wilderness. However, most hiking RVD use is expected to occur along the Pacific Crest Trail which is the major hiking attraction in the Scodies. Many hikers, however, find the area rugged and challenging due to its aridity. The four-wheel drive road to McIvers Spring provides access to many areas of the Scodies. If the road was of a standard that average cars could drive, the Scodies would receive more dispersed primitive camping and would provide more access regardless if the area were designated as wilderness or not. However, the road north of the microwave tower is currently within the FPA boundary and could not be used by vehicles unless it were specifically identified and exempted in wilderness legislation.

The Scodies lie within the Kern River airshed and it is assumed that existing concentrations of any regulated pollutants are transported primarily from the southern San Joaquin Valley from the Bakersfield area via this major air corridor. Existing levels of particulates may also be attributed to emissions generated in the Kern River Valley communities. As a small isolated-island range, the Scodies could have potential problems if industry were to locate high-emitting facilities around the base of the range.

Primary recreation experiences in the Scodies FPA are hunting, OHV use, and hiking. Most of the use occurs in the pinyon pine woodland ecosystem in the Semi-primitive Motorized ROS class. Only the Pacific Crest Trail bisects the area. Access by hikers and hunters is limited and rugged from the base of the Scodies to the plateau-like summit. It is speculated that over 90 percent of all use in the Scodies FPA originates from Forest Road 27S11 which provides access to the plateau summit. Water is needed for camping, and McIvers Spring is utilized by hikers and OHV users. Most OHV use occurs during the weekends and hunting season. Since the road to McIvers Spring is essentially a four-wheel drive road, this limits the opportunity for more dispersed use. High summer temperatures keep use relatively low.

Wildlife information for the Scodies FPA is limited. The area does not provide for an abundance of quality habitat. The area is relatively arid with little water available during the summer and fall. Several springs and guzzlers have been developed for wildlife over the years in the Scodies. A few deer reside in the area. Mountain and valley quail, are commmon where water is available. There are no threatened or endangered animals in the Scodies.

Average annual precipitation is 10 inches. Estimated annual water yield is only 6,000 acre-feet. Major perennial streams do not drain the area.

Channels in the area are composed of rocky granitic alluvium and are fairly susceptible to degradation.

The Scodies FPA is currently under permit to three livestock operators. Generally, sheep and cattle graze the lower slopes. Forage available is annual grass and shrubs. Production is fairly low, producing 445 AUM's per year. Potential for increased production lies in additional water developments along with shrub type conversions and vegetation manipulation projects. Production could be increased to 525 AUM's. Currently there are 5.8 miles of fence with six stock watering troughs in the Scodie Mountains. Wilderness designation would not prohibit livestock grazing.

The vegetation in the Scodies FPA is dominated by a uniform appearing pinyon pine woodland. Jeffrey pine is restricted to the most mesic sites primarily on the northern half of the area, and could be naturally eliminated through time with continued aridity. The Jeffrey pine stands are too sparse and remote to be considered suitable for timber production. Sagebrush and semidesert chaparral occupy southern slopes. One sensitive plant, Yosemite bitterroot (Lewisia disepala), is known in the Scodies FPA.

Recent information provided by the Bureau of Mines states that about 50 claims have been located in the area, but no mineral production has been recorded. In addition, the Bureau of Mines shows the Scodies to have a low mineral resource potential. An old small mine is located just south of the microwave tower in the Cane Creek drainage. Tungsten occurrence was not found during the Bureau's investigation; and other previous reports grade it as too small and low grade to be of economic value.

Currently, a very small acreage on the northeast corner of the FPA is being investigated to determine suitability for installation of an electromagnetic acoustic research station.

The Scodies FPA was inhabited by both the Tubatulabal and Kawaiisu Indians. These Indian groups relied heavily upon the local pinyon crop, utilizing seasonal base camps. Temporary hunting camps were also occupied throughout the pinyon nut harvest season. Proximity to stable water sources does not appear to have been a factor in the location of camps. The area contains numerous cultural resources which were located by an intensive survey associated with the construction of the Pacific Crest Trail. These sites occurred in such numbers that it was often difficult to construct the trail without impacting significant properties. Generally, cultural sites in the Scodies tend to be located on small, flat spurs and ridge lines that provided adequate camping space, open view, and easy access to the surrounding pinyon pine woodland.

During the 1982-83 winter, several areas on the plateau of the Scodies received storm damage to trees. This fuel on the ground could pose a problem in suppressing a wildfire, in addition to the rugged nature of the area. There is also evidence of black stain root disease and dwarf mistletoe infestations on pinyon pines along Forest Road 27S11 between the microwave station and McIvers Spring.

There are no private lands within the Scodies FPA.

NEED

The nearest designated area is the Dome Land Wilderness. However, the topography and vegetation of the Scodies FPA are very different from that formed in the Dome Land Wilderness. The southern boundary of the Scodies FPA is adjacent to BLM Wilderness Study Area 163 from Bird Springs Pass Road to Kelso Creek Road.

The Scodies FPA is comprised of a vast pinyon pine woodland. This ecosystem is currently not represented in any Forest Service wilderness in California.

The Scodies was placed in the further planning category in RARE 11. Although the area was proposed for wilderness in a 1980 Bill, the California Wilderness Act of 1984 retained its further planning status.

Public response during the RARE II process displays 56 percent favoring wilderness designation with 44 percent desiring non-wilderness designation. The wilderness proponents described the great scenic beauty and wilderness values of the area. Concerns also centered around the Pacific Crest Trail and user conflicts. Those opposing wilderness designation felt the Scodies provided good motorized recreation and did not want to see it eliminated.

ENVIRONMENTAL CONSEQUENCES

1. Designation: Non-wilderness
   Prescription: Wildlife & Dispersed Recreation (PS5)
   Alternatives: See Table C.12

Wilderness attributes would be little affected by the application of this prescription, except possibly in the immediate area of a project. Primarily, projects would be aimed at providing water developments, so only small areas would be involved. Because of the arid nature of the country, appreciable increase in recreation use is not expected, even if the limited trail system is expanded also. Cultural resources would remain reasonably protected, although project areas would require inventory, evaluation and protection/mitigation of cultural resources.

Major changes to grazing programs would not occur although some range improvement measures would be implemented. Air quality would remain the same given the areas location in the Kern River airshed.

Social and economic benefits for the area would be few. The biggest social cost would include the loss of a formal wilderness designation.

Large resource trade-offs requiring mitigation would not occur. Enforcement need for nonmotorized vehicle regulations on the PCT would continue at the same rate as currently exist.

Fire suppression costs will remain constant due to limited access.

2. Designation: Non-wilderness
Prescription: General Dispersed Recreation (PS1)
Alternatives: See Table C.12

Wilderness attributes of natural appearance and integrity would not be affected by application of this prescription. Because of the arid nature of the area, recreation use of the area is not expected to change except through encouragement of OHV use, which would affect solitude. Opportunities to increase the trail system to facilitate this use are available. Cultural resources would be impacted, both by project development and dispersal of users; these activities would require inventory, evaluation and appropriate cultural resource mitigation/protection.

Major changes to grazing programs would not occur even with some range betterment projects, although conflicts with OHV's would increase. Air quality would remain the same given the area's location in the Kern River airshed.

Social and economic benefits for the area would be few. The biggest cost would include the loss of a formal wilderness designation.

Large resource trade-offs requiring mitigation would not occur. Enforcement needs to prevent OHV use of the PCT would increase over the existing situation.

3. Designation: Wilderness
Prescription: Natural Role of Fire (WF4)
Alternatives: See Table C.12

Wilderness designation would maintain the attributes of solitude, natural appearance, and natural integrity characteristic of the Scodie Mountains. Recreation use is generally light, being concentrated mostly around the access road to the microwave tower and McIvers Spring. It would decrease if the wilderness did not permit motor vehicle use to the springs. Further, there is no outstanding feature to draw use to the area. The extreme arid conditions will preclude significant recreation use increases under any designation, although use of the PCT could increase with the attraction of a wilderness designation. Opportunities to expand the trail system on the plateau-like mountaintop would, however, make parts of the area more accessible. Cultural resources, while largely unexplored, are known to abound on more gentle terrain. They would receive maximum protection. Views from the area, while looking to lower elevations where human presence is sometimes evident, are spectacular.

Due to the area's location in the Kern River airshed, periods of limited vision will continue to be common to this area. Air quality would restrict application of prescribed fire.

Although there are three permittees who utilize this area for grazing, opportunities to increase forage production and additional water developments would be foregone.7/ Current improvements would be retained. The existing wildlife population would remain constant, albeit a limited population at best. Much of the vegetation is a uniform-appearing pinyon pine woodland. This trend would continue unless a program of applied fire management was allowed to create a more natural regime.

Fire suppression costs would increase over existing costs. Prescribed fire costs would be high due to limits and/or restrictions placed on types or use of equipment.

Social benefits would be primarily associated with increasing the amount of wilderness available. Economical costs would involve increased administration of wilderness regulations. OHV infringement is a current problem on the PCT; and designation as wilderness (closing the road to McIvers Spring) would greatly compound existing management, administration and law enforcement problems. The cost of administration would be high.

Large resource trade-offs requiring mitigation would not occur with wilderness designation.

4. Designation: Wilderness
   Prescription: Full Fire Control & Suppression (WC4)
   Alternatives: See Table C.12

Wilderness designation would maintain the attributes of solitude, natural appearance, and natural integrity characteristic of the Scodie Mountains. Recreation use is generally light, being concentrated mostly around the access road to the microwave tower and McIvers Spring. It would decrease if the wilderness did not permit motor vehicle use to the springs. Further, there is no outstanding feature to draw use to the area. The extreme arid conditions will preclude significant recreation use increases under any designation, although use of the PCT could increase with the attraction of a wilderness designation. Opportunities to expand the trail system on the plateau-like mountaintop would, however, make parts of the area more accessible. Cultural resources, while largely unexplored, are known to abound on more gentle terrain. They would receive maximum protection. Views from the area, while looking to lower elevations where human presence is sometimes evident, are spectacular.

Due to the area's location in the Kern River airshed, periods of limited vision will continue to be common to this area. Air quality would restrict application of prescribed fire.

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7/ Under the Amenity Alternative, grazing would be permitted in new wildernesses. This would result in a complete loss of this opportunity with its resultant economic impacts. Recreationists would not experience conflicts with cattle under this situation.

ment would be foregone.8/ Current improvements would be retained. The existing wildlife population would remain status quo, albeit a limited population at best. Much of the vegetation is a uniform-appearing pinyon pine woodland. This trend would continue without the opportunity to implement a program of applied fire management to create a more natural regime.

Fire suppression costs would increase over existing costs due to limits and/or restrictions placed on types or use of equipment.

Social benefits would be primarily associated with increasing the amount of wilderness available. Economical costs would involve increased administration of wilderness regulations. OHV infringement is a current problem on the PCT; and designation as wilderness (closing the road to McIvers Spring) would greatly compound existing management, administration and law enforcement problems. The cost of administration would be high.

Large resource trade-offs requiring mitigation would not occur with wilderness designation.

Table C.13 displays the critical indicators (as explained in Section B), used to compare impacts of each alternative. Table C.14 displays average annual outputs for the first and fifth decade for this Further Planning Area by alternative.

8/ Under the Amenity Alternative, grazing would not be permitted in new wildernesses. This would result in a complete loss of this opportunity with its resultant economic impacts. Recreationists would not experience conflicts with cattle under this situation.

TABLE C.12
SCODIES

ACRES (AND PERCENT) ALLOCATED BY ALTERNATIVE AND MANAGEMENT PRESCRIPTION

Management Prescription	Acres (%) PRF	CUR	RPA	AMN
PS1	0	0	48000(100)	0
WF4	0	0	0	48000(100)
wc4	0	0	0	0
PS5	48000(100)	48000(100)	0	0
TOTAL	48000(100)	48000(100)	48000(100)	48000(100)

Management Prescription	MKT	PRO	WFV
PS1	0	0	0
WF4	0	0	0
wc4	0	0	0
PS5	48000(100)	48000(100)	48000(100)
TOTAL	48000(100)	48000(100)	48000(100)

TABLE c.13

SCODIES FURTHER PLANNING AREA

Alternative	Decade	-Indicators- Acres of Habitat Improvement (M ac)	Increased M AUM's (Avg/Yr)
AMN		(no outputs)	
PRF	5	13.0	.1
CUR	5	13.0	.1
RPA	5	13.0	.1
MKT	5	13.0	.1
PRO	5	13.0	.1
WFV	5	13.0	.1

TABLE C 14

FURTHER PLANNING AREA - SCODIES
AVERAGE ANNUAL OUTPUTS
DECADES 1 AND 5

OUTPUT	DECADE	PRF	CUR	RPA	AMN	MKT	PRO	WPV
Recommended Wilderness Acres	-	0	0	0	48.000	0	0	0
Non-Wilderness Acres	-	48,000	48.000	48,000	0	48.000	48.000	48.000
Total Developed Recreation	1	0	0	0	0	0	0	0
(MRVD)	5	0	0	0	0	0	0	0
Dispersed Recreation	1	9	9	9	1 0	9	9	9
(MRVD)	5	2 2	2 2	2 2	2 2	2 2	2 2	2 2
Wilderness Recreation	1	0	0	0	0011	0	0	0
(MRVD)	5	0	0	0	0035	0	0	0
Total Wildlife & Fish	1	90	90	90	100	90	90	90
User Days (WFUD)	5	220	220	220	250	220	220	220
Grazing (AUM)	1	503	445	387	396	530	534	423
	5	632	445	565	418	645	650	503
Suitable Timber Land	1	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0
Total Volume (MMCF)	1	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0
(MMBF)	1	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0
Mineral Potential Foregone	1	0	0	0	0	0	0	0
(Acres of high and medium)	5	0	0	0	0	0	0	0
Gross Revenue (MM$)	1	60	60	59	59	60	60	60
	5	60	60	59	59	60	60	60
Net Revenue (MM$)	1	49	52	49	44	49	49	52
	5	40	43	39	44	40	.40	43
Total Cost (MM$)	1	20	07	11	15	11	11	07
	5		16	20	15	20	20	16

B. CRITICAL INDICATORS, AMOUNT AND TIMING OF ANTICIPATED CHANGE

To compare the impacts of various prescriptions, a matrix was prepared in which quantitative values of activity outputs were developed for the five decades of the planning period. This was done for each alternative. The values for the following items were reviewed:

RVD's
Acres of wildlife habitat improvement
Acres of range improvement
Acres of water yield improvement
Acres of prescribed fire
Acres of fuel reduction
Miles of road construction
Timber volume harvested
Increase in AUM's

After analyzing these, it was felt that the following are critical indicators which would best indicate the degree of impact on any individual Further Planning Area:

Acres of habitat improvement
Acres of water yield improvement
Miles of road construction
Timber volume harvested
Increase in AUM's

Indicators were applied to the individual Further Planning Areas in combinations representative of anticipated actions within each area. For instance, acres of habitat improvement and increase in AUM's were used as indicators in an area where timber would be not harvested or water yield improvement would not be undertaken. Information is presented in the four Tables (C.4, C.7, C.10, and C.13), located after their respective FPA narrative, to provide both magnitude and time of change.

Tables C.2, C.5, C.8, C.11, and C.14, also located after their respective FPA/WSA narrative, display average annual outputs for the first and fifth decade for each alternative.

Table C.15 compares the acres of National Forest Further Planning Areas that are allocated to each management emphasis by alternative.

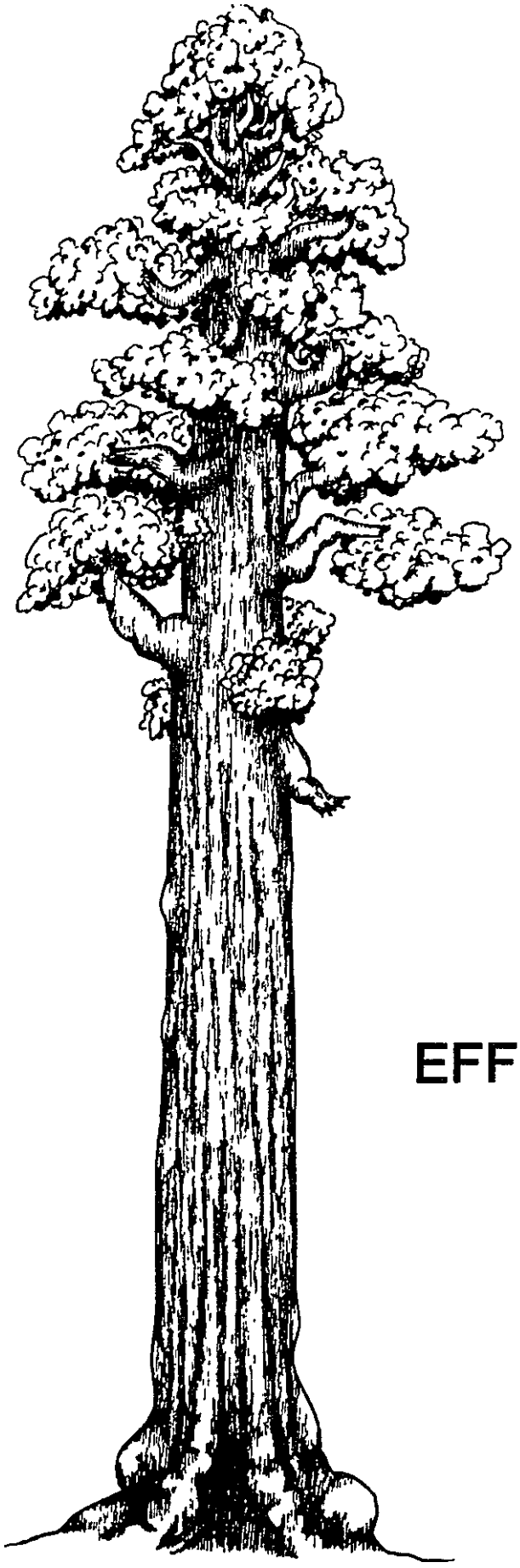
Table C.16 compares the acres of National Forest FPA's and BLM WSA allocated to each management prescription by alternative.

TABLE C 15 ACRES BY MANAGEMENT EMPHASIS ALLOCATED BY ALTERNATIVE - TOTAL FOR NATIONAL FOREST FURTHER PLANNING AREAS

Alt	Gen Disp Rec	Water-Orien.Rec	Developed Rec	Wild Fire Mgt	WL/Disp Rec	Range	Timber	Water Yield	Total Acres
PRF	4,000	0	0	0	52,500	19.360	15.600	0	91.460
CUR	4,000	0	0	0	50.700	19.160	17,600	0	91,460
RPA	52.500	0	0	0	7,900	15.260	13.300	2,500	91.460
AMN	0	0	0	91,460	0	0	0	0	91,460
MKT	3.160	0	0	0	48.000	15,890	0	24,410	91.460
PRO	3,160	0	0	0	48.000	19,900	20,310	0	91,460
WFV	1,800	0	0	0	89.660	0	0	0	91,460

TABLE C 16
FURTHER PLANNING AND WILDERNESS STUDY AREA EVALUATION (USFS and BLM)
ACRES AND PERCENT ALLOCATED BY ALTERNATIVE AND MANAGEMENT PRESCRIPTION

Management Prescription	Acres (%) PRF	CUR	RPA	AMN	MKT	PRO	WFV
B01	500 (1)	500 (1)	0	0	500 (1)	500 (1)	500 (1)
Ow1	0	0	0	0	1360 (1)	1360 (1)	0
MC1	1300 (1)	1300 (1)	0	0	1300 (1)	1300 (1)	1300(1)
PS1	0	0	70910 (55)	0	0	0	0
CFI	2200 (2)	2200 (2)	4500 (4)	0	0	0	0
B02	0	0	0	0	0	0	0
ow2	0	0	0	0	0	0	0
MC2	0	0	0	0	0	0	0
CF3	0	0	0	0	0	0	0
WF4	12650 (10)	0	0	127020 (100)	0	0	0
WC4	0	0	12650 (10)	0	9710 (8)	0	0
B05	0	0	1100 (1)	0	0	0	4400 (3)
OW5	0	0	2500 (2)	0	0	0	10210 (8)
MC5	2500 (2)	2700 (2)	2300 (2)	0	0	0	6740 (5)
PS5	70910 (55)	83560 (65)	0	0	48000 (37)	48000 (37)	83560 (66)
CF5	2000 (2)	0	2000 (2)	0	0	0	20310 (16)
B06	4400 (3)	4400 (3)	3800 (3)	0	4400 (3)	4400 (3)	0
OW6	10210 (8)	10210 (8)	7710 (6)	0	8850 (7)	8850 (7)	0
MC6	4240 (3)	4040 (3)	3240 (3)	0	2500 (2)	5900 (5)	0
PS6	0	0	0	0	25850 (20)	35560 (28)	0
CF6	510 (1)	510 (1)	510 (1)	0	140 (1)	840 (1)	0
CF7	15600 (12)	17600 (14)	13300 (9)	0	0	20310 (16)	0
MC8	0	0	2500 (2)	0	4100 (3)	0	0
CF 8	0	0	0	0	20310 (16)	0	0
SIA	0	0	0	0	0	0	0
WSR	0	0	0	0	0	0	0
Total	127020(100)	127020(100)	127020(100)	127020(100)	127020(100)	127020(100)	127020(100)



Appendix D

ECONOMIC EFFICIENCY ANALYSIS

APPENDIX D

ECONOMIC EFFICIENCY ANALYSIS

CONCEPTUAL BACKGROUND

Present net value (PNV) is the criterion used to maximize net benefits in planning benchmarks and alternatives for the Sequoia National Forest. For each alternative PNV is the difference between the discounted value of all priced outputs and all Forest Service management and investment cost over the analysis period. The priced outputs are those that are or can be exchanged in the market place. They include the value of forage; the stumpage value of timber; the value of commercial fish in the stream; fur animals and other harvested miscellaneous products; the value of any increased water flow quantities: the in-the-ground value of minerals; and all recreation visitor days including those for wildlife, fishing, and wilderness experiences.

The alternatives are designed to achieve the specified nonpriced outputs and to meet constraints at the least cost. Thus, the PNV of each alternative estimates the value of the maximum attainable benefits of priced outputs. It is the value of priced benefits realized in excess of all the Forest Service costs of producing priced outputs and nonpriced outputs and meeting management constraints. PNV, therefore, is an estimate of the market value of the current forest resources after all costs of producing outputs and meeting constraints have been subtracted from the value of the expected flow of priced outputs.

Net Public Benefit is defined to be overall value to the Nation of all outputs and positive effects (benefits) less all the associated Forest Service inputs and negative effects (costs) for producing those primary benefits whether they can be quantitatively valued or not. Thus, conceptually, net public benefits are the sum of PNV plus the full value of nonpriced outputs. The full value of nonpriced benefits is used because their cost of production has been accounted for in PNV. The nonpriced benefits include outputs such as threatened and endangered species maintenance or enhancement; natural and scientific areas; cultural site reservations (such as Indian religious sites), and historical or anthropological sites; visual quality in excess of full service day standards; diversity objectives; or air quality in excess of Minimum Management Requirements. Minimum Management Requirements in this context are standards that must be met in the production of any or all outputs from the Forest. The minimum level, therefore, is a cost of production in the multiple-use context.

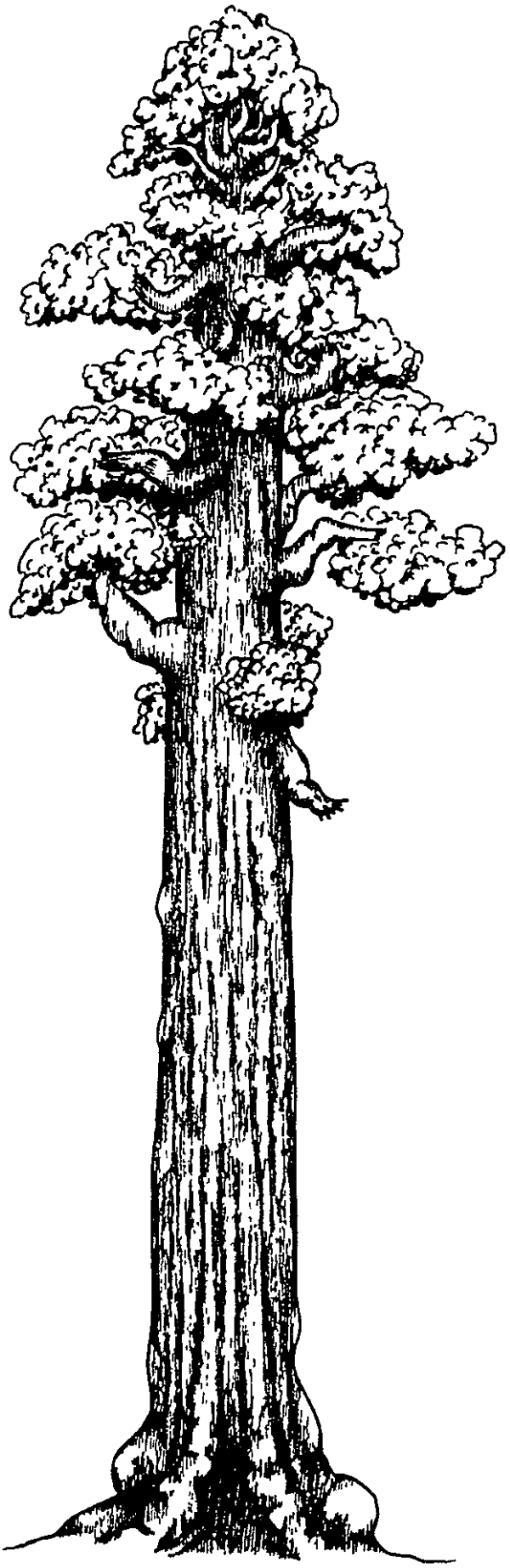
There are also second level benefits or effects that are also the concern of National Forest policy and management. These include local income and Job effects on economic development of communities; net cost impacts on taxpayers; price effects on consumers of forest products and other producers of those products; payments to communtiies in lieu of taxes; and benefits to specific users of National Forest products who pay no fees, or fees less than the price of the valued outputs. All these are distributive welfare effects of National Forest production. All the foregoing distributive effects and impacts have been the object of national policy issues and

discussions in both the Administration and the Congress. Because they are distributive effects, they are essentially questions of equity rather than efficiency. They involve questions of who should get benefits and who pays the costs. They cannot be assessed in the context of the efficiency criteria associated with the PNV and the net public benefit concepts.

EIS PRESENTATION

The methodology, background, and results of the economic efficiency analysis that was conducted during the planning process are presented throughout the FEIS. As a result, all of the major sections of the FEIS including those listed below, must be read in order to get a complete picture of the analysis that was conducted.

Context	Reference
Discussion of how economic efficiency analysis was used in the process of developing alternatives.	Chapter II, Section B, Alternative Development Process
Outputs, total cost, and PNV for each of the benchmarks.	Chapter II, Section C, Benchmarks
Results of the constraint analysis and a comparison of the alternatives in terms of PNV. This is the most comprehensive summary of the analysis results in the FEIS.	Chapter II, Section E, Part 6, Economics and Trade-offs Analysis
Background information on economic conditions and the resource supply-demand situation for the Forest.	Chapter 3
How and why PNV of the alternatives differs.	Chapter 4
Technical details of the modeling and analysis process including a description of basic estimates and assumptions on benefits, costs, and interest rates.	Appendix B



Appendix E

WILD AND SCENIC RIVERS

APPENDIX E

WILD AND SCENIC RIVERS

I. INTRODUCTION

The Nationwide Rivers Inventory (NRI) of January 1982, identified rivers that may be suitable for inclusion in the National Wild and Scenic Rivers System. In a broad sense, the National Rivers Inventory was intended to provide information on the Nation's remaining free flowing and natural rivers. It was to supply the Administration, Congress, and agencies with background data for their use in making decisions of eligibility and suitability. Specifically, the inventory:

1) Provides baseline data on the condition and extent of the Nation's free flowing and natural river resources that can be monitored over time;

2) Provides a basis for determining which rivers require study for possible additions to the National Wild and Scenic River System;

3) Provides a list of natural, free-flowing rivers to identify areas of conflict between water uses and potential or confirmed outstandingly remarkable features prior to heavy commitment of private or public funds; and

4) Responds to the President's 1979 Environmental Message to complete an inventory of natural, free-flowing rivers.

Those rivers on the Sequoia NF identified in the NRI for additional study were:

South Fork Kern River
Kings River
South Fork Kings River

Each is discussed in detail in the following sections of this Appendix.

The North Fork Kern River on the Sequoia NF has also been studied for possible inclusion into the National Wild and Scenic River System. The public comment phase of the Draft Environmental Impact Statement (DEIS) was completed. A Final Environmental Impact Statement (FEIS) was prepared. In May 1985, the President transmitted a recommendation to Congress that a portion of the North Fork of the Kern be designated as a Wild and Scenic River.

Legislation to establish all or segments of each of these rivers was enacted into law in November 1987. The North and South Forks of the Kern River were designated via S247. A portion of the main stem of the Kings River, the South Fork Kings River, and the Middle Fork Kings River (Sierra National Forest) were designated via HR799. A Special Management Area of approximately 48,000 acres was also established as part of HR799.

Public input on the Draft EIS and Plan included comments that the Lower Kern River below Lake Isabella should be considered for Wild and Scenic River status. In order to address this input, the Forest has undertaken an evaluation of the river from Lake Isabella downstream to the National Forest boundary above Bakersfield. The eligibility evaluation for the Lower Kern River is included in Section III of this Appendix.

11. WILD AND SCENIC RIVER INVENTORY

The Wild and Scenic River Inventory for each river is presented here. The report presents a condensation of inventory information and describes those features preliminarily identified as outstandingly remarkable as directed by the Wild and Scenic Rivers Act.

Eligibility is determined and appropriate classifications (Wild, Scenic, or Recreation) are developed. Eligibility and classification of river segments were determined from the criteria defined in the Act. In order to be eligible for inclusion in the National System, a river must:

a. Be "free-flowing" that is. "existing or flowing in natural condition without impoundment, diversion, straightening, riprapping, or other modification of the waterway. The existence, however, of low dams, diversion works, and other minor structures at the time any river is proposed for inclusion in the national wild and scenic rivers system shall not automatically bar its consideration for such inclusion: Provided, that this shall not be construed to authorize, intend, or encourage future construction of such structures within components of national wild and scenic rivers system." (16 U.S.C. Sec. 1286).

b. Possess "outstandingly remarkable scenic, recreational, geologic. fish and wildlife, historic, cultural, or other similar values." (16 U.S.C. Sec. 1271).

   Following the identification of outstandingly remarkable values, the next step is to determine river eligibility and classification, based on the condition of the river corridor at the time of study. Each eligible segment is recommended for classification as one of three categories which are defined by the Act (16 U.S.C. Sec. 1273).

   Webster's dictionary defines remarkable as "worthy of being or likely to be noticed, especially as being uncommon or extraordinary: synonym, noticeable." Outstanding is defined as "a standing out from a group, i.e., conspicuous: marked by eminence and distinction; synonym, noticeable: antonym, commonplace." It would therefore follow that an outstandingly remarkable value would be one that was a conspicuous example of a value from among a population of similar values that are themselves uncommon or extraordinary. In applying this to a study river, an inventory should be made of all special values present within the corridor that are not commonly found elsewhere in the physiographic section. The special features or values would then be individually assessed as to their uniqueness in the State or Nation. Those that are noticeable or distinctive in this context would be outstandingly remarkable.

Eligible river segments are classified according to the extent of evidence of human activity as one of the following:

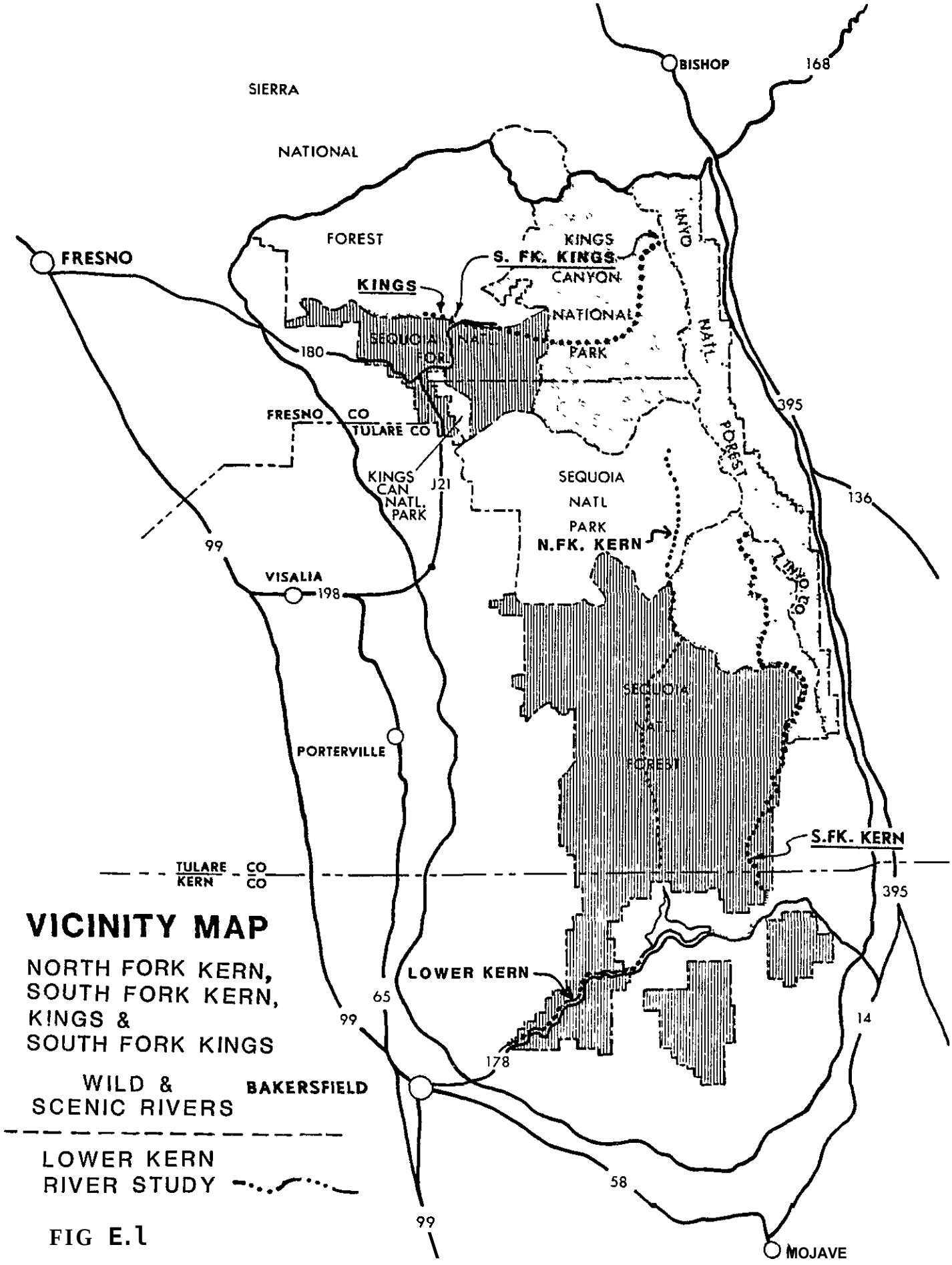
a. "Wild river areas--Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America."

b. "Scenic river areas--Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads."

c. "Recreational river areas--Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past." (16 U.S.C. Sec. 1273(b)).

In applying these criteria, with the added assistance of the supplemental criteria outlined in "Guidelines for Evaluating Wild, Scenic and Recreational River Areas Proposed For Inclusion in the National Wild and Scenic Rivers System Under Section 2, Public Law 90-542", (National Wild and Scenic Rivers: Final (Revised) Guidelines Federal Register 9/7/82), the study team will project the most likely eligibility and classification of the river.

Following is the specific inventory of values and characteristics for each NRI study river.



VICINITY MAP

NORTH FORK KERN,
SOUTH FORK KERN,
KINGS &
SOUTH FORK KINGS

WILD & SCENIC RIVERS

LOWER KERN RIVER STUDY

FIG E.1

A. South Fork Kern River

Study Area:	Source (Inyo NF) to Isabella Reservoir via Sequoia NF
Length in Miles:	83
Physiographic Section:	Cascade - Sierra Mountains - Sierra Nevada (NRI)
Landscape Character Type:	Sierra Nevada/Desert and Desert Mountain
Counties:	Tulare/Kern

Special Values Summary

Narrative Description of Values: The South Fork Kern River is totally free-flowing and descends through steep gorges with large granite outcroppings and domes interspersed with open meadows. The river flows through three wildernesses -- the Golden Trout, South Sierra, and Dome Land. Numerous waterfalls and rapids are located in the gorges; with the majority of them existing wildernesses. The river alternately passes from perpendicular-walled gorges to flat pinyon-juniper-sage-brush meadows. It traverses Monache Meadows, the largest meadow complex in the Southern Sierra Nevadas. The 15 miles of river below Rockhouse Meadow are inaccessible by road or trail until the river emerges from the Forest into the South Fork Valley above Onyx. The river corridor has dramatic diversity in vegetation and riparian habitat. A premium trout fishery exists in the upper reaches of the river. Numerous historic and prehistoric sites are known within the corridor.

Visual Resources: The entire River corridor is considered as Variety Class A within the landscape character type. Most of the corridor remains in a natural condition. Attractiveness of the corridor is enhanced by the diversity of features that include steep gorges with waterfalls and rapids, mountain meadows, and large granite outcroppings and domes interspersed with open areas in Kennedy Meadows and Rockhouse Basin. There is a dramatic variation in vegetation. One of the most impressive areas is Monache Meadows. This large complex is surrounded on the west, north, and east by wilderness, and offers panoramas unexcelled in many areas of the Forest. Human intrusions to the natural landscape include four-wheel drive roads in Monache Meadows; two trail bridges along the PCT in the South Sierra Wilderness; and, at Kennedy Meadows, a bridge, a paved road along a 1-1/2 mile stretch of River and a developed campground. Evidence of old roads now closed also remain in Rockhouse Basin, within the Dome Land Wilderness. The corridor south of National Forest System land has been altered in places for agricultural purposes.

Recreation: Recreation is limited due to access of the river. This is particularly so with the designation of the South Sierra Wilderness and the additions to the Dome Land Wilderness in 1984. Where access is available, fishing and camping predominates. Most use occurs in the vicinity of Kennedy Meadows. Some swimming and floating occurs in the South Fork Valley area. Camping is available in the Monache, Kennedy, and Rockhouse

vicinities. Very few whitewater opportunities exist. Trails 36E03, 34E12, 35E04, and 35E01 parallel the river. Thirteen miles of the Pacific Crest Trail parallel the South Fork Kern, crossing it twice with bridges. The Monache Meadows vicinity is a popular riding area for OHV's. A number of OHV trails exist in the area; and low standard roads cross the river in three locations.

The Recreation Opportunity Spectrum classes for the River corridor are varied. There are approximately 12 miles of corridor in the Roaded Natural class. This includes about 9.5 miles between the Forest Boundary on the south to Lake Isabella and short stretches in Rockhouse Basin and the Kennedy Meadows Areas. About eight miles of Semi-primitive Motorized are located in the Monache Meadows Area and 36 miles of Semi-primitive Non-Motorized occur within the three wildernesses. There are about 27 miles of the Primitive class within the South Sierra and Golden Trout Wildernesses.

Fisheries: Adequate food supplies and spawning gravel provide good habitat above Rockhouse Basin for rainbow, brown and golden trout, and suckers. Angling pressure is heavy at Kennedy Meadows, with moderate angler use at Rockhouse Basin. The area around Kennedy Meadows receives planted trout supplied by the California Department of Fish and Game (CDF&G). Natural native trout populations occur in the higher elevations of the South Fork Kern River watershed.

The Golden Trout Wilderness is the ancestral home of golden trout, the State Fish of California. The subspecies Salmo aguabonita aguabonita is found in the upper South Fork of the Kern River (above Ramshaw Meadow and in Mulkey and Golden Trout Creeks).

South Fork Kern goldens are threatened by predation from nonnative brown trout originating from downstream areas. A small fish weir has been constructed on the stream just north of Monache Meadows. The CDF&G in cooperation with the Inyo NF are attempting to remove the brown trout down through Templeton Gorge to insure the continued survival of South Fork goldens.

Wildlife: Recovery Species - Includes all species on Sequoia and Inyo NF's that are listed by Federal or State wildlife agencies as Endangered, Threatened or Rare; or by the Regional Forester as Sensitive.

Harvest Species - Includes species that are subject to sport or commercial harvest under regulation. This designation is made by the California Fish and Game Commission.

Special Interest - Includes nonharvest species of special public interest (formerly referred to as "unique").

(a) Recovery:	bald eagle (federally endangered) peregrine falcon (federally endangered)
(b) Harvest:	mourning dove mink raccoon bobcat Audubon cottontail rabbit black-tailed jackrabbit brush rabbit California quail chukar partridge California mule deer
(c) Special Interest:	mountain lion ringtail burrowing owl golden eagle common snipe blue grosbeak Lawrence's goldfinch savannah sparrow yellow billed cuckoo

The study area lies mostly within summer range for the Monache Deer Herd. Less than one mile of the South Fork is within the key winter deer range of Long Valley. Estimated population of this herd is *4,600* animals.

Vegetation (Botanic): Nearly three-fourths of the South Fork Kern River is within designated wildernesses. The headwaters are in the Golden Trout Wilderness, the middle section in the South Sierra Wilderness, and the southern section of the river bisects the Dome Land Wilderness. Vegetation along the South Fork Kern River from Lake Isabella to its headwaters changes markedly.

Vegetation types include:

1) Subalpine coniferous forests dominated by foxtail pine near the headwaters.

2) Large meadows such as Ramshaw, Templeton, and Monache are surrounded by a band of the blue-green rothrock sagebrush.

3) Rocky slopes comprised of "desert-like'' scrub occur along the South Fork Kern River in the Dome Land Wilderness.

4) The northern extention of Nolina parryi ssp. wolfii (yucca-like plant) near Rockhouse Basin and Long Canyon. Extensive populations of this species occur in the river corridor just below the Kern-Tulare County line.

5) A large riparian forest (comprised of cottonwoods, alders, willows) occurs just above Lake Isabella.

Two sensitive plants occur in the region of South Fork Kern River. These species are:

Ramshaw sand verbena: Abronia alpina
Alkali mariposa : Calochortus striatus

Cultural and Historical Resources: Cultural resources have been recorded along the portion of the South Fork Kern River located on the Sequoia NF, and in the Monache Meadows section of the Inyo NF. Several excavations have been conducted in this area. Data is being acquired which helps to illuminate the prehistory in this particular area.

Prehistory:

The Tubatulabal, a Uto-aztecan subgroup, previously occupied the areas along the South Fork of the Kern. The Tubatulabal may have been in the southern Sierra as far back in antiquity as 4,000 B.C., assuming they had similar occupation dates as the surrounding cultural areas which have been investigated.

The Tubatulabal lived in three basic types of settlements: the individual family camp, the multifamily camp, and the hamlet. During the gathering season, a highly mobile subsistence strategy was needed, calling for the individual family camp settlement type. Multifamily camps were predominant near pinyon groves and fishing areas, and after gathering activities ended during the winter months, families returned to hamlets. These hamlets were located on the edges of lakes, or on the floor of the South Fork of the Kern River Valley or the lower foothills. Hence, these are the types of prehistoric sites that would be found along the South Fork of the Kern.

Historic Contacts:

As early as 1776, the Tubatulabal were visited by Spanish explorers. Francisco Garces explored the lower portions of the Kern Valley and during that same year, Father Pedro Font met the Tubatulabal at the confluence of the Kern and South Fork of the Kern. Later in the 1850's, settlers brought disease and death to the Tubatulabal; so that by the 1870's there were few survivors.

Historic Land Uses:

The major historic land use in South Fork country was cattle ranching which began in the early 1800's. Gold mining in the 1850's was another historic land use. Archaeological sites of this era include cabins, ranches, mining and cattle camps, transportation systems, and towns.

Cultural Resource Surveys:

The Archaeological Reconnaissance Report of the Kennedy Meadow/Rockhouse Basin segments of the South Fork Kern, records 35 archaeological prehistoric sites, two of which are multicomponent sites (both prehistoric and

historic). The Monache Meadows area documents 31 prehistoric sites along the South Fork Kern. A total of 66 archaeological sites indicates that the river is a significant cultural resource area which needs to be further investigated.

Geology: The South Fork Kern River flows through a variety of rock types.

Segment 1 of the river is dominated by recent (geologically speaking) alluvium. This material is very fertile which has enabled the extensive riparian forest to become established in this segment.

The Dome Land Wilderness section (Segment 2) is nearly totally dominated by mesozoic granitic rock with numerous domes. Three major Tertiary volcanic outcrops lie between Taylor and Manter Creek. There are several small falls along the South Fork in the Dome Land Wilderness, especially on Taylor and Manter Creeks. The river below Rockhouse Meadow occurs in a rugged and steep granitic gorge where whitewater rapids are common. Some riparian trees (willows, ash, cottonwoods) occur along the banks.

Segment 3 between the Dome Land Wilderness and South Sierra Wilderness is in the vicinity of Kennedy Meadows. This area is granitic in origin and is primarily alluvial material.

The South Sierra Wilderness section (Segment 4) contains some granitics but is mainly pre-Cretaceous metamorphic and Mesozoic basic intrusive rocks that are shades of deep brown as compared to the white granitics.

Segments 5 and 5A (Inyo NF) contain Monache Meadows. This is as interesting geologic area which contains an excellent example of a volcanic dome (Monache Mountain). Monache Meadows contains extensive alluvium with the majority of the west bank of the river granitic in origin, and the east side pre-Cenozoic granitic and metamorphic rocks. Also, a few glacial deposits occur in Monache Meadows. The segment has geothermal potential.

Segment 6 from the Golden Trout Wilderness to the headwaters (Inyo NF) is granitic in origin except for the large Tertiary volcanic cone of Templeton Mountain, and a small outcrop Pliocene volcanic pyroclastic rocks near the west end of Ramshaw Meadows. Some glacial deposits are also found in association with the meadow alluvium.

The following geologic features are located along the South Fork and are good examples of geologic features for the Sierra Nevada mountains.

(1) South Fork Kern: Cones (less than one million years old).
(2) Volcanic dome (Templeton and Monache Mountain).
(3) Granite Domes in Dome Land Wilderness (White Dome)

River Access and Land Ownership:

Land Use:

Segment 1 is almost entirely private land. Only a short segment inside the National Forest boundary (approximately 1 mile) is not private. Beginning with Segment 2, the Forest Service administers 99 percent of the public

lands along the South Fork Kern River. Some small private parcels are located in Rockhouse/Kennedy area, with large inholdings at Monache, Ramshaw, and Templeton Meadows. The river is close to large areas of private land outside the Forest boundary at Kennedy Meadows.

Access:

(1) Two-wheel drive into Kennedy Meadows area.
(2) Two-wheel drive near the Rockhouse Basin area.
(3) Four-wheel drive and motorcycle access into Monache Meadows area.
(4) Dome Land, South Sierra, and Golden Trout Wildernesses limited to horse and foot travel on trails.
(5) Numerous roads of varying standards along Segment 1 outside the National Forest.

Designated Floodway: In November 1981, the lower stretch of the South Fork (from about 1-1/2 miles north of Bloomfield Ranch to Lake Isabella) was designated as a floodway. The purpose of this designation is to preserve and keep open an area for passage of 100-year floodwaters. The controls require a landowner who proposes any development within the area to obtain a permit for review by any interested parties. Open space activities (e.g., agriculture and pasture) are not a problem; but anything that might change the volume, velocity or direction of stream flow could be rejected. The restrictions affect any proposed structure within the floodway. Pole structures are possible and portable facilities (e.g., toilets) may be used and removed during the flood season. Generally, the restrictions apply to permanent facilities unless the proposal can clearly demonstrate that the project will not affect the flow characteristics during flood stage. Coordination of permits is controlled by the Kern County Water Agency.

Water Resource Development: The South Fork originates at an elevation of about 11,500 feet and flows in a southerly direction along the eastern edge of the Kern Plateau for about 72.5 miles, and then westerly for 10.5 miles to Isabella Reservoir. There is a potential hydropower development on the South Fork Kern River near the southern Forest boundary (Segment 1).

Socioeconomic: The socioeconomic environment of the South Fork includes several modest tourist oriented businesses at Kennedy Meadows, a potential hydroelectric site, and a number of ranches south of the Forest near Lake Isabella. At Kennedy Meadows there are two businesses, a restaurant and a small general store, employing from two to ten people during the summer weekends. At the southeast corner of the Forest, in a small parcel outside the Dome Land Wilderness, there is a section of the South Fork corridor being considered for development of a small hydroelectric plant. There are six ranches, primarily in the cattle business, that employ about 15 to 30 people along the southern segment of the River. There is a potential for geothermal development in the Monache Meadows area.

Current Protection

Nearly 76 percent of the South Fork Kern River is currently in established wildernesses. About 12 percent is in private ownership in South Fork Valley. The remaining 12 percent is National Forest System land in the

Monache Meadows segment and a small segment between the Kennedy Meadows Road and Kennedy Meadow Campground.

Identification and Description of South Fork Kern River Segments

Segment 1 - Isabella Reservoir to Dome Land Wilderness boundary - (10.5 miles)

About one mile of this segment is within the Forest boundary and outside the Dome Land Wilderness. Below the Forest boundary, this segment crosses private lands before reaching Lake Isabella. The river flows westerly through the South Fork Valley. Whitewater rapids do not occur. Most of the private land supports cattle grazing and pastures. California Highway 178 parallels the river throughout this segment, but the river cannot be seen due to the extensive riparian forests along its bank.

A unique element within this segment of river is the Nature Conservancy's Kern River Preserve. This preserve contains extensive riparian forest communities along the river comprised of cottonwoods, willows, and Oregon ash. The riparian area provides habitat for the yellow-billed cuckoo. The cuckoo is listed as Rare by the California Fish and Game Commission while the western subspecies has been identified as a candidate for federal listing as Threatened or Endangered. The South Fork Kern population of yellow-billed cuckoo forms a significant part of the statewide population. The lower reaches of the study area encompasses a portion of the largest contiguous remnant of the willow/cottonwood riparian forest in the State.

Segment 2 - Dome Land Wilderness - (27.0 miles)

This segment begins at the Dome Land Wilderness boundary, The South Fork Kern throughout the Dome Land Wilderness below Rockhouse Basin is the most rugged portion of this river. Rough terrain makes access difficult except for a few Forest Service trails that offer limited access, then require cross-country travel. Waterfalls, whitewater. and primitive camping occur along the river. Improvements do not exist along this segment. The river drops approximately 2,000 feet and flows southerly.

Segment 3 - Kennedy Meadows [between Dome Land and South Sierra Wildernesses] (3.0 miles)

This segment of the river is wedged between the Dome Land Wilderness to the south and the South Sierra Wilderness to the north. The river meanders in this segment with elevation loss less than 400 feet. Access is provided by Kennedy Meadows road with developed camping at Kennedy Meadow Campground.

Segment 4 - South Sierra Wilderness - (14.3 miles)

This segment of the river is in the South Sierra Wilderness. The river in this section flows southeasterly with the northern half forming the common boundary between the Sequoia and Inyo NF's. Portions of the river are accessible by trail; however, most of the river corridor requires cross-country travel. Two Pacific Crest Trail bridges cross the river in this segment. Primitive camping occurs in a few areas above the Kennedy Meadow Campground to Monache Meadows.

Segment 5 - Monache Meadows [between South Sierra Wilderness and the weir just south of the Golden Trout Wilderness] - (7.0 miles)

The river corridor in this segment, in the Inyo NF. has significant private inholdings at Monache Meadows. Access to most of this segment is by four-wheel drive vehicles and motorcycles. There is a small airfield at the northern end of Monache Meadows on private land. Several cow camps and cabins along with primitive campgrounds (heavily used during deer season) occur along the river north of Monache Meadows towards the Golden Trout Wilderness boundary. Cattle grazing occurs throughout Monache Meadows, and a number of fences exist to aid grazing management. Low standard roads cross the river in three locations. Motorcycles use these roads and several trails extensively.

Segment 5A - Monache Meadows [between the weir and the Golden Trout Wilderness] - (1.2 miles)

This short stretch of river corridor, in the Inyo NF, consists of the lower reaches of the rugged canyon area which extends north into the Golden Trout Wilderness (Segment 6). The river is relatively inaccessible above the weir. There are no improvements in this area.

Segment 6 - Golden Trout Wilderness (Inyo NF) - (20.0 miles)

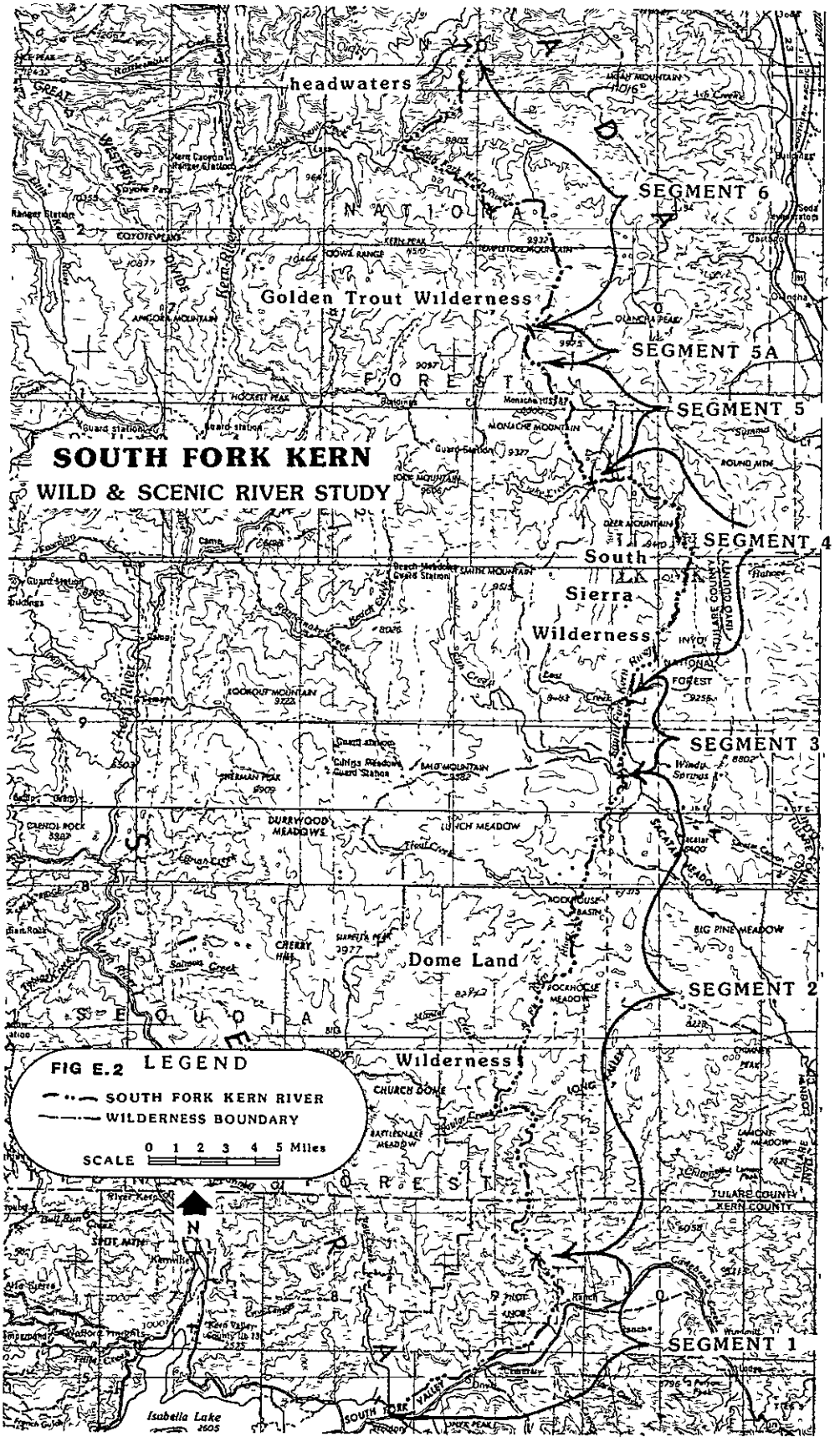
The headwaters of the South Fork Kern River occur along the crest of the Sierra Nevada from just south of Cottonwood Pass to Olancha Peak. The highest points are Olancha Peak (12,123 feet), Trail Peak (11,623 feet), and Kern Peak (11,510) feet with the eastern crest averaging 10,000 feet. The South Fork of the Kern meanders through Ramshaw and Templeton Meadows. An extensive trail system offers access to most of the river. Travel is limited to horse and foot since mechanized vehicles are not permitted. This segment is located on the Inyo NF with private inholdings at both Ramshaw and Templeton Meadows. Primitive camping occurs in several places along the river. The only improvements are summer cow cabins on the private inholdings.

Table E.l - South Fork Kern River - Summary of Outstandingly Remarkable Values

Segment	1	2	3	4	5	5A	6
Outstandingly Remarkable Values							
Scenic	No	Yes	No	Yes	Yes	Yes	Yes
Recreation	NO	Yes	No	Yes	Yes	Yes	Yes
Fisheries	No	NO	NO	No	Yes	Yes	Yes
Wildlife	Yes	No	No	No	No	No	NO
Vegetation (Botanic)	Yes	No	NO	No	Yes	Yes	Yes
Cultural/Historical	Yes	Yes	Yes	Yes	Yes	No	No
Geology	No	Yes	No	NO	Yes	Yes	Yes
Free-Flowing Nature Affected By:							
Impoundments	No	NO	NO	No	NO	No	No
Diversions	Yes	No	No	NO	NO	No	No

Table E.2 - South Fork Kern River - Wild and Scenic River Study/Eligibility Classification Analysis

Classification Segment	1	2	3	4	5	5A	6
Wild							
Free of Impoundments	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Generally Inaccessible Except by Trail?	No	Yes	No	Yes	No	Yes	Yes
Watershed/Shoreline Essentially Primitive?	NO	Yes	No	Yes	No	Yes	Yes
Waters Unpolluted?	NO	Yes	Yes	Yes	Yes	Yes	Yes
Scenic							
Free of Impoundments?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Accessible in Places by Road?	Yes	No	Yes	No	Yes	No	No
Watershed/Shoreline Largely Primitive & Largely Undeveloped?	NO	Yes	No	Yes	Yes	Yes	Yes
Recreation							
Readily Accessible by Road or Railroad?	NO	No	Yes	No	Yes	No	NO
Some Development Along Shoreline?	Yes	No	Yes	No	Yes	No	NO
Some Impoundments or Diversions in the Past?	Yes	No	NO	No	No	No	No
Highest Eligible Classification	Rec.	Wild	Rec.	Wild	Scenic	Wild	Wild


SOUTH FORK KERN
WILD & SCENIC RIVER STUDY
headwaters
SEGMENT 6
Golden Trout Wilderness
SEGMENT 5A
SEGMENT 5
SEGMENT 4
South
Sierra
Wilderness
SEGMENT 3
Dome Land
SEGMENT 2
Wilderness
SEGMENT 1
FIG E.2 LEGEND
SOUTH FORK KERN RIVER
WILDERNESS BOUNDARY
SCALE 0 1 2 3 4 5 Miles
N
Isabella Lake

B. Kings River

Study Area:	Pine Flat Reservoir to confluence of Middle and South Fork Kings River.
Length in Miles:	18
Physiographic Section:	Cascade - Sierra Mountains - Sierra Nevada (NRI).
Landscape Character Type:	Sierra Nevada/Sierra Foothills.
county:	Fresno

Special Values Summary:

Narrative Description of Values: The Kings River is one of the largest rivers flowing down the western slopes of the Sierra, and forms the boundary between the Sequoia and Sierra NF's. The river is wooded with premium whitewater and several cataracts. The Kings River is a State Wild Trout Stream. Numerous Indian village sites and remnants of one of the longest logging flumes in the world are located in this system. Other historic artifacts create an area of historic and cultural significance. Whitewater rafting exists in the lower reaches of the river corridor. The river flows through a wide canyon near Pine Flat. As the river ascends toward the confluence with the Middle Fork-South Fork, the canyon becomes more narrow and steep. Main ridges on both sides of the river are over 5,000 feet in elevation above the river. Slopes on the north side of the river are covered with chaparral and hardwoods. The south side of the river is less arid and includes more conifers and less chaparral. The river exists in a free-flowing state with numerous rapids. Access is limited above Garlic Falls.

Visual Resources: The entire river corridor is considered as Variety Class A within the landscape character type. The presence of clear, unpolluted water is seen in rapids and large pools: the diversity of the vegetation, and the many boulders enhance the attractiveness of the river corridor. Unimproved Forest roads and other human intrusions interrupt the natural landscape west from Garnet Dike Campground. The upper portion. east of the campground, presents a unique panorama of a picturesque stream flowing through an unaltered steep-walled V-type canyon.

Recreation: Excellent river rafting occurs between Garnet Dike (Sec. 27, T12S, R27E) and Keller's Ranch. Included in this area are Camp 4, Camp 4 1/2, Garnet Dike, and Mill Flat Campgrounds. Trail 27E01 is adjacent to the south bank of the river above Mill Flat. Fair opportunities for fishing and hiking exist east of Garnet Dike. Whitewater rafting is a popular activity from April to August below Garnet Dike Campground. Presently, three commercial operations hold permits to conduct rafting trips.

The Recreation Opportunity Spectrum classes for the corridor include:

1) 8-1/2 miles of Semi-Primitive Non-Motorized located generally from Fox Canyon on the west to one-half mile west of the confluence with the South Fork: and,

2) 9-1/2 miles of Roaded Natural primarily found in the lower elevations west of the Garnet Dike Campground and for one-half mile west of the confluence of the Rivers.

Fishing is a popular activity and is very common along the more accessible lower portion of the river with portions restricted to fly fishing only (Garnet Dike to Rough Creek). Trail access stops near Garlic Falls; and thus, limits fishing above that point. Hiking is popular in the spring and fall when temperatures are mild. Three miles of the Kings River Trail on the Sierra NF have been designated as a Forest Service National Recreation Trail. This trail segment runs from Garnet Dike to Spring Creek. Other recreation activities in the area include hunting, camping, and horseback riding.

Fisheries: The Kings River above the North Fork junction is designated and managed under the California Wild Trout Program. The goal of this management emphasis is to maximize wild trout angling opportunities, with a priority placed on maintaining abundant self-sustaining trout populations in which the number of larger, older fish is not significantly reduced by angler harvest. Principal species involved are rainbow and brown trout.

Wildlife: The North Fork Kings and Hume Deer Herds rely heavily on land adjacent to the river. Deer commonly winter along the lower slopes of the canyon, and move to higher elevations in the summer. Approximately 150 species of riparian-associated wildlife live along the river. Important habitat for the endangered peregrine falcon and bald eagle also occurs along the river corridor. Wolverines are known to be occasional residents of the Kings Canyon area.

Vegetation (Botanic): There are no sensitive plant species or notable plant communities known to exist along this portion of the Kings River. The area is within the Western Hardwood ecosystem.

Cultural and Historical Resources: Indian sites are evident along both sides of the river. Various studies have identified and recorded several prehistoric archaeological sites, as well as highly sensitive historic resource areas along the river corridor.

Prehistory:

The ethnographic group which occupied this area was the Choinimni of the northern foothill Yokuts. The Choinimni used the Kings River for transportation and fishing extensively. On large tule barges which could carry eight to ten people, the Choinimni would travel downstream from the lower segments of the river west to Tulare Lake. They would fish, hunt, gather acorns, and trade with valley tribes. Fishing camps and villages were located along the Kings River where the Choinimni would gather acorns and hunt deer resources not available in the Valley.

The archaeological multi-activity sites would most likely consist of bedrock mortars, pestles, obsidian, midden areas, and single activity sites consisting of modified obsidian.

Historic Land Use:

In 1889, the Kings River Lumber Company began its remarkable feat of completing a 54-mile long lumber flume which followed the Kings River all the way to the town of Sanger, in the San Joaquin Valley. Before it entered the Kings River Canyon, it split off down Mill Flat Creek to the historic town of Millwood, where the area was logged by the Sanger Lumber Company from 1888 to 1908. The other branch followed the Kings River to Tenmile Creek to the historic Hume Lake Mill owned by the Hume-Bennett Lumber Company from 1908 to 1917.

There were feeders to keep the flume replenished with water all along the course of the flume making it one of the longest lumber flumes in the world. Most flumes at that time were cut square, but the Kings River flume was cut V-shaped because of a successful idea pioneered by a Nevada logger in 1889. Little remains of the flume today.

Archaeological Survey Report:

A total of 25 prehistoric sites have been recorded. These include villages, burial grounds, and fishing camps. Historic sites are known but have not been recorded. The cultural resources along the Kings River can provide valuable information for both the prehistory and history of the area. The Kings River is, therefore, a very important and significant cultural resource area and should be further investigated.

Geology: The Kings River Canyon is unique in the Sierra Nevada. The Canyon is over 7,000 feet deep; considerably deeper than the Grand Canyon. The north ridge of the canyon on the main Kings is 10,051 feet high on Spanish Mountain. The river below, where Deer Canyon enters, is only at 2,400 feet.

Geologically, the main Kings from Pine Flat Reservoir to the Middle Fork is comprised of granitic rocks, with some pre-Cretaceous limestones, pre-Cretaceous metasedimentary rocks and a small pre-Cretaceous metavolcanic outcrop. Nearly all of the pre-Cretaceous material occurs in Segment 1.

River Access and Land Use:

Land Use:

The area is under Federal power withdrawals. Forest Service facilities along the river include Garnet Dike Campground (Sierra NF), Camp 4-1/2, Camp 4, and Mill Flat Campgrounds (Sequoia NF). There is also a guard station at Camp 4-1/2 which includes a cattle permittee corral and cabin. Three gauging stations occur along the river. One highway bridge crosses the river at Keller's Ranch just below Rodgers Crossing. There is no commercial timber within the zone. There are active tungsten mining claims along the north side of the river.

Access:

The lower half of the river is accessible by the paved Balch Camp Road, Forest Service unimproved roads, one special-use mining access road, and the Kings River Trail. The upper portion of the river is inaccessible except for a Forest Service trail which runs down to the river from Yucca Point (Sequoia side).

Land Ownership: Except for one parcel of private land near Pine Flat Reservoir owned by Pacific Gas and Electric, the area is in public ownership.

Water Resource Development: The Kings River Conservation District (KRCD) has proposed a dam and reservoir at Rodgers Crossing. A detailed feasibility study has been conducted by the Bechtel Corporation for the KRCD. Also, a small hydropower project has been proposed near the confluence of Tenmile Creek and the Kings. Under the proposal, water from Tenmile Creek would generate about five megawatts of power. The powerhouse structure and part of an access road, powerline and penstock may be located within the river corridor.

Socioeconomic: The socioeconomic environment of the Kings River area is limited to three commercial river rafting operations and the grazing of cattle, all of which is under Forest Service permit. The river rafting program is confined to the section of the river below Garnet Dike and involves about 15 seasonal jobs. Grazing, also confined to the lower, accessible portions of the Canyon, involves a total of seven permittees.

Current Protection: Travel and water influence zone is protected under current Forest Service multiple-use management. Approximately 10 miles of the upper river are in an unroaded area selected under FARE II for Further Planning.

Identification and Description of River Segments

Segment 1 - Pine Flat Reservoir to Garlic Meadow Creek - (13 miles)

This segment extends upstream far enough to contain the maximum impoundment which could be created if a dam at Rodgers Crossing was ever constructed.

A recommendation on this segment for Wild and Scenic designation was deferred in this planning process. For this reason, detailed information is not presented for this segment.

Segment 2 - Garlic Meadow Creek to Confluence of Middle Fork and South Fork Kings River - (5 miles)

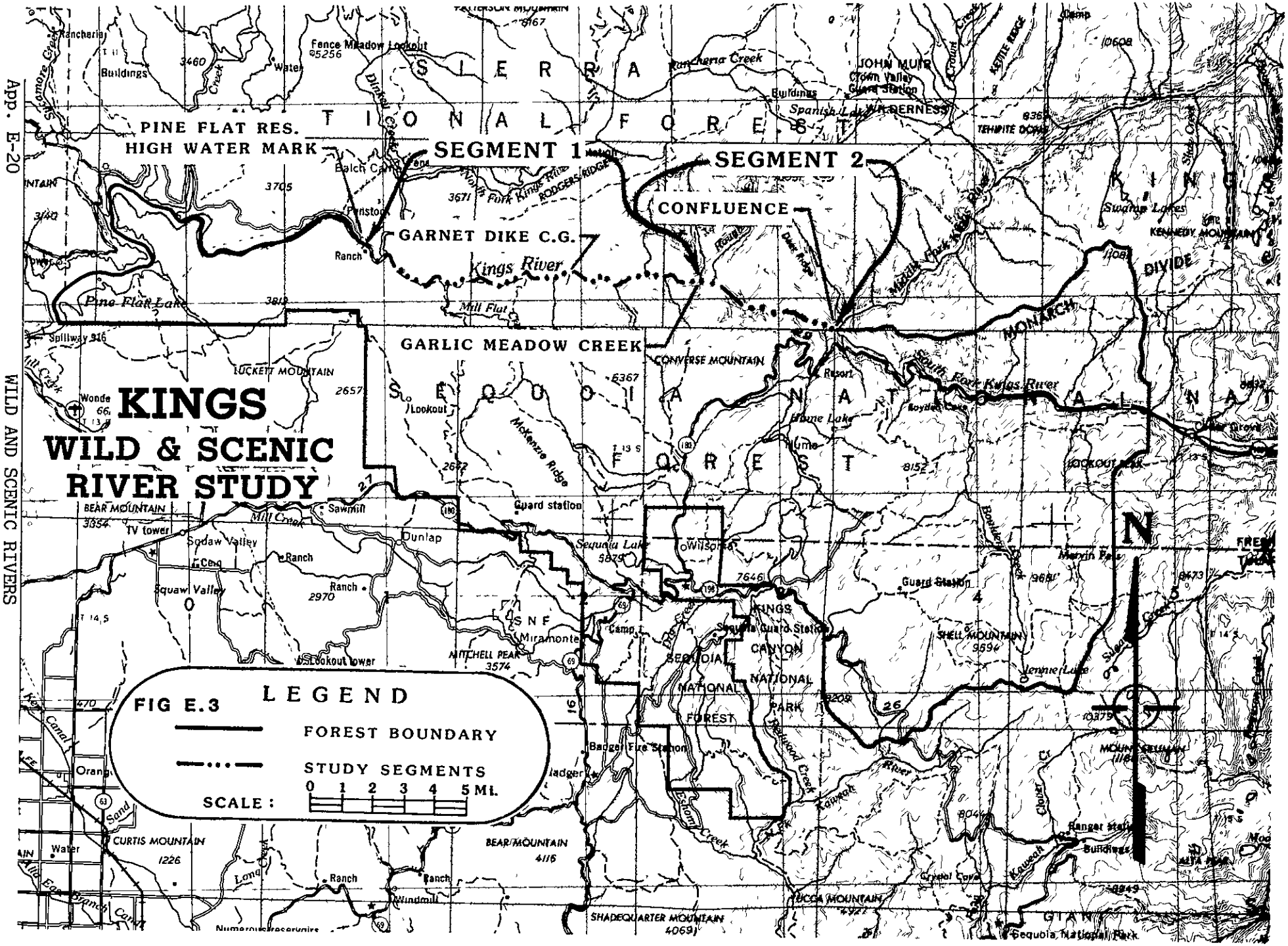
Access to Segment 2 is restricted to the Yucca Point Trail that enters the river at the confluence of the Middle and South Forks. The river corridor is wild and rugged, receiving virtually no recreation use at this'time. It is very difficult to go via foot from Yucca Point to the west. Rafting does not occur on this segment of the river due to the hazards involved and the lack of access.

Table E.3 - Kings River Segment 2 - Summary of Outstandingly Remarkable Values

Outstandingly Remarkable Values	
Scenic	Yes
Recreation	Yes
Fisheries	Yes
Wildlife	No
Vegetation (Botanic)	No
Cultural/Historical	Yes
Geology	Yes
Free Flowing Nature Affected By:	
Impoundments	No
Diversions	No

Table E.4 - Kings River - Wild and Scenic River Study/Eligibility Classification Analysis

Classification	Segment 2
Wild	
Free of Impoundments?	Yes
Generally Inaccessible Except by Trail?	Yes
Watershed/Shoreline Essentially Primitive?	Yes
Waters Unpolluted?	Yes
Scenic	
Free of Impoundments?	Yes
Accessible in Places by Road?	NO
Watershed/Shoreline Largely Primitive & Largely Undeveloped?	Yes
Recreation	
Readily Accessible by Road or Railroad?	No
Some Development Along Shoreline?	No
Some Impoundments or Diversion in the Past?	No
Highest Eligible Classification -	Wild


KINGS
WILD & SCENIC
RIVER STUDY
LEGEND
FOREST BOUNDARY
STUDY SEGMENTS
SCALE: 0 1 2 3 4 5 MI.
SEGMENT 1
SEGMENT 2
CONFLUENCE
PINE FLAT RES.
HIGH WATER MARK
GARNET DIKE C.G.
GARLIC MEADOW CREEK
Kings River
Pine Flat Lake
SIERRA NATIONAL FOREST
SEQUOIA NATIONAL FOREST
KINGS CANYON NATIONAL PARK
SEQUOIA NATIONAL FOREST
JOHN MUIR WILDERNESS
MONARCH DIVIDE
South Fork Kings River
Sequoia Lake
Wilsonia
Dunlap
Sawmill
Guard station
Squaw Valley
Miramonte
Badger
Orange
Sand
Canal
Water
CURTIS MOUNTAIN
BEAR MOUNTAIN
MITCHELL PEAK
SHADEQUARTER MOUNTAIN
TICCA MOUNTAIN
SHELL MOUNTAIN
MOUNT GELLMAN
Sequoia National Park
Ranger station
Buildings
Camp
Ranch
Windmill
Numerous reservoirs
Fence Meadow Lookout
Balch Camp
Pinston
Rancheria Creek
Spanish Lake
Swamp Lakes
KENNEDY MOUNTAIN
Hume Lake
Hume
Resort
Converse Mountain
Lookout
Lookout tower
TV tower
Sodaw Valley
Squaw Valley
Mill Creek
Mill Flat
Spillway 916
LUCKETT MOUNTAIN
McKenzie Ridge
Rodgers Ridge
Dark Ridge
Kettle Ridge
Tehipite Dome
Jennie Lake
Crystal Cave
Boulder Creek
Kaweah River
Eshom Creek
Long Creek
Clover Ck
Sugar Creek
Sycamore Creek
Dirty Creek
Middle Fork Kings River
North Fork Kings River
Wonder
Fresno
Tulare
GIANT

C. South Fork Kings River

Study Area:	Kings River confluence (Sequoia and Sierra National Forests) to source in Sequoia and Kings Canyon National Parks, (National Park Service)
Length in Miles:	40.5 (USDAFS 12.1 miles)
Physiographic Section:	Cascade - Sierra Mountains - Sierra Nevada (NRI)
County:	Fresno

Special Values Summary:

Narrative Description of Values: The headwaters are in the Sequoia and Kings Canyon National Parks above timberline in a heavily glaciated basin. The river flows through one of the deepest and most classic glacial canyons in the nation with several waterfalls and unique geological formations.

The South Fork Kings has a complex floral diversity with several rare species. Numerous prehistoric sites and a significant cultural resource area exist on the river. The state has designated the river as a Wild Trout Stream. Important peregrine falcon and golden eagle habitat exist in the study area.

Visual Resources: The entire river corridor is considered as Variety Class A within the landscape character type. Waterfalls, unique geologic formations and a diversity of plant species enhance the characteristics of this free-flowing stream. Much of the lower half of the river. from just below Boyden Cave is located adjacent to the State Highway/Park Service Road that provides access to the Cedar Grove portion of Kings Canyon National Park. Numerous campgrounds, the road, and other developments have reduced the naturalness of the corridor. The lower 2.5 miles of river is in a very rugged canyon well away from and not influenced by the highway.

Recreation: The river is a raging torrent and is extremely dangerous for floating opportunities during spring and early summer. There are good opportunities for fishing. hiking, and camping in both the Sequoia National Forest and the Cedar Grove area, Kings Canyon National Park. Along the roaded portions of the river, angling pressure is heavy, while use diminishes as distance from road access increases.

The Recreation Opportunity Spectrum class for the 12 miles of river within National Forest System land is Roaded Natural. The 6.5 miles between the Forest boundary to Road's End in the National Park is also Roaded Natural. Then, there is a short distance of Semi-Primitive Non-Motorized north of Road's End with the remainder of the river in Primitive.

Fisheries: The river segment within the Forest is designated and managed under the California Wild Trout Program. The goal of this management emphasis is to maximize wild trout angling opportunities, with priority placed on maintaining abundant self-sustaining trout populations in which

the number of larger, older fish is not significantly reduced by angler harvest. There are no golden trout in this river system.

Wildlife: California bighorn sheep are known to be in the Goodale Creek/ Taboose area. It is likely that rams frequent the Upper Basin area of the South Fork of the Kings River during parts of the year.

Peregrine falcons are known to frequent the area and the cliffs along the South Fork Kings River. The Murro Blanco Canyon of the South Fork is especially good habitat and exceptionally remote with difficult access, making human impact on any possible peregrines almost nil. This also has contributed to a lack of information on the peregrine. Wolverines are known to be occasional residents of the Kings Canyon area.

Vegetation (Botanic): The following two sensitive plants are known to exist along South Fork of the Kings.

1 Erigeron li (Hall)
location - lt Meadows

2. Streptanthus fenestratus (Kings Canyon Jewel Flower)
location - Mist Falls and Hotel Creek

Cultural and Historical Resources: No major cultural resource investigations such as excavations have been conducted in this area, although much is needed due to the numerous sites recorded and lack of knowledge of the prehistory of the area.

Prehistory:

The ethnographic group which predominantly occupied this area was the Western Mono; specifically, the Wobonuch. The high elevation of the South Fork of the Kings limited the occupation periods to summer and early fall. Hunting and gathering activities were carried on in these seasonal camps to prepare for the winter months. These temporary camps were either occupied by single family or a group of families. The archaeological sites would be characterized by bedrock mortars and obsidian flakes and more often single activity sites with either only bedrock mortars or only an obsidian scatter.

Historic Land Uses:

Historic land uses cannot be ascertained at this time.

Cultural Resource Survey:

Along the corridor of the South Fork of the Kings there are 13 prehistoric sites recorded in the Archaeological Survey of the Sequoia and Kings Canyon National Parks. More than half of the sites are single activity possible hunting camps evidenced by the presence only of obsidian. The other multi-activity sites were probably seasonal base camps leaving an archaeological record of bedrock mortars, obsidian and midden areas.

Geology: Geology of the South Fork Kings River is very interesting. The river gorge in this section of the Kings River averages 5,000 feet deep.

Segment 1 is the most complex geologically. Extensive pre-Cretaceous metasedimentary and pre-Cretaceous limestones are common in the area. These limestone formations have numerous caves, the largest and most famous for the region being Boyden Cave. The cave is adjacent to the river. A small ridge of Jurassic-Triassic metavolcanic rocks occurs east of the Boyden Cave limestone area. The remainder of Segment 1 is granitic. A prominent waterfall occurs on Grizzly Creek adjacent to Highway 180 and the South Fork Kings River.

Segment 2 (from the Forest boundary to Road's End in Sequoia and Kings Canyon NPs) is totally granitic in origin. A rather open valley with deep walls is the dominant feature which is quite a geologic change from Segment 1. In addition, this segment contains a "U-shaped" canyon that was carved by glaciers during the Pleistocene. Extensive alluvium occurs along the South Fork in this segment. Many creeks enter from the steep canyon into the South Fork in this segment. Roaring River Falls is the most prominent of these features.

The third segment (also in the National Park) is also mainly granitic. Sixty Lake Basin contains a series of flattish valley areas commonly with lakes connected to one another by steep areas and waterfalls.

The South Fork Kings River is unique because of the deep gorge, cliffs, dikes, and combination of various rock types adjacent to the river. Examples include:

(1) Sixty Lake Basin - Glacial stairway (series of flattish valley areas, commonly with lakes connected to one another by steep areas and waterfalls. U-shaped valleys and glacial marks indicate glaciation).

(2) Boyden Cave - Limestone Cave. In addition, there is an "Early Triassic to Late Jurassic" megafossil locality in the vicinity of Boyden Cave.

River Access and Land Ownership: Yucca Point Trail provides access to the extreme lower end of this river segment (T13S, R28E, Section 1). Excellent access occurs from Boyden Cave to Cedar Grove along California Highway 180. Ownership of river corridor is 100 percent public lands.

Water Resource Development: None known in South Fork.

Socioeconomic: The socioeconomic environment of the South Fork Kings River is limited to several small tourist oriented businesses. Under permit to the Forest Service, an operator conducts tours of Boyden Cave during the summer. Boyden Cave is located on State Highway 180 west of Cedar Grove, the site of a campground, store and gas station. The latter two are operated as concessions within the Sequoia and Kings Canyon National Parks. Altogether, these businesses account for fewer than ten seasonal jobs.

Current Protection: Within travel influence and water influence zones of the current district multiple-use plan.

Identification and Description of South Fork Kings River Segments

Segment 1 - Confluence of Middle Fork/Main Kings River to Horseshoe Bend - (2.5 miles)

This segment of the river is extremely inaccessible, lying in the bottom of the very steep canyon well below California Highway 180. There is no access into this river area. Horseshoe Bend is the first real look at the river afforded visitors as the roadway drops into the canyon bottom. The river itself is virtually a continuous whitewater rapid. This segment is entirely within the Sequoia NF.

Segment 1A - Horseshoe Bend to Forest Boundary - (9.5 miles)

The majority of this segment is easily reached by California Highway 180. Due to the ruggedness of the canyon and river in this section, campgrounds do not exist. Improvements include the Grizzly Falls picnic area and Boyden Cave operated under a special-use permit. Scenic vistas are common in this river corridor and the excellent maintained highway brings many visitors to the area. Whitewater rapids are common along the entire length of Segment 1A. At Horseshoe Bend, the road is well above the river and canyon views with whitewater attract many photographers. It drops rapidly to the river shoreline at Boyden Cave, approximately three-quarters of a mile to the east where the road crosses to the north side of the river. Highway 180 is not open during the winter season. Segment 1A is completely within the Sequoia NF.

Segment 2 - Forest Boundary to Road's End in Sequoia and Kings Canyon National Parks - (6.5 miles)

Segment 2 is very different from Segments 1 and 1A in many attributes. In this section, the river meanders through an open U-shaped valley, similar in appearance to Yosemite Valley (without the major waterfalls). Numerous well-developed campgrounds occur along the river. Several trails occur in this area with trailheads leading to the "high country." Segment 2 is entirely within Kings Canyon National Park. Other improvements include a Ranger Station and a pack station. Roaring River Falls and Zumwalt Meadows are the two most visited areas in this segment. Due to the meandering of the South Fork in this segment, visitors heavily use the river for fishing. It is in Segment 2 where the only improved campgrounds occur along the South Fork Kings River.

Segment 3 - Road's End to Headwaters in Sequoia and Kings Canyon NPs - (22.0 miles)

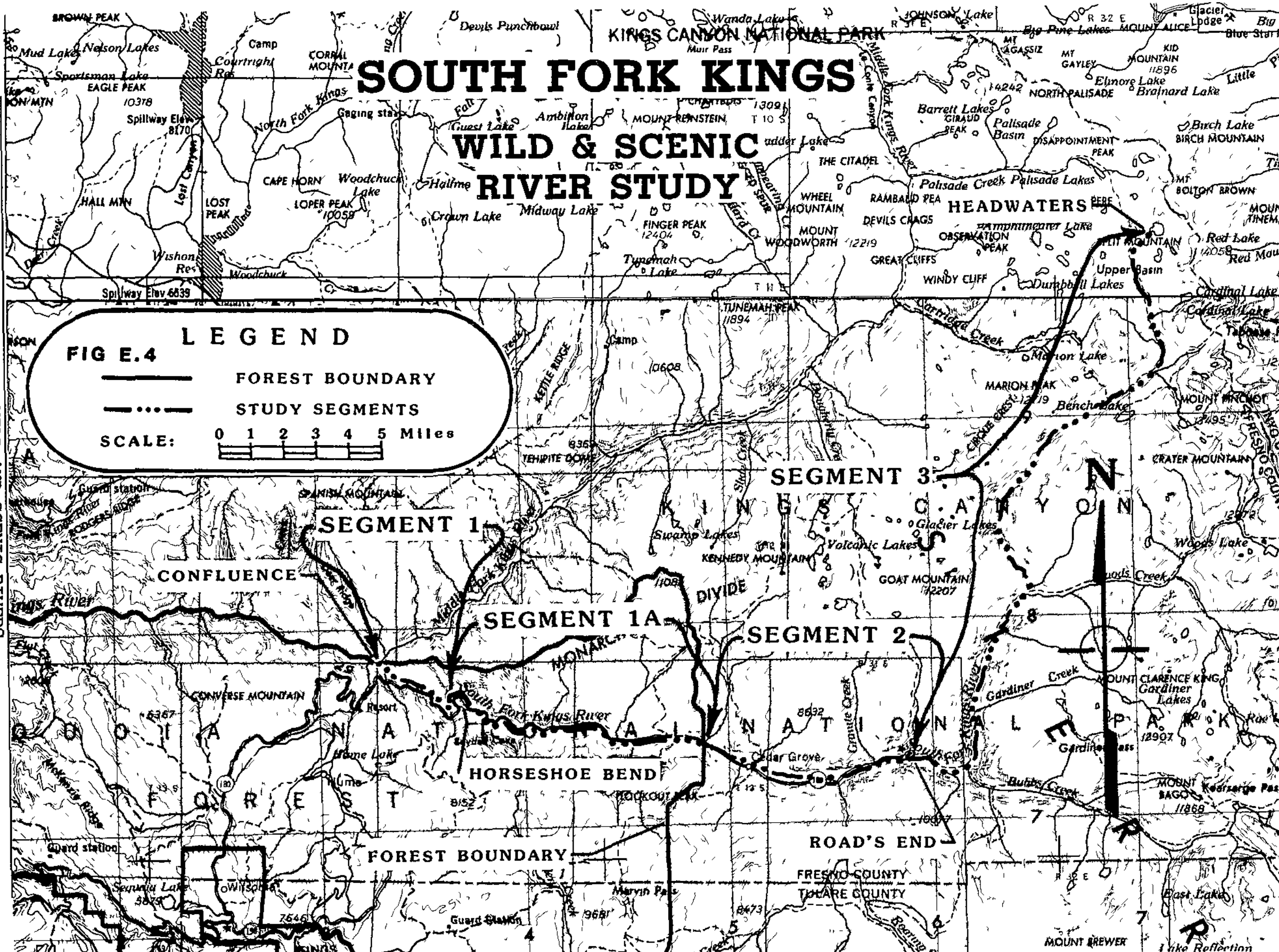
Segment 3 is entirely within Kings Canyon National Park. The area is accessible only by trails. The headwaters of the South Fork Kings River occurs in Upper Basin at the base of Mather Pass at 12,000 feet. The headwaters are surrounded by a horseshoe-shaped ridge of peaks averaging 12,000 feet. There are no improvements or developments in this section. The area is very isolated and rugged. Over half of this segment is without trails along the river corridor due to the steepness of the river gorge.

Table E.5 - South Fork Kings River - Summary of Outstandingly Remarkable Values

	Segment 1	1A	2	3
Outstandingly Remarkable Values				
Scenic	Yes	Yes	Yes	Yes
Recreation	NO	No	Yes	Yes
Fisheries	No	No	NO	NO
Wildlife	NO	No	No	NO
Vegetation (Botanic)	No	No	No	No
Cultural/Historical	No	No	No	NO
Geology	Yes	Yes	Yes	Yes
Free Flowing Nature Affected By:				
Impoundments	NO	NO	No	No
Diversions	NO	No	No	No

Table E.6 - South Fork Kings River - Wild and Scenic River Study/Eligibility Classification Analysis

Classification	Segment 1	1A	2	3
Wild				
Free of Impoundments?	Yes	Yes	Yes	Yes
Generally Inaccessible Except by Trail?	Yes	No	NO	Yes
Watershed/Shoreline Essentially Primitive?	Yes	Yes	No	Yes
Waters Unpolluted?	Yes	Yes	Yes	Yes
Scenic				
Free of Impoundments?	Yes	Yes	Yes	Yes
Accessible in Places by Road?	No	Yes	Yes	No
Watershed/Shoreline Largely Primitive & Largely Undeveloped?	Yes	Yes	No	Yes
Recreation				
Readily Accessible by Road or Railroad?	Yes	Yes	Yes	No
Some Development Along Shoreline?	Yes	Yes	Yes	No
Some Impoundments or Diversion in the Past?	NO	No	NO	NO
Highest Eligible Classification	Wild	Rec	Rec	Wild


SOUTH FORK KINGS
WILD & SCENIC
RIVER STUDY
LEGEND
FIG E.4
FOREST BOUNDARY
STUDY SEGMENTS
SCALE: 0 1 2 3 4 5 Miles
HEADWATERS
SEGMENT 3
SEGMENT 1
CONFLUENCE
SEGMENT 1A
SEGMENT 2
HORSESHOE BEND
FOREST BOUNDARY
ROAD'S END
KINGS CANYON NATIONAL PARK
N
FRESNO COUNTY
TULARE COUNTY
South Fork Kings River
Cedar Grove
Kings River
SPANISH MOUNTAIN
CONVERSE MOUNTAIN
KENNEDY MOUNTAIN
GOAT MOUNTAIN
TEHIPITE DOME
MARION PEAK
MOUNT PINCHOT
CRATER MOUNTAIN
MOUNT CLARENCE KING
MOUNT BREWER
SPLIT MOUNTAIN
DIVIDE
Upper Basin
Bench Lake
Marion Lake
Cardinal Lake
Volcanic Lakes
Glacier Lakes
Gardiner Creek
Gardiner Lakes
Bubbs Creek
Woods Creek
Woods Lake
Swamp Lakes
Granite Creek
Sequoia Lake
Wishon Res
Courtright Res
Palisade Creek
Palisade Lakes
NORTH PALISADE
MOUNT WOODWORTH
FINGER PEAK
TUNEMAH PEAK
Muir Pass
Wanda Lake
Devils Punchbowl
Crown Lake
Midway Lake
Guest Lake
Woodchuck Lake
Nelson Lakes
Mud Lake
Sportsman Lake
EAGLE PEAK
HALL MTN
CAPE HORN
LOPER PEAK
LOST PEAK
Lost Canyon
North Fork Kings
Hume Lake
Marvin Pass
LOOKOUT PEAK
Kearsarge Pass
East Lake
Lake Reflection

111. Lower Kern River

Study Area:	Lake Isabella Dam to National Forest boundary above Bakersfield
Length in Miles:	30.8
Landscape Type:	Desert Mountain
County:	Kern

Narrative Description of Values: The Kern River below Lake Isabella is a controlled stream with diversions. It descends through a long canyon. At the upper end the canyon is broad and gentle. It gradually becomes more rugged so that at the lower end it is a very narrow, steep-sided gorge until it opens into the San Joaquin Valley just below the National Forest boundary. State Highway 178 traverses this canyon. In the upper reaches of the canyon, this highway and other roads cross the river in several places and in some instances are adjacent to the river. Roads are generally not evident from the river in the middle portions, while at the lower end of the canyon, the highway is immediately adjacent to the river. Where accessible, the river is heavily used by recreationists. Two hydroelectric plants operate along the river within the National Forest.

Identification and Description of Kern River Segments

Segment 1: - Lake Isabella Dam to Borel Powerhouse - (7.0 miles)

Approximately 4.3 miles immediately below the dam are outside the National Forest boundary. Two short segments are either private (.5 mile) or managed by the Corps of Engineers (.8 mile). The Bureau of Land Management manages 3.0 miles. The remaining 2.7 miles is within the National Forest.

Water flow is regulated by the Lake Isabella dam according to the demand for irrigation water in the San Joaquin Valley. In addition, the intake for the Southern California Edison Borel power plant affects river flows for all of this river segment, as water is diverted into a pipeline under Lake Isabella and not returned to the river until it goes through the power plant. This power diversion can withdraw up to 600 cubic feet per second (cfs) from the river. During peak spring runoff it is not uncommon for flows in the river channel to approach or exceed 5,000 cfs. Typical summertime flows during irrigation season are around 500 to 2,500 cfs. When irrigation diminishes at the end of summer, flows in the channel are generally reduced to a trickle. The river drops about 210 feet (30 feet per mile) in this segment and flows generally southwest.

Highway 178 crosses the river twice in this segment, and parallels it for some distance. Other roads (e.g., State Highway 155 and County Road 214) either cross or parallel the river in places. However, these roads are not readily visible from the river. Smaller dirt roads access the river in a number of places. Whitewater boating and kayaking occur on this river segment when water conditions permit. There is one developed campground along this segment, operated by the Corps of Engineers (Main Dam), and one proposed day-use development (Borel). Whitewater boating put in/take outs

exist in several locations: each have minimal facilities. These put ins are primarily used by the four permitted commercial outfitters.

Segment 2 - Borel Powerhouse to Democrat Dam - (13.2 miles)

This river segment is all National Forest with the exception of three small parcels of private land (total private frontage is about one mile).

Flows are the same as in Segment 1, with the very important difference that no water is diverted from the channel for hydropower. Whitewater boating can generally occur on this segment of river except under very high spring runoff or low wintertime flows, since the addition of water from the Borel Powerhouse tailrace normally provides sufficient flows during the whitewater boating season (generally May through September). The river continues its southwest flow and drops approximately 350 feet in this segment (27 feet per mile).

While the river is located between State Highway 178 and County Road 214, both roads are away from the river itself. People on the river are not generally aware of either road except where Route 178 crosses the river about midway along this segment, and even here it is not a major intrusion. There are three roaded access points available to the general public, at Sandy Flat, Hobo Campground/Miracle Hot Springs, China Garden, and Democrat Beach, all served by dirt roads. A small bridge crosses the river on private land at China Garden. Democrat Beach is the principal and lowest takeout point for whitewater rafting on the river. Sandy Flat is the only currently designated put in on this segment and is the most popular put in on the Lower Kern with non-outfitted floaters. Sandy Flat and Democrat Beach have minimal facilities. The decision was made in 1980 to develop a campground at Sandy Flat and the Forest Service is currently pursuing alternatives to construct this facility. Four roaded campsites have been dedicated to commercial rafting outfitters operating under special use permit. A special use resort has existed at Miracle Hot Springs, which is adjacent to Hobo Campground. It has been closed since late 1985 but may open again in the future. A preliminary permit was issued by the Federal Energy Regulatory Commission in 1985 for a private developer to study the feasibility of a proposed hydroelectric plant which would divert water from almost the entire length of this segment. CALTRANS holds a Highway Easement Deed granted by the United States to construct a freeway which would extend the existing four-lane portion of Highway 178 down to Bakersfield. This highway improvement will require another crossing of the Kern River and extensive right-of-way excavation. The timing for this improvement is indefinite.

Segment 3 - Democrat Dam to the National Forest Boundary - (10.6 miles)

Located entirely on National Forest land, this segment of the river is the steepest, most rugged section of the canyon.

Flows are the same as Segment 1, except that a maximum of about 450 cfs is diverted for hydropower, as opposed to 600 cfs in Segment 1. Democrat Dam is the diversion for Southern California Edison's KR1 power plant. The

plant is located just inside the National Forest boundary about one mile from the mouth of the canyon. Under normal irrigation season water conditions, the river is a series of impressive rapids interspersed with stretches of seemingly quiet waters. As a result of the hydropower diversion, in the winter months or other low flow periods the river is no more than a slow trickle when the power plant is in operation. The minimum flow bypassed by the hydro plant is based on a specified minimum fish release of 50 cfs from June to September, and less outside those months. The river continues its southwesterly flow, dropping a total of 960 feet between Democrat Dam and the Forest boundary (90 feet per mile).

State Highway 178 is located immediately adjacent to all but the upper one-half mile or so of this river segment. There are innumerable turnouts and locations where recreationists stop to camp, picnic, fish, and swim (entering the river is discouraged as it is very dangerous and has resulted in many drownings). There are three developed picnic sites along the river. No whitewater boating is authorized along this segment, although a few people do try the activity. This segment could also be affected by the proposed highway development.

Table E.7 - Kern River - Summary of Outstandingly Remarkable Values

Segment	1	2	3
Outstandingly Remarkable Values			
Scenic	Yes	Yes	Yes
Recreation	Yes	Yes	Yes
Fisheries	No	No	No
Wildlife	Yes	Yes	Yes
Vegetation (Botanic)	No	No	No
Cultural/Historical	NO	No	No
Geology	No	No	No
Free Flowing Nature Affected By:			
Impoundments	Yes	Yes	Yes
Diversions	Yes	No	Yes

Note: Recreation and scenic values are considered outstandingly remarkable because of the location of this river corridor to major population centers, the diversity of recreation opportunities, and the contrast of the canyon gorge to the adjacent valley. The Kern Canyon also provides the only known habitat for a unique (and unnamed) species of slender salamander in the genus Batrachoseps.

Table E.8 - Kern River - Wild and Scenic River Study/ Eligibility Classification Analysis

Classification	Segment 1	2	3
Wild			
Free of Impoundments?	No	No	No
Generally Inaccessible Except by Trail?	NO	No	No
Watershed/Shoreline Essentially Primitive?	Yes	Yes	No
Waters Unpolluted?	Yes	Yes	Yes
Scenic			
Free of Impoundments?	No	No	No
Accessible in Places by Road?	Yes	Yes	Yes
Watershed/Shoreline Largely Primitive & Largely Undeveloped?	Yes	Yes	No 1/
Recreation			
Readily Accessible by Road or Railroad?	Yes	Yes	Yes
Some Development Along Shoreline?	Yes	Yes	Yes
Some Impoundments or Diversion in the Past?	Yes	Yes	Yes
Highest Eligible Classification	Inelig. 2/	Scenic	Inelig. 2/

1/ The proximity of SH 178 to the river is the primary reason for the difference in this segment.

2/ Hydropower diversions virtually dry up the river in Segments 1 and 3 in low water situations, except for minimum fish releases.

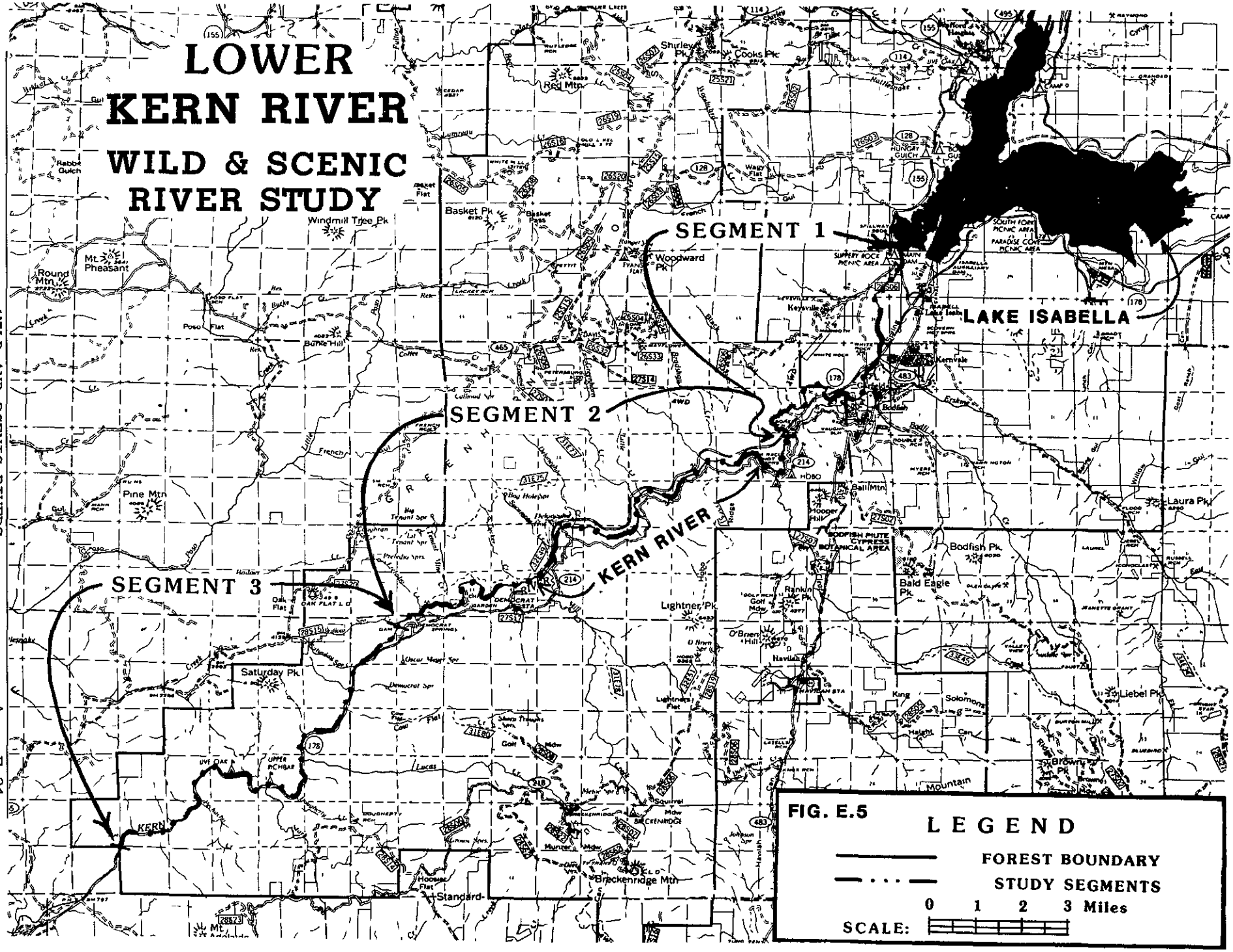


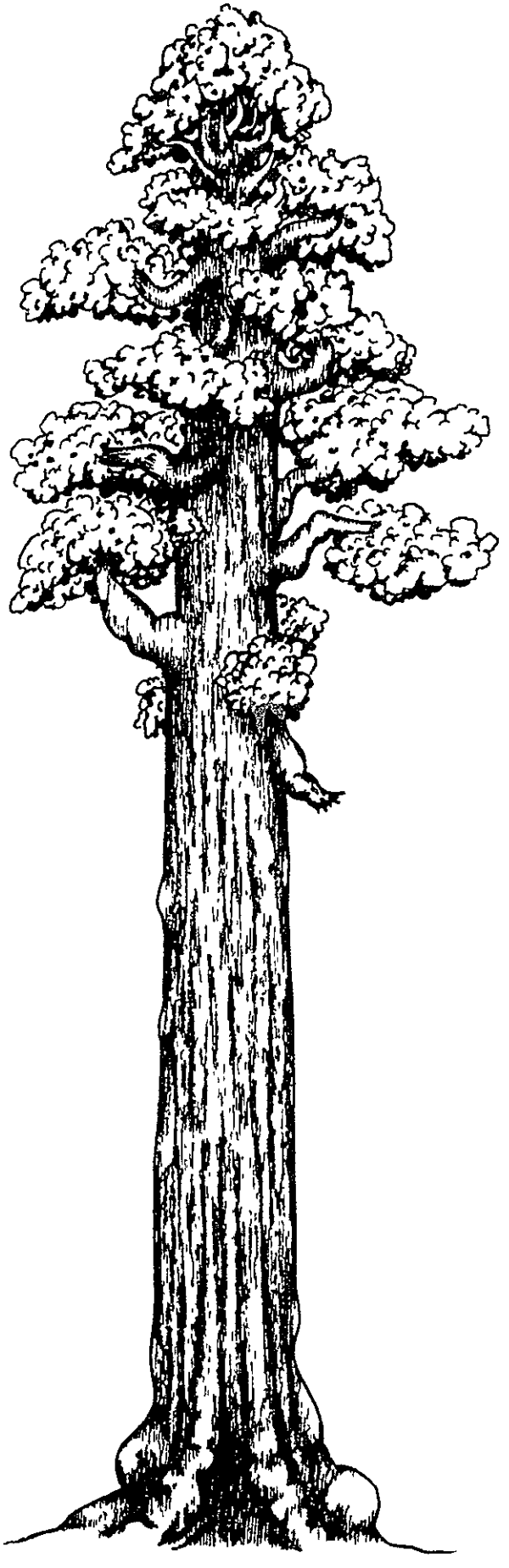
FIG. E.5

LEGEND

FOREST BOUNDARY

STUDY SEGMENTS

SCALE: 0 1 2 3 Miles



Appendix F

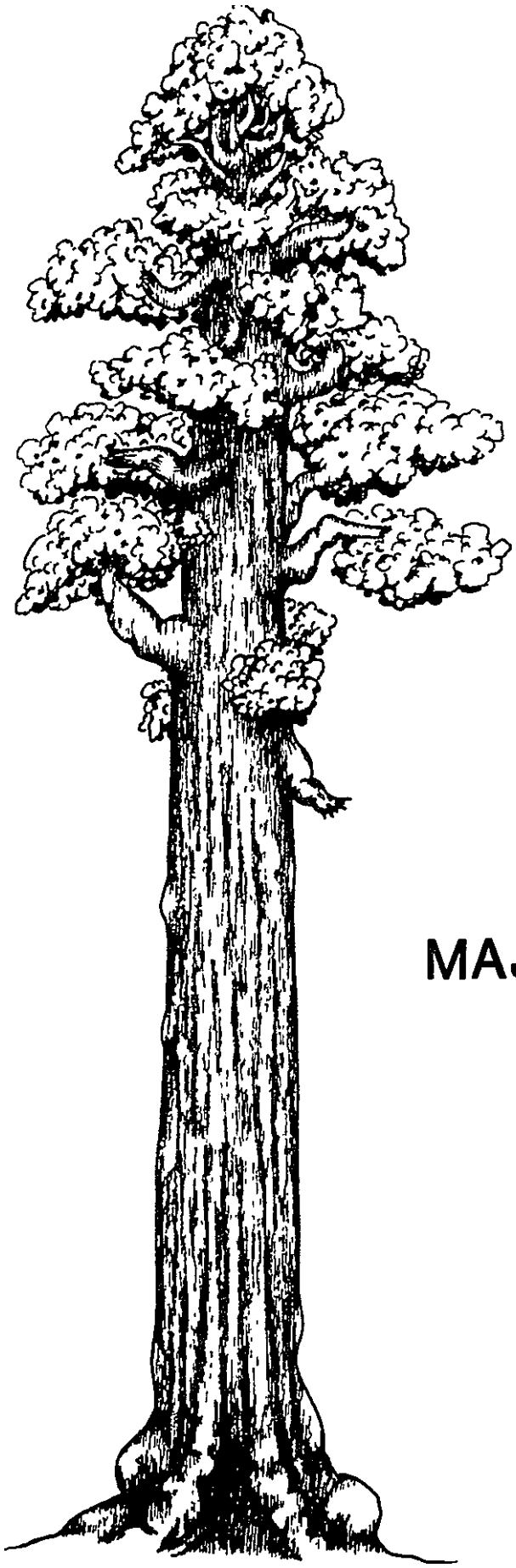
WATER YIELD

APPENDIX F

WATER YIELD BY WATERSHED

Current average annual water yield from the Sequoia NF by National Forest Service (NFS) Watershed is summarized:

NFS WATERSHED NUMBER	NAME	AVERAGE ANNUAL WATER YIELD (in thousand acre-feet)
1803001005	Kings River	160
1803001004	South Fork Kings River	105
1803000701	Kaweah River	19
1803000601	Tule River	78
1803000401	Poso Creek	6
1803000101	Upper Kern River	81
1803000102	Little Kern River	82
1803000103	Middle Kern River	70
1803000104	Lower Kern River	41
1803000201	Upper South Fork Kern River	5
1803000202	Middle South Fork Kern River	18
1803000203	Lower South Fork Kern River	12
1803000204	South Fork Kern River	13
1803000301	Kern River	23
1803000302	Caliente Creek	3
1803000502	Indian Wells Creek	0
1809020601	Cottonwood Creek	0
1803000501	Deer Creek	16
1803000801	Mill Creek	4
	Total	736



Appendix G

MAJOR SILVICULTURAL SYSTEMS

APPENDIX G

MAJOR SILVICULTURAL SYSTEMS AND THEIR APPLICATION

I. INTRODUCTION

The purpose of this appendix is to describe the major silvicultural systems used in land management planning for National Forests, and the advantages and disadvantages of each, considering both biological and managerial perspectives. However, almost all of the information in this appendix also applies to selecting an appropriate silvicultural system for a particular stand.

Silvicultural systems are used to manage forest stands. A silvicultural system is a planned sequence of treatments for controlling the species composition and structure of the vegetation during the life of a stand. A stand is a community of trees sufficiently uniform to be distinguishable as a silvicultural or management unit. Typically, stand sizes vary from about 5 to over 30 acres on National Forest System lands.

Management objectives for stands are typically expressed as combinations of forest products and amenities. Examples include: specific amounts of livestock forage, water runoff, and wood products; kinds of wildlife habitat; and specific scenic view qualities. No single silvicultural system can produce all desired combinations of products and amenities from a particular stand, or from a National Forest.

Forests are managed by using combinations of silvicultural systems to achieve the forest management objectives. All of the silvicultural systems discussed here are used in the National Forests in California. The combinations vary greatly, depending on the characteristics of local forest ecosystems and the differing management objectives.

Selection of the appropriate silvicultural systems occurs at both the National Forest management planning level and Ranger District project level. At the National Forest planning level, selection is based on a broad match of silvicultural systems with the overall planning objectives and ecological characteristics of broadly-defined land classes. Examples of land classes are: areas capable, available, and suitable for growing commercial wood products: Streamside Management Zones; and Spotted Owl Habitat Areas. At the Ranger District project level, selection of silvicultural systems is typically made by a certified silviculturist. Choices are based on matching the attributes of the silvicultural systems with specific management objectives and with the ecological characteristics for specific stands.

11. DESCRIPTIONS OF THE SILVICULTURAL SYSTEMS

A silvicultural system typically includes cutting trees, growing new trees, and controlling competing plants. Cuttings are classified as regeneration cuttings (those that help to replace stands), and intermediate cuttings (those that maintain or improve the character of existing stands).

Silvicultural systems are not just the creation of foresters: rather, they are adaptions of natural occurrences. Nature makes "regeneration cuttings" by means of fire, insects, disease, wind, and other phenomena by removing a single tree, a small group of trees, a stand, or sometimes a whole forest.

Regeneration cuttings strongly influence stand characteristics and management options. Therefore, the five major silvicultural systems are named after them: clearcutting, seed-tree, shelterwood, single-tree selection, and group selection. Each of these systems includes regeneration cuttings to establish new tree seedlings or sprouts, and intermediate cuttings to develop the desired stand characteristics, such as species composition, spatial distribution, and plant vigor.

The clearcutting, seed-tree, and shelterwood systems are even-aged systems: which means that all of the trees in the stand are approximately the same age for almost all the life of the stand. The single-tree and group selection systems are uneven-aged systems: the trees in the stand differ markedly in age, with at least three major age classes present. Uneven-aged stands have no beginning or end points in time.

A. Even-aged Systems

Clearcutting is the harvesting, in one operation, of all merchantable trees in a stand or a larger area to help establish a new even-aged stand. The new stand may be created by natural processes such as seeding from trees in adjacent stands, or by sprouting from the stumps or roots of the cut trees. The new stand can also be created artificially by broadcast scattering of seeds or by planting seeds or seedlings. In California, clearcut stands are usually regenerated by planting seedlings.

Clearcutting does not necessarily mean that all unmerchantable trees are removed. Where feasible, high-quality unmerchantable trees are saved to become part of the new stand. A 1987 survey showed that on gentle terrain in the National Forests on the western slope of the Sierra Nevada, high-quality unmerchantable trees are being retained on an average of about 10 and 20 percent of the acres being regenerated to ponderosa pine, and to red fir or white fir, respectively.

The clearcutting silvicultural system is illustrated in Figure G.l.

The shelterwood system (shown in Figure *G.2)* requires leaving sufficient trees per acre (typically 10 to *20)* during the regeneration cutting to provide an environment that protects (shelters) the seedlings of a new even-aged stand. Protection may be needed from excessive moisture stress or frosts in some forest areas. The new stand can be created by the natural or artificial processes described above.

Regeneration under shelterwoods by planting seedlings is a common practice on National Forest System lands in the Region. The shelterwood trees are harvested following establishment of the seedlings of the new even-aged stand. The shelterwood system is the second-most commonly used even-aged system on National Forest System lands in Region 5, after the clearcutting system. The shelterwood system is most commonly used in stands where red or white fir are to be regenerated.

The seed-tree system (shown in Figure G.3) requires leaving a few good seed-producing trees per acre (typically about 3 to 10) during the regeneration cutting. These trees produce the seed needed to establish a new even-aged stand. Following seedling establishment, the seed trees are harvested. This system has seldom been used for intensive timber management on the National Forest System lands in Region 5. The primary reasons were: frequent unreliability of natural regeneration in the desired periods, invasion of cleared lands by unwanted vegetation (particularly shrubs), and the poor economics of harvesting the few seed trees after natural seedlings are established.

B. Uneven-aged Systems

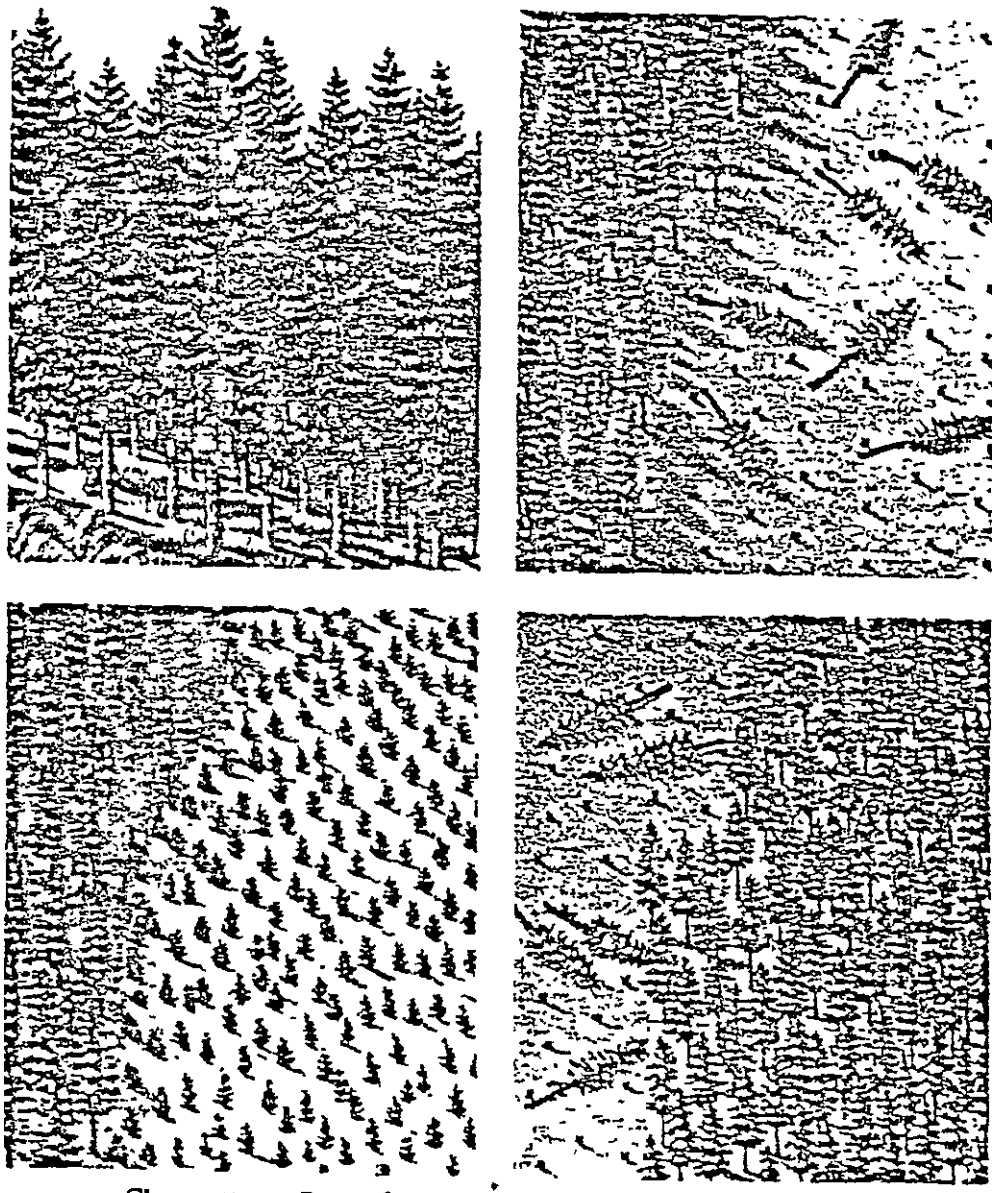
In the single-tree selection system (shown in Figure G.4), each tree is evaluated for its contribution to the desired characteristics of the uneven-aged stand. Regeneration and intermediate cuttings are usually done in one operation. The desired seedlings or sprouts grow in the spaces created by harvesting of individual trees.

Repeated selection cuttings, part of the single-tree selection system, have been used frequently to manage National Forest System lands, particularly in the Sierra Nevada and Cascade Mountain Ranges. There has been a major shift over the last two decades to utilize either the clearcutting or shelterwood systems. The primary reason is that selection cuttings have caused significant understocking in many stands, thereby reducing productivity. There are many examples of poor selection cuttings in California, under the guise of the singletree selection system. High quality, large trees were cut, leaving inferior, small trees. Genetic principles were ignored, and many stands were left understocked, with slow-growing, small trees that are more susceptible to attacks by insects and diseases. In these situations, establishing a new even-aged stand typically is the most efficient way of regaining desired productivity levels and other stand qualities.

The group selection system requires harvesting trees in small groups (less than about two acres). The openings created in the stand resemble miniature clearcuts. The uneven-aged stand consists of a mosaic of even-aged groups. Thus, the group selection system uses the principles of even-aged systems described above to manage much smaller units of land. Currently, the group selection system is used less frequently than the single-tree selection system on the National Forest System lands in Region 5.

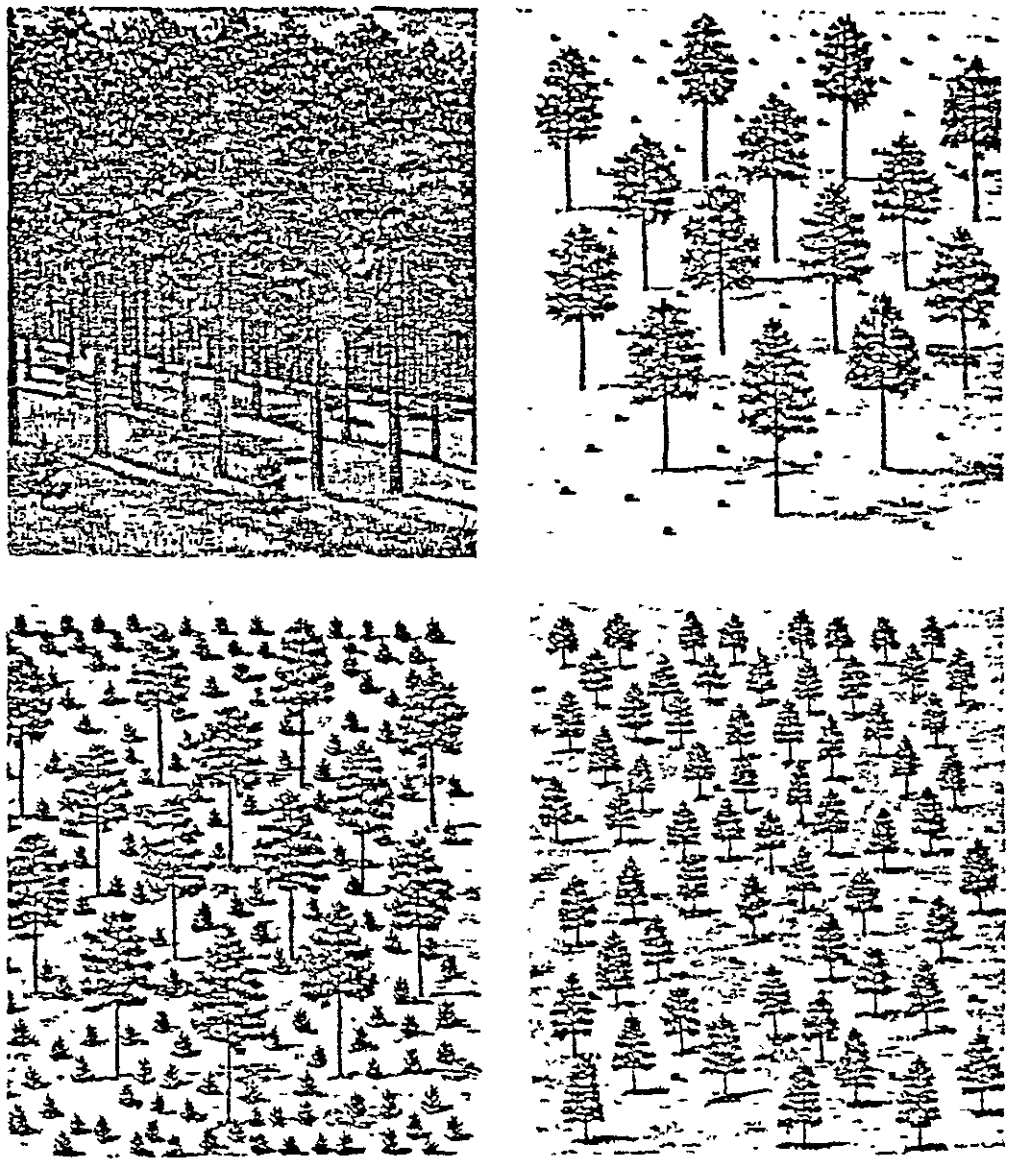
Even-aged systems are more practical than uneven-aged systems for intensive management of wood products. The reasons are explained in Section V below on "Managerial Contrasts Among Forests and Stands Managed by Different Silvicultural Systems."

Figure G.1



Clearcutting. *Part of a mature stand is cut, removing all trees. A new stand arises from seeds of surrounding trees or from sprouts sent up by roots or stumps. Seedlings may also be planted or seeds broadcast. When the new trees are well on their way in the unobstructed light of the clearing, a neighboring stand of mature trees is cut in turn. (The illustration is from* The Secret Life of the Forest *by Richard M. Ketchum, copyright 1970 by American Heritage Press, and is used with the permission of McGraw-Hill Book Company* and the Society of American Foresters.)

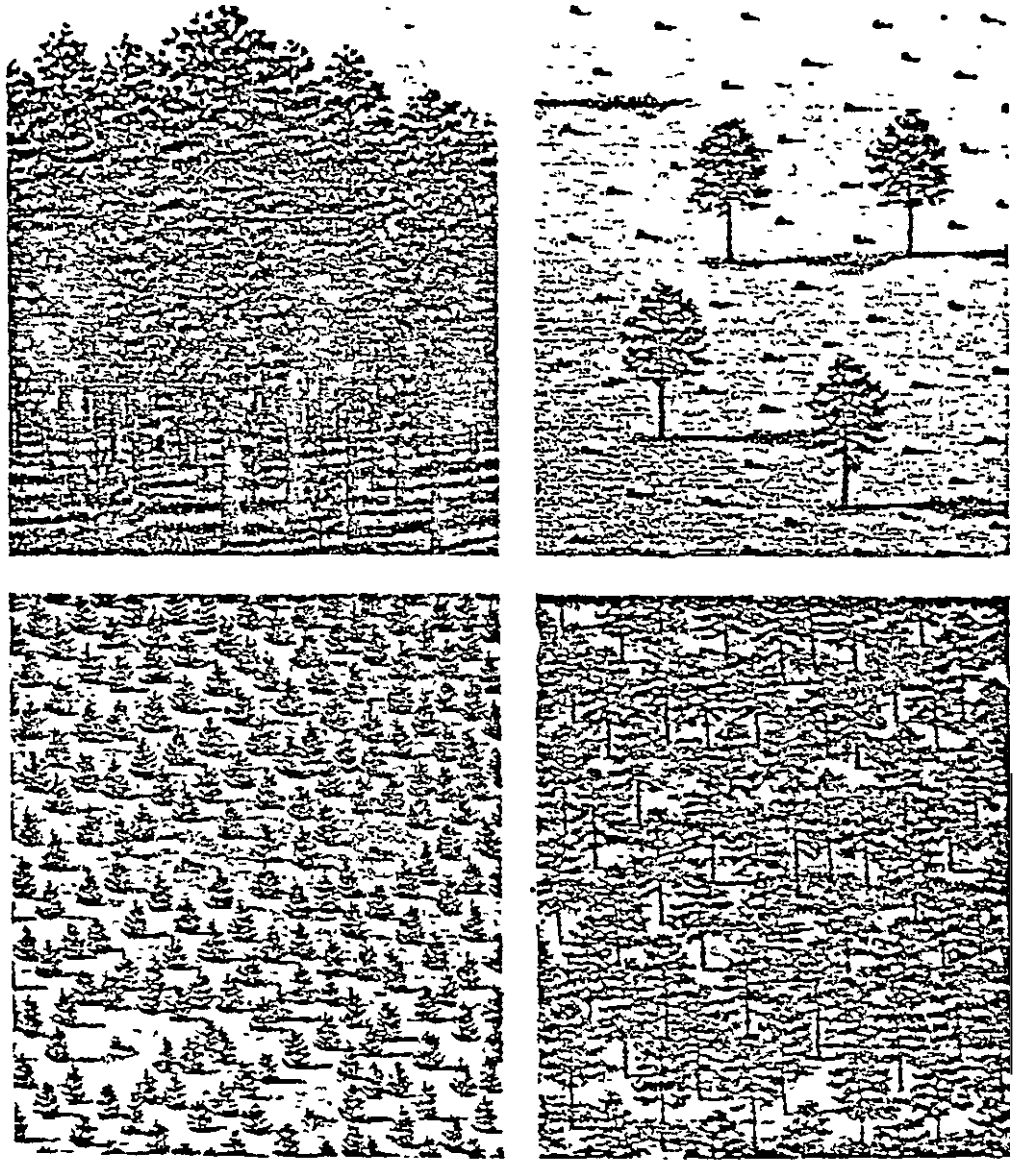
Figure G.2



Shelterwood System. *A mature stand is partially cut, leaving some of the better trees of desired species to grow, cast seed, and provide shade and perhaps other shelter for the new stand. Usually more trees are left per acre than in the seed-tree system. These shelter trees will be harvested after seedlings have become established and no longer need protection.*

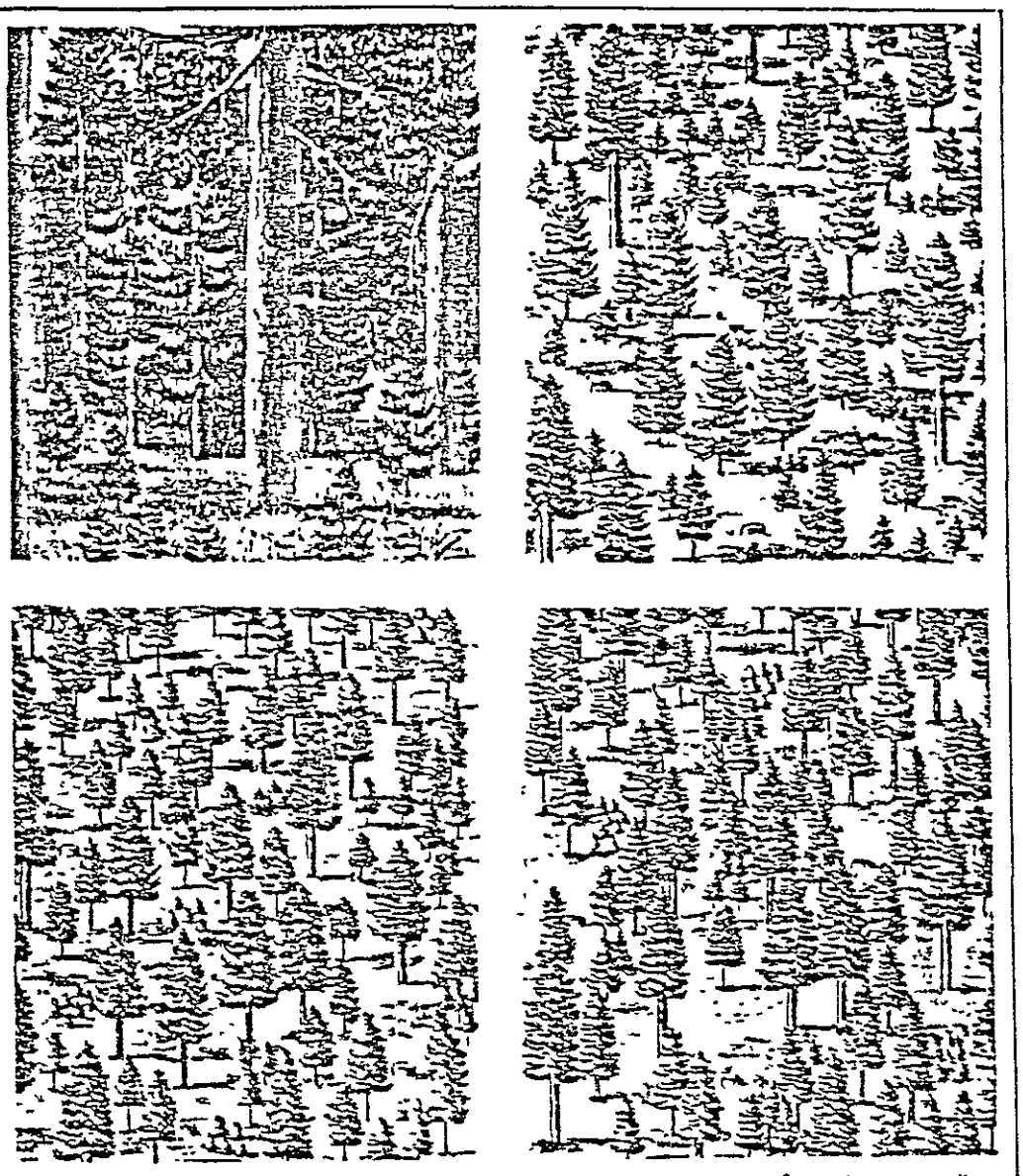
(The Figure and caption are used with permission of the Society of American Foresters.)

Figure G.3



Seed-tree System. *The mature stand is logged, but enough trees are left to reseed the area. The seed trees usually are large and valuable, and may be harvested when they have fulfilled their purpose. Like clearcutting, the system favors light-demanding species. (The illustration is from* The Secret Life of the Forest *by Richard M. Ketchum, copyright 1970 by American Heritage Press, and is used with the permission of McGraw-Hill Book Company* and the Society of American Foresters.)

Figure G.4



Single-tree Selection System. *Cuts are made more often than in other systems, but since the entire stand is never removed, appearances are not much affected. Undesirable trees are removed, overly dense areas are thinned, and mature trees are harvested during each cut. Seedlings of shade-tolerant species develop wherever they can find room. The stand contains trees of many ages.* (The Figure and caption are used with permission of the Society of American Foresters.)

III. TIMBER YIELD AND REGULATION OF FORESTS AND STANDS

Timber yield is the amount of wood that is harvested periodically from a specified forest area. The maximum yield allowed from a National Forest for a planning period (typically one decade) is called the Allowable Sale Quantity. By Federal law, the Allowable Sale Quantity generally cannot exceed the long-term, sustained capacity of that Forest to grow wood. Within each National Forest, stands are managed by silvicultural systems to achieve continuous production of the Allowable Sale Quantity.

When this continuous production level is achieved, the Forest and stands are said to be "regulated." Where the single-tree selection or group selection silvicultural systems are used, each regulated stand would produce approximately the same yield from each harvest, which would occur about every 10 years. By contrast, where the even-aged systems are used, yields from each harvest in a regulated stand would not be equal, but the average yield for the Forest would be the same.

The conversion of wild stands to regulated stands in many of California's forests has just begun. The goal of regulation will take many decades to achieve. No major forest in California has yet been regulated.

IV. BIOLOGICAL CONTRASTS AMONG FORESTS AND STANDS MANAGED BY DIFFERENT SILVICULTURAL SYSTEMS

The key biological contrasts discussed in this section are summarized in Table G.1.

A. Appearance

-- Variation in tree age. A forest managed by even-aged silvicultural systems consists of a mosaic of even-aged stands. Every age class would be represented in a regulated forest, and each age class would be represented by approximately the same number of stands. A regulated forest managed by the group selection system would resemble forests managed by the even-aged silvicultural systems; except that the even-aged components (groups) would be much smaller and more numerous. By contrast, each stand in a regulated forest managed by the single-tree selection system would have trees of many ages (perhaps all ages).

The oldest (or largest) trees in any managed forest depend primarily on the management objectives, not on the silvicultural systems. In particular, the amounts of large- or old-growth to be produced or maintained depend more on the willingness to forego yields than on the kinds of silvicultural systems used to manage stands.

-- Variation in developmental stages. In the even-aged and group selection systems, all stages of forest development are present in the forest, including grasses, forbs, shrubs, tree seedlings, and larger trees. Each stage is represented by entire stands or groups. By contrast, in the single-tree selection system, the areas dominated by small plants such as grasses, forbs, or shrubs are commonly very small (for example, less than one-hundredth of an acre), but they typically occur somewhere in every

stand. In a regulated forest, the total area occupied by each stage should be about the same, regardless of the silvicultural system.

-- Occurrence of shade-tolerant and -intolerant plants. Even-aged and group selection systems favor plants that can be readily established and which grow well in full sunlight (shade-intolerant plants). These include grasses, most forbs and shrubs, and many of the most valuable commercial tree species, such as ponderosa pine and Douglas-fir. The single-tree selection system favors plants that can be readily established and grow well at low light levels (shade-tolerant plants). Examples in California forests are many ferns; few grasses, forbs, and shrubs; many noncommercial hardwood tree species; and a few commercial conifer tree species, such as white fir and incense-cedar.

However, on low-quality forest lands where lack of soil moisture or other soil conditions cause low plant densities, shading by trees is greatly reduced. There, shade-intolerant plants will persist if the single-tree selection system is used,

-- Diversity of plant species. Species diversity depends on the biological and physical environments, how diversity is evaluated, and on how the stands are managed under the different silvicultural systems.

On moderate-to-high quality lands, stands managed by the single-tree selection system shift toward shade-tolerant species. In California, many stands and forests which were previously dominated by commercially more valuable pine and Douglas-fir now have large components of less valuable tanoak, madrone, or white fir. This process could reduce tree species diversity in such stands, compared with management by other silvicultural systems. The shift toward more shade-tolerant species also means that the species diversity of plants near the ground would eventually be lower in stands managed by the single-tree selection system.

The species composition of commercial tree species may be significantly increased or decreased during stand regeneration depending on the environmental conditions, availability of natural seed, selection of species to be planted, and the success of the plantings. If artificial regeneration fails in stands with mixed species, the diversity in the naturally-regenerated stand may be reduced significantly. Potential seed trees of some species could have been harvested, or only certain species (for example, white fir) could regenerate naturally under the brush that rapidly occupies newly harvested areas.

If both artificial and natural regeneration fail, the species diversity of commercial trees has been significantly reduced. The risk of a complete regeneration failure is least for the single-tree selection system. There is high probability of successful natural regeneration of all species where openings are small, seed sources are present, and ground environmental conditions are suitable for tree seedling establishment. The risk of loss of diversity in large openings can be reduced by planting all appropriate species, or by designating appropriate seed trees or shelterwood trees of mixed species.

-- Vertical diversity. The vertical diversity in stands managed by the even-aged or group selection systems can be quite limited. Typically there is a single dominant layer of seedlings, saplings, or larger trees. However, usually there is considerable diversity in stands with the larger trees because some trees are significantly taller and have fuller crowns than others. Full vertical diversity still occurs over the forest, but not in each stand or group. By contrast, in the single-tree selection system, the vertical diversity within each stand should be much greater. Seedlings, saplings, and trees in larger tree classes should be seen from any point in the stand.

-- Tree vigor. If the stands are well managed, tree and stand vigor should be independent of silvicultural systems, with three exceptions. First, new seedlings in openings (particularly shade-tolerant species such as red fir and white fir) are heavily stressed by heat and lack of adequate water until they develop good root systems. These stresses often cause heavy mortality (especially of natural seedlings: or of low-quality, mishandled, or poorly planted seedlings from nurseries). Second, seedlings in openings are more susceptible to damage or mortality from frosts, particularly at high-elevation sites. Where seedling mortality (even of high-quality, properly handled and planted nursery seedlings) is expected to be excessive, use of the single-tree selection, shelterwood. and group selection (where groups are small) systems are favored. Third, maintaining good vigor of small shade-intolerant species, such as ponderosa pine, can be very difficult in stands managed by the singletree selection system. To promote vigor and growth of these trees, tree density may have to be reduced, which can significantly reduce timber yields.

Many stands on National Forest System lands are severely infected with certain root diseases or dwarf mistletoes. It is very difficult and costly to maintain or improve tree vigor and productivity there if the single-tree selection system is used. These root diseases and dwarf mistletoes infect other trees more easily when this system is used.

B. Genetic Resources

-- Conservation of genes. Genetic diversity is basically unaffected when natural or artificial regeneration of commercial tree species is successful. (Successful artificial regeneration means that appropriate procedures are used during seed collection to ensure a large genetic diversity in the collected seed.) However, if regeneration of a particular species were to fail repeatedly over broad areas, genetic diversity would be reduced.

-- Quality of genes. Where improperly applied, the single-tree selection system can lead to "high-grading," which in turn reduces genetic quality for wood production. High grading is the selective removal of the best trees (most rapidly growing, largest, and most valuable for wood) so that most regeneration comes from seed produced by the lower-quality, remaining trees.

The average genetic quality may be significantly lowered in a stand managed by the single-tree selection system, because of higher rates of inbreeding. Some forest geneticists theorize that inbreeding should also increase under the shelterwood or seed-tree systems. Nearby trees of the same species

usually are closely related, and 'they can pollinate each other. The natural seedlings should be even more inbred. By contrast, artificial regeneration or natural regeneration from edges of large openings reduces the probability of significant inbreeding. Large openings facilitate pollen movement from more distant, less closely related trees.

C. Productivity.

Scientific long-term comparisons of wood production using the different silvicultural systems have not been made anywhere in the world. This comparison will be possible many decades from now at Blodgett Forest, a University of California research facility. Theoretically, the total biological productivity (biomass) may be greatest for stands managed by the single-tree selection system. This is because of more continuous tree cover, compared to the other systems. However, merchantable stand growth and timber yields may not be higher for the single-tree selection system. Merchantable yields are strongly influenced by managerial factors.

V. MANAGERIAL CONTRASTS AMONG FORESTS AND STANDS MANAGED BY DIFFERENT SILVICULTURAL SYSTEMS

The major managerial contrasts described on this section are summarized in Table G.2.

A. Public Concerns

In the last two decades, the clearcutting system, and, to a lesser extent, the shelterwood and seed-tree systems, have generated controversy in the United States and Europe.

There are at least six major concerns in California:

- Clearcut areas are regarded as visually unattractive;
- The risks of significant soil erosion and loss of soil productivity are thought to be much greater for the clearcutting system;
- Regeneration of clearcut stands is thought to be unreliable;
- The risks of significant genetic losses are thought to be much greater for the clearcutting system because new stands may be monocultures;
- The use of chemical herbicides (strongly opposed by some groups and individuals) is thought to be much greater if even-aged systems are used, particularly the clearcutting system; and
- Artificial regeneration, particularly of even-aged stands, is thought to be too costly.

All of these undesirable effects can occur under any silvicultural system. However, the risks of some are significantly different among certain systems. The concerns about genetic losses were addressed earlier in the sections on Diversity of plant species and Genetic Resources. The other five concerns are discussed in the following sections on Effects on Scenic Quality, Risks of Adverse Effects on Watersheds and Soils, Scientific Knowledge Base, Management Experience, Need for control of competing vegetation (including the use of herbicides), and Treatment costs.

Other managerial aspects of the silvicultural systems are also discussed in the following sections. They include: risk of major wildfires; risk of damage by insect, disease, or wildlife pests; production of livestock forage; protection of archaeological resources; administration of silvicultural projects; timber harvesting efficiency; genetic improvements in forests; and effects on fisheries and wildlife.

B. Effects on Scenic Quality

It is usually easier to create or maintain naturally-appearing landscapes with uneven-aged systems rather than even-aged systems. Uneven-aged systems are usually less noticeable because they create less contrast and are more flexible in design. However, long-term maintenance of natural-appearing landscapes can be more difficult under the uneven-aged systems, particularly for the single-tree selection system, because the inevitable natural wildfires are more difficult to control. (See the section on Risk of Major Wildfires.)

Depending on circumstances, all silvicultural systems may achieve visual quality objectives, whether the emphasis is on wood production or natural-appearing landscapes. Regeneration cutting in some situations can meet retention or partial retention objectives; for example, partial cuttings, such as shelterwood or single-tree selection. or openings that emulate and blend with natural conditions. Which alternatives are optimal, or even feasible, depend on factors such as location relative to the viewer, slope steepness, and available topographic or vegetative screening.

C. Risks of Adverse Effects on Watersheds and Soils

These risks depend more on the characteristics of the watershed and soils, and on the care and quality of work, than on the kind of silvicultural system used. Adverse effects associated with any silvicultural treatment can usually be avoided or mitigated. The major possible adverse effects are erosion, sedimentation in waterways, soil compaction, and loss of soil productivity through soil or nutrient loss.

The risk of significant, cumulative erosion and sedimentation effects in watersheds usually depends more on road quality and location than on silvicultural treatments. The risk of significant erosion within stands depends on how much protective vegetation and litter cover is removed, as well as on road quality and location. This risk is generally higher for the clearcutting system because more cover is temporarily removed by clearcutting and preparation for seedling establishment. The risk is least for the single-tree selection system.

Extensive and frequent use of heavy machines can cause Significant soil compaction of some soils. The risk of this occurring should not be different among the silvicultural systems.

The risk of soil nutrient losses is increased where vegetation or litter is cleared or high-intensity fires occur. Again, the risk due to clearing vegetation or litter is greater for the even-aged silvicultural systems. High-intensity fires may occur in any stand if controlled fires are used improperly. However, the risk of high-intensity fires is greater for the

single-tree selection system because crown wildfires are more likely. (See Section G, Risk of Major Wildfires.)

D. Scientific Knowledge Base. Knowledge is least for the single-tree selection system for National Forest lands in California.

-- Biological. Considerable research has been completed on the biological foundations for all of the silvicultural systems. Planting, natural regeneration, and genetic principles have been extensively studied for all systems. Research is more complete on early growth of young potential crop trees and control of competing plants for the even-aged and group selection systems. Similarly, stand growth model research is more complete for the even-aged and group selection systems. There are no major differences in the knowledge base about intermediate cuttings or about insect and disease pest management, among the silvicultural systems.

-- Managerial aspects. Research on the managerial aspects of California's forests has been focused on the even-aged and group selection systems. Only in the last decade have concerted efforts been made to research the long-term practicality of the single-tree selection system. Earlier studies were not completed because of difficulties with controlling regeneration of some desired species, controlling stocking, or sustaining the desired stand structures and merchantable yields. This resulted in strong recommendations against the system by many forest research scientists. New interest has been generated by demands for continuous forest cover, maintenance of an unmanaged appearance, and an alternative to management by the even-aged systems. However, several decades of management will be required before analyses of overall effectiveness can be made. Research in the group selection system is also underway in California. It too will require several decades of treatments to achieve regulated stands.

E. Management Experience

Timber harvesting has occurred in California for over 140 years. However, experience with managing forests with the goal of regulating potential yield has been limited to the last several decades. Regulation of National Forest System lands has only involved the even-aged silvicultural systems, particularly clearcutting. However, extensive experience has been gained with all of the silvicultural systems in managing certain stands.

-- Single-tree selection. Most of the harvesting from National Forest System and many private timber lands in California has been selection cuttings of large trees. These cuttings were typically made with no long-term plan for managing the stands by the single-tree selection system. This system can require cutting trees in all size classes during each operation. Regeneration from natural seeding was usually counted on. Also, growth of the young trees and the uncut smaller merchantable trees was counted on to offset the reduction in the forest inventory due to harvesting the largest trees. Unfortunately, repeated harvests of the largest trees have often caused undesirable results: understocked residual stands with lower quality, lower value trees. These stands will have to be regenerated using one of the even-aged silvicultural systems or the group selection system, so as to reestablish full stocking of desired species.

-- Group selection. The group selection system was tried extensively on National Forest System land in the Region about 20 years ago. Small openings were made to encourage natural regeneration, particularly of sugar and ponderosa pines. Special cutting guidelines were developed for different kinds of naturally-occurring groups of trees. The system, called Unit Area Control, failed for three reasons. First, the many small groups of natural regeneration could not be managed efficiently. They could not be monitored. Needed subsequent treatments were not made. The young trees did not grow well or died. Some groups could not be treated due to the higher costs of treating small areas. Second, the cutting guidelines could not be used consistently. There was great difficulty in determining which kinds of groups were actually present in the stand, and the location of their boundaries. Third, many of the small groups were unavoidably destroyed when large trees in adjacent groups were felled, or when logs were moved out of the stand in later harvesting projects. It is particularly difficult and costly to save small groups of trees on steep slopes from excessive damage during harvesting or preparation of the site for successful establishment of tree seedlings.

-- Even-aged systems. The oldest plantations on National Forest System lands in the Region are about 60 years old. Some are soon to be harvested and replaced, thus completing the cycle of an even-aged silvicultural system. Extensive experience has been gained in the regeneration, promotion of young tree growth, intermediate cutting, and regeneration cutting treatments for even-aged systems in all major timber types in the Region. Overall, artificial regeneration following clearcutting has been very reliable in ponderosa pine, Douglas fir. and mixed conifer stands. Artificial regneration has been significantly less reliable in red or white fir stands. The primary causes of planting failures are:

(1) difficulties with consistently producing high-quality seedlings in the nurseries: and

(2) planting when the environmental conditions are inappropriate.

,The shelterwood system with natural or artificial regeneration is presently used in red or white fir stands where regeneration after clearcutting is expected to be unreliable.

F. Wood Production

-- Need for control of competing vegetation (including the use of herbicides). Control of competing vegetation is needed in all of the silvicultural systems to ensure establishment and good growth of tree seedlings or sprouts. Some have theorized that less control is needed in the single-tree selection system. Under this system tree cover is more continuous, resulting in fewer competing grasses, forbs, and shrubs. However, these competitors cause significant moisture stress in the seedling and sapling potential crop trees (in addition to the substantial moisture stress caused by the larger trees), thereby reducing their survival and growth. There is no compelling theoretical basis for concluding that the need for control of competing vegetation should be reduced if the single-tree selection system were used. Certain commonly-occurring, major competing plants can retain good vigor when shaded by most

conifers (such as manzanita, bear clover, tanoak, or madrone). Using the single-tree selection system would definitely not reduce the need for controlling competition from such plants.

Frequency of control treatments varies by silvicultural system. Treatments under the single-tree selection system could be needed somewhere in every stand as often as every 5 to 10 years. The average treatment frequencies in the other systems are much lower. For example, in any of the even-aged systems, up to about three treatments could be needed in the first 10 years of a new stand. Additional treatments may not be needed until the stand is regenerated--a period that could exceed 50 years. Thus, the average period between treatments would be greater than 20 years. Regardless of the silvicultural system used, the total acres treated (and the total pounds of herbicide applied per acre, if herbicides were used) should be about the same over the long term.

The aerial application of herbicides (usually the most cost-effective, and frequently the most controversial method of applying herbicides) could not be used in the single-tree selection system. Depending on topography and vegetation structure, it could also be impractical in the group selection system.

-- Treatment costs. The size of a treatment area is a major factor in determining treatment costs and managerial feasibility. Generally, costs per acre in intensively managed forests are higher when the treatment units are smaller. Therefore, the even-aged systems are the most cost efficient; and the group selection and the single-tree selection system (in that order) are the least cost efficient.

Regeneration by clearcutting is the most cost efficient among the even-aged systems. Shelterwood and seed tree systems are less so, in that order. The removal of shelterwood trees or seed-trees, after the seedlings are established, is a second cost not required in the clearcutting system.

In theory, the total cost of natural regeneration should be less than for artificial regeneration. The costs of seed collection, nursery operations, seedling handling, and planting are eliminated. However, these savings are often offset by increases in pre-commercial thinning costs. Natural regeneration often results in much greater densities of trees than would be planted, or are desirable. Also, unreliable seed production by many commercial tree species often delays natural regeneration. This reduces wood productivity. When natural regeneration is delayed, the sites are occupied by competing plants, the control of which can be costly. Overall, artificial regeneration insures prompt reforestation of preferred species at desirable densities. If natural regeneration is to be used, the shelterwood and seed-tree systems are usually more cost efficient than the uneven-aged systems. The reason is the economies of scale associated with larger treatment areas. Where artificial regeneration is to be used, the clearcutting and shelterwood systems are more cost efficient, for the same reason.

-- Achieving regulated forests, while maintaining Forest timber harvest levels. Regulation can be accomplished most easily with the even-aged or group selection silvicultural systems. There are two critical

disadvantages of the single-tree selection system. First, foresters lack the detailed information about trees needed for cutting on a stand-by-stand basis. There are tens of thousands of stands on a typical National Forest in California, with up to about 10,000 potential crop trees per stand. Currently, inventory data needed for the single-tree selection system are lacking for about two-thirds of these stands. Second, in the Mediterranean climate in California, large forest wildfires are inevitable. Reforestation after these fires creates many new even-aged stands. It is very difficult to regulate a forest under a single-tree selection system when substantial acreages of unplanned even-aged stands occur.

-- Planning, contracting. and record keeping. The many small units used in the uneven-aged systems make for ineffective and costly operation and administration. If stands in a typical Ranger District were managed by uneven-aged systems, in excess of 50,000 separate areas would have to be inventoried, planned for. treated, and monitored. Even with computers, the management complexity would be excessive. Therefore, the extent to which uneven-aged management systems are used for intensive timber management will necessarily be very limited.

-- Timber harvesting. Five important aspects of timber harvesting are strongly influenced by the choice among silvicultural systems:

(1) variability in sizes of harvested trees;

(2) area to be harvested;

(3) complexity of the harvesting treatments;

(4) probability of causing significant damage to trees to be left in the stand; and

(5) probability of causing long-term root disease problems.

The first three influence harvesting efficiencies; and the other two affect the vigor. tree stocking, and value of the residual stand.

There is wide size variation in trees harvested in each operation under the single-tree selection system. This reduces harvesting efficiency because logging equipment is size-dependent. However, this disadvantage could be insignificant in young-growth stands.

Harvesting in the single-tree selection system is also much less efficient than for the other systems because more land must be treated in each operation to harvest the desired yield from the forest.

The complexity of harvesting treatments is also greatest in the single-tree selection system. Identifying which trees to cut, determining where they are to be felled, felling the trees in the designated areas, and removing the trees or logs out of the stand without damaging the residual trees can be very difficult and costly. In the single-tree selection system, cuttings occur as frequently as every 5 to 10 years. In the other systems, only the intermediate cuttings are as complex. The regeneration cuttings

in the other systems are more straightforward operations. Group selection and clearcutting are the most efficient.

Logging damage to trees left to grow in the stand is typically greatest for the single-tree selection system. It is very difficult to selectively harvest trees in dense stands without damaging many residual trees, particularly on steep slopes. Damaged trees are often infected by wood-decaying fungi that can persist in the soil for long periods, thus retaining the capacity to infect new trees, The fungi reduce the windfirmness, vigor, commercial value, and stocking of residual trees. These characteristics are of particular concern in developed recreation areas where selection systems are often applied. Stands with red or white fir have an especially high probability of being infected with wood-decaying fungi when damaged.

-- Genetic improvements in forests. Genetic improvements to increase timber growth, improve tree form and wood quality, or increase resistance to disease and insect pests, depend primarily on planting trees with desirable genetic characteristics. Therefore, the potential for genetic improvement is greater for silvicultural systems that use artificial regeneration. The clearcutting, group selection, and shelterwood systems (if artificial regeneration is used) have the greatest potential for improving the genetic quality of forest trees. The single-tree selection system, with its natural regeneration and higher rates of inbreeding, has the least potential.

G. Risk of Major Wildfires

The even-aged systems (clearcutting in particular) are best for reducing the risk of major wildfires because the greater control of fuel distribution makes wildfire prevention and suppression easier and less costly. The single-tree selection system is least desirable because fires burn intensely and are more difficult to control. Openings which can serve as fuelbreaks occur less frequently in forests or stands managed by this system. Also, the multiple tree layers create "ladders," permitting ground fires to spread into the crowns of the large trees. Crown fires are more destructive and more difficult to control than ground fires. Finally. the use of controlled fires to reduce the risks of large wildfires is most difficult and costly in the single-tree selection system.

H. Risk of Significant Pest Damage

Silvicultural treatments reduce risks by selecting appropriate tree species, by diversifying within and among stands, and by maintaining tree vigor. Diversification within stands is increased through use of multiple species or uneven-aged silvicultural systems. Vigor is promoted by preventing the trees and other plants from becoming too dense. Competing plants also provide habitat for animal pests such as pocket gophers and rabbits. Well-managed stands in all systems reduce the risk of significant pest damage. However, there are significant exceptions.

Risk of significant insect or disease damage to trees increases if the trees have been wounded. Many wounds occur during silvicultural treatments. Accidental scarring of trees can be caused by felling nearby

trees, or by bumping them with machines or logs moving through the forest. Risk increases with frequency of stand treatments, particularly cutting. Cutting frequency is much higher for the single-tree selection system than for others, so the risk of significant insect and disease damage is highest.

Two serious pests, dwarf mistletoes and some root rots, can be difficult, costly, and, in some cases, impossible to control under selection systems. Damage from these pests is most easily controlled by managing stands as wholes. Dwarf mistletoe plants can project seeds down on trees within about 100 feet horizontally, thereby infecting nearby susceptible species. Even-aged systems allow the manager to control damage from this pest through cutting treatments.

Many root disease fungi infect susceptible trees by root-to-root contact. Some root diseases start at harvest time and spread to other trees in the stand. Control may require killing trees in a zone around the infected area. Uneven-aged management, particularly the single-tree selection system, can perpetuate root disease "centers" and spread infection.

Generalizations about wildlife pest damage and silvicultural systems are difficult. The major potential wildlife pests in the Region include pocket gophers, deer, porcupines, and rabbits. These animals feed in vegetation dominated by grasses, forbs, shrubs, or tree seedlings. Use of the even-aged or group selection systems can create large areas temporarily dominated by this kind of vegetation. This can cause higher densities of potential pests, which increases the risk of significant damage to potential crop trees. However, often the actual damage levels are not increased where this occurs.

I. Production of Livestock Forage and Browse

Even-aged systems and the group selection system are best for livestock production. Grasses, forbs, and shrubs used by livestock occur in the greatest quantity in openings. Management efficiency increases in large forage areas because livestock control and access is easier and less costly.

J. Protection of Cultural Resources

There should be no significant differences among the silvicultural systems in their risk of damage to undetected archaeological resources. Damage depends more on the intensity and frequency of management treatments than on the kind of silvicultural system, particularly when large machines are used.

K. Effects on Fisheries and Wildlife Habitat

Fisheries habitat is most easily protected where the water quality is high, where stream temperatures are kept moderate through shading, and where the runoff quantity is sufficient to maintain spawning areas. The single-tree selection or group selection systems are usually more advantageous than the even-aged systems for managing the vegetation in streamside management zones and riparian areas. However, the silvicultural systems used outside

these zones does influence the amount of sediment in the water (see Section C, Risks of Adverse Effects on Waterhsed and Soils).

The choice of silvicultural systems to best manage wildlife habitat depends on which species are to be emphasized. Regardless of which treatment is used in a stand, some species will benefit and others will not. Most wildlife species are adapted to thrive in specific structures and species of forest vegetation. For example, the use of the even-aged or group selection systems favors deer, quail, and rabbits that use herbaceous and shrubby vegetation most abundant in large openings in the forest. The single-tree selection system may favor animals that need vertical diversity, such as spotted owls and tree squirrels.

Almost all forest wildlife species could use a particular young-growth stand at some time in its development regardless of the silvicultural system. (The exceptions are the few species that may be totally dependent on very large, decadent trees for habitat.) The kind of system would influence the proportions of species, and when and how they could use the stand as habitat. A significant exception is single-tree selection management applied to large areas. The absence of large openings could prevent use by wildlife adapted to this kind of habitat, such as soaring hawks. Overall, a mix of the silvicultural systems in the forest would probably best achieve most wildlife management objectives.

Table G.1 - Ratings of the Major Silvicultural Systems by Principal Biological Attributes

G is Good, Excellent, or Many
M is Moderate or Few
P is Poor or None

BIOLOGICAL ATTRIBUTE	Clear Cutting	Shelter-wood	Seed-Tree	Group Selection	Single-Tree Selection
Appearance					
a. Diversity of tree sizes in a stand:					
(1) Vertical	P	P	P	M	G
(2) Horizontal	P	P	P	M	G
b. Number of openings in a forest: 1/					
(1) Larger than 2 ac.	G	G	G	P	P
(2) 1/10th to 2 ac.	P	P	P	G	P
(3) Smaller than 1/10 ac.	P	P	P	P	G
c. Potential for conserving or improving plant species diversity in a stand	G	G	G	G	M 2/
Genetics					
a. Resistance to inbreeding effects	G	G,M	G,M	G	P
b. Resistance to degradation by "high-grading"	G	G	M	G	M
c Potential for conserving genes in a forest 3/	G	G	G	G	G
Productivity (potential for producing biomass)	G	G	G	G	G

1/ Exclusive of roads and natural openings such as meadows or rock outcrops.

2/ Assumes no major fires: otherwise "Poor."

3/ Assumes all harvested species are planted successfully, or will regenerate naturally: otherwise "Poor."

Table G.2 - Ratings of the Major Silvicultural Systems by Key Managerial Attributes

G is Good, Excellent, or High
M is Moderate
P is Poor

MANAGERIAL ATTRIBUTE	Clear Cutting	Shelter-Wood	Seed-Tree	Group Selection	Single-Tree Selection
Overall Public Acceptance	P	M	M	M	G
Natural Appearance	P	M	M	M	G
Soil Protection in Stands					
Soil stability where soils have high erosion potentials	P	M	M	P	G
Scientific Knowledge Base and ment Exper	G	M	M	M	M
Wood Production					
a. Cost efficiency of treatments:					
(1) General (based on size)	G	G	G	P	P
(2) Regeneration	M	M	M	M	M
(3) Feasibility of aerial application of herbicides	G	G	G	P	P
(4) Harvesting	G	M	M	M	P
b. Potential for regulating the forest, while maintaining harvest levels	G	M	G	P	P
c. Administrative efficiency (planning, contracting, and record keeping)	G	M	M	P	P
d. Need for control of competing vegetation	G	G	G	G	G

Table G.2 - Ratings of the Major Silvicultural Systems by Key Managerial Attributes (continued)

G is Good, Excellent, or High
M is Moderate
P is Poor

MANAGERIAL ATTRIBUTE	Clear Cutting	Shelter-Wood	Seed-Tree	Group Selection	Single-Tree Selection
Wood Production (continued)					
e. Potential for retaining vigor and value of residual trees 1/	G	G	G	M	M
f. Potential for genetic improvement of trees by planting	G	G	G	M	M
Controlling Wildfires in a Forest					
a. Potential for controlling major wildfires	G	G	G	G 2/	P 3/
b. Potential for using controlled fires to manage fuels	G	G	G	M 2/	P 3/
Risk of Significant Pest Damage					
Potential for controlling damage from dwarf mistle-toes and certain tree root diseases	G	G	G	G 2/	P
Livestock Production Potential in a Forest	G	G	G	M 2/	P
Streamside Mangement Zones					
Potential for protecting fish habitat	P	G	P	G	G

1/ Exclusive of roads and natural openings such as meadows or rock outcrops.

2/ Assumes all harvested species are planted successfully, or will regenerate naturally; otherwise "Poor."

3/ Assumes no major fires; otherwise "Poor."

Table G.2 - Ratings of the Major Silvicultural Systems by Key Managerial Attributes (continued)

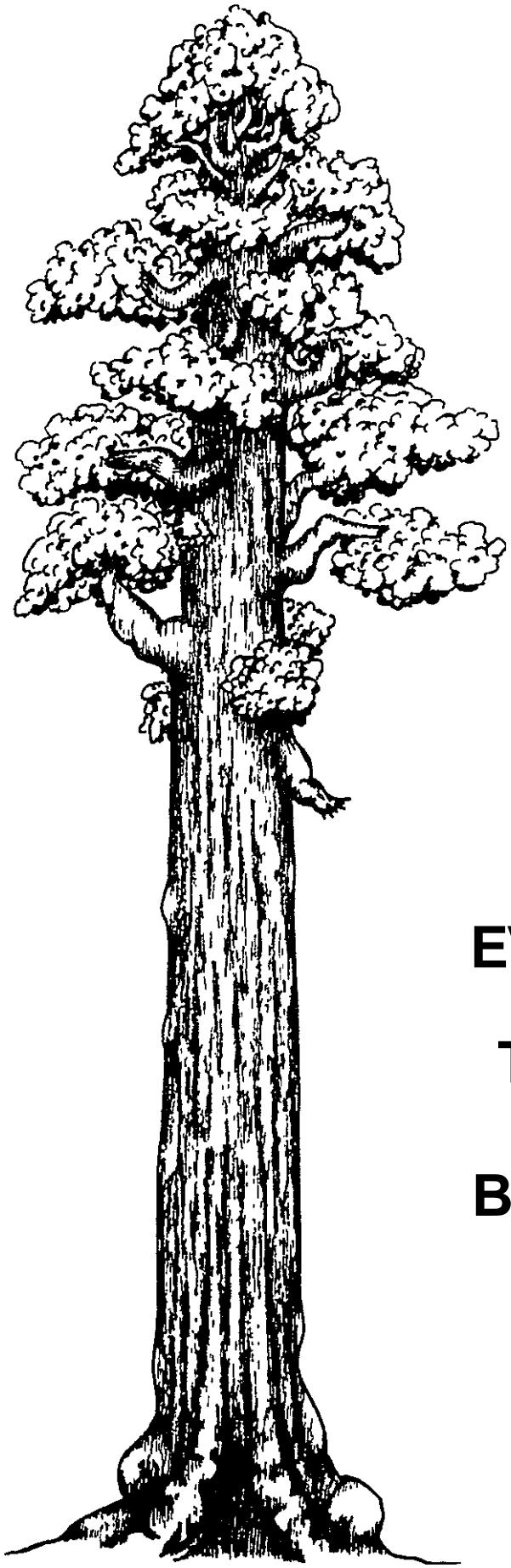
G is Good, Excellent, or High
M is Moderate
P is Poor

MANAGERIAL ATTRIBUTE	Clear Cutting	Shelter-Wood	Seed-Tree	Group Selection	Single-Tree Selection
Wildlife Habitat in a Forest					
a. Potential for deer, rabbits, and quail	G	G	G	G	P 1/
b. Potential for spotted owls and tree squirrels	P	P	P	M	M
c. Potential for soaring hawks and eagles	G	M	G	M 2/	P 3/

1/ Assumes gentle slopes; otherwise "Moderate" but "Poor" for the Group and Single-tree selection systems.

2/ Assumes openings of about 1-2 acres; "Poor" if smaller.

3/ Assumes highly productive land; otherwise "Moderate" or "Good."



Appendix H

EVALUATION of TWISSELMANN BOTANICAL AREA

APPENDIX H

EVALUATION OF ERNEST C. TWISSELMA" BOTANICAL AREA

I. INTRODUCTION

With the death in 1972 of Ernest C. Twisselmann, amateur botanist of Kern County and the Kern Plateau, several botanists and interested conservationists approached the Cannell Meadow Ranger District for establishment of a "botanical reserve" in his honor. Evaluation of the proposed reserve was initiated by the District as to choice of location and choice of classification for this area.

Based on Twisselmann's article A Botanical Scanning of the Kern Plateau 1971, four areas of special botanical interest occurring in this region of the southern Sierra Nevada were considered. The arkosic gravels bordering Ramshaw and Templeton Meadows are within the Golden Trout Wilderness, Inyo National Forest. The metamorphic ridgetop of Bald Mountain is the location of an active lookout for fire detection with a road to the tower, and of a proposed nature trail. Big Meadows is presently in private ownership, and therefore, is not feasible, The final area, Sirretta Peak, is adjacent to the Dome Land Wilderness.

From the above information, the best choice of location presently available on the Kern Plateau that has significant botanical interest is Sirretta Peak. In addition, several botanists and conservation groups have proposed establishment of the reserve on Sirretta Peak. Not only is this an excellent botanical region, but there are no resource conflicts that require mitigation. Timber in the Sirretta Peak region is of marginal quantity and quality with difficult access (see Section II, Affected Environment of this appendix). Foregone commodity values are deemed insignificant when weighed against the protected botanical values. It was the decision of the Cannell Meadow District to proceed with classification of a "botanical reserve" honoring Ernest C. Twisselmann on Sirretta Peak.

The following will focus on the type of classification appropriate to the Sirretta Peak area:

A. Location and Size

The proposed Ernest C. Twisselmann Botanical Area is located on the Kern Plateau in the Cannell Meadow Ranger District of the Sequoia National Forest, Tulare County, California. It lies approximately one mile north of Big Meadow, adjoins the Dome Land Wilderness, and includes Sirretta Peak. The area consists of approximately 859 acres and includes parts of Sections 16, 17, 20, and 21, T23S, R34E, M.D.B.&M.

B. Purpose, Objective, Need, and Origin of the Proposal

The selected area is proposed to be classified as a Botanical Area to preserve a botanically significant natural ecological complex.

Botanical areas are established to protect significant botanical values and contain specimens or group exhibits of plants, plant groups, and plant communities which are significant because of form, color, occurrences, habitat, location, life history, arrangement, ecology, environment, rarity, and/or other features. Identified areas having these characteristics and being deemed an important example are to be classified under 36 CFR 294.1 concurrent with Regional Forester's approval of area management plans designed to protect the values involved.

The Forest Supervisor of the Sequoia National Forest has proposed this Botanical Area to meet the needs, purpose, and objectives stated above. In addition, naming it after Ernest C. Twisselmann will pay tribute to a person who contributed much to the botanical knowledge of Kern County and, more specifically, to the Kern Plateau.

C. Topography and Climate

The proposed Botanical Area is located among granite peaks and ridges rising sharply from mountain meadows. Elevations range from 8,500 feet in the Salmon Creek drainage to 9,978 feet on the peak just north of Sirretta Peak.

Temperatures range from an average low of 0-10° F in January and February to high temperatures of 75-85' F during July and August. The growing season ranges from two to four months depending on the elevation and variations in the weather patterns for a particular season.

Precipitation for the area ranges from 30-35 inches annually, mostly as snow during the winter with some occasional thundershowers during summer months.

D. Unique Features

Foxtail pine reaches the southern limit of its range within this proposed Botanical Area. The foxtail pine is an endemic species to California. In addition, this species is found in association with four other pines on one slope within the area. This association and other features are described further in the following section.

11. AFFECTED ENVIRONMENT

In this section the various resources inherent in the proposed Botanical Area are described.

A. Vegetation

Six plant associations are represented in the proposed botanical area that form a unique mosaic of vegetation in the southern Sierra Nevada. Due to the small geographical area available for this diverse assemblage, many associations are rarely distinct since several indicator species occur in two or more of the associations. These associations are: Foxtail Pine Forest, Subalpine/Mixed Conifer Forest,

Red Fir Forest, Rock Outcrop, Montane Chaparral, and Mountain Meadow-Streambank. Within the proposed Botanical Area, the Foxtail Pine Forest is the dominant association. The Subalpine/Mixed Conifer Forest along with the Red Fir Forest make up the remainder of the overstory vegetation. Throughout the entire region, both the Rock Outcrop and Montane Chaparral association are common.

Foxtail pine (Pinus balfouriana) is found throughout the proposed area with the exception of some of the lower elevations. This association includes several southern Sierran endemics such as foxtail buckwheat (Eriogonum polypodum) and sierra mountain parsley (Oreonana clementis). The granite penstemon (Penstemon caesius) is one of the dominant ground cover species.

Dominants in the Subalpine/Mixed Conifer Forest are western white pine (Pinus monticola) and limber Pine (Pinus flexilis). Within this association also occur Jeffrey pine (Pinus jeffreyi), lodgepole pine (Pinus murrayana). and scattered foxtail pines. Limber pine at this location makes this the most southern population in the Sierra Nevada.

The Red Fir association is primarily comprised of red fir (Abies magnifica var. shastensis). However, most of the other conifers mentioned above can be located within this association. One of the most common understory shrubs in the Red Fir association is bush chinquapin (Castanopsis sempervirens).

Within the Mountain Meadow-Streambank association. the greatest species diversity for the proposed botanical area is located. Numerous species of grasses, sedges (primarily Carex spp.) and rushes (Juncus spp.) form the foundation for this association. Several plants are restricted to this association. Noteworthy plants include: Labrador tea (Ledum glandulosum var. californicum), twinberry (Lonicera involucrata) and mountain ash (Sorbus californica).

The Rock Outcrop association is comprised of small woody plants like the prickly phlox (Leptodactylon pungens ssp. pulchriflorum), pride of the mountain (Penstemon newberryi), rabbitbrush (Chrysothamnus spp.). horsebrush (Tetradymia canescens). and creambush (Holodiscus microphyllus).

The Montane Chaparral association is comprised of woody shrubs that form fairly large "brushfields." The dominant species are: bush chinquapin (Castanopsis sempervirens), mountain white thorn (Ceanothus cordulatus), green-leaf manzanita (Arctostaphylos patula), Kern Plateau ceanothus (Ceanothus pinetorum), and squaw currant (Ribes cereum).

Except for the Mountain Meadow-Streambank, Montane Chaparral, and Rock Outcrop associations, the timbered associations are not readily distinct throughout the area as individual conifer species to assess timber volumes. For ease in computing timber volumes, a map was developed showing approximate plant association boundaries with a Subalpine, red fir, and subalpine/red fir designation. Table H.l was developed from that map and a forest type map of the District.

Table H.1 - Vegetation by Plant Associations and Timber Volumes

Plant Association	Area Acres	Area Percent	Gross Timber Volume M Board Feet Per Acre	Gross Timber Volume M Board Feet Total
Rock Outcrop	154	18	0	0
Montane Chaparral	23	3	0	0
Mountain Meadow-Streambank	24	3	12	288
Subalpine (primarily Foxtail Pine)	38	4	8	304
Red Fir	20	2	20	400
Sub Alpine/Red Fir (50%)	600	70	7	4200
	859	100		5192

The approximately 5.2 million board feet of timber included within the proposed Botanical Area is included in the 1961 Timber Management Plan as part of the allowable cut calculation. However, most of the timber is located in relatively inaccessible locations on very rocky soils. Quality is low, and growing potential is low. Potential for successful regeneration by artificial means does not exist for most of the area (over 90 percent) and would be low for the remainder. Harvest would have to utilize helicopters because of the terrain and rock. To date, harvest has not been proposed within the area.

Foxtail pine is found throughout the proposed Botanical Area with the exception of some of the lower elevation areas. One grove particularly noteworthy because of the large size of the specimens is located in a basin just over East Sirretta Pass. The area was named "Foxtail Basin" by a botanist exploring the area with Ernest C. Twisselmann in 1971. Another fairly large grove of foxtail pine extends north up the ridge from Sirretta Peak to the east-west ridgeline. A few red fir are mixed in, but the grove is predominantly foxtail pine. The ridge that follows the Dome Land Wilderness boundary from the southern edge of the Botanical Area to the eastern edge is covered with foxtail pine. It has the greatest concentration of limber pine in the proposed area. It is near this southern edge of the Botanical Area that foxtail pine reaches the southern limit of its entire range.

A unique association of five native pines is located in the basin east of Sirretta Peak between the meadow and East Sirretta Pass. According to John T. Howell (Curator Emeritus, California Academy of Sciences, and expert on the Sierran flora), this is the only known location in the state where foxtail, limber, western white, Jeffrey, and lodgepole pines all occur on the same slope.

Foxtail pine is found in all age classes within the proposed area. A considerable amount of young reproduction was noted in a swale

southeast of the "five pine area." extending up the saddle to the ridge along the Dome Land Wilderness boundary. Mature trees in this area have been estimated to be 2.500 years old.

In addition to the unique association of conifers and the plant associations, several plants observed at the proposed botanical area constitute phytogeographical records.

A complete floristic inventory of the proposed Ernest C. Twisselmann Botanical Area has not been made. Seventy species were identified during field trips. The mountain meadows contain a variety of additional species, as yet unidentified.

Table H.2 - Southern Limits Within the Sierra Nevada, Sirretta Peak

Foxtail pine (Pinus balfouriana)
Limber pine (Pinus flexilis)
Explorers Gentian (Gentiana calycosa)
California mountain ash (Sorbus californica)
Foxtail buckwheat (Eriogonum polypodum)
Sierra mountain parsley (Oreonana clementis)
Wooly butterweed (Senecio canus)
Labrador tea (Ledum glandulosum var. californicum)
Nuttall's sandwort (Arenaria nuttallii ssp. gracilis)
Moss-Lupine (Lupinus breweri var. bryoides)
Pygmy hulsea (Hulsea vestita ssp. pygmaea)

Table H.3 - Tulare County Endemics on Sirretta Peak

Foxtail buckwheat (Eriogonum polypodum)
Purple ivesia (Ivesia purpurascens)
Kern Plateau catchfly (Silene aperta)

B. Wildlife and Fish

Several species of birds and mammals have been identified within the proposed area. Others, though not observed specifically, are known to inhabit surrounding areas and are suspected to make use of the proposed area also. There are no fisheries in the proposed area.

None of the listed species are found on the combined lists of rare and endangered species compiled by the California Department of Fish and Game and the USDA, Forest Service.

C. Watershed

The headwaters of the north fork of Salmon Creek and a fork of Little Trout Creek are within the proposed Botanical Area. Salmon Creek flows south through Big Meadow and into the main fork of the Kern River.

Little Trout Creek flows northeast into Trout Creek which joins the South Fork of the Kern in Rockhouse Basin.

The two meadows mentioned in Section A, Vegetation, are located at the headwaters of these two drainages in the proposed Botanical Area.

D. Geology and Soils

The proposed area is composed of granite rock overlaid by a relatively thin layer of coarse. granitic soil. It is part of the Sierra Nevada, fault-block mountain range.

Soils are highly erodible and gully easily whenever water is concentrated. The steep slopes, 40-70 percent, increase the risk of erosion. Evidence of this can be observed on the trail through the area as discussed in Section F. Outdoor Recreation and Trails.

Capacity of the soil to grow trees or other vegetation varies from low in the rocky, undeveloped soils to moderate on some of the northern slopes in swales and saddles. The meadows consist of alluvial material from previous lake bottoms and are highly productive soils.

E. Livestock Grazing

The proposed Ernest C. Twisselmann Botanical Area is within the Cannell Meadow and A. Brown Livestock Grazing Allotments. There is little range value within the area except for the two meadows near the headwaters of Little Trout and Salmon Creek drainages. Use has been noted on the meadow in the Salmon Creek drainage within the Cannell Meadow Allotment. Cattle using the A. Brown Allotment are driven into the Little Trout Creek drainage over the Sirretta Peak Trail (34E12) and are able to wander throughout the area. Most use is concentrated in the small meadows where feed is most abundant. A drift fence on the ridge between the two allotments is ineffective and needs repair.

F. Outdoor Recreation and Trails

There are no recreation sites within the proposed area nor are any planned according to the Kern Plateau Recreation Plan developed in 1959 and District recreation personnel.

Trail 34E12, Sirretta Peak Trail, goes through the middle of the proposed area. It is designated for hiking and horseback travel only. The trail appears to get some use. Most of the trail within the area, south of East Sirretta Pass, is eroding. The trail itself has become a gully in many places. Concentrated water flowing from the trail has caused gullying below it. Much of the current condition resulted from a high intensity storm during September 1976, based on observations before and after the storm. It appears that erosion is increasing fairly rapidly.

This trail provides one of the access routes to Sirretta Peak, a limited hiking attraction. The trail register kept on the peak shows an average of 31 persons per year have hiked there and signed the

register between 1970 and 1976. Neither this trail nor the one west of the peak (33E32) actually go to the peak. Cross-country travel is used for the final one-quarter to one-half mile to the peak.

The trail is also used when moving cattle into Sirretta Meadows and Little Trout Creek Meadow from the road north of Big Meadow. The trail is designated for reconstruction to improve the existing condition and prevent future erosion.

The Tulare County endemic plant, foxtail buckwheat (Eriogonum polypodum), is located in colonies along the trail at East Sirretta Pass.

G. Visual and Cultural Resources

The proposed Ernest C. Twisselmann Botanical Area is part of the rolling plateau lands at the southern end of the Sierra Nevada range. The plateau consists of mountain meadows separated by granitic peaks and ridges. The proposed area is located in the ridge and peak portion of the basic land type, just north of Big Meadow (the largest meadow on the Kern Plateau within the Sequoia NF).

The proposed area has been identified as having a common variety from a visual standpoint, but vistas from peaks and ridges within the proposed area are dramatic. To the northeast, the rolling plateau reaches to Olancha Peak and ends to the north at the base of Cirque Peak. The area itself, however, consists of a light colored granitic soil, sparsely covered with subalpine type trees and shrubs, and occasionally broken up by a large rock outcrop. The small areas containing such outcrops could be considered as having a distinctive variety. However, the variety of the area, overall, is considered common.

There are no recorded archaeological sites within the proposed area according to the District atlas. Other evidence of past human use of the area has not been noted during reconnaissance to date.

H. Minerals, Rights-of-way, Land Status, Special Uses

Known mining claims do not exist within the proposed area. The closest one known is in Section 15, east of the proposed area near Snow Meadow on South Creek. This mining claim is a gold claim filed May 1976.

Economic mineral deposits have not been reported in the proposed area. There has been no mineral examination of the area. If the Botanical Area is established, a withdrawal will be investigated to preclude prospecting and mining.

Rights-of-way are not involved in the proposed area.

Private land does not occur within the proposed area. There are no withdrawals. Just east of the proposed boundary in Section 17, Power Project #85 was filed by Southern California Edison Company in 1921. There has been nothing done on that land to date; and there should be no effect of this proposal on that withdrawal.

Currently special-use permits are not on file within the proposed area.

I. Fire Control

The ridge systems running east and west through the Botanical Area and north and south between the proposed area and the Dome Land Wilderness are logical locations to establish firelines during suppression activities. The open, rocky terrain and scattered vegetation make it unnecessary to construct presuppression firebreaks along these ridges. They would only be used to combat large fires threatening the immediate area.

Special measures are not needed in the area except to identify the need for quick suppression of fires occurring there.

J. Insects and Disease

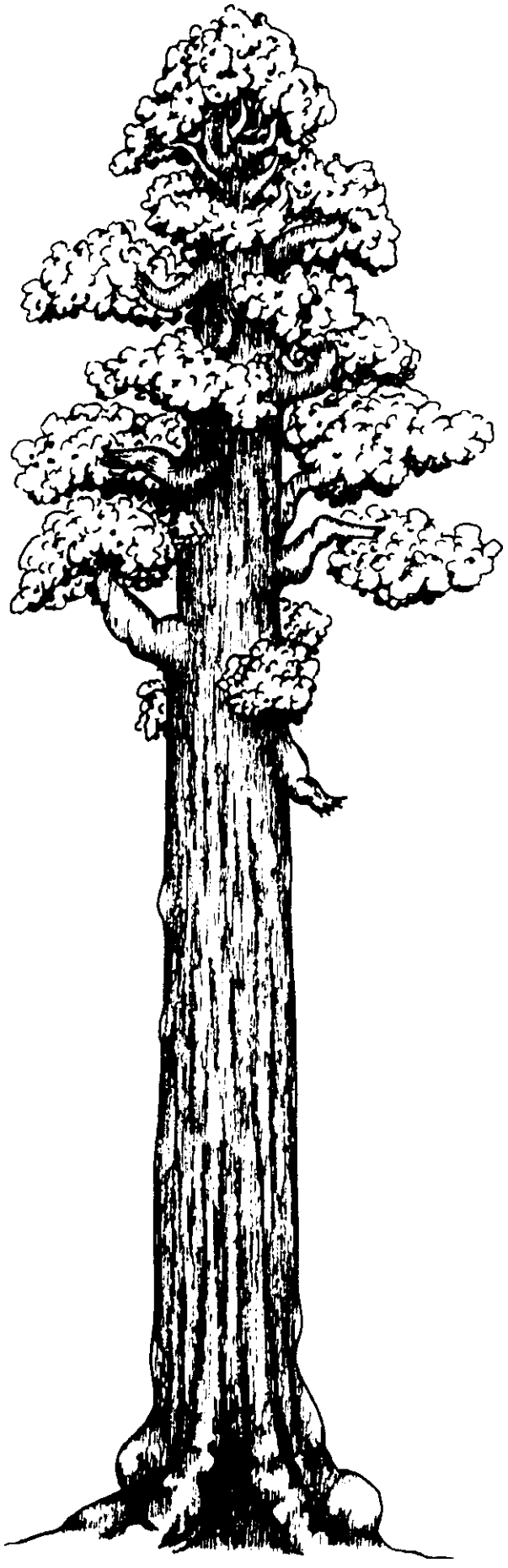
An inventory was not made to identify the extent of insects and disease occurring within the area. Casual observation revealed occasional incidents of both, but nothing unusually high. There will be no effect as a result of this proposal.

K. Transportation

Trails are discussed in Section F, Outdoor Recreation and Trails. Roads are not planned for this area.

L. Economics

The approximately five million board feet of timber inventoried on the 859 acres will be placed in a reserved status. The low overall growing capacity of the area and the relative inaccessibility of the timber except with an expensive helicopter system reduce the actual impact of this loss. In addition, only 1.5 million board feet over the entire proposed Botanical Area is of commercial quality. The actual effect will be a slight reduction in the commercial timber base from which the maximum allowable cut for the District is computed. The visible loss in annual timber outputs will be negligible. The artificial regeneration potential is low on a small portion where commercially harvestable species occur. Planting would be infeasible on the remaining area due to rock and poor soils. Also, a high-risk cut would reduce stocking to inadequate levels and regeneration could not be assured.



Appendix I

ACRONYMS

APPENDIX I

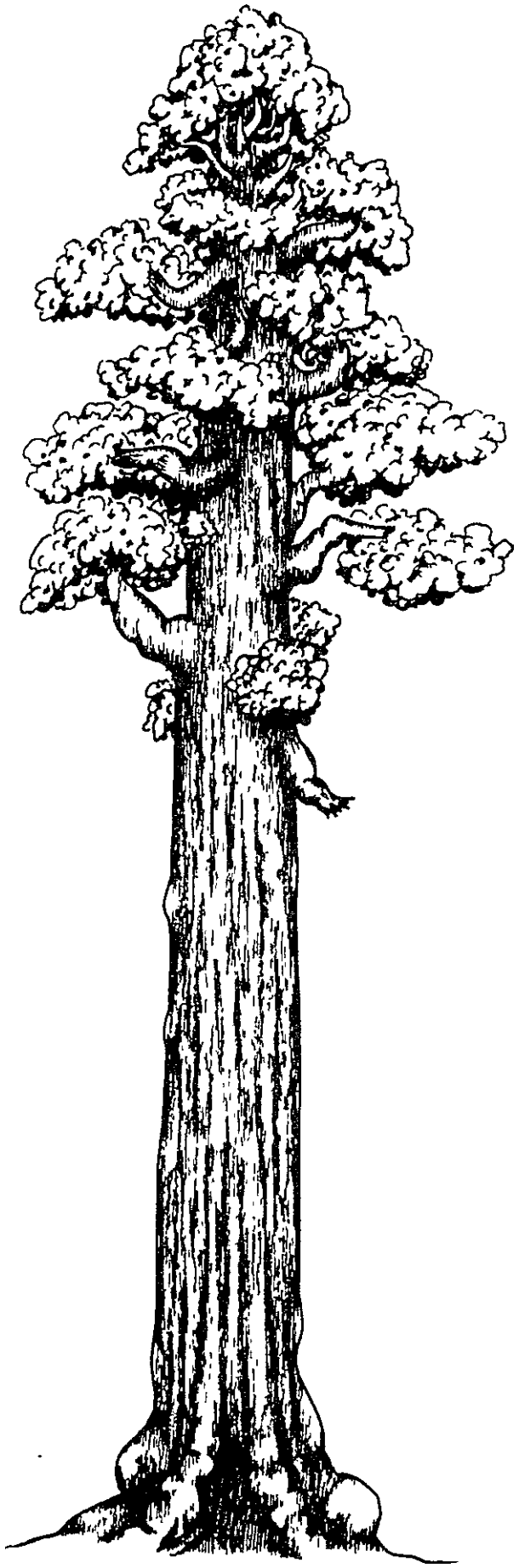
ACRONYMS

3-FIA	Three Forest Interpretive Association (Sequoia, Sierra. Stanislaus)
4WD	Four-wheel Drive
AFB	Air Force Base
AC-FT	Acre Feet (of water)
ADM	Administration
ADT	Average Daily Traffic
AMN	Amenity Emphasis (Alternative)
AMS	Analysis of the Management Situation
ARR	Archaeological Reconnaissance Report
ASQ	Allowable Sale Quantity
AUM	Animal Unit Month
BG	Background
BLM	Bureau of Land Management
BMP	Best Management Practice
BSS	Base Sale Schedule
BTU	British Thermal Unit
CAS	Capable, Available and Suitable
CCC	California Conservation Corps
CDF	California Department of Forestry
CED	Current, Economic Dispersed (Alternative)
CEE	Constrained Economically Efficient (Alternative)
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic Foot per Second
CG	Campground
CMAI	Culmination of Mean Annual Increment
CRM	Cultural Resource Management
CUR	Current (Alternative)
CWE	Cumulative Watershed Effects
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EFFF	Emergency Fire Fighting Funds
E.O.	Executive Order
EPA	Environmental Protection Agency
ERA	Equivalent Roaded Acre
EVC	Existing Visual Condition
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commision
FFP	Forest Fire Protection
FG	Foreground
FLPMA	Federal Land Policy Management Act
FPA	Further Planning Area
FS	Forest Service
FSH	Forest Service Handbook
FSM	Forest Service Manual
FVC	Future Visual Condition
FY	Fiscal Year
GSA	General Service Administration

GTW	Golden Trout Wilderness
HC	Habitat Capability
HCM	Habitat Capability Model
HRP	Human Resources Program
HRU	Human Resource Unit
I&C's	Issues & Concerns
ICO'S	Issues, Concerns and Opportunities
IDT	Interdisciplinary Planning Team
IPM	Integrated Pest Management
IS	Interpretive Services
IVQO	Initial Visual Quality Objective
JTPA	Job Training and Partnership Act
KV/K-V	Knudsen-Vandenberg (funding for reforestation)
KRCD	Kings River Conservation District
LBU	Low Budget (Alternative)
LKGT	Little Kern Golden Trout
LMP	Land Management Planning
LTSY	Long Term Sustained Yield
LTSYC	Long-Term Sustained Yield Capacity
M	Modification (VQO class)
M	Thousand
MAR	Management Attainment Report
MBF	Thousand Board Feet (of timber)
MCF	Thousand Cubic Feet (of timber)
MG	Middleground
MIR	Minimum Implementation Requirement
MIS	Management Indicator Species
MIZ	Meadow Influence Zone
MKT	High Market Emphasis (Alternative)
MM	Maximum Modification (VQO class)
MM	Million
MMBF	Million Board Feet (of timber)
MMCF	Million Cubic Feet (of timber)
MMR	Minimum Management Requirement
MT	Management Team
NDY	Non-Declining Yield
NEPA	National Environmental Policy Act
NF	National Forest
NFS	National Forest System
NFMA	National Forest Management Act
NOI	Notice of Intent
NP	National Park
NPB	Net Public Benefit
NR	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NRT	National Recreation Trail
NST	National Scenic Trail
NVC	Net Value Change
OHV	Off-highway Vehicle
01	Office of Information
OMB	Office of Management and Budget
ORV	Off-road Vehicle
OSHA	Occupational Safety and Health Administration

P	Preservation (ROS Class)
PAOT	People-At-One-Time
PCT	Pacific Crest Trail
PFD	Preferred Departure (Alternative)
PNV	Present Net Value
PR	Partial Retention (VQO class)
PRF	Preferred (Alternative)
PRO	High Production Emphasis (Alternative)
PSW	Pacific Southwest (Region of the Forest Service)
PT	Planning Team
R	Rural (ROS Class)
R	Retention (VQO class)
RARE	Roadless Areas Review and Evaluation
RD	Ranger District
RIM	Recreation Information Management
RN	Roaded Natural (ROS Class)
RNA	Research Natural Area
RO/R.O.	Regional Office
ROS	Recreation Opportunity Spectrum
RPA	Forest and Rangeland Renewable Resource Planning Act
RPA	1980 Resource Planning Act Program (Alternative)
RVD	Recreation Visitor Day
S&G's	Standards and Guidelines
SAOT	Skiers-at-One-Time
SCSEP	Senior Community Service Employment Program
SHPO/S.H.P.O.	State Historic Preservation Officer
SIA	Special Interest Areas
SMA	Special Management Area
SMZ	Streamside Management Zone
SO/S.O.	Supervisor's Office
SOHA	Spotted Owl Habitat Area
SOMA	Spotted Owl Management Area
SPM	Semi-primitive Motorized (ROS Class)
SPNM	Semi-Primitive Non-Motorized (ROS Class)
SYEP	Summer Youth Employment Program
T&E	Threatened and Endangered (Species)
TM	Timber Management
TPC	Timber Policy Constraint
TSI	Timber Stand Improvement
U	Urban (ROS Class)
USC	United States Code
USDA	United States Department of Agriculture
USDAFS	United States Department of Agriculture, Forest Service
USDI	United States Department of Interior
VAC	Visual Absorption Capability
VIS	Visitor Information Service
VQI	Visual Quality Index
VQO	Visual Quality Objective
WFHR	Wildlife and Fish Habitat Relationship
WFUD	Wildlife and Fish User Days
WFV	Wildlife, Fish and Visual Emphasis (Alternative)
WHE	Fish and Wildlife Harvest Emphasis (Alternative)
WIN	Watershed Improvement Needs
WLI	Wilderness/Capital Investment Emphasis (Alternative)

WRIS	Wildland Resource Information System
WSA	Wilderness Study Area
WSR/W&SR	Wild and Scenic Rivers
YACC	Young Adult Conservation Corps
YCC	Youth Conservation Corps



Appendix J

GLOSSARY

A

access
See public access

acre equivalent
The index of acres affected by wildlife habitat improvements in contrast to actual acres treated

acre-foot
A water measurement term, equal to the amount of water that would cover an area of one acre to a depth of one foot (325,851 gallons)

activity
A work process that is conducted to produce, enhance, or maintain an output or achieve an administrative and/or environmental quality objective

activity fuels
Fuels which have been directly generated or altered by management activity

activity outputs
The quantifiable goods or services resulting from any management actions taken on the Forest

administration-endorsed areas
Areas recommended by the President to Congress for classification or designation as National Wilderness, Wild and Scenic Rivers, or National Recreation Areas

administrative cost
Costs of required general administration which are prorated over fixed, variable, and investment costs

administratively-designated areas
Areas designated by the Secretary of Agriculture, the Chief of the Forest Service, or the Regional Forester because they merit special attention and management, such as scenic or geological areas

administrative unit
All the National Forest System lands for which one Forest Supervisor has responsibility

aerial logging
See logging systems

affected environment
The natural and physical environment and the relationship of people to that environment that will or may be changed by actions proposed

age class
One of the intervals, usually 10 to 20 years, into which the age range of vegetation is divided for classification or use

agricultural base
Economy in which the basic industry of a community is agriculture

air quality related values
Those attributes of Mandatory Class I areas important to the functioning of the area for the purposes for which they were established and preserved and which can be affected by air quality. May include visibility, ecologic, historic, cultural, or other values

airshed
A region with common resources and problems of air pollution. It may coincide with a watershed or be a part of a large urban agglomeration

allocation
The assignment of sets of management practices to particular land areas to achieve the goals and objectives of the alternative

allocation model
See resource allocation model

allotment
See range allotment

allowable sale quantity (ASQ)
The quantity of timber that may be sold from the area of land covered by the Forest Plan for a time period specified by the Plan. This quantity is usually expressed an an annual basis as the average annual allowable sale quantity (36 CFR 219.3(a) NFMA Regulations)

alternative
In Forest planning, a given combination of resource uses and a mix of management practices that achieve a desired management direction, goal, or emphasis

amenity (amenity value)
Typically used in land management planning to describe those resource values for which market values (or proxy values) are not or cannot be established. See also market

American Indian Religious Freedom Act of 1978
An Act by Congress that establishes as U.S. policy the protection and preservation of the inherent right of American Indians to believe, express, and exercise their traditional religions. The Act directs agencies to consult with native traditional leaders in order to determine the potential effect of Agency activities upon American Indians' religious and cultural rights and practices

AMS
See Analysis of the Management Situation

analysis areas
A aggregation of like capability areas with sufficiently similar physical, biological, and administrative conditions such that they would probably respond in a like manner to management activities. *See* also capability areas

analysis of the management situation (AMS)
A determination of the ability of the planning area to supply goods and services in response to society's demand for those goods and services

animal unit month (AUM)
The amount of forage required to support one mature (1,000 pound) cow or equivalent animal for one month, based on an average daily forage consumption of two pounds of dry forage per day

annual Forest program
The summary of aggregation of all projects that make up an integrated (multi-functional) course of action for a given level of funding of a National Forest that is consistent with the Forest Plan

apparent naturalness
The degree to which each roadless area reflects levels of environmental modification

appropriated costs
The sum of operational and capital investment costs

Archaeological Resources Protection Act of 1979
An Act by Congress that establishes protection for archaeological resources to prevent loss and destruction due to uncontrolled excavation and pillaging. Establishes permit procedures to permit excavation or removal of archaeological resources (and associated activities) located on public or Indian lands. Defines excavation, removal, damage, or other alterations or defacing of archaeological resources as a "prohibited act" and provides for criminal and civil penalties. Provides monetary rewards to individuals furnishing information leading to a civil violation or conviction of a criminal violation

area of influence
A delineated geographic area within which the present or proposed actions of a forest unit exert an important influence on residents and visitors

aspect
The compass direction that the slope of a land surface faces

ASQ
See allowable sale quantity

assigned value
A monetary value that represents the price consumers would be willing to pay for Forest outputs, whether or not such prices are actually paid to the Federal Government by consumers. In Forest planning the term assigned values refers to both market and nonmarket outputs because it is National policy to provide most Forest outputs at either no charge to consumers or at a price less than the willingness to pay price

AUM
See animal unit month

available, capable, and suitable
See available lands, capable lands. and suitable lands

available lands
Those portions of the Forest not administratively excluded from use for timber production

avera e annual cut
The volume of timber harvested in a decade, divided by 10, used as a basis for comparison of alternatives, not as a measure of nondeclining yield

average daily traffic (ADT)
The average 24-hour volume being total volume during a stated period divided by the number of days stated, the period is one Year

B

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backcountry
An undeveloped area where the management objectives stress dispersed off-road recreation (e g , hiking, trail bike riding. hunting, fishing) Generally describes semi-primitive motorized and semi-primitive nonmotorized recreation opportunities

background (BG)
The view beginning 3-5 miles from the observer and as far into the distance as the eye can detect the presence of objects

background level
The measurement of an environmental quality or characteristic in a natural or relatively unaffected state, such as water quality, used as a basis for comparison after management activities. or large climatic events.

backlog
Work done by the Forest Service (such as reforestation, timber stand improvement, slash disposal, or land line location) which needs to be completed

basal area
The cross-sectional area of a stand of trees measured at 4 5 feet above the ground, expressed in square feet

base area
The public or private land used to support a recreation operation that depends on use of the National Forest System land for its viability Usually used to describe the base facility of a ski area

base sale schedule (BSS)
The timber sale schedule in which the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade of the planning period The planned sale and harvest for any decade is not greater than long-term sustained yield capacity

base timber harvest schedule
See base sale schedule

benchmark
An analysis of the supply potential of a particular resource or of a set of resources subject to specific management objectives or constraints Benchmarks define the limits within which alternatives can be formulated

benefit
The total value of an output or other effect

benefit-cost analysis
An analytical approach to making choices on the basis of receiving the greatest benefit for a given cost or producing the required level of benefits at the lowest cost Also referred to as cost effectiveness analysis when the benefits cannot be quantified in terms of dollars

benefit-cost ratio
Measure of economic efficiency, computed by dividing total benefits by total casts Usually both benefits and costs are discounted to present *See* also discounting

: Management Pra (BMP)
Management acti ch are de t
maintain water (and soil t
by preventative tlay cor means

biological control
A method to control insect populations or tree diseases through the use of applied biology

biological potential
The maximum possible output of a given resource limited only by its inherent physical and biological characteristics

biomass
The total mass (e g , weight, Volume) of living matter in a biological system

BLM
Bureau of Land Management

BMP
See Best Management Practices

board foot
A unit of timber measurement equalling the amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide

broadcast burning
A technique of using Prescribed fire to burn all flammable materia within pre-determined boundaries - as opposed to burning individual piles or isolated patches of fuels

boating
See floating

browse
Leaf and twig growth of shrubs, woody vines, and trees available for animal consumption, act of consuming browse

BSS
See base sale schedule

burning prescription
Written direction stipulating fire environment conditions, techniques, and administrative constraints necessary to achieve specified resource management ob ectives by use of fire on a given area of land

C

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canopy
The more or less continuous cover of branches and foliage formed collectively by the crown of adjacent trees and other woody growth

capability
The potential of an area of land to produce resources, supply goods and services. and allow resource uses under an assumed set of management practices and at a given intensity Capability depends upon current conditions and site conditions such as climate. slope, landform, soils, and geology. as well as the application of mana ement practices, such as silviculture or protection from fire, insects, and disease

capability areas
The smallest unit of land or water used in Forest planning They are discrete and recognizable units classified Primarily according to physical, admin strative. and biological factors All land within a capability area is homogeneous in ability to produce resource outputs and in production imitations

capable lands
Those portions of the Forest that have an inherent ability to support trees far timber harvest and produce at least 20 cubic feet per acre per year of wood fiber. CMAI

ltal i : costs
Those Costs sociated with ons OF
devel improvements incl road
const reforestation, cam
const land line location etc

carrying capacity
The number of organisms of a given species and quality that can survive in. without causing deterioration of a given ecosystem through the least favorable environmental conditions that occur within a stated interval of time

CEQ
See Council on Environmental Quality

CFR
See Code of Federal Regulations

cfs
See cubic foot per second

characteristic landscape
The naturally appearing landscape being viewed

chemical control
A method to control insect populations or tree diseases through the use of applied chemicals.

Class I Area
Any area which is designated for the most stringent degree of protection from future degradation of air quality The Clean Air Act designates as mandatory Class I areas· each national park over 6,000 acres and each national wilderness area over 5,000 acres

Clean Air Act
An act by Congress for air pollution prevention and control.
1 To protect and enhance public health and welfare and the productive capacity of its population
2 To initiate and accelerate a national research and development program to achieve the prevention and control of air pollution
3 To provide technical and financial assistance to state and local governments in connection with the development and execution of their air pollution prevention and control programs
4 To encourage and assist the development and operation of regional air pollution control programs

l ut
A silvicultural treat that removes In a ngle cut the entire hantable sta g op of trees. with tl irpose of tal lishing a ever- stani

clearcutting
Harvesting of ell merchantable trees in one cut or area for the purpose of creating a new. even-aged stand The area harvested may be a patch stand. or strip large enough to be mapped and recorded as a separate age class in planning

clearing
An opening of any size created by management activities or natural occurrences within any vegetative type

climax
The culminating stage in plant succession for a given site where the vegetation has reached a highly stable condition

closed cano y
A condition that exists when the crowns of the trees in a stand cover 100 percent of the potential open space

closure
The administrative order restricting either location, timing, or type of activity in a specific area

CMAI
See culmination of mean annual increment

codominant
One main crown class of trees with their tops in the up er canopy but lower than the dominant trees See also dominant

Code-a-site
A method of recording and evaluating dispersed recreation camping sites

Code of Federal Regulations (CFR)
The listing of various regulations pertaining to management and administration of the National Forest

coliform bacteria
Any of several bacteria found in the large intestine of humans and animals the presence of which indicates fecal pollution

collector road
See road

commercial species
Tree species suitable for industrial wood products

commercial thinning
Cutting timber by means of sales far products (poles, posts, pulpwood, etc) in immature stands to improve the quality and growth of the remaining stand

commercial timber sales
The se ling timbe from National Fo System lands or the conomic gain of party emovi and n keting the trees

commodity
A resource output with commercial value

common variety minerals
See minerals, common variety

communications transmitter sites
See electronic sites

unity lifes yles
The ways in w ich ı idents conduc their everyday rout nes ı how the "way hey l is associated with e National Fo est

community stability
The capacity of a community to absorb and/or cope with change without major hardships to groups or institutions within the community

compartment
A division of forest land defined by natural and human-made features usually between 3,000 and 15,000 acres in size. used to facilitate timber planning.

concern
See management concern

condition class, facility
See facility condition class

confinement
To restrict the fire within determined boundaries established either prior to the fire, during the fire, or in a escaped fire situation analysis The normal tactic is surveillance only

conifer
A group of cone-bearing trees, mostly evergreen, such as pines. firs, incense-cedar, giant sequoia. etc

constraints
Limitations, actions which cannot be taken or which must be taken

sumer surplus
The difference between he a c tually paid by consumers for a good c rice and the amount each individual wou be willing to pay

consumptive use
1) A use of resources that reduces the su ply, such as logging and mining
2) water right term water diverted and not returned to the waterbody from which it was taken.
See also nonconsumptive use

containment
To surround a fire, and any spot fires therefrom, with control line, as needed, which can reasonably be expected to check thk fire's spread under prevailing and predicted conditions The normal tactic is indirect attack and burn to human-made or natural barrier with little or no mop-up

control
To complete the control line around a fire, any spot fires therefrom, and any interior islands to be saved. burn any unburned area adjacent to the fire side of the control line, and cool down all hot spots that are immediate threats to the control line, until the line can reasonably be expected to hold under foreseeable conditions The normal tactic is direct attack on the fire. if possible, and mop-up

cord
A stack of cut wood four feet by four feet in vertical cr ss section and eight feet long, contains 128 stacked cubic feet Two cords roughly equal one MBF

core area
See spotted owl core area

corridor
A narrow strip of land where existing or planned transportation and utility facilities are or will be located

cost
The price paid or what is given up in order to acquire, produce, accomplish, or maintain anything *See* administrative cost

cost-effective
Achieving a specified level of outputs under given conditions far the least cost *See* enefit-cost ratio

cost efficiency
The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs (such as environmental, economic or social impacts) are not assigned monetary values, but are achieved at specified levels in the least cost manner Cost efficiency is usually measured using percent net value; though use of benefit-cost ratios and rates-of-return may sometimes be appropriate.

Council on Environmental Qualit
An advisor council to the %resident establishes by the National Environmental Policy Act of 1969 It reviews federal programs for their effect on the environmental studies, and advises the President on environmental matters

cover
Vegetation used by wildlife for protection from predators and weather conditions, or in which to reproduce

critical habitat
Key land acres used by wildlife for forage and reproduction

crown
The upper part of a tree carrying the main branch system and foliage

cubic foot
A unit of measure referring to wood volume 1 foot x 1 foot x 1 foot

cubic foot per second (cfs)
Unit measure of streamflow or discharge, equivalent to 449 gallons per minute or about two acre-feet per day

culmination of mean annual increment (CMAI)
The point where the average annual growth of a stand of timber no longer increases

cultural practices
Various treatments to vegetative stands such as release. thinning. etc

cultural resources
Cultural resources are the tangible and intangible aspects of cultural Systems. living and dead, that are valued by a given culture or contain information about the culture Cultural resources include, but are not limited to sites structures buildings, districts. and objects associated with or representative of people. cultures. and human activities and events

lative wat:rshed effects (CWE's)
The additi/e or synergistic effects of lan management activities to water quality and beneficial uses as transmitted to the fluvial system Equivalen: Roaded Acres ire sed to measure .h: CWE's by defin ng a ran rd by which a ile range of impa ts c te easured against o account for var ing el of soil compact n and increase in run

current alternative
See no action alternative

current management direction
See management direction

cutting cycle
The planned, recurring lapse of time between successive cuttings of a crop or timber stand

D

DBH
See diameter breast height

decadence
Refers to decaying or declining growth of tree stands

decision criteria
Essentially the rules or standards used to evaluate alternatives They are measurements or indicators that are designed to assist a decision maker to identify a preferred choice from any array of possible alternatives

decision space
The limits within which Forest planning alternatives occur The outer limits are defined by benchmarks in Forest planning

decking areas
Sites that are intermediate between Stump and landing used to collect logs.

DEIS
See draft environmental impact statement

demand
The quantity of a good or service called for given a price or other combination of factors

r nd analysi
A study of t:e fa affecting the quantity and price of a go or service th ould be used or purchased by consumers if e available

demand schedule
The relationship between price and quantity demanded The demand schedule expresses how much of the good or service would be bought or consumed at various prices at a particular point in time

departure
A level of timber production that allows the planned sale and harvest to drop in a future decade (as opposed to non-declihing yield) See also non-declining yield

dependent communities
Communities whose so:ial, e:onomic, or poiitical iife would become discernably different in important respects if outputs from the National Forest were significantly altered

dependent species
A wildlife species that is dependent an a specific habitat element (e g , Snags, a vegetation type). The habitat element is deemed essential for the species to occur regularly or to reproduce

designated areas
See administratively-designated areas

design Capacity
The maximum theoretical amount of use a developed facility was constructed to accommodate

design standard
A set of descriptive terms which summarize the essential characteristics of a facility's design It may include the number of lanes. width of traveled way average design speed: ditch, shoulder. dike: or pavement Structure

:rminate stand
A group of trees f similar age and s ecies composition that r: clearl/ a : group from surrounding t nds

developed recreation
Use of a developed recreation site

developed recreation site
Relatively small, distinctly defined area where facilities are provided for concentrated public use (e , campgrounds, picnic areas, swimming areas.?

development scale
A predetermin scale for recreation te development w h guides the degree of si modification and kind of facilities to be installed

diameter breast height (DBH)
The diameter of a standing tree at a point 4 feet 0 inches from ground level

direction
See management direction

directive system
Is the basis for management and control of all internal program and administrative direction This system is made up of two basic components They are
1) Forest Service Manual (FSM), and
2) Forest Service Handbooks (FSH)

direct outputs
Resource outputs that are caused by an action and occur at the same time and place

discharge
Amount of flow at a given point in a stream. usually expressed in cubic feet per second

discount Pate
The interest rate which is used to reduce costs and benefits occurring in the future to their value in the present The higher the discount rate the lower the present value of future benefits and costs See discounting and present value

discounted benefit
The present value of future benefits

discounted cost
The present value of future Costs

discounting
An adjustment made to costs and benefits to compensate for the fact that dollars received or spent in the future have a lower value today than dollars in the present For example, it would be preferable to receive $100 this year rather than in one year from now because it could be invested at one percent simple interest and be worth $104 in one year Thus, given the choice between receiving benefits worth $100 today or benefits worth $100 one year from today, one would choose to receive it today Discounting reduces future costs and benefits to reflect that fact and enables comparisons to be made of benefits and costs occurring at different points in time

d ersed recreation
Outdoor recreation which occurs outside of planned and maintained recreational facili ties (e g , scenic driving, hunting, back-packing

distance zone
One of three categories used in the Visual Management System to divide a view into near and far components The three categories are 1) foreground (FG) (0 - 1/4 to 1/2 mile), 2) middleground (MG) (FG - 3 to 5 miles), 3) background (BG) (MG = infinity)

District Ranger
The official responsible for administering a subdivision of an administrative unit *See* Ranger District

diversity
The distribution and abundance of different plant and animal communities and species within an area

dominant
One main crown class of trees with their tops in the uppermost layers of the canopy

dominant land type
An area of land classified on the basis of geomorphic principles An understanding of geologic processes (as reflected in land surface form and features) individual kinds of soil, and the factors which determine the behavior of ecosystems (i e , climate vegeta-tion, relief, parent materials, and time) is used as the basis of this classification System

draft environmental impact e d
The statement of enviro l fect
required for major Fede t s un
section 102 the Nati r onme l
Policy Act e released to e l blic d
other agen for comme c l view

E

EA
See Environmental Assessment

early forest su
The plant a animal it that develops
immediately following the emoval o
destruction of the on in an area

ecology
The study of plants and animals in relation to their environment

or omic cost
Total fixed and variable costs for inputs, including costs incurred by other public and private parties, opportunity costs, and cost savings

economic efficiency
The usefulness of inputs (costs) to produce outputs (benefits) and effects when all costs and benefits that can be identified and valued are included in the computations Economic efficiency is usually measured using present net value, though use of benefit-cost ratios and rates-of-return may sometimes he appropriate

economic growth
Increased economic activity in real terms over time

ecosystem
Any complex of living organisms interacting with their environment

ecotone
The transitional zone between two overlapping habitats or plant communities.

edge
The boundary between two elements of the environment (e g , field/woodland)

edge contrast
The degree of similarity or difference between two or more adjacent elements of the environment

EFFALT
The Effective Alteration (EFFALT) approach is a means of quantifying the degree of visibly detectable alteration of the landscape caused by even-aged timber management The EFFALT index is a means to compare the overall visual impact of each alternative

effects
Results expected to be achieved or actually achieved related to physical, biological. and social (cultural and economic) factors resulting from the achievement of outputs Examples of effects are tons of sediment, pounds of forage, person-years of employment, income, etc There are direct effects indirect effects, and cumulative effects

efficiency, cost
See cost efficiency

efficiency, economic
See economic efficiency

EIC
See Ending Inventory Constraint

EIS
See Environmental Impact Statement

electronic sites
Areas designated for the operation of equipment which transmits and receives radio signals, excluding television aerials and antennas

encumbrance
See title claim

endangered species
A species of native fish, wildlife, or plants found by the Secretary of the Interior to be threatened with extinction because its habitat is threatened with destruction drastic modi-fication or severe curtailment. or because of aver-bxploitation, disease. predation. or other factors and its survival requires assistance Protection is established by the Endangered Species Act *See* also threatened species

em species
A ant or animal that is restri) a
r tively small geographic area or t an
u ual or rare type of habitat

ending inventory constraint (EIC)
A constraint to ensure that the total timber volume remaining at the end of the planning horizon will equal or exceed the volume that would occur in a managed Forest

environmental analysis
An analysis of alternative actions and their predictable short- and long-term environmental effects, which include physical, biological. economic, social, and environmental design factors and their interactions

environmental assessment (EA)
A concise public document required by the regulations implementing the National Environ-mental Policy Act which briefly provides sur-ficient evidence and analysis for determining whether to prepare an environmental impact statement or a findin of no significant impact This document is the report of the environmental analysis.

ronmental effect
Environmental effects descri the cha
positive or negative, in the hysical,
biological economic, and so l state
directly c indirectl re ul g from one or
more activ ies or ou ut

env ital impact stat ent (EI
A ement of the env ronment effects which
would be expected to r sult fr proposed
ative management actions

ephemeral stream
A stream which flows only from storm runoff and receives no contribution to flow from ground water

equivalent roaded acre (ERA)
See cumulative watershed effects.

erosion
The detachment and movement of soil from the land surface by wind, water, or gravity

even-aged management
Management of forest stands that results in trees of essentially the same age growing together Cutting methods which produce even-aged stands are clearcut, shelterwood, and seed tree

even-aged stand
A forest stand composed of trees having no or relatively small differences in age

even-flow
Maintaining a relatively constant supply of timber from decade to decade

existing visual condition (EVC)
The present state of visual alteration which is measured in degrees of deviation from the natural appearing landscape It provides a baseline inventory from which to measure change See visual condition

expanded suppression
The control or containment of wildfires at increased acreage within allowable fire intensity levels and fire control standards

extensive grazing
Season-long use of rangelands with distribution of livestock occurring through riding, salting, etc

extensive vs intensive management
Loose terms generally used to indicate a degree or level of management. For example
1) Intensive timber management refers to all practices or a set of practices necessary to emphasize timber production on land suitable for timber production
2) Extensive timber management consists of practices necessary to manage timber on land emphasizing other values

F

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facility condition class
The rating system used in the Recreation Information Management System to classify the condition and maintenance needs of recreation sites and areas

fee ownership
Ownership of property that has no limitation, qualification, or condition affecting it and is the maximum possible ownership possible in real estate under the system of property rights founded on English common law

fee purchase
Acquisition of fee ownership to a piece of property

fee site
A Forest Service recreation area in which users must pay a fee

FEIS
See environmental impact statement

final cut
Generally, removal of the last trees remaining in a stand, specifically, removal of the last seed bearers or shelter trees after regeneration is established under a shelterwood system

firebreak
See fuelbreak

fire hazard
The fuel in which a fire will ignite and burn

fire risk
The potential cause of a fire

firewood
See fuelwood

fisheries habitat
Streams, lakes, and reservoirs that support fishes

fixed cost
A cost committed for the planning period In Forest planning, the total cost of the minimum level benchmark.

floating
The use of river craft including inflatable boats, kayaks, canoes, dories or other recognized types of craft Does not include floats, tubes or similar objects that are used for play

floodplains
Lowland and relatively flat areas adjoining inland water, including as a minimum, that area subject to one percent or greater chance of flooding in any given year

forage
All browse and nonwoody plants used for grazing or harvested for feeding grazing animals

forb
Any nongrass-like plant having little or no woody material on it A palatable, broad-leaved, flowering herb whose stem, above ground, does not become woody and persistent See grass/forb

foreground (FG)
The portions of a view between the observer and up to one-quarter or one-half mile distant

Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA)
An act of Congress requiring the preparation of a program for the management of the National Forests' renewable resources and of land and resources management plans for units of the National Forest System It also requires a continuing inventory of all National Forest System lands and renewable resources

forest cover type
A classification of forest land referring to a group of timber stands of similar development and species composition Examples include the mixed conifer and the true fir types.

forest development roads and trails
A Forest road or trail under the jurisdiction of the Forest Service (Title 23 USC 101 as amended by the Surface Transportation Act of 1978)

forest highway (legal definition)
The term "Forest highway" means a Forest road under the jurisdiction of and maintained by a public authority and open to public travel (Title 23 USC 101 as amended by the Surface Transportation Act of 1978) This designation provides Congressional funding separate from ordinary use tax sources to insure adequate access and mobility between state primary highway system and the National Forests

forest land
Land at least 10 percent occupied by forest trees of any size, or formerly having had such tree cover and not currently developed for non-forest use Or, land within the National Forest boundary

Forest Officer
An employee exercising a specific and properly delegated authority

Forest Plan
See National Forest Land and Resource Management Plan

Forest Service Handbook (FSH)
The principal source for detailed instructions for performing specialized tasks Handbooks complement the Forest Service Manual

Forest Service Manual (FSM)
The principal source of continuing instructions for the conduct of Forest Service programs and activities, and is the basic and ruling component of the directive system The Manual is also available to interested persons outside the Service as a source of information on basic operations in the Forest Service

forest succession
See early forest succession

Forest Supervisor
The official responsible for administering the National Forest System lands in the Forest Service Administrative unit, which may consist of two or more National Forests, or all the Forests within a State who reports to the Regional Forester

forest survey site classes
A measure of the maximum capacity of an area to produce timber. measured in cubic feet per acre per year

Site Class	Max Cu Ft /Ac /Yr
1	225 +
2	165-224
3	120-164
4	85-119
5	50-84
6	20-49
7	less than 20

forest type
A term referring to a group of timber stands of similar character, development, and species composition due to ecological factors Examples on the Forest are mixed conifer and true fir types

forest-wide standard
A performance criterion indicating acceptable norms, specifications, or quality that actions must meet to maintain the minimum considerations for a particular resource. This type of standard applies to all areas of the Forest regardless of the other prescriptions applied

formation
One or more plant communities dominated by one particular life form occurring in similar habitats (e g , conifer forest)

FORPLAN
A linear programming model used for developing and analyzing Forest planning alternatives Also *see* linear programming and Appendix B

front country
The area below the elevation of the conifer forests (e g , blue oak Savanna. mixed chaparral)

FSH
See Forest Service Handbook

FSM
See Forest Service Manual

fuel
Any material that will carry and sustain a fat-est fire, primarily natural materials, both live and dead

fuelbreak
Any natural or constructed barrier utilized to segregate, stop, and control the s read of fire or to provide a control line from which to work

fuel management
The practice of planning and executing treatment or control of any vegetative material which adversely affects meeting fire management direction based upon resource management goals and objectives

fuels, activity
See activity fuels

fuels, natural
See natural fuels

fuel treatment
The rearrangement or disposal of natural or activity fuels to reduce the fire hazard Fuels are defined as both living and dead vegetative materials consumable by fire

fuelwood
Wood cut into short lengths for burning It is generally refuse material and may he round. split, or sawn

full service management
Management of developed recreation facilities to provide optimum maintenance

future scenarios
A word picture of a fixed sequence of future events in a defined environment

future visual condition (FVC)
See visual condition

G

game species
Any species of wildlife or fish for which seasons and bag limits have been prescribed. and which are normally harvested by hunting, trapping and fishing under State or Federal laws, codes. and regulations

goal
As used in the Forest Service, a concise statement that describes a desired condition to be achieved sometime in the future It is normally expressed in broad, general terms, and may not have a specific date for completion

goods and services
The various outputs produced by forest and rangeland renewable resources the tangible and intangible values of which are expressed in market and nonmarket terms

granitic rock
This is a general term which includes several rack types with differing combinations of quartz micas, and feldspars Usually has a salt-aid-pepper look

grass/forb
An early forest successional stage where grasses and forbs are the dominant vegetation See also forb

grazing
Consumption of herbage or artificial pasture forage by animals

grazing allotment
See range allotment

grazing permittee
An individual who has been granted written permission (a grazing permit) to graze livestock for a s ecific period on a range allotment in the Rational Forest

groundwater
Water within the earth that supplies wells and springs. Specifically. water in the zone of saturation where all openings in soils and rocks are filled

group selection
The cutting method in which trees are removed in small groups of less than two acres in size

growing season
The months of the year a species of vegetation grows

growing stock level
The number or volume of trees growing in a forest or in a specified part of it

guideline
An indication or outline of policy or conduct that is not a mandatory requirement (as opposed to a standard. which is mandatory) *See* also standard

H

habitat
The sum of environmental conditions of a specific place that is occupied by an organism. a population. or a community

habitat capability models
A mode? developed to describe the capability of specific habitat to support wildlife species

habitat diversity
See wildlife habitat diversity

habitat diversity index
A measure of wildlife habitat diversi improvement expressed as a percentage of optimum size class distribution that is achieved ov time

habitat quality crit
A wildlife habit model developed to des conditions neces to maintain wildlife populations at elected levels

habitat quality criteria for riparian h i
A specific habitat quality criteria e i for riparian areas describing habit conditions necessary to support rip dependent species at various ie ect population levels

hard snag
A dead tree that has not started to rot *See* snag and soft snag

hardwoods
A conventional term applied to the wood of a broadleaf tree (e g , maple, willow, oak, sycamore, alder) See softwoods

harvest species
Species of animals or fish that are hunted or fished for human consumption.

harvest system
See logging systems

helicopter logging
See lagging systems

heliport
An area used for landing and takeoff of helicopters which is accessible by road or boat It generally has supporting facilities.

helispot
Any designated landing spot for helicopters It is distinguished from a heliport by lack of supporting facilities

herbicide
A substance used to inhibit or destroy plant growth

hiding cover
Trees of sufficient size and density to conceal wildlife from view at 300 feet

high-lead
See logging systems

home range
An area in which an individual animal spends all. or most of, its time.

horizontal diversity
The distribution and abundance of different plant and animal communities across a specified area of land

n Resource Unit (H
A human ge graphic e characterized by particular patterns f ultural lifestyles, economic c nditions, i titutio al arrange ments, and topography

I

ICO's
See issues. concerns, and opportunities

IDT
See interdisciplinary team.

implementation
Those activities necessary to respond to the approved land and resource management plan

incidental grazing
Grazing use that occurs on lands not managed for the production of domestic livestock May occur as a result of natural herd movement trailing of livestock. or the use of domestic livestock in recreation

terminate nd
A group of ee of similar age and pecie composition ha has been i by other tree species to the point wl h rigin group nas iost its identity as a c rete unit

indicator species
A species or group of species whose habitat needs represent the habitat of a larger set of species

indirect u
Outpu s the ac ion but whlch are later in time or farther removed in distance but still bly foreseeable

induced outputs
Outputs in the private sector induced by the direct outputs produced on the Forest

inherent edge
Naturally occurring breaks between two or more elements of the environment

inholdings
Lends within the proclaimed boundaries of the Forest that are owned by some agency organization, or individual besides the Forest Service

initial attack
The initial suppression action taken by the first arriving individual or module to control a wildfire

ial Visual Quality Objectives (IVQO)
Visual objectives for a defin ive la area that is developed by using the Forest Service's Visual Management Sy tem

in-migration
The movement of human population into an area

input/output analysis
A quantitative study of the interdependence of a group of activities based on the relationship between inputs and outputs of the activities The basic tool of analysis is a square input/output table. interaction model, for a given period that shows simultaneously for each activity the value of inputs and outputs, as well as the value of transactions within each activity itself. It has especially been applied to the economy and the industries into which the economy can be divided

inputs
Land, labor, and capital required to produce outputs Inputs are generally represented by activity costs

institutional analysis
An examination of the institutions within the area of influence and their expected responses to Forest Service actions See also area of influence

instream flow
The amount of water passing a given point at a given time

integrated land d emen t plan
A forest pl wh considers all lands and all resourc of the National Forest. in contrast to j st part of the orest's lands or just one of t e

integrated pest management (IPM)
A process wherein pests (insects, animals, disease and competing vegetation) their impacts: end management become park of resource management considerations in planning Techniques which may be used are biological, chemical. manual. mechanical. or prescribed fire

intensive grazing
Grazing mana ement that Controls distribution of cattle an8 duration of use on the range, usually by fences. so parts of the range are rested during the growing season

intensive timber management
Timber management practices carried out to increase timber yield per acre

interdisciplinary team (IDT)
A group of individuals with different training who solve a problem or perform a task through frequent interaction so that disciplines can combine to provide new solutions

intermediate harvest
Any removal of trees from a stand between the time of its formation and the regeneration cut Most commonly used intermediate cuttings are release, thinning, improvement. and salvage

intermittent stream
A stream which flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow in mountainous areas

rpretive services (IS)
Activities and displays that interpret the natural and social history of the National Forest environment for the visiting public and inform them about ati nal Forest g als programs, and ser ces

ntory data and information colle on
The process of obtaining, storin and using current inventory data appropria for planning and managing the Forest

inversion
A warmer air layer overlapping a colder one because of a rapid heat loss by reradiation from the ground at night In the San Joaquin Valley this inversion produces the "tule-fogs" during the winter months In urban areas, it traps a si nificant concentration of pollutants especfally during the summer months

irretrievable commitments
Applies to losses of production or use of renewable natural resources for a period of time For example, timber production from an area is irretrievably lost during the time an area is a wilderness study area If the use is changed, timber production can be resumed The production lost is irretrievable, but the action is not irreversible

irreversible commitments
Decisions causing changes which cannot be reversed Once used, the resource cannot be reinstated. nor can opportunities be recovered Applies to nonrenewable resources such as minera s and Cultural resources

issue
See public issue

issues, concerns, and opportunities (ICO's)
Refers to thb public issues. management concerns, and opportunities identified in the Forest planning process

J

K

K-V funds
Funds set aside from timber sale receipts to finance reforestation. wildlife habitat. and other improvements in the timber sale area

L

land allocation
The assignment of a management emphasis to particular land areas with the purpose of achieving the goals and objectives of that alternative

Land and Water Conservation Act
Provides funds for and authorizes Federal assistance to the states in planning, acquisition, and development of needed land an8 water areas and facilities, provides funds for the Federal acquisition and development of outdoor recreation resources

land exchange
The conveyance of nonfederal land or interests to the United States in exchange for National Forest System land or interests in land

landform
A natural landscape that exists as a result of wind, water, or geologic activity (e g , a plain, plateau, basin, mountain. etc)

landing
Any place where round lags are assembled far further transport, commonly with a change of transport method

land line
For Forest plan purposes, National Forest property boundaries

land line location
To locate, survey, mark, and post the boundaries of National Forest System lands

landownership adjustment
The transfer of the ownership of lands by land exchange. land purchase, donations. or other methods

land status
The ownership Status of lands within the National Forest boundaries

late forest succession
A stage of forest succession where the majority of trees are mature or overmature
See early forest succession

leasable minerals
See minerals, leasable

lifestyle
The characteristic way people live, indicated by consumption patterns, work, leisure, expressed values, and other behavior

linear programming
A mathematical method used to determine the most effective allocation of limited resources between competing demands when bath the objective (e g , profit or cost) and the restrictions on its attainment are expressible as a system of linear equalities or inequalities (e.g., y=a+bx).

litter
The uppermost, sli htly decayed layer of organic matter on fhe forest floor

local dependent industries
Industries relying on National Forest outputs for economic activity

local lifestyle
See community lifestyles

locatable minerals
See minerals, locatable

logging systems
Methods of extracting logs from the stump to an area of collection. which are

aerial - a e stem which employs aerial means of Transportation, (e g , helicopters)

cable - a method which utilizes a powered cable system as the main device for moving logs High-lead, low-lead. and skyline are types of cable logging

tractor - a method which uses a tractor as the motive power for transporting logs, whether by dragging or carrying the logs

long-term effects
Those outcomes that will be significant beyond the RPA planning horizon of 50 years

long-term sustained yield (LTSY)
The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified intensity of management consistent with multiple-use objectives

long-term sustained yield capacity (LTSYC)
See long-term sustained yield

law-lead
See logging systems

low standard service
A level of recre management prescribed when recre tion are reduced in an alternati and therefore require different nager direction

LTSY
See long-term sustained yield

LTSYC
See long-term sustained yield

M

M
Thousand

maintenance level
A formal established set of objectives whlch describe the conditions necessary to achieve the planned operation of a road Maintenance levels describe the intensity of road maintenance

Level 1 - Basic custodial care required to protect the investment and to see that damage to adjacent land and resources is held to a minimum. Roads not open to public traffic

Level 2 - Roads where management requires limited passage of traffic (e g , administrative. permitted etc)

Level 3 - Roads which are open for gener public traffic This level is required to meet minimum standards for general public use traffic

Level 4 - Roads are open for public traffic which are frequently paved or surfaced with aggregate materials

Level 5 - Roads open to general public traffic providing comfort Roads usually paved

ce lev l os s (long-term)
costs requi ed to keep capital assets at a given level of service and availability
These are variable costs

maintenance level costs (short-term)
Costs incurred to keep capital assets at a given level of service and availability
These are fixed costs

maintenance wildlife Species
Wildlife species not emphasized in a given alternative scenario

managed season
That period of time developed recreation sites are open for public use, with routine maintenance. cleanup. and operation on a scheduled basis

management action
Any activity undertaken as part of the administration of the Forest

management area
An area of similar management goals and a common management prescription. Consists of a grouping of capability areas selected through evaluation procedures and used to locate decisions and resolve issues and concerns

management area grouping
An area of land used in planning which consists of similar analysis areas. has one prescription assigned and may not be contiguous When prescriptions change between alternatives. management areas also change

management Concern
An issue or problem requiring resolution

management direction
A statement of multiple-use and other goals and objectives, the management prescriptions, and the associated standards and guidelines for attaining them.

management indicator species (MIS)
A particular type of animal whose presence in a certain situation or location is a fairly certain sign or symptom that particular environmental conditions are also present

management intensity
The management practice or combination of management practices and their associated costs designed to obtain different levels of goods and services

management opportunity
A statement of general actions measures, or treatments that address a public issue or management concern in a favorable way

management practice
A specific measure. action, or treatment

management prescription
Management practices selected and scheduled for application on a specific area to attain multiple-use benefits and Other goals and objectives

management program
A set of activities designed to achieve a specific outcome

management standards and guidelines
See standard and guideline.

management team
The decision-making body comprised of the Forest Supervisor and his staff officers and District Rangers

market outputs
Outputs normally exchanged in markets as evidenced by transactions timber, range, developed recreation, minerals, and commercial utilized fish

mass movement
Downslope unit movements of a portion of the land's surface (i e , a single landslide or the gradual simultaneous downhill movement of the whole mass of loose earth material on a slope face)

mast
Nuts, acorns. and similar products of hardwood species. which are consumed by animals

mature timber
Trees that have attained full development, particularly height, end are in full seed' production

maximum erosion hazard
This is an assessment of the relative hazard of the loss of surface soil in an average year, assuming that protective vegetation bas been removed

maximum modification (MM)
See Visual Quality Objectives.

MBF
Thousand board feet A measure of wood volume equal to 1 inch x 1 foot x 1000 feet
See board feet

meadow ecosystem
A meadow ecosystem is a grassy opening, two acres or larger, dominated by perennial sedges, rushes, and grasses (wet meadow) or perennial grasses and forbs (dry meadow).

MCF
Thousand cubic feet A measure of wood volume See cubic feet

mean annual increment
The average yearly growth of a tree, calculates by dividing the volume of the tree by its age

merchantable timber
Timber of salable quality

middleground (MG)
The space between the foreground and the background in a picture of landscape The area located from 1/4-1/2 to 3-5 miles from the viewer

mineral development
The preparation of a proven mineral deposit for mining

mineral entry
Filing a claim to hold or purchase public land in order to claim the rights to minerals it contains

mineral exploration
The search for valuable minerals on lands open to mineral entry

mineral production
Extraction of mineral deposits

mineral soil
Weathered rock materials without any vegetative cover

minerals, common variety
Deposits which - although they may have value for use in trade. manufacture, the sciences, or in the mechanical or ornamental arts - do not possess a distinct. special economic value for such use over and above the normal uses of the general sum of such deposits

minerals, leasable
Minerals which are developed (i e. explored. mined, extracted. etc) by a permit or lease. in contrast to minerals development through claims staking (e g , coal, oil, gas. and geothermal)

minerals, locatable
Those hardrock minerals which are mined and processed for the recovery of metals May include certain nonmetallic minerals and uncommon varieties of mineral materials such as valuable and distinctive deposits of limestone or silica.

minerals, salable
Minerals occurring in high volume, low-Unit-value deposits which do not have a distinct or special economic value over similar materials and are therefore usually sold rather than leased or claim staked Examples are sand, gravel. stone and clay

minerals, strategic and critical
Minerals that are necessary for industry and national defense and have been identified by Congress for stockpiling

mineral withdrawal
The withholding of an area of federal land from mineral entry or development in order to reserve the area for a particular public purpose or program

minimum stream Flow
A specified level of flow through a channel that must be maintained by the users of Stream for biological, physical. or other purposes

mining claim
That portion of the public estate in which the right of exclusive possession of locatable mineral deposits is vested in the locator of a deposit

mining patents
See patented mining claim.

MIS
See Management Indicator Species

mitigation
Actions to avoid, minimize. reduce, eliminate. or rectify the impact of a management practice

MM
Million.

MMBF
Million board feet. A measure of wood volume. See board feet and MBF

MMCF
Million cubic feet. A measure of wood volume. See cubic feet and MCF

modification (M)
See Visual Quality Objectives

itor ng and evaluation
The pe ioodic evaluatio n a e basis of Forest Plan management p act. o determ how well objectives have bee met and how closely management standards have been app.ied

mortality
Dead or dying trees resulting from forest fire. insects. diseases, or climatic factors

multiple-use
The management of all renewable surface resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people

municipal watershed
The watershed from which the runoff is used for drinking purposes in a city.

N

National Environmental Policy Act (NEPA)
An act to declare a national policy which will encourage productive and enjoyable harmony between people and their environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere, and stimulate the health and welfare of people, to enrich the understanding of the ecological systems and natural resources important to the nation, and to establish a Council on Environmental Quality

National Forest Land and Resource Management Plan
A plan developed to meet the requirements of the Forest and Range land Renewable Resources Planning Act of 1974, as amended, that guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands of a given National Forest

National Forest Landscape Management System
The art and science of planning and administering the use of forest lands in such ways that the visual effects maintain or upgrade human psychological welfare. It is the planning and design of the visual aspects of multiple-use land management

National Forest Management Act (NFMA)
A law passed in 1976 as amendments to the Forest and Range land Renewable Resources Planning Act that requires the preparation of Regional and Forest plans and the preparation of regulations to guide that development

National Forest System land
National Forests, National Grasslands, and other related lands for which the Forest Service is assigned administrative responsibility

National Historic Preservation Act of 1966 (as amended)
An Act by Congress that declares national policy of historic preservation. Directs expansion of the National Register of Historic Places, authorizes matching Federal grants to States and the National Trust for Historic Preservation. An amendment authorizes the Secretary of the Interior to withhold from public disclosure, locational information on National Register listings if such disclosure would create a risk of damage or destruction to such sites and objects

National Recreation Trails
Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the national system of trails authorized by the National Trails System Act. National recreation trails provide a variety of outdoor recreation uses in or reasonably accessible to urban areas

National Register of Historic Places
A listing (maintained by the USDI National Park Service) of areas which have been

d as being of cal signifi-
c The Register i places of lo
a state significance as well as those of
v to e nation as a whole

National Wild and Scenic River System
Rivers with outstanding remarkable scenic recreational, geologic, fish and wildlife: historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act for preservation of their free-flowing condition

National Wilderness Preservation System
All lands covered by the Wilderness Act and subsequent wilderness designations, irrespective of the department or agency having jurisdicitor

natural forest
The condition of a forest environment at any point in time, including its associated plant and animal communities, which has been reached essentially through the process of natural succession

natural fuels
Fuels not directly generated or altered by management activity. This includes fuels which have accumulated because of deliberate fire exclusion.

al opening
A break in the forest canop an area f essentially bare soil, gras orbs, or hrubs in an area dominated ees

NEPA
See National Environmental Policy Act

net public benefit (NPB)
The overall value to the nation of all Outputs and positive effects (benefits) less all associate% inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both qualitative and quantitative criteria rather than a single measure or index

net value ia e
The su o the changes sulting from increa es (benefits) and decreases (d in the value of outp rom the land area affected as the con ce of fire

network
See spotted owl network

NFMA
See National Forest Management Act

no action alternative or current alternative
The alternative which continues current management direction into the future

noncommercial vegetative treatment
The removal of trees for other than timber production purposes

noncommodity outputs
A resource output that cannot be bought and sold

nonconsumptive species
Wildlife species not used as food for human consumption, but normally observed, studied, photographed, etc. (as opposed to harvest or consumptive species)

nonconsumptive use
1) Use of a resource that does not reduce the supply, such as many types of recreation

2) Water right term. water returned after use to the waterbody from which it was diverted (e g , hydroelectric) See also consumptive use

non-declining yield
Timber scheduled for harvest so that any given decade's production does not fall below the previous decade's production

nondiscretionary resources
Resources considered in the Plan where the choices of allocation are limited by law and/or regulation, or by unique, site-specific sets of physical-environmental requirements (e g , Research Natural Areas, Wild and Scenic Rivers)

nongame
Wildlife that are not hunted far sport and/or far food

nonmarket outputs
Forest outputs not normally exchanged in markets. In the Forest Service, the following resource outputs are classified as nonmarket outputs: dispersed recreation, wildlife and fish user days, water. Although not normally exchanged in mhrkets, the Forest Service assigns proxy values for analysis purposes.

nonpoint source pollution
Pollution occurring at many diffuse locations, as opposed to pollution from a specific site, such as a factory.

tr al range improvem n s
Cu l practices (type c n ersi , noxious we ntrol, seeding, etc) that are carried ou to increase forage production and enhance or ect the other resources

ice of intent (NOI)
Written notice to the affected District Ranger by those who intend to engage in mining activity on he For st including prosp ting exploration mining a l mineral rocess ing activities

ous weeds
A plant species that is undesirable. conflicts, restricts, or otherwise causes problems with management objectives

O

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objective
A clear and specific statement of planned results to be achieved within a stated time period. The results indicated in the Statement of objectives are those which are designed to achieve the desired state or process represented by the goal. An objective is measurable and implies precise time-phased steps to be taken and resources to be used which, together, represent the basis for defining and controlling the work to be done. Objectives may be stated as a range of outputs, casts. and/or effects

objective function
A term used in linear programming referring to the Item to be maximized (or minimized) in the problem's Solution (e g , maximize PNV. maximize timber)

obliteration
The act of eliminating the functional charac teristics of a road and reestablishment of natural resource production capability.

occupancy trespass
The illegal occupation or possession of National Forest System land or property

off-highway vehicle (OHV)
Any motorized vehicle capable of cross-country travel an or immediately over land, water, Snow, ice or other natural terrain. Examples include motorcycles, four-wheel drive vehicles and snowmobiles. The State of California has defined off-highway vehicles by size and class of vehicles

old growth
A stand that is past Pull maturity end showing signs of decadence, the last stage in forest succession. Although the tree age, size. height, or density will vary by timber type, trees are usually 21 inches or larger DBH and 150 years or older

opening
An area of land from which timber has been harvested (generally using even-aged management). In Region 5, the maximum size of openings is 5 to 60 acres for Douglas fir and 5 to 40 acres for all other forest types. An opening is no longer considered an opening when a specified number of trees per acre within a specific forest type and site class have reached 4 5 feet in height

operational costs
Those associated with administerin and maintaining National Forest facilities and resource programs

operations plan
A claimants or Operators written plan approved by a Forest officer, describing proposed mining activities

opportunity
See management opportunity

rtunity cost
The value of the benefits foregone when a management alternative is chosen.

Order 3 Geologic Resource Inventory
An inventory describing and designating geologic factors such as soils, surficial deposits, bedrock. landslides, etc and geologic resources such as ground water, minerals and underground space
Also see FSM 2881

ORV
Off-road vehicle. See off-highway vehicle

output
A good, service, or on-site use produced from forest and rangeland resources. See nonmarket output

output, activity
See activity outputs

output, direct
See direct outputs.

overflow capacity
Use of a developed recreation site which exceeds the designed capacity

overmature timber
Trees that have exceeded full development, particularly in diameter, height or growth rate, and are declining in vigor: health, and soundness

oversteeped slo es
Slopes greater than the angle that soil or loose rock fragments remain stable

overstory
That portion of the trees, in a forest of more than one story, forming the upper or uppermost layer

P

Pacific Southwest Region
The Re ion of the Forest Service covering the 17 Natfonal Forests within the State of California. This region is referred to as Region 5 or R-5

PAOT
See persons-at-one-time

partial retention (PR)
See Visual Quality Objectives

particulates
A component of polluted air consisting of any liquid or solid particles suspended or falling through the atmosphere

patented mining claim
A patent is a document which conveys title to land. When patented, a mining claim becomes private property and is land over which the United States has no propert rights except as may be reserved in the paten%

payment in lieu of taxes
Payments to local or State governments based on ownership of Federal land and not directly dependent on production of outputs or receipt sharing. Specifically, they include payments made under the Payments in Lieu of Taxes Act of 1976 by U S Department of the Interior

perennial stream
Stream that flows throughout the year

permitted grazin
Use of a Natfonal Forest ran e allotment under the terms of a grazing permit

personal income
Income earned by all households within a region (salaries, wages. profit, rent, royalties. interest, etc)

persons-at-one-time (PAOT)
A recreation capacity measurement term indicating the number of people that can use a facility or area at one time

person-year
Approximately 2,000 working hours. May be filled by one person working yearlon or several people filling seasonal positions

physiographic surface
A land surface created by geologic processes of intrusion. deposition. erosion. or structural movement

planned ignitions
A fire started by a deliberate management action

planning area
The area of National Forest System land covered by a Regional or Forest plan

planning criteria
Standards, tests, rules, and guidelines by which the planning process is conducted and upon which judgments and decisions are based

planning direction
Refers to R-5, Pacific Southwest Region Land Management Planning Direction. Circulated to the Forests March 1, 1982. Copies are available far review in Forest planning offices

planning horizon
The overall time period considered in the planning process ?hat spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decisions. In Region 5 the planning horizon is 160 years

planning period
Five decades. The time interval within the planning horizon that is used to show incremental changes in yields. costs. effects. and benefits

n ng qu:stion
A major policy questi of :ong-ra ge significance, derived om :he pub. ic is: and management concerr t: be dec: ded wl selecting amon; alterr iv: Forest plans

planning records
A system that documents data collections, analysis, interdisciplinary team decisions, and activities that result from the process of developing a Forest Plan, revision, or significant amendment

planning regulations
Refers to the Code of Federal Regulations (36 CFR 219) "National Forest System Land and Resource Management Planning"

planning team (PT)
A group of resource specialists assigned to Land Management Planning that provide data to the interdisciplinary team for Forest planning

plantation
A stand of trees resulting from planting or artificially seeding an area

plant communities
A group of plants that live together in the same environment

PNV
see present net value

point pollution source
An identifiable source from which pollutants are or may be discharged (e.g., a pipe. ditch. channel. tunnel, conduit, well)

pole and sapling
A forest successional stage in which trees between one and 10 inches in diameter are the dominant vegetation

pole timber trees
See size class

policy
A guiding principle upon which is based a specific decision or set of decisions

possible management prescription
A combination of management practices. A possible management prescription emphasizes one or more management opportunities over others in order to address specific public issues and management concerns. The combination of management practices describes how all resource uses and activities would be managed to attain what the prescription has been designed to accomplish. If a possible management prescription is selected and scheduled for application, it becomes a management prescription

practice
See management practice

precommercial thinning
The selective removal of trees in a young stand to maintain a specific stocking or stand density range, and improve the vigor and quality of the trees that remain

preparatory cut
Removal of trees near the end of a rotation so as to permanently open the canopy and enlarge the crowns of seed bearers - with a view to improving conditions for seed production and natural regeneration, as typical in shelterwood systems

prescribed fire
Introduction of fire under controlled conditions to dispose of slash or fuels control unwanted vegetation or stimulate grasses, forbs, shrubs, or trees for range, wildlife, recreation, or timber management' purposes

prescription (Rx)
The set oh management practices applied to a specific area to attain specific objectives. Region 5 distinguishes between FORPLAN Rx's and management Rx's. FORPLAN Rx's are sets of "pure" activities without spatial allocation and standards and guidelines. Management Rx's are written as a result of allocating FORPLAN solutions to management areas and imposing standards and guidelines. See also management area

present net value (PNV)
The difference between the value of discounted benefits derived from all out uts to which monetary values or establishes market prices are assigned, and the total discounted costs of managing the planning area

present value
The value which results when benefits or costs expected to occur in the future are discounted to the future. See also discounting

preservation (P)
See Visual Quality Objectives

preservation
See Giant Sequoia, Chapter 3, EIS, Vegetation Management section

presuppression
Activities required in advance of fire occurrence to ensure effective suppression action. Includes
1) recruiting and training fire forces,
2) planning and organizing attack methods,
3) procuring and maintaining fire equipment, and
4) maintaining structural improvements necessary for the fire program

primary range
See range

primitive roads
Roads constructed with no regard for grade control or designed drainage. sometimes by merely repeated driving over an area. These roads are single lane, usually with native surfacing and sometimes passable with four-wheel drive vehicles only. especially in wet weather

uctive potential
The largest possible amount of output that a resource can supply without rading the production capability of th esource

productivity
See site productivity

Program Accounting and Management Attainment Reporting System (PAMARS)
The administrative system used by the Forest Service to monitor costs and outputs

program budget
The schedule of projects and activities to be carried out on the Forest for a year for which money has been appropriated

Program Development and Budgeting
The process by which activities for the Forest are proposed and funded

project
Work schedule for a project area to accomplish management prescriptions. Projects can be for operation maintenance and protection (OMP) or for investment purposes. OMP projects are for ongoing work and are generally considered one

year at a time. Investments can be of multi-year duration A project is organized for managerial convenience, and is described by location, activities, outputs, effects, workforce dollars, time, and responsibility for execution

proposed action
In terms of the National Environmental Policy Act, the project, activity, or decision that a Federal agency intends to implement or undertake which is the subject of an environmental impact statement

proxy value
A value assigned to a good or service for evaluation purposes when the good or service is not bought nor sold and an established monetary price does not exist

public
The people of an area, state, or nation that can be grouped together by a commonality of interests, values, beliefs, or lifestyles

public access
Usually refers to a road or trail route over which a public agency claims a right-of-way available for public use

public benefit, net
See net public benefit

public issue
A subject or question of wides read public interest relating to managemen? of National Forest System lands identified through public participation.

public participation activities
Meetings, conferences, seminars, workshops, tours, written comments, response forms, news releases, letters, and similar activities designed and held to obtain comments from the general and specific publics about National Forest System land management planning

put to bed (roads)
Blocking a road so that is can not be used by motorized vehicles, removing drainage structures and promoting revegetation by ripping, seeding, planting and fertilizing, if necessary See obliteration

Q

QWIK-QWERY
A computer program used for data analysis and sorting

R

R-5
The abbreviation for the Pacific Southwest Region of the Forest Service. National Forests in California belong to Region 5

range
primary - includes areas which are readily accessible have available water and will be overuse6 before livestock significantly graze other areas

secondary - areas less preferred by livestock which will ordinarily not be grazed significantly until the primary range bas been overused

suitable - land that is or can be made accessible to livestock, that produces forage or has inherent fora e producing capabilities, and that can %e grazed on a sustained yield basis under given management goals

transitory - land temporarily suitable for grazing, but transient over time and/or location For example, grass may cover an area for a period before being replaced by trees or shrubs not suitable for forage

sui - area that should not be gra by k because of unstable soils, ste o topography, or inherent low potential for forage production.

range allotment
A designated area of land available for livestock grazing upon which a specified kind and number of livestock may be grazed under a range allotment management plan.

range condition
The state of health of the range based on what it is naturally capable of producing

range permittees
See grazing permittee

Ranger District
Administrative subdivisions of the Forest supervised by a District Ranger who reports to the Forest Supervisor

raptors
Birds of prey with a strong notched beak and sharp talons (e g , the eagle, hawk, owl, etc)

RARE II
See Roadless Area Review and Evaluation II

rare species
One that, although not presently threatened with extinction, is in such small numbers throughout its range that it may be endangered if its environment worsens

rate-of-return
Rate of interest at which the net discounted benefits equal the net discounted costs (Internal rate-of-return is a similar measure appropriate to private firms)

real dollar value
A monetary value which compensates for inflation

real income
Income based on real dollar values (values from which the effect of change in purchasing power of the dollar has been removed)

receipt income
A percentage of revenue collected by National Forests which is given to state and county governments where the Forest is located for use on county roads and schools

reconstruction
Road or trail construction activities which take Place on an existing road or trail and which raise the standard of the road or trail. Usually the length of the existing facility is not materially changed, although the length may be increased to reduce the grade This can include relocation of the facility in a completely new location

Record of Decision
A document separate from but associated with, an environmental impact statement that publicly and officially discloses the responsible official's decision on which alternative in the EIS to implement

recovery species
Federally listed threatened or endangered wildlife and fish species for which an objective has been set to raise the population to a viable level

recreational livestock
Animals used primarily in conjunction with recreation (e g., horses, mules, llamas, etc.)

recreational river area
As used in the Wild and Scenic Rivers Act, those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past

recreation experience level
A classification (using a scale Of 1 for "primitive" to 5 for "modern") of the level of development in camp and picnic sites pertaining to the types of recreation opportunities and modifications in the environment that can be expected

Recreation Information Management (RIM)
The Forest Service system for recording recreation facility condition and use

recreation opportunity
The availability of a choice for a user to participate in a Preferred activity, within a preferred setting, to realize the desired experience

recreation opportunity class
A land classification based on recreation settings and possible uses

Recreation Opp nity Spectrum (ROS)
A means of ssifying and managing recreation opportunities based on physical setting social setting and managerial setting T e six different OS classes briefly desc are:

Primitive (P) - An area three miles or more from roads and trails having motorized use, generally 5,000 acres or more in an essentially unmodified natural environment.

l-Primitive No Motorized (SPNM) - An ar one-half mile rom roads and trails hav motorized use, generally 2,500 to 5,000 acres with only subtle modifications to an otherwise natural setting

Semi-Primitive Motorized (SPM) - Same as semi-primitive non-motorized but with motorized use of roads and trails, including ORV touring, snowmobile, hiking. cross-country skiing, etc.

Roaded Natural (RN) - An area one-half mile or less from roads, resource modifications range from evident to strongly dominant

Rural (R) - The setting is substantially modified with structures or other cultural modifications

Urban (U) - The setting is strongly dominated by structures, highways, and streets

recreation sidences
Houses or cabins on National For system land th are not intended to be the primary resider of the owner

recreation visitor day (RVD)
Twelve hours c recreation use in any combination of persons and s (i e on person for 12 ours, 3 per for 4 1

reduced service management
Management of developed recreation facilities below optimum maintenance standards

reforestation
Reestablishing a crop of trees on forest land by natural or artificial methods

reforestation backlog
Suitable timber land wh ch i currently n stocked with commercial tree species La occupie l mainly with hardwoods, brush, or grasses scheduled for conversion to commercial conifer through reforestation

regeneration
Reestablishing a crop of trees on forest land by natural or artificial methods

regeneration cutting
Refers to the logging of stands to allow new crops to be planted usually applied to stands which cannot economically be held because of poor stocking, health. thrift, quality. or composition

regeneration harvest
Any cutting of trees in preparation for the establishment of a new stand or individual trees Cutting prescriptions include clearcutting, seed-tree, shelterwood. and group selection

region
An administrative unit within the National Forest System. Each region has a headquarters (regional) office and is supervised by a Regional Forester The Pacific Southwest Region (R-5) Regional Office is in San Francisco

Regional Forester
The official responsible for administering a single region

Res onal guide
The guide developed to meet the requirements of t e Forest and Rangeland Renewable Resources Planning Act of 1974, as amended that guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands of a given region It also assigns RPA objectives to the Forests within that Region

onal lan and resource man gem nt plan
The plan oped to meet the requirements of the Fore and Rangeland R ble Resources Planning Act f 1974, as a d, that guides nil natural re rce management activiti and ablishes ma emen t standards and gui es for th l ional Forest S stem lan a ven reg n it also assign RPA obj es to th Forests within tha Region

Regional Office
See region.

Regional Plan
See Regional Land and Resource Management Plan.

regulated timber land
Land which is capable and is managed to produce regular periodic yields of commercial timber in perpetuity Ideally. a regulated forest would consist of equal areas in each age class eo that the oldest stands could he cut annually to produce a sustained yield

Regulation Classes
Regulation Class I prescriptions are even-aged management prescriptions for existing timber stands with full timber yields expected These represent harvest regimes on lands not otherwise constrained that result in optimum timber production in volume and/or value Practices in this class are.

1) Clearcutting without thinning (non-intensive harvest in FORPLAN)

2) Shelterwood without thinning (non-intensive harvest in FORPLAN)

3) Clearcutting with thinning(s) prior to harvest

Regulation Class II pres
Management Classrif prescriptionspace a conditions". for exitions timber"standal

Reduced timber yields would be expected These represent harvest regimes on lands designated to meet non-timber objectives that result in a mean rotation longer than o timum for timber production Generally other values are accounted for by constraints on harvest rates, not by modifications to yield tables, the exceptions are group to selection (item 5) and specialized prescriptions (item 6) specialized

Practices in this class are.

1) Clearcutting without thinning (non-intensive harvest in FORPLAN)

2) Shelterwood without thinning (non-intensive harvest in FORPLAN)

3) Clearcutting with thinning(s) prior to harvest.

4) Shelterwood with thinning(s) prior to harvest

5) Group selection (i e , clearcuts less than five acres in size) or single tree selection

6) Specialized prescriptions which contain unique yield tables and/or constraints on harvest rates (e , deer winter range prescriptions wit% wider spacing and no release)

Regulation Class III prescriptions are for existing stands which are equivalent to the former "marginal timber yield" categorization Timber outputs resulting from prescriptions in this class will be regulated as a separate non-interchan eabale component of the allowable sale quantify Practices in this class are

1) Removal o single tre s or small groups of trees for sanitation, salvage, o hazard reduction (assume yields based o past 10-year e perience)

2) Stand maintenan e along es to maintain the vigor of th stands ields are ofte linked to other harvest in adjacent areas Gen rally this practice is used for stre amside and highway zones if not other-wise managed by indepe ident s al s

3) Prescriptions for marginal productivity (i e , lands producing less than 20 cubic feet per acre per year) and/or disputed regeneration

4) Group selection (i e.. clearcuts less than five acres in size) or single tree selection

release
Freeing a tree group of trees from immediate competition by eliminating growth that is overtopping or closely surrounding them.

release and weeding
All work done to free desirable trees from competition from less desirable trees, dense shrubs, or grasses and other forms of herbaceous vegetative growth.

Research Natural Area (RNA)
An area established specifically to preserve a representative sample of an ecological community, primarily for scientific and educational purposes

residual stand
The trees remaining after some form of selection cutting is performed on a stand

resource allocation model
A mathematical model using linear programming which will allocate land to prescriptions and schedule implementation of those prescriptions simultaneously The end purpose of the model is to find a schedule and allocation that meets the goals of the Forest and optimizes some objective function such as "minimize costs"

resource element
A major category of activity required to accomplish the Forest Service mission The eight resource elements are recreation wilderness, wildlife and fish, range, timber. water, minerals, and human and community development

resource management plan
A plan developed prior to the Forest Plan that outlined the activities and projects for a particular resource element independently of considerations for other resources Such plans are superseded by the Forest an

resource use and development opportunities
A possible action, measure, or treatment, and corresponding goods and services identified and introduced during the scoping process which subsequently may be incorporated into and addressed by the and resource management plan in terms of a management prescription

responsible official
The Forest Service employee who has been delegated the authority to carry out a specific planning action.

restoration
A process of restoring site conditions as they were before the land disturbance

retention (R)
See Visual Quality Objectives

return period
Average time in years between flood flows of a specified size for a given stream

rights-of-way
Accurately located land areas within which users may conduct operations approved or granted by the landowners May also refer to a permit, easement, lease, license, or Memorandum of Understanding (MOU) used to authorize the land use

rights-of-way acquisition
Rights-of-way granted to National Forest by others to use the land in the manner specified

rights-of-way grant
Rights-of-way granted to others to use National Forest System land in the manner specified

RIM
See Recreation Information Management

riparian area
Land situated along the bank of a stream or other body of water and directly influenced by the presence of water (e g , streamsides. lake shores)

RNA
See Research Natural Area.

road
A general term denoting a travel way for vehicles greater than 40 inches in width Roads are functionally classified as

abandoned road - A road not needed on a [redacted]ng basis for sustained or intermittent use. Abandoned roads include abandoned system roads and temporary roads. Where possible, abandoned roads not planned for future use will he obliterated Unofficially referred to as nonsystem roads

arterial road - Typically a two-lane, surfaced road serving large land areas and usually connecting with public highways.

collector road - ingle-lane or double-road which is typically surfaced and serve smaller land areas They usually form a link between arterial and local roads

1 road - Typically a native surface, one road accessing a single resource terminal facility such as a log landing, a campground, a t or Ski facility

nonsystem road - see abandoned road

system road - A road needed on continuing basis for sustained or intermittent use

roaded natural (RN)
See Recreation Opportunity Spectrum

roaded natural recreation
Recreation activities which occur in an area characterized by predominantly natural appearing environments with moderate evidences of human sights and sounds

roadless area
As defined by the Roadless Area Review, an area of undeveloped Federal land within which there are no improved roads or roads maintained for use by motorized vehicles, generally 5,000 acres or larger unless adjacent to an existing Wilderness.

Roadless Area Review and Evaluation II (RARE II)
The assessment of roadless and undeveloped areas within the National Forests as potential wilderness areas as required by the National Wilderness Act This refers to the second such assessment which was documented in the final environmental impact statement of the Roadless Area Review and Evaluation, January 1979

road obliteration
See obliteration

ROS
See Recreation Opportunity Spectrum.

rotation
The length of time between the formation or regeneration of a tree stand and its final cutting

roundwood
Timber and fuelwood prepared in the round state - from felled trees to material trimmed, barked. and crosscut (e g , logs, transmission poles)

RPA
See Forest and Rangeland Renewable Resources Planning Act

RFA program
The recommended direction for long-range management of renewable resources of National Forest System lands This direction serves as the basis for the Regional targets assigned to the Forest The development of this direction is required by the Forest and Rangeland Renewable Resources Planning Act

rural (R)
See Recreation opportunity Spectrum

RVD
See recreation visitor day

Rx
See prescription

S

salable minerals
See minerals. salable

sale schedule
The quantity of timber planned for sale by time period from an area of suitable land covered by a forest plan

salvage
The exploitation of trees that are dead, dying, or deteriorating (e g , trees which are overmature or materially damaged by fire, wind, insects, fungi, or other injurious agents) before their timber becomes worthless

sanitation cutting
The removal of dead, damaged, or susceptible trees, to prevent the spread of pests or pathogens and to anticipate salvage

sapling
See size class

sawlog
A log meeting minimum standards of diameter, length, and defect. For softwoods, they are at least eight feet long, sound and straight, and with a minimum diameter inside bark of six inches

sawtimber
Trees that will yield logs suitable in size and quality for producing lumber. *See* size class

scoping process
Process used to identify issues and concerns which are within Forest Service authority to resolve. See also Appendix A

Seasonal Average Daily Traffic (SADT)
The average 24-hour traffic volume, being the total volume during a stated season of use that a road is open, divided by the number of days in that season

seasonal economy
An economy based on employees working only part of the year (e g , summer employment, winter employment at a ski area). *See* also year-round economics.

secondary range
See range

second growth
Forest growth that has become established after some interference with the previous forest crop (e g , cutting, serious fire, or insect attack)

second home
A residence that is not occupied year-round and whose owner has a permanent residence somewhere else

sedimentation
The deposition of soil and organic material transported by or suspended in water

seed cut
Removal of trees in a mature stand so as to effect permanent opening of its canopy (if there is no preparatory cutting to do this) and so provide conditions for securing regeneration from the seed of trees retained for that purpose

seedling
See size class

[illegible]ling [illegible]
A fo[illegible]ice sional s[illegible]ge in wh[illegible]h trees less than [illegible]ve inches [illegible] diameter ir the pred[illegible]t vegetation

seed tree cutting
Harvesting all trees in one cut except for a small number of seed bearers left singly or in small groups, usually 8 to 10 per acre. An even-aged stand results

seen area
Total area observed. May be measured in terms of foreground, middleground, and background

selection cutting
The removal of trees individually or in small groups less than five acres in size

semi-primitive motorized (SPM)
See Recreation Opportunity Spectrum

semi-primitive non-motorized (SPNM)
See Recreation Opportunity Spectrum

sensitive species
Those species of plants or animals which
1) have appeared in the Federal Register as proposals for classification and are under consideration for official listing as endangered or threatened species;
2) are on an official State list; or
3) are recognized by the Regional Forester as needing special management in order to prevent the need for their placement on Federal or State lists

sensitivity level
A particular degree or measure of viewer interest in the scenic qualities of the landscape

seral
A biological community which is a developmental, transitory stage in an ecologic succession

settlement patterns
Any distinguishable distribution of a population in a geographic area, including the historical cycles of settlement in an area. This descriptor identifies where a population is located, the type of settlement categorized by its centralized/dispersed, permanent$ temporary, and year-round/seasonal characteristics. It also describes the major historical growth/nongrowth cycles and the reasons far each successive wave of settlement

shelterwood cutting
A regeneration method under an even-aged silvicultural system. A portion of the mature stand is retained as a source of seed and/or protection during the period of regeneration. The mature stand is removed in two or more cuttings commonly termed seed cutting and removal cutting

shrub and seedling
A forest successional stage in which shrubs and seedling trees are the dominant vegetation

silvicultural system
The entire process by which forest stands are tended, harvested, and replaced. It includes all cultural practices performed during the life of the stand such as regeneration cutting, fertilization, thinning, improvement cutting: and use of genetically improved sources of tree seeds and seedlings to obtain multiple resource benefits. Silvicultural systems are classified as even-aged or uneven-aged

silviculture
The art and science of growing and tending forest vegetation for specific management goals

single tree selection cutting
The cuttin method in which individual trees are removes to provide a stand with trees of different sizes and age classes on the same site. This method results in an uneven-aged stand

site
A refinement of a capability area. A subdivision of a capability area using those land characteristics which cause significantly different short-term Outputs, effects, or costs when a management prescription is implemented on it

site class
See forest survey site classes

site index
A numerical evaluation of the quality of land for plant product-vity, especially used in forest land where it is determined b the rate of growth in height on one or more of the tree species

site preparation
The preparation of an area for regeneration. It involves the removal of slash and/or competing vegetation and usually the exposure of bare mineral soil

site productivity
Production capability of specific area5 of land

size class
For purposes of Forest planning, size class refers to the three intervals of tree Stem diameter used for classification of timber

1) seedling/sapling - less than five inches in diameter
2) pole timber - five to less than ten inches in diameter
3) sawtimber - larger diameter than pole timber

skidding
A loose term for hauling logs by sliding. not on wheels, from stump to roadside, deck. skidway, or other landing

skier day
Measure of downhill skiing use equivalent to one person skiing for eight hours

skiers at one time (SAOT)
a measure of ski area capacity represented by the number of skiers that can occupy the area at the same time

skyline
See logging systems

slash
The residue left on the ground after timber cutting, storms fire, etc It includes unutilized logs: uprooted stumps broken stems, branches. twigs, leaves. bark. and chips

slope slump
A slide or earthflow of a soil mass

SMZ
See streamside management zone

snag
A standing dead tree from which the leaves and most of the branches have fallen Snags provide food and living space for many birds and animals. See hard snag and soft snag.

social category
People with a common social characteristic such as age, nationality, occupation. hobby, interest. or educational level

social diversity
The variety of choices people have in shaping current and future activities in their environment

social group
People who cooperate to pursue common interests and/or attain mutual goals

social impact
Changes in social or cultural conditions that directly or indirectly result from a Forest Service program. project, or activity

social impact analysis
The social components of the environmental analysis process, a systematic effort to determine how present programs or proposed actions affect the human environment

social or anization
The structure of a society described in terms of roles, relationships, norms, institutions. and/or community cohesiveness and stability

Social Resource Unit (SRU)
A human-geographic area exhibiting common cul ural economic, and institutional characteristic, An SRU is an aggregation of Human Resource Units and typically crosses National Forest county. and state boundaries The SRU is used to design. implement. and evaluate management actions that respond to changing social conditions of physical resource uses at an area or regional level

social stability
The de ree of control people have in protecting the cultural strengths within their environment and managing changes affecting their future activities

social value
A shared standard of preference or desirability, as wealth. beauty, good health. honesty. or privacy

social variable
A social or cultural element such as population size, employment, opinion on an issue, crime rates, satisfaction with community life or recreation-use patterns, that can be evaluated at different times or places to show the effects of a Forest Service action

soft snag
A standing dead tree from which the leaves and most of the branches have fallen and which bas started to rot internally *See* snag and hard snag

softwoods
A term applied to the wood of a cone-bearing tree (e g , pines. firs incense-cedar, giant sequoia) *See* hardwood6

soil horizons
Layers of the soil each of which has comparatively uniform characteristics different from adjacent layers (e g , surface layer)

soil productivity
The capacity of soil to produce a specific crop such as wood products, forage. etc under defined levels of management It is generally dependent on available soil moisture. nutrients, and length of growing season

soil resource inventory (SRI)
The systematic examination, description. classification. and mapping of soils

sound wood
Timber that is free from defect damage, or decay (i.e , in solid, whole. gkod condition)

ial interest area (SI\)
Areas established and managed for their unique special feature They include ge logic l historical, arc aeological botan cal, r other memorable features

spacial-use permits
Permits, memorandums f understan and g of easements authorizing the y and use of land.

special uses
Uses of public land for which a special-use permit is required

species
See dependent. endangered. or threatened species

specimen giant sequoia
A standing giant sequoia, live or dead, that has mature characteristics such as columnar form of stem, deeply furrowed bark, lower stem free of limbs, red bark, etc In addition, it must be older than 150 years and larger than eight feet in diameter at six feet above ground level

spotted owl core area
300 or more continuous acres within which a known or potential spotted owl nest site is located

ted owl habitat
1,0 a res of b bitat and 650,
1,0 1,65 o a t habitat depending
on thb mana m p l to sustain habitat
ove ne

spotted owl management area (SOMA)
Groups of three or more spotted ow1 habit areas which are separated by not more than 1 5 miles from core area to core area The SOMA's are spaced between six and 12 miles apart

SRI
See soil resource inventory

SRU
See Social Resource Unit

stagnation
With respect to air pollution, the persistence of a given volume of stable air over a region. permitting an abnormal buildup of pollutants from sources within the region

d
A community of trees or other vegetation c is suffic e unif in position, constitut o ge, s atial angement, or condition t dist e from adjacent communities l to t form management entity

standard
Performance criterion indicatin acceptable norms, specifications, or qualify that actions must meet. A principle requiring a specific level of attainment, a rule to measure against. See also guideline

standard service
Management of recreation facilities which provides for ve etation management, tutt maintenance of facilities, appropriate toilet cleaning and garbage pick up, and information and interpretive services for the recreation user

stocking
An indication of the number of trees, basal area, or cubic feet in a stand as compared to the desirable number for best growth and mana ement Examples are overstocked. well stooged. understocked

stocking level
The degree to which land is occupied by trees (measured by basal area and/or number of trees by size and spacing), compared with a stocking standard which establishes the stocking required to utilize fully the growth potential of the land.

strategic and critical minerals
See minerals, strategic and critical

stream class
A classification given to all named drainages or stream channels on the Forest, based on stream size, season, amount of flow, importance as a fishery or water source, and other characteristics They range from Class I (largest, most important) to Class IV (small, often intermittent)

Stream flow minimum
See minimum stream flow

stream order
Stream ordering starts at the fingertip tributaries at the head of a Stream system and these are designated as first-order streams Then two first-order streams join to form a second-order stream segment. two second-order streams join. forming a third-order. and so on

streamside management zone (SMZ)
An area of land extending beyond the riparian area commonly managed with caution as a buffer to protect riparian areas and water quality

structural range improvements
Those range improvements c t and maintained (fences, cattleguar develop-ments, etc) to facilitate ttie ement of the range resource

stumpage
Timber as it stands uncut

subculture
A distinctive pattern of beliefs, values, norms, and customs shared by a portion of the population, Often because of a common ethnic heritage. occupation. or religious or ideological Orientation

subdivisions
Areas of previously undeveloped land divided into lesser blocks of ownership

succession
The gradual supplanting of one plant community by another as the site changes over time until the climax community is reached *See* early forest succession and forest succession

suitable lands
Acres of land selected for management of timber production on a regulated basis from land which has been identified as tentatively suitable See tentatively suitable lands

suitable range
See range

supply potential
The output production possible from the available resources

support services
Any arrangement people use for taking care of each other. Support services occur in a geographic area in both formal and informal ways Examples include health Care, education. law enforcement, fire protection, transportation environmental protection, and energy

Examples Of informal support activities include the ways people manage on a day-to-day basis using family, neighborhood, friendship. or any other support system

suppression
Actions taken to extinguish or confine a fire

sustained yield
See long-term sustained yield

T

T & E
Threatened and endangered Species See endangered species and threatened species

tall-forest cover
Trees of at least *young* sawtimber size

target
A statement used to express lanned results to be reached within a state8 time period

tentatively suitable lands
Those lands which are defined as
1) presently forested, currently producing, industrial or producing, crops of
2) not withdrawn from timber production by Congress, the Secretary of Agriculture, or the Chief of the Forest Service,
3) **for which technology and k wledge exist and are available to ensur timber produc tion without irreversible mage to soils productivity, or watershed**
4) where there is reasonable assurance that adequate restocking can be attained within five years after final harvest. and
5) where adequate information is available to pro ect responses to timber management activities

theoretical capacity
See design capacity

thermal *cover*
Trees of at least sapling size of sufficient density to provide shelter from winter winds for wi dlife

thinning
Cutting timber to improve the quality and growth of the trees that remain In commercial thinning, timber is cut In precommercial thinning, non *trees* are cut *See* commercial thinning

threatened species
Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and which has been designated in the Federal Re ister by the Secretary of Interior as a threatened species **See also** endangered species

e-:tej shelterwood
An even-aged silvicultural system in which in order to provide a source f seed and/or protection for regeneratin thc id cro (th shelterwood) is removed i ree success e shelterwood cuttings

tiering
Refers to the *practice* of covering general matters in broader environmental impact statements which are subsequently incorporated by reference into narrower environmental impact statements or environmental analyses, allowing the narrower document to concentrate solely on the issues relevant to that specific project

timber
A general term for the major woody growth Of vegetation in a forest area

timber base
The lands within the forest capable, available, and suitable for timber production

timber compartment
See compartment

timber harvest
See timber production

timber harvest schedule
The quantity of timber planned for sale and harvest, by time period. from the area of land covered by the Forest pian

timber land, regulated
See regulated timber land

timber production
The growing, tending, harvesting, and regeneration of regulated crops of industrial wood. Industrial wood includes logs, bolts, or other round selections cut from trees for industrial or consumer use, except fuelwood.

timber sale
See commercial timber sales

timber stand improvement (TSI)
The use of noncommercial thinning, clearing, weeding and intermediate cuttin S to eliminate or suppress less desirable vegetation and improve composition. condition. structure. or growth of a stand.

title claim (encumbrance
Claim of ownership oh National Forest System land by others.

tractor logging
See logging systems

trade-off
The impact on an output or cost caused by changing another output or cost

trailhead
The parking, signing, and other facilities available at the terminus of a trail

trail maintenance level
A maintenance sequence ranging from I to IV, with Level I being a low level providing for resource protection and foot traffic only and Level IV being a high level emphasizing user convenience for all modes of travel (foot. horse. motor vehicle)

transitory range
See range

travel management
The administrative decisions on the location and timing of road and trail closures

treatment area
The site-specific location of a resource improvement activity

tree bole effect
The visual appearance of tree trunks in an area where an opening has been made in the forest canopy

TSI
See timber stand improvement

t -step shelterwood
An even-aged silvicultural rstem in which, in order to provide a source seed and/or protection for regeneratin., the old crc (the shelterwood) is removed i.i two successiv shelterwood cuttings

type conversion
The n of one type of vegetation cover Lo another g forested Lo nonforested, one tree species to Another. shrubs to grasses)

U

UAC
See unit area control

understory
Low-growing vegetation (herbaceous shrubs, or seedlings and saplin s) growing under a stand of trees Also, that portion of trees in a forest stand below the overstory

en-ag d anagement
Manag me it of forest stands which l in trees of several or r ages growing together Cutting m producing uneven-a stands a single-tree and group selectio

l: area control (UAC)
A system of forest management whereby r stand bound ries a d cutting prescrip er determined rima i y by the condition of existing t ber

unpatented mining claim
See mining claim

unplanned ignition
A fire started at random by either natural or human causes. or a deliberate incendiary fire

unregulated timber
Timber on commercial forest l nd that is not considered part of the annual harvest because other resource values are greater (e g., recreation, aesthetics)

unsuitable lands
Refers to land which is not suited for timber production according to the following criteria defined in NFMA Regulations, 36 CFR 219.14

1) is not at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use.

2) there is not reasonable assurance that such lands can be adequately restocked within five years after final harvest.

3) technology is not available to ensure timber production from the land without irreversible resource damage to soil productivity or watersheds. and

4) land has been withdrawn from timber production by Congress, the Secretary of Agriculture or the Chief of the Forest Service

unsuitable range
See range.

i interfac
in area of in settlemen on ri land
contiguous i the Forest that is developed
or potenti developable to rs
comparable to conventional vi

utility corridors
Area of land set-aside for powerlines, pipelines, or other similar utilities'

utilization standards
The minimum size of tree that may be cut as Sawtimber or roundwood

V

variety class
See Visual Variety Class

vegetation treatment
Any activities undertaken to modify the existing condition of the vegetation

vegetative management
Activities designed primarily to promote the health of the forest cover for multiple-use purposes

vertical diversity
The distribution and abundance of different plant and animal communities from the ground level up

viable populations
Populations of reproductive plants or animals of sufficient numbers and distribution to assure perpetuation of the species in perpetuity

viewshed
The landscape seen or potentially seen from all or a lo ical part of a travel route. use area, or wafer body

visitor information service (VIS)
Activities which interpret for visitors, In layman's language, Forest management, protection, utilization, and research It also includ s interpreting the local bc geology, ec lcgy, zoology, history, anc archaeology See also Interpretive Ser

visual absorption capability (VAC)
The ability of the lands e to withstand management man pul tions out significantly affecting its isu l cha r Rated as high mod rate, an ow

Visual Condition
The following are Visual Condition Classes and descriptions
I - Pristine, no trace of management activities, only change from natural ecological processes

II - Evidence of management activities is not detectable by the average viewer

III - Effects on the landscape ıagemei activities are visible b remain visually subor linate to characteristic landscape

IV - Landscape alterations caused by management activities visually dominate the characteristic landscape but vegetative and land farm alterations must borrow visual characteristics that naturally occur within the surrounding area

V - Effect of management activities visually dominate the natural landscape but the visual characteristics of the alterations must appear to be of natural occurrence only when viewed in the background When seen in the foreground or middleground they may not appear at all natural

VI Landscape alterations totally dominate the natural landscape and appear unnatural when viewed at any distance and in stark contrast to surrounding natural features

al enhancement
A short-term manageme:.t alternative which is done with the express purpose of in easing positive visual variety where li :tl variety how exists

visual quality index (VQI)
A numerical rating of scenic quality that reflects both the condition of the landscape and the acreage of land in each of the six condition levels ranging from Type I which appears to be untouched by human activities to Type VI where changes in the landscape appear to be drastic disturbances and are in glaring contrast to the natural appearance

visual quality objectives (VQO)
A set of measdrable maximum levels of future alteration of a characteristic landscape These levels are

Preservation (P) - Ecological change only

Retention (R) - Euman activities are not evident to the casual Forest visitor

Partial Retention (PR) - Human activities may be evident but must remain subordinate to the characteristic landscape

Modification (M) - Human activity may dominate the characteristic landscape but must, at the same time, follow naturally established form, line. color, and texture It should appear as a natural occurrence when viewed in foreground or middleground

Maximum Modification (MM) - Human activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background

visual resource
The composite of basic terrain, geologic features vegetative patterns 'and land use effects that typify a land unit and influence the visual appeal that the unit may have for visitors

Visual Variety Class
A measure of the inherent potential of landscape for scenic value. based on the remise that greater diversity in landscape features increase the natural scenic quality The three Variety Classes are

Class A :) - reas with landform: Vege ative patterns, or that create a landscape of unusual and :tanding visual quality

Class B (Common) - Areas with d: ape features that provide an a: amount of variety and c: eate a land: e hat is common to the area

Class C (Minimal) - Areas with little change in their landscape features and thus, with little scenic quality

VQO
See Visual Qualit Objectives
See also Initial visual Quality Objectives

W

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water chance
An area generally on a perennial stream utilized for drafting water to accomplish dust abatement on log ing roads or used for fire suppression Wafer chances can be either a temporary or a permanent water-holding structure

water influence zone
Areas oriented to outdoor water recreation

Water Pollution Act
Public Law 92-500 :n ctel in 1972 which has an objective to rest 'e and maintain the chemi-cal, physica an biological integrity of tl Nation's wat

water rights
Legal right to divert and use water or to use it in place

watershed
The total area above a given point on a stream that contributes water to the flow at that point

watershed condition
The Status of a watershed which influences soil productivity, water yield, water pollution, or hazardous events

watershed modeling
A mathematical formulation to simulate natural watershed phenomena The end purpose of the model is to predict water yield and sedimentation

water yield
The total amount of water coming from an area of land, commonly a watershed. over a given period of time

water yield increase
Additional water released to the Forest streams as a result of Forest management activities

wetlands
An area at least periodically wet or flooded, where water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soi and an its surface (e g , bags and marshes)

WFHR
See Wildlife and Fish Habitat Relationships

WFUD
See Wildlife and Fish User Day

wild and scenic river
Under the 1968 Wild and Scenic Rivers Act. a river set aside to preserve its natural environment and water quality "Wild River," "Scenic River" and "Recreation River" are cl sifications of rivers covered by the Act (1% U S C Sec 1273(b))

wilderness
Briefly, under the Wilderness Act of 1964, wilderness

1) is undeveloped Federal land without permanent improvements or human habitation,

2) is protected and managed so as to preserve its natural conditions,

3) has outstanding opportunities for solitude or primitive recreation.

4) has at least 5,000 acres or is of sufficient size to make practical its condition, and

5) and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest

wilderness study area (WSA)
One of the areas selected by the Chief of the Forest Service from an inventory of unroaded and undeveloped National Forest System lands as having apparent hi n qualities for wilder-ness The area will & studied to determine whether it should be recommended for addition to the National Wilderness Preservation system

wildfire
Any wildland fire that requires suppression

Wildlife and Fish Habitat Relationships (WFHR)
A system for organizing information about wildlife and fish species, their habitats, and relationships between them which is used in

land and resource management planning to set standards and guidelines, evaluate species and habitat diversity, identify special habitat needs, etc

wildlife and fish user day (WFUD)
Twelve hours of recreation use oriented to wildlife and fish

wildlife habitat diversity
The distribution and abundance of different plant and animal communities and species within a specific area

withdrawal
Withholding an area of Federal land from settlement, sale, location, or entry allowed under the general land laws to reserve the area for a particular purpose or program

wood fiber production
The growing, tending, harvesting, and regeneration of harvestable tree;

work routines
Predictable ways in which people earn their living, including where and when. Factors such as times of day and year, stability, skills required, types of work (hard labor, services), natural resources required, and pay levels are used to generate a profile of a geographic area's work routines. The opportunities for advancement, the business ownership patterns, and the generational cycles of employment activities are also described as part of the work routines descriptor

X

Y

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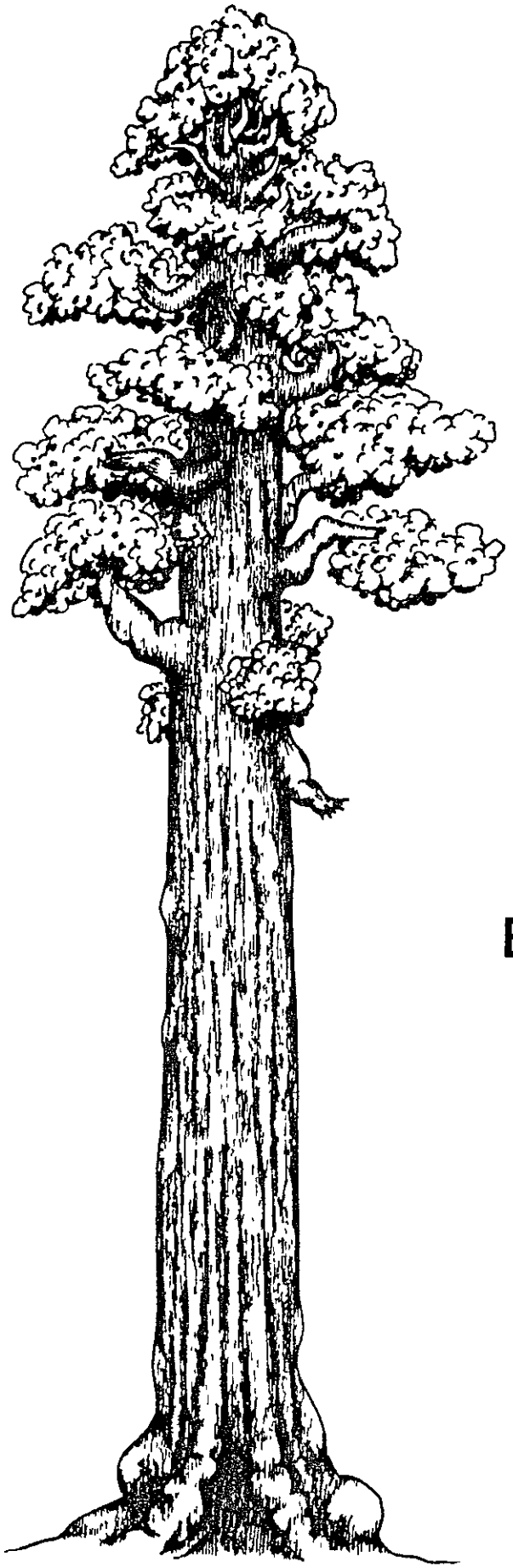
year-round economics
Economics based on employees working year-round as opposed to seasonal employment
See also seasonal economy

yield table
A tabular statement of timber volumes expected to be produced under a specified set of conditions

Z



Appendix K

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APPENDIX K

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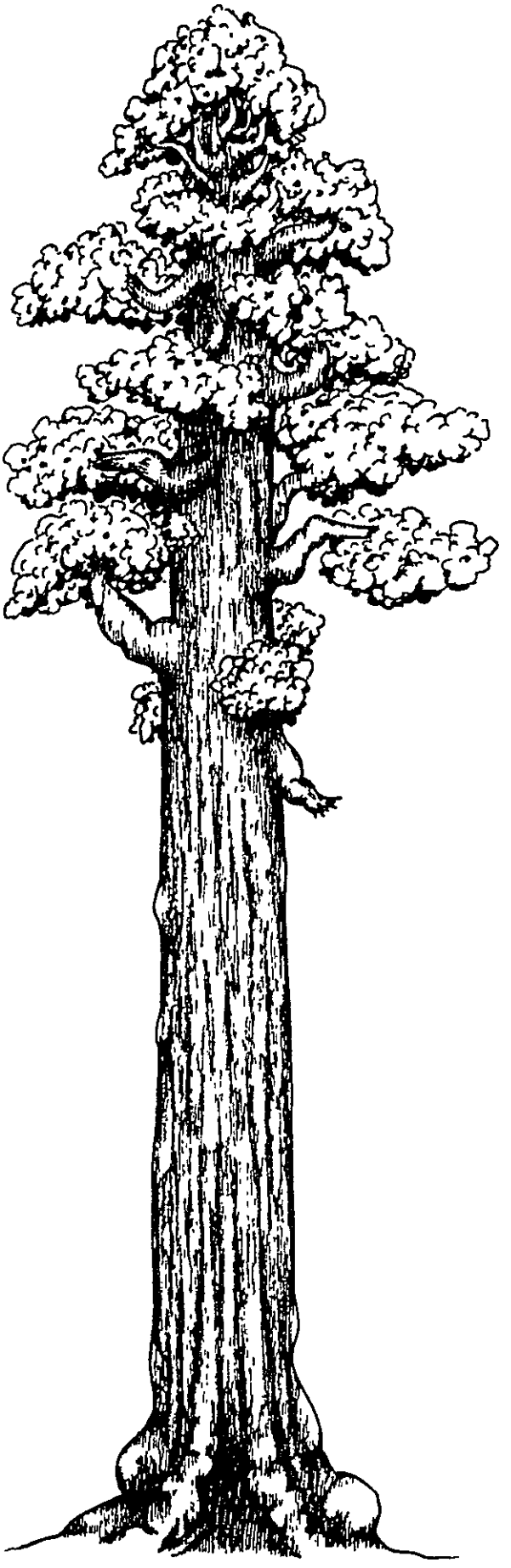


Appendix L

BUDGETS

APPENDIX L

BUDGETS AND THEIR RELATIONSHIP TO THE FOREST PLAN

The purpose of this appendix is to explain how the Forest gets its funding and what effect different funding levels will have on implementation of the Land and Resource Management Plan (Forest Plan). The appendix explains 1) the Federal budget process, 2) alternate sources of funding, 3) Forest priorities, and 4) monitoring compliance of the Forest Plan.

I. The Federal Budget Process

The Federal budget process is lengthy and complex. The Sequoia National Forest's budget is combined with the budgets of the other 17 National Forests which comprise Region 5 of the Forest Service. The budgets of the nine Forest Service regions are, in turn, combined to form the Forest Service's budget. This, in turn, becomes part of the Department of Agriculture's budget before it enters pertinent Congressional subcommittees. Needless-to-say, the budget gets negotiated at each step. The flow chart on the following page illustrates highlights in the chain of events that a Forest budget undergoes on its way to and from Congress.

The role of the Forest Plan in this process is to identify for Congress and for the public what appears to the Forest Service to be the best program and funding level for the Sequoia NF. As can be seen from the chart, however, the factors influencing the Forest's final budget are many and relatively uncontrollable from the Forest's perspective. The ultimate decision-making power over the budget lies with Congress, not only with regard to the total size of the budget, but also with regard to how much will be spent for individual budget items (e.g., timber sales, recreation, wildlife). For these reasons, it is probable that actual budgets will never match the Forest Plan budgets exactly. However, it is anticipated that the parties involved in the budget process will use the Forest Plan for guidance and long-range direction in deciding budget priorities.

As an indication of the Sequoia National Forest's budget trends and priorities as they have been reflected in recent budgets, Table L.1 on page L-3 shows the Forest's funding by resource (function) for fiscal years 1982 (The Plan base year), 1985, 1986, and 1987.

BUDGET PROCESS FLOW CHART

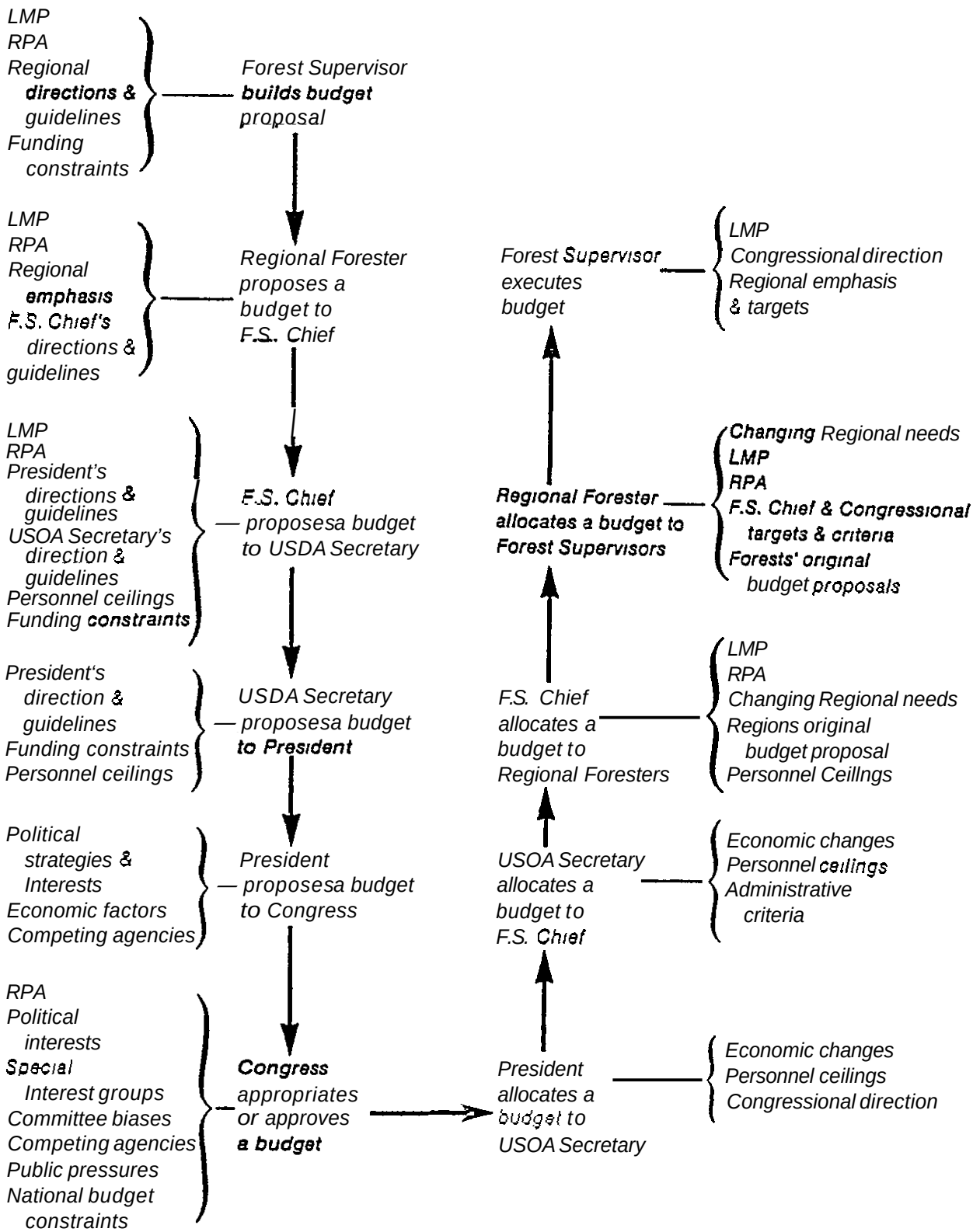


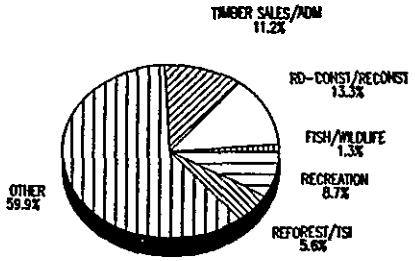
Table L.l - Sequoia National Forest Budgets

($ in thousands)

FISCAL YEAR	82	85	86	87
TOTAL FOREST FUNDS	17,628	13,480	11,515	11,099
TRUST FUNDS	575	1,170	1,585	1,234
KV (Reforestation of Timber Sales)	(459)	(879)	(867)	(685)
OTHER	(116)	(291)	(718)	(549)
PERMANENT APPROPRIATIONS	1,123	494	529	550
TIMBER PURCHASE ELECT	(503)	(-)	(-)	(-)
TIMBER SALVAGE	(254)	(244)	(184)	(161)
BRUSH DISPOSAL ON TIMBER SALES	(366)	(250)	(345)	(383)
TOTAL APPROPRIATED FUNDS	15,930	11,816	9,140	9,315
RANGE BETTERMENT	(38)	(36)	(34)	(34)
CONSTRUCTION	(6,050)	(1,432)	(861)	(1,021)
TRAIL	[280]	[111]	[36]	[54]
ROADS	[5,387]	[1,153]	[804]	[856]
RECREATION	[383]	[83]	[2]	[111]
TOTAL NAT'L FOREST SYSTEM	(9,842)	(9,001)	(8,506)	(8,260)
GENERAL ADMIN.	[1,345]	[1,184]	[1,325]	[1,236]
SOIL, WATER, AIR PROTECTION	[201]	[134]	[124]	[127]
RANGE	[144]	[147]	[188]	[126]
WILDLIFE	[172]	[158]	[176]	[136]
RECREATION	[1,245]	[1,069]	[1,000]	[1,080]
REFORESTATION/ TIMBER STAND IMPV.	[620]	[640]	[600]	[776]
TIMBER SALE PREP. & ADMIN.	[1,445]	[1,509]	[1,198]	[1,338]
TRAIL MAINTENANCE	[171]	[103]	[113]	[66]
ROAD MAINTENANCE	[757]	[553]	[438]	[394]
COOP. LAW ENFORCEMENT	[54]	[101]	[83]	[46]
FIRE PROTECTION	[3,178]	[3,001]	[2,841]	[2,561]
MAINTENANCE OF FACILITIES	[226]	[187]	[178]	[173]
LAND LINE LOCATION	[125]	[136]	[131]	[118]
LANDS MANAGEMENT	[146]	[55]	[66]	[57]
MINERALS	[13]	[24]	[45]	[26]
PURCHASER CREDITS (NOT PART OF ABOVE TOTALS)	863	571	488	570

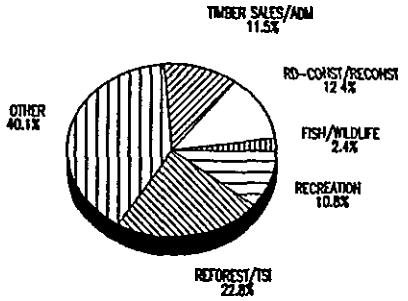
In order to understand how past budgets compare with the Plan's Preferred Alternative, the above information for recent budgets and costs for the LMP Preferred Alternative have been converted into pie charts for broad resource categories.

FY 85-87 AVERAGES



TOTALS $12.031 MILLION

FOREST PLAN



$19.991 MILLION

"Other" includes the myriad of functional funds not specified above (e.g., range, fire, general administration). Refer to Table L.1 on page L-3.

While not identical, the two pie charts show a similar distribution of funds to major resource areas. This is important, even though past budgets have not been formulated under the broad "umbrella" of a Land Management Plan. The significance is to indicate that a balanced approach to forest management will occur even if budgets less than that necessary to fully implement the Preferred Alternative result. Budgets for the Forest Plan implementation will be developed using the Forest Plan as a foundation; and subject to final allocation, can be expected to approximate the percentages shown.

Using the logic that the Sequoia NF's timber program under the Preferred Alternative is similar to what has occurred on the Forest for the past 25 years, it is not surprising to note mostly minor percentage shifts in the major functional categories for timber and road construction. The most significant shift occurs in the area of Reforestation/Timber Stand Improvement. The primary reason for this shift lies in the fact that the Preferred Alternative identifies an increased program in Timber Stand Improvement activities (e.g., thinning young tree stands to facilitate growth and improve stand vigor). This important aspect of Forest management has unfortunately not been recognized in recent past budgets.

Should Congress continue to fund individual resource programs as in the recent past, adjustments will be required in planned output levels and for the rate at which some provisions of the Forest Plan are implemented. For example, should funds for timber sale preparation and administration continue at the current level, the sale targets outlined in the Forest Plan will be decreased. Similarly, if funds for recreation continue at current levels, much of the action detailed under recreation as described in the Forest Plan will not be undertaken in the coming decade.

II. Alternate Sources of Funding

The budget given to the Forest Service by Congress authorizes it to spend both appropriated and trust funds. However, while the budget is paramount in a National Forest's ability to carry out activities, it is not the only factor that allows a Forest to get work done. Forests also receive money and services from many other sources. These other sources are becoming increasingly important.

Cooperators aid greatly in accomplishing needed work. For FY 84, a total of $174,000 was provided by others to do "Coop" work. In FY 85, the total was 5154,000, and in FY 86, $384.000. Following are examples of various cooperative deposits with which the Sequoia National Forest is dealing:

Cooperator	Purpose	Amount 1/
California Department of Fish and Game	Sikes Act Wildlife Habitat Improvement	5 30,000
Penny Pines	Planting Trees	$ 2,000
Timber Purchasers	Remarking of Timber Harvest Units	$ 20,000
	Deferred and Recurrent Road Maintenance	$125,000
Kern County	Wildlife Habitat Improvement	$ 10,000
State of California	Fire Protection on State Lands	$ 30,000
	Snow Survey	$ 5.000
Three-Forests Interpretive Association	Interpretive Projects and Services	5 7.000
Some One-Time Allocations:		
CALTRANS	State Highway Improvement	$125,000
Land Exchange Proponents	Facilitate Exchanges 58,000 -	$ 10,000
Water District	Watershed Monitoring Associated with Chaparral Treatment	$ 16,000
County of Kern	Cultural Resource Studies	$ 16,000 2/

1/ Approximate annual amount for recurring funds.

2/ Coop agreement consummated, but funding returned to County when another solution to the need was utilized.

Reimbursements for work performed also add significantly in some program areas. For example:

1) The Sequoia assists the Tule River Indian Reservation with its fire program and periodically provides aircraft to other agencies in times of need. Reimbursements to the Forest vary from $15,000 to $54,000 per year.

2) The Sequoia does fire protection for various agencies, with reimbursements ranging from $55,000 to $81,000 per year, depending on fire conditions.

3) The Sequoia provides assistance to the State of California in various fire related areas, with reimbursements ranging from $135,000 to $719,000 per year. Again, fire severity greatly influences yearly amounts.

4) The Sequoia has begun participation with the State of California in the Green Sticker program. The State will reimburse the Forest for OHV and snowmobile trail construction, administration, and planning. Currently, the Forest has agreements for approximately $300,000 on approved projects. Approximately $350,000, in addition, have been approved by the State Legislature and agreements are pending.

Occasionally, the Forest receives other funding for emergency situations. For example, following a devastating storm in 1983, the Forest received approximately $275,000 for trail repair and reconstruction, and $250,000 for road repair and reconstruction from the Federal Highway Administration through ERFO (Emergency Repair-Federally Owned) program. This funding was utilized over the FY 84-86 period.

The Sequoia National Forest has investigated a number of opportunities to reduce costs of operation. One of these involves operation of the Stony Creek Campground. the Stony Creek Picnic Area, and the Fir and Cove Group Campgrounds under a concessionaire permit. Under the permit system, operations are funded out of fees collected from campers by a private operator and Forest Service costs are reduced. This action is saving the Forest approximately $15,000 per year.

Volunteers have played, and will continue to play, an increasingly large role on the National Forests. Various programs bring volunteers to help with both office work and field activities. In FY 85, the Forest had a total of 9.4 person-years of contributed time under the Volunteer Program, providing an appraised value of work totaling over $98,000. In FY 86. these figures increased to 17.3 person-years and over $230,000. The recreation program is the primary beneficiary of volunteer contributions, including such activities as campground hosts (caretakers), trail maintenance and reconstruction efforts, developed site facility construction and rehabilitation, and OHV administration. Other significant volunteer efforts contribute to the fish and wildlife. timber management, facilities, and protection programs.

The Forest is exploring ways to make additional use of user fees and other funds to finance operating programs. This includes pursuing the

opportunity to obtain user donations for various programs (recent authority to do so has been granted) and to meet proponents' needs for timeliness, having proponents of various projects (e.g., a mineral proposal, a powerline proposal) fund necessary Forest Service study and coordination. Investigating ways to improve efficiency and productivity are also receiving emphasis as a method to make available funding "stretch" to the limit and accomplish more with the resources available.

111. Forest Priorities

While output levels listed in the Forest Plan are tied to projected budget levels, they are not the sole or even the primary product of the Forest Plan. The Land Management Plan establishes management direction for the Forest. This includes the Minimum Management Requirements (MMR's), Timber Policy Constraints (TPC's), Minimum Implementation Requirements (MIR's), and Standards and Guidelines (S&G's). These are discussed in Chapter 2 of the FEIS and Chapter 4 of the Forest Plan. The Forest Plan delineates which activities are appropriate for each section of the Forest. For instance, some areas will be managed for recreation, with other activities being undertaken in a fashion to complement recreation. Other areas are managed for range or timber production as their primary function.

The Preferred Alternative shows the maximum potential the Forest can achieve (e.g., the amount of timber which can be sold, the number of cattle grazed) within the bounds of the management direction the Forest has set for itself. The amount of output actually produced and number of activities and projects actually implemented depends on available funding and, in many instances, on actual demand.

Should Congress not provide the budget levels required for full Forest Plan implementation in a given year, management intensity and/or production levels will be lower. Priority within base level funding for the Forest will be the dollars necessary to ensure achievement of MMR's, TPC's, and MIR's. (MMR's are those requirements outside Forest Service authority to change. TPC's are necessary to ensure timber harvest meets sustained non-declining yield, culmination of mean annual increment, and dispersion requirements. MIR's for the Sequoia NF pertain to managing sensitive plants and maintenance of scenic corridors along designated highways.)

Funding beyond the MMR. TPC, and MIR levels will tie to Forest-Wide S&G's. (S&G's are Regional standards and guidelines or specific mitigation measures necessary to meet a fixed objective.) Implementation of S&G's could be affected by budget levels.

Generally speaking, S&G's fall into two categories:

1) those associated with project mitigation; and

2) those which will maintain or possibly enhance the Forest environment.

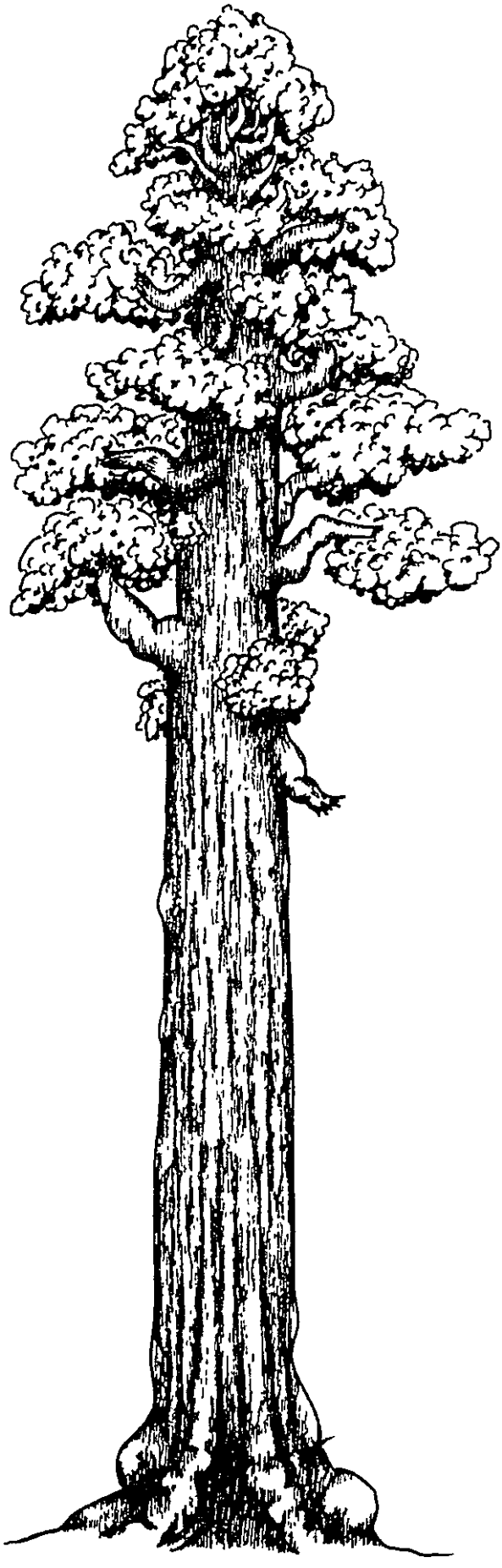
Standards and Guidelines established by the Forest Plan to regulate implementation of projects will not be relaxed simply to meet production levels. Under NEPA, an environmental analysis is completed for every project that affects other resources. If the environmental analysis shows

that the project cannot be accomplished without violating the S&G's, the project will be modified or revised to ensure compliance.

Other S&G's address maintenance and/or enhancement of the environment but are not tied to specific projects. Lower budget levels will alter their rate of accomplishment. For example, a Forest may have an S&G which reads: "Manage vegetation within developed recreation sites to maintain or improve recreation values." Without appropriate funding, this may not be accomplished within the time frame envisioned by the Forest Plan.

IV. Monitoring Compliance

The Forest Plan includes a monitoring plan that will help the Forest identify how it is meeting the objectives. (This monitoring plan is given in Chapter 5 of the Forest Plan). If the Forest strays too far from accomplishing the objectives set in the Forest Plan, a Plan amendment or revision is required. However, because Forest Plan objectives are expressed in average annual terms for a 10-year period, accomplishment levels at less than the annual average will not automatically trigger a Plan amendment or revision. The allowed variability for each monitoring item is shown in the monitoring plan. If Forest activities consistently fall outside of the allowed variability, a Plan amendment or revision could be triggered.



Appendix M

HERBICIDES

APPENDIX M

EFFECT OF HERBICIDE CONSTRAINTS ON TIMBER MANAGEMENT

If herbicides were constrained in reforestation and timber stand improvement activities, there would be an effect on long-term sustained yield (LTSY) and the cost of timber production. The magnitude of effects would depend upon the extent of the constraints imposed. The greatest effect would be expected with a prohibition on the use of all herbicides. The least effect would be expected, for example, with constraint on the method of application. Intermediate effects would be expected, for example, if only certain chemicals were prohibited. Effects would also depend upon the physical and biological characteristics of land being managed intensively for timber products and the maximum age to which timber producing trees were allowed to grow.

In order to assess the range of possible effects on LTSY and cost, the Preferred Alternative (PRF) was analyzed under two constraining conditions:

1) no herbicides, and
2) no aerial application of herbicides.

The analysis was based on Appendix A to the Region 5 Draft EIS entitled "Vegetation Management for Reforestation" dated June 1983. This document developed estimates for the changes in timber yields and reforestation costs under several alternative regimes of vegetation management. The Regional analysis was adapted to the Sequoia National Forest by:

1) adjusting rotation lengths from 85 years average to 90 years on land assigned to Regulation Class I, and to 150 years on land assigned to Regulation Class II;

2) adjusting LTSY reductions caused by competing vegetation when rotation length is different than the 85 years assumed in the Regional DEIS;

3) revising "typical" reforestation and timber stand improvement prescriptions to better match local conditions and technology available on the Sequoia NF (Table M.1); and

4) adjusting costs to reflect actual local experience where applicable (Table M.2).

Reduction in LTSY and increase in cost for the "No Herbicide" condition were calculated using adaptations of Tables 26 and 28 of the Vegetation Management DEIS; and the combinations of forest cover type, competing vegetation and slope class appropriate to the Sequoia National Forest weighted by the acres ultimately regenerated under PRF. Tables 26 and 29 were used for the "No Aerial Herbicide" condition. A basic assumption used in these calculations was that all lands remain suitable for timber management under all constraints; except that all cable ground and most of

the tractor ground with bearclover competition is unsuitable when herbicides are prohibited.

Since rotation length has a significant effect on both yield and cost, the weighting by acres also had to include a calculation to account for the proportion of Regulation Classes I and II lands in Alternative PRF. (Yields from Regulation Class III generally do not depend upon intensive reforestation and stand improvement treatments, and thus were not affected by any constraining condition.) Tables M.3 through M.8 were created by first calculating the effects under the two constraining conditions (above) with rotation length set at 90 years. Effects were then recalculated with a rotation of 150 years. Averages weighted by acres assigned to each rotation length (Regulation Class) were then calculated to produce the final result shown in Table M.9. The model used to calculate effects caused by constraining herbicides was much simplified from that used in FORPLAN. For this reason the tables are valid for comparative relationships only. Absolute values may differ significantly from those derived by FORPLAN.

The estimate of effects on other alternatives followed this same procedure, based on the acres and Regulation Classes appropriate to each. Table M.10 lists the acres by regulation class and alternative used in the weighting calculation.

Table Ml - Typical Prescriptions and Treatment Costs

CONDITION: NO HERBICIDES

Treatment Unit	Site Prep	$/ac	Plant	$/ac	Release	$/ac	Thin	$/ac	Total
EASTSIDE PINE									
1 NON-SPROUT MANZ/TRACTOR	Tractor plle 90% Broadcast burn 10	1300	Plant 100% Replant 20%	1340	rub 100% X 2	1500	all	1170	$1310
2 OTHER BRUSHITRACTOR	Sanie as 1	1300	Same as 1	1340	rub 100% ach Mast 75%	1480	all	1170	$1290
3 GRASS-FORDSITRACTOR	Same as 1	1300	Plant 100% Replant 40%	1390	rub 10 X 2	1500	70%	120	$1310
RED FIR									
4 OTHER BRUSHITRACTOR	Same as 1	1300	Plant 50% replant 30%	220	Same as 2	1480	Nat 50% Plnt 5 X 65%	150	11150
5 GRASS-FORDSITRACTOR	Same as 1	1300	Plant 70% replant 30%	280	Same as 3	500	Same as4	150	$1230
6 GRASS-FORBS/CABLE <60%	Broadcast burn 100%	1350	Same as 5	280	Same as 3	1500	Same as4	1150	$1200
7 GRASS-FORBSICABLE >60%	Same as 6	380	Same as 5	310	Same as 3	550	Same as4	1160	11400
MIXED CONIFER									
8 SPROUTING MANZ/TRACTOR	Same as 1	1300	Plant 1002 Replant 30%	360	Same as 2	1480	all	1170	$1310
9 SPROUTING MANZ/CABLE <60%	Same as 6	1350	Same as 8	1360	Same as 3	500	all	1170	$1380
10 SPROUTING MANZ/CABLE >60%	Same as 6	1360	Same as 8	400	Same as 3	1550	all	190	11520
11 BEARCLOVER/TRACTOR	Unsuitable 90% Terrace 10%	1400	Same as 3	1390	Same as 3	0		0	$ 790
12 BEARCLOVER/CABLE <60%	Unsuitable 100%								
13 BEARCLOVERICABLE >60%	Unsuitable 100%								
14 OTHER BRUSHITRACTOR	Same as 1	1300	Same as 1	1340	Same as 2	1480	all	1170	$1290
15 OTHER BRUSH/CABLE <60%	Same as 6	1350	Same as 1	1390	Same as 3	500	all	1170	$1410
16 OTHER BRUSH/CABLE >60%	Same as 6	380	Same as 8	400	Same as 3	550	all	1190	11520

TRAI

Table M.1 - Typical Prescriptions and Treatment Costs (continued)

CONDITION: NO HERBICIDES

Treatment Unit	Site Prep	$/ac	Plant	$/ac	Release	$/ac	Thin	$/ac	Total
MIXED CONIFER							1		
17 GRASS-FORBS/TRACTOR	Same as 1	1300	Same as 3	1390	Same as 3	1500	all	1170	$1360
10 GRASS-FORBS/CABLE <60%	Same as 6	1350	Same as 3	1390	Same as 3	1500	all	1170	$1410
19 GRASS-FORBS/CABLE >60%	Same as 6	1380	Same as 3	1430	Same as 3	1550	all	1190	$1550
BRUSHFIELD CONVERSION									
20 BRUSHFIELD/TRACTOR	Tractor pile 100%	1300	Same as 3	1390	Same as 2	1400	all	1170	$1340
71 BRUSHFIELD/CABLE <60%	Hand cut 6 pile 100%	1350	Same as 3	1390	Hand cuttings X 2	1500	all	1170	$1410

Table 111 - Typical Prescriptions and Treatment Costs (continued)

CONDITION: NO AERIAL APPLICATION OF HERBICIDES

Treatment Unit	Site Prep	$/ac	Plant	$/ac	Release	$/ac	Thin	$/ac	Total
EASTSIDE PINE									
1 NON-SPROUT MANZ/TRACTOR	Tractor pile 90 Broadcast burn 10%	1300	Plant 100% Replant 10%	1310	Ground herb 90%, Grub 10%	1190	all	1170	$ 970
2 OTHER BRUSH/TRACTOR	Same as 1	1300	Same as 1	1310	Same as 1	1190	all	1170	$ 970
3 GRASS-FORBS/TRACTOR	Tractor pile 100%, Ground herb 1002	1400	Same as 1	1310	Ground herb 100%	1180	all	1170	11140
RED FIR									
4 OTHER BRUSH/TRACTOR	Same as 1	1300	Plant 40% Replant 20%	1170	Ground herb 70% Grub 10%	1150	Nat 60% Plnt 40C	1240	$ 860
5 GRASS-FOROSITRACTOR	Tractor pile 100% Ground herb 100%	1480	Plant 50% Replant 30%	1220	Same as 4	1150	Nat 50% Plnt 50%	1230	$1080
6 GRASS-FORBS/CABLE <60%	Broadcast burn 100% Ground herb 100%	1530	Same as 5	1220	Same as 4	1150	See 5	1230	11130
7 GRASS-FORDSICADLE >60%	Same as 6	1580	Plant 60% Replant 30%	1280	Ground herb 100%	1200	Nat 40% Plnt 60%	1240	$1300
MIXED CONIFER									
8 SPROUTING MANZITRACTOR	Same as 1	1300	Plant 100% Replant 20%	1340	Same as 1	1190	all	1170	$1000
9 SPROUTING MANZ/CABLE <60%	Same as 6	1530	Same as 8	1340	Same as I	1190	all	1170	$1230
10 SPROUTING MANZ/CABLE >60%	Same as 6	1580	Same as 8	1370	Same as 1	1210	all	1190	$1350
11 BEARCLOVER/TRACTOR	Same as 5	1480	Same as 8	1340	Ground herb 100 X 2	1360	all	1170	$1350
12 OEARCLOVERICADLE <60%	Same as 6	1530	Same as 8	1340	Same as 11	1360	all	1170	$1400
13 BEARCLOVER/CABLE >60%	Same as 6	1580	Same as 8	1370	Same as 11	1400	all	1190	$1540
14 OTHER BRUSH/TRACTOR	Same as 1	1300	Same as 8	1340	Same as 1	1190	all	1170	$1000
15 OTIIER BRUSH/CABLE <60%	Same as 6	1530	Same as 8	1340	Same as 1	1190	all	1170	$1230
16 OTHER BRUSH/CABLE >60%	Same as 6	1580	Same as 8	1370	Same as 1	1210	all	1190	$1350

Table H.1 - Typical Prescriptions and Treatment Costs (continued)

CONDITION: NO AERIAL APPLICATION OF HERBICIDES

Treatment Unit	Site Prep	$/ac	Plant	$/ac	Release	$/ac	Thin	$/ac	Total
MIXED CONIFER									
17 GRASS-FORBS/TRACTOR	Same as 3	1480	Same as 1	1310	Same as 3	180	all	1170	$1140
18 GRASS-FORBS/CABLE <60%	Same as 6	1530	Same as 1	1310	Same as 3	180	all	1170	$1190
19 GRASS-FORBS/CABLE >60%	Same as 1	1580	Same as 1	1340	Ground herb 100%	200	all	190	$1310
BRUSHFIELD CONVERSION									
20 BRUSHFIELD/TRACTOR	Pile 90%, Mow 10%, Ground herb 100%	1480	Same as 1	1310	Same as 1	190	all	1170	$1150
21 BRUSHFIELD/CABLE	Ground herb 100% X2, Broadcast burn	1710	Same as 1	1310	Same as 1	190	all	1170	$1380

Table M.1 - Typical Prescriptions and Treatment Costs (continued1

CONDITION: TREATMENT METHODS UNCONSTRAINED

Treatment Unit	Site Preo	$/ac	Plant	$/ac	Release	$/ac	Thin	$/ac	Total
EASTSIDE PINE									
1 NON-SPROUT MANZ/TRACTOR	Tractor pile 90% Broadcast burn 10%	1300	Plant 100% Replant 10%	310	Ground horb 30%, Aerial Herb 60%, Grub 10%	160	all	170	$ 940
2 OTHER ORUSIIITRACTOR	Same as 1	300	Same as 1	310	Same as 1	1160	all	1170	1940
3 GRASS-FORQSITRACTOR	Tractor pile 100%, Ground herb 30%, Aerial herb 70%	1440	Same as 1	1310	Ground herb 30%, Aerial herb 70%	150	all	170	$1070
RED FIR									
4 OTHER BRUSHITRACTOR	Same as 1	1300	Plant 40% Replant 20	1170	Ground herb 70% Grub 10%	150	Nat 60% Plnt 40%	240	$ 860
5 GRASS-FORQSITRACTOR	Tractor pile 100% Ground herb 50% Aerial herb 50%	1450	Plant 50% Replant 30%	1220	Same as 4	150	Nat 50% Plnt 50%	1230	11050
6 GRASS-FORBSICABLE <60%	Broadcast burn 100% Aerial herb 100%	1480	Same as 5	220	Same as 4	iiSO	See 5	230	$1080
7 GRASS-FORQSICAQLE >60%	Broadcast burn 100% Aerial herb 100%	1530	Plant 60% Replant 30:	280	Aerial 100%	1140	Nat 40% Plnt 60%	1240	$1190
MIXED CONIFER									
8 SPROUTING MANZ/TRACTOR	Same as 1	1300	Plant 100% Replant 20%	1340	Same as 1	160	all	170	$ 970
9 SPROUTING MANZ/CABLE <60%	Same as 6	1480	Same as 8	1340	Same as 1	1160	all	1170	$1150
10 SPROUTING MANZ/CABLE >60%	Same as 7	1530	Same as 8	1370	Same as 1	180	all	1190	11270
11 BEARCLOVER/TRACTOR	Same as 5	1450	Same as 8	1340	Ground herb 100; X 2	1360	all	170	11320
12 BEARCLOVER/CABLE <60%	Same as 6	1480	Same as 8	1340	Same a5 11	1360	all	1170	11350
13 BEARCLOVER/CABLE >60%	Same as 7	1530	Same as 8	1370	Aerial herb 100% X 2	290	all	190	$1300
14 OTHER BRUSH/TRACTOR	Same as 1	1300	Same as 8	1340	Same as 1	1160	all	1170	$ 970
15 OTHER BRUSH/CABLE <60%	Same as 6	1480	Same as 8	1340	Same as 1	1160	all	1170	$1150
16 OTHER BRUSH/CABLE >60%	Same 4s 7	1530	Same as 8	1370	Same as 1	1180	all	190	$1270

Table H.I - Typical Prescriptions and Treatment Costs (continued)

CONDITION: TREATMENT METHODS UNCONSTRAINED

Treatment Unit	Site Prep	$/ac	Plant	$/ac	Release	$/ac	Thin	$/ac	Total
MIXED CONIFER									
17 GRASS-FORBS/TRACTOR	Same as 3	1440	Same as 1	1310	Same as 3	150	all	1170	11070
18 GRASS-FORBS/CABLE <60%	Same as 6	480	Same as 1	1310	Same as 3	150	all	1170	11110
19 GRASS-FORBS/CABLE >60%	Same as 7	1530	Same as 1	1340	Aerial horb 100%	1140	all	190	$1200
BRUSHFIELD CONVERSION									
20 BRUSHFIELD/TRACTOR	Pile 90%, Mow 10%, Aerial herb 50%, Ground herb 505	1460	Same as 1	1310	Same as 1	1160	all	1170	$1100
21 BRUSHFIELD/CABLE	Aerial herb 100% X2, Broadcast burn	1610	Same as 1	310	Same as 1	1160	all	170	$1250

Table M.2. - Typical Treatment Costs [1] For Reforestation and Timber Stand Improvement

TREATMENT	$/acre
Tractor piling including burning	$300
Mowing (mastication)	310
Broadcast burning	350
Hand cutting (brush sprouts)	250
Hand cutting (old brushfield)	350
Contour Terracing	400
Hand grubbing	250
Herbicide, aerial application	130
Herbicide, ground application	180
Planting	280
Pre-commercial thinning plantations	170
Pre-commercial thinning natural regeneration	290

1/ Estimates based on recent contract experience on the Sequoia National Forest and typical costs experienced Region-wide (Appendix C of the R5 Vegetation Management DEIS). All figures above include project preparation, administration and overhead allowances.

Add 10% for operations on slopes >60%.

Table M.3 - No Applications of Herbicides - Regulation Class I Land Base - Effects on Timber Yields and Costs of Cultural Treatments (Exclusive of Animal Damage Control), By Major Timber Types, By Alternative

Alternative: PREFERRED ALTERNATIVE (PRF), BUT NO APPLICATIONS OF HERBICIDES
Land Base Assumption: LAND BASE IS ALL REGULATION CLASS I (AVERAGE ROTATION AGE IS 90 YEARS)
(Adapted for the Sequoia National Forest - John Fiske, October 22, 1907)

		AVERAGE CULTURAL TREATMENT COSTS COSTS PER ACRE ($)						MEAN ANNUAL GROWTH (MAI, BD. FT. SCRIBNER)				
TREATMENT UNIT	ACRES (N)	SITE PREP	PLANT	RELEASE	PRECOM. THIN.	TOTAL	TOTAL COST (MILLION $)	PERCENT OF MAX MAI	MAXIMUM MAI/AC	ESTIMATED MAI/AC	MAI (MLBF)	AVG. TOTAL CULTURAL COST/ MBF
Eastside Pine												
Non-sprout, Manz/Tractor	7	300	340	500	170	1310	9	80	180	144	1	101
Other Brush/Tractor	6	300	340	480	170	1290	8	90	180	162	1	88
Grass-Forbs/Tractor	13	300	340	500	120	1310	17	30	180	54	1	270
Subtotal or Average	26	300	365	495	145	1305	34	57	180	103	3	141
Red Fir												
Other Brush/Tractor	7	300	220	400	210	1210	0	100	700	700	5	19
Grass-Forbs/Tractor	26	300	280	500	150	1230	32	50	700	350	9	39
Grass-Forbs/Cable <60%	3	350	280	500	150	1280	4	50	580	290	1	49
Grass-Forbs/Cable >60%	2	380	310	550	160	1400	3	50	580	250	1	54
Subtotal or Average	38	300	271	499	162	1239	47	59	684	407	15	34
Mixed Conifer												
Sprouting Manzan/Tractor	47	300	360	480	170	1310	62	80	500	400	19	36
Sprouting Manz/Cable <60%	8	350	360	500	170	1300	11	80	410	328	3	47
Sprouting Manz/Cable >60%	4	300	400	550	190	1520	6	80	410	328	1	51
Bear Clover/Tractor	3	400	390	0	0	790	2	50	500	250	1	35
Other Brush/Tractor	76	300	340	400	170	1290	90	100	500	500	38	29
Other Brush/Cable <60%	22	350	390	500	170	1410	31	100	410	410	9	38
Other Brush/Cable >60%	10	300	400	550	190	1520	15	90	410	369	4	46
Grass-Forbs/Tractor	17	300	390	500	170	1360	23	90	500	450	8	34
Grass-Forbs/Cable <60%	4	350	390	500	170	1410	6	90	410	369	1	42
Grass Forbs/Cable >60%	3	300	430	550	190	1550	5	90	410	369	1	47
Subtotal or Average	194	317	363	484	169	1334	259	91	477	435	84	34
Brushfield, Assumed to be Sprouting Manzanita, and Converted to Mixed Conifer												
Brush/Tractor	0	300	350	480	170	1340	0	80	500	400	0	0
Brush/Cable <60%	0	350	390	500	170	1410	0	00	410	32R	0	0
Subtotal or Average	0	325	390	490	170	1110	0	80	455	364	0	0
Total or Average	258	314	350	407	166	1317	340	03	5L2	398	103	37

Total Annual Timber Yield - Sequoia NF . 103 Million Board Feet (Scribner) Per Year
Average Mean Annual Increment Per Acre - Sequoia NF: 390 Board Feet (Scribner) Per Acre Per Year
Average Annual Vegetation Management Costs for Reforestation - Sequoia NF: 3.70 Million Dollars
Average Program Cost of Vegetation Management During Reforestation Per Thousand Board Feet (Scribner) Yield - Sequoia NF: 37 Dollars

Table M.4 - No Aerial Applications of Herbicides - Regulation Class I Land Base - Effects on Timber Yields and Costs of Cultural Treatments (Exclusive of Animal Damage Control), By Major Timber Types, By Alternative

Alternative PREFERRED ALTERNATIVE (PEF), PUT NO AERIAL APPLICATIONS OF HERBICIDES
Land Base Assumption. LAND BASE IS ALL REGULATION CLASS I (AVERAGE ROTATION AGE IS 90 YEARS)
(Adapted for the Sequoia National Forest - John Fiske, October 22, 1987)

		AVERAGE CULTURAL TREATMENT COSTS						MEAN ANNUAL GROWTH (MAI, BD. FT. SCRIBNER)				
		COSTS PER ACRE ($)										
TREATMENT UNIT	ACRES (M)	SITE PREP	PLANT	RELEASE	PRECOM. THIN.	TOTAL	TOTAL COST (MILLION $)	PERCENT OF MAX MAI	MAXIMUM MAI/AC.	ESTIMATED MAI/AC	MAI (MMBF)	AVG. TOTAL CULTURAL COST/ MBF
Eastside Pine												
Non-sprout, Manz/Tractor	7	300	310	190	170	970	7	100	180	180	1	60
Other Brush/Tractor	6	300	310	190	170	970	6	100	180	180	1	60
Grass-Forbs/Tractor	13	480	310	180	170	1140	15	100	180	180	2	70
Subtotal or Average	26	390	310	185	170	1055	27	100	180	180	5	65
Red Fir												
Other Brush/Tractor	7	300	170	150	240	860	6	100	700	700	9	14
Grass-Forbs/Tractor	26	480	220	150	230	1080	28	100	700	700	18	17
Grass-Forbs/Cable <60%	3	530	220	150	230	1130	3	100	580	580	2	22
Grass-Forbs/Cable >60%	2	580	280	200	240	1300	3	90	580	522	1	28
Subtotal or Average	38	456	214	153	232	1055	40	99	684	681	26	17
Mixed Conifer												
Sprouting Manzan/Tractor	47	300	340	190	170	1000	47	100	500	500	24	22
Sprouting Manz/Cable <60%	8	530	340	190	170	1230	10	100	410	328	3	33
Sprouting Manz/Cable >60%	4	580	370	210	190	1350	5	90	410	369	1	41
Bear Clover/Tractor	33	480	340	360	170	1350	45	100	500	500	17	10
Bear Clover/Cable <60%	10	530	340	360	170	1400	14	100	410	410	4	38
Bear Clover/Cable >60%	4	580	310	400	190	1540	6	90	410	369	1	46
Other Brush/Tractor	16	300	340	190	170	1000	16	100	500	500	38	20
Other Brush/Cable <60%	22	530	340	190	170	1230	27	100	410	410	9	38
Other Brush/Cable >60%	10	580	310	210	190	1350	14	90	410	369	4	41
Grass-Forbs/Tractor	17	430	310	180	170	1140	19	100	500	500	9	25
Grass-Forbs/Cable <60%	4	530	310	180	170	1190	5	100	410	410	2	32
Grass Forbs/Cable >60%	3	500	340	200	190	1310	4	90	410	369	1	39
Subtotal or Average	238	405	340	225	172	1141	272	99	477	472	112	27
Brushfield, Assumed to be Sprouting Manzanita, and Converted to Mixed Conifer												
Brush/Tractor	0	480	310	190	170	1150	0	100	500	500	0	0
Brush/Cable <60%	0	110	310	190	170	1380	0	100	410	410	0	0
Subtotal or Average	0	595	310	190	170	1110	0	100	455	455	0	0
Total or Average	302	410	321	212	179	1123	339	99	582	473	143	26

Total Annual Timber Yield - Sequoia NF: 143 Million Board Feet (Scribner) Per Year
Average Mean Annual Increment Per Acre - Sequoia NF: 473 Board Feet (Scribner) Per Acre Per Year
Average Annual Vegetation Management Costs for Reforestation - Sequoia NF: 3.77 Million Dollars
Average Program Cost of Vegetation Management During Reforestation Per Thousand Board Feet (Scribner) Yield - Sequoia NF: 26 Dollars

Table tl.5 - Herbicide Application - Regulation Class I Land Base - Effects on Timber Yields and Costs of Cultural Treatments (Exclusive of Animal Damage Control), By Major Timber Types, By Alternative

Alternative: PREFERRED ALTERNATIVE (PRF), OUT KO CONSTRAINT ON HERBICIDE APPLICATION
Land Base Assumption: LAND BASE IS ALL REGULATION CLASS I (AVERAGE ROTATION AGE IS 90 YEARS)
(Adapted for the Sequoia National Forest - John Fiske, October 22, 19071

TREATMENT UNIT	ACRES (M)	AVERAGE CULTURAL TREATMENT COSTS COSTS PER ACRE ($) SITE PREP	PLANT	RELEASE	PRECOM. THIN.	TOTAL	TOTAL COST (MILLION $)	MEAN ANNUAL GROWTH (MAI, BD. FT. SCRIBNER) PERCENT OF MAX MAI	MAXIMUM MAI/AC	ESTIMATED MAI/AC	MAI (MMBF)	AVG. TOTAL CULTURAL COST/ MMBF
Eastside Pine												
Non-sprout, Manz/Tractor	7	300	310	160	170	940	7	100	180	180	1	58
Other Brush/Tractor	6	300	310	160	170	040	6	100	180	180	1	55
Grass-Forbs/Tractor	13	410	310	150	170	1070	14	100	180	180	2	66
Subtotal or Average	26	370	310	155	170	1005	26	100	180	180	5	62
Red Fir												
Other Brush/Tractor	7	300	170	150	240	060	6	100	700	700	5	14
Grass-Forbs/Tractor	26	450	220	150	230	1050	27	100	700	700	18	17
Grass-Forbs/Cable <60%	3	400	270	150	230	1080	3	100	530	500	2	21
Grass-Forbs/Cable >60%	7	530	280	140	240	1190	2	100	580	500	1	23
Subtotal or Average	38	429	214	149	232	1025	39	100	684	684		
Mixed Conifer												
Sprouting Manzan/Tractor	47	300	340	160	170	970	46	100	500	500	74	22
Sproutinn Manz/Cable <60%	0	480	340	160	170	1150	9	100	410	410	3	31
Sprouting Manz/Cable >60%	4	530	370	180	190	1270	5	100	410	410	7	34
Bear Clover/Tractor	33	450	340	360	170	1320	44	100	500	500	17	29
Bear Clover/Cable <60%	10	480	340	360	170	1350	14	100	410	410	4	37
Bear Clover/Cable >60%	4	530	370	290	190	1380	6	100	410	410	2	37
Other Brush/Tractor	76	300	340	160	170	970	74	100	500	500	30	77
Other Brush/Cable <60%	22	480	340	160	170	1150	25	100	410	410	9	31
Other Brush/Cable >60%	10	530	370	180	190	1270	13	100	410	410	4	34
Grass-Forbs/Tractor	17	440	310	150	170	1070	18	100	500	500	9	24
Grass-Forbs/Cable <60%	4	480	210	150	170	1110	4	100	410	410	2	30
Grass Forbs/Cable >60%	3	530	340	140	190	1200	4	100	410	410	1	33
Subtotal or Average	238	384	340	198	172	1094	260	100	475	475	113	26
Brushfield, Assumed to be Sprouting Manzanita, and Converted to Mixed Conifer												
Brush/Tractor	0	480	310	160	170	1100	0	100	500	500	0	0
Brush/Cable <60%	0	610	310	160	170	1250	0	100	410	410	0	0
Subtotal or Average	0	535	310	160	170	1110	0	100	455	455	0	0
Total or Average	307	389	371	212	179	1078	325	100	476	476	144	25

Total Annual Timber Yield - Sequoia NF: 144 Million Board Feet (Scribner) Per Year
Average Mean Annual Increment Per Acre - Sequoia NF 476 Board Feet (Scribner) Per Acre Per Year
Average Annual Vegetation Management Costs for Reforestation - Sequoia NF: 3.62 Million Dollars
Average Program Cost of Vegetation Management During Reforestation Per Thousand Board Feet (Scribner) Yield - Sequoia NF: 2 Dollars

Table M.6 - No Applications of Herbicides - Regulation Class II Land Base - Effects on Timber Yields and Costs of Cultural Treatments (Exclusive of Animal Damage Control), By Major Timber Types, By Alternative

Alternative PREFERRED ALTERNATIVE (PRF), BUT NO APPLICATIONS OF HERBICIDES
Land Base Assumption. LAND BASE IS PLL REGULATION CLASS II (AVERAGE ROTATION ALE TS 150 YEARS)
(Adapted for the Sequoia National Forest - John Fiske, October 22, 1987)

TREATMENT UNIT	ACRES (M)	AVERAGE CULTURAL TREATMENT COSTS COSTS PER ACRE ($) SITE PREP	PLANT	RELEASE	PRECOM. THIN.	TOTAL	TOTAL COST (MILLION $)	MEAN ANNUAL GROWTH (MAI, BD. FT. SCRIBNER) PERCENT OF MAX MAI	MAXIMUM MAI/AC	ESTIMATED MAI/AC	MAI (MMBF)	AVG. TOTAL CULTURAL COST/ MBF
Eastside Pine												
Non-sprout, Manz/Tractor	7	300	340	500	170	1310	9	90	220	198	1	44
Other Brush/Tractor	G	300	340	480	170	1290	8	100	220	220	1	39
Grass-Forbs/Tractor	13	300	390	500	120	1310	17	50	220	110	1	79
Subtotal or Average	26	300	365	495	145	1305	34	72	220	159	4	55
Red Fir												
Other Brush/Tractor	7	300	220	480	210	1210	8	100	060	060	6	9
Grass-Forbs/Tractor	26	300	280	500	150	1230	32	70	860	602	16	14
Grass-Forbs/Cable <60%	3	350	280	500	150	1280	4	70	710	497	1	17
Grass-Forbs/Cable >60%	2	300	310	550	160	1400	3	70	710	497	1	19
Subtotal or Average	38	308	271	499	162	1239	47	76	840	636	24	13
Mixed Conifer												
Sprouting Manzan/Tractor	47	300	360	400	170	1310	62	90	610	549	26	16
Sprouting Manz/Cable <60%	E	350	360	500	170	1300	11	90	500	450	A	70
Sprouting Manz/Cable >60%	4	380	400	550	190	1570	6	90	500	450	2	23
Pear Clover/Tractor	3		390	0	0	790	2	70	610	427	1	12
Other Brush/Tractor	76	300	340	400	170	1290	98	100	610	610	46	14
Other Brush/Cable <60%	22	350	390	500	170	1410	31	100	500	500	11	19
Other Brush/Cable >60%	10	380	400	550	190	1520	15	100	500	500	5	20
Grass-Forbs/Tractor	17	300	390	500	170	1360	23	100	610	610	10	15
Grass-Forbs/Cable <60%	4	350	390	500	170	1410	6	100	500	500	2	19
Grass Forbs/Cable >60%	3	300	430	550	190	1550	5	100	500	500	2	21
Subtotal or Average	194	317	363	484	169	1334	259	96	585	560	109	16
Brushfield, Assumed to be Sprouting Manzanita, and Converted to Mixed Conifer												
Brush/Tractor	0	300	390	480	170	1340	0	90	610	549	0	0
Brush/Cable <60%	0	350	390	500	170	1410	0	90	500	450	0	0
Subtotal or Average	0	325	390	490	170	1110	0	90	555	500	0	0
Total or Average	258	314	350	407	166	1317	340	91	587	531	137	17

Total Annual Timber Yield - Sequoia NF. 137 Million Board Feet (Scribner) Per Year
Average Mean Annual Increment Per Acre - Sequoia NF. 531 Board Foot (Scribner) Per Acre Per Year
Average Annual Vegetation Management Costs for Reforestation - Sequoia NF 2.27 Million Dollars
Average Program Cost of Vegetation Management During Reforestation Per Thousand Board Feet (Scribner) Yield - Sequoia NF 17 Dollars

Table M.7 - No Aerial Applications of Herbicides - Regulation Class II Land Base - Effects on Timber Yields and Costs of Cultural Treatments (Exclusive of Animal Damage Control), By Major Timber Types, By Alternative

Alternative. PREFERRED ALTERNATIVE **(PRF)**, BUT NO AERIAL APPLICATIONS OF **HERBICIDES**
Land Base Assumption LAND BASE **IS** ALL REGULATION CLASS II (AVERAGE ROTATION AGE **IS** 150 YEARS)
(Adapted for **the** Sequoia National Forest - John Fiske, **October** 22, 1987)

TREATMENT UNIT	ACRES (M)	AVERAGE CULTURAL TREATMENT COSTS COSTS PER ACRE ($) SITE PREP	PLANT	RELEASE	PRECOM. THIN.	TOTAL	TOTAL COST (MILLION $)	MEAN ANNUAL GROWTH (MAI, CD. FT. SCRIBNER) PERCENT OF MAX MAI	MAXIMUM MAI/AC	ESTIMATED MAI/AC	MAI (MMBF)	AVG. TOTAL CULTURAL COST/ MMBF
Eastside Pine												
Non-sprout. Manz/Tractor	1	300	310	190	170	970	7	100	220	220	2	29
Other Brush/Tractor	6	300	310	190	170	970	6	100	720	220	1	29
Grass-Forbs/Tractor	13	480	310	180	170	1140	15	100	220	220	3	35
Subtotal or Average	26	390	310	185	170	1055	27	100	220	220	6	32
Red Fir												
Other Brush/Tractor	7	300	170	150	240	860	6	100	860	860	6	7
Grass-Forbs/Tractor	26	420	220	150	730	1080	28	100	860	860	22	8
Grass-Forbs/Cable <60%	3	530	220	150	230	1130	3	100	710	710	2	11
Grass-Forbs/Cable >60%	2	580	280	200	240	1300	3	100	710	710	1	12
Subtotal or Average	38	456	214	153	232	1055	40	100	840	840	32	8
Mixed Conifer												
Sprouting Manzan/Tractor	47	300	140	190	170	1000	47	100	618	610	29	11
Sprouting Manz/Cable <60%	8	530	740	190	170	1730	10	100	500	500	4	16
Sprouting Manz/Cable >60%	4	580	370	210	190	1350	5	100	500	500	7	18
Bear Clover/Tractor	33	480	340	360	170	1350	45	100	610	610	70	15
Bear Clover/Cable <60%	10	530	340	360	170	1400	14	100	500	500	5	19
Bear Clover/Cable >60%	4	580	370	400	190	1540	6	100	500	500	2	21
Other Brush/Tractor	76	300	340	190	170	1000	76	100	610	610	46	11
Other Brush/Cable <60%	27	530	340	190	170	1730	27	100	500	500	11	16
Other Brush/Cable >60%	10	580	370	210	190	1350	14	100	500	500	5	18
Grass-Forbs/Tractor	17	480	310	180	170	1140	19	100	610	610	10	12
Grass-Forbs/Cable <60%	4	530	310	180	170	1190	5	100	500	500	2	16
Grass Forbs/Cable >fin-	3	580	340	200	190	1310	4	100	500	500	2	17
Subtotal or Average	238	405	340	225	172	1141	272	100	580	580	138	13
Brushfield, Assumed to be Sprouting Manzanita, and Converted to Mixed Conifer												
Brush/Tractor	0	480	310	190	170	1150	0	100	610	610	0	0
Brush/Cable <60%	0	710	310	190	170	1380	0	100	500	500	0	0
Subtotal or Average	0	595	310	190	170	1110	0	100	555	555	0	0
Total or Average	302	410	321	212	179	1123	339	100	582	582	176	13

Total Annual Timber Yield - Sequoia NF: 176 Million Board Feet (Scribner) Per Year
Average Mean Annual Increment Per Acre - Sequoia NF: 582 Board Feet (Scribner) Per Acre Per Year
Average Annual Vegetation Management Costs for Reforestation - Sequoia NF: 2.26 Million Dollars
Average Program Cost of Vegetation Management During Reforestation Per Thousand Board Feet (Scribner) Yield - Sequoia NF 13 Dollars

Table M.8 Herbicide Application - Regulation Class II Land Base - Effects on Timber Yields and Costs of Cultural Treatments (Exclusive of Animal Damage Control), By Major Timber Types, By Alternative

Alternative: PREFERRED ALTERNATIVE (PRF), PUT NO CONSTRAINT ON HERBICIDE APPLICATION
Land Base Assumption: LAND BASE IS ALL REGULATION CLASS SI (AVERAGE ROTATION AGE IC 150 YEARS)
(Adapted for the Sequoia National Forest - John Fiske, October 22, 1987)

TREATMENT UNIT	ACRES (M)	AVERAGE CULTURAL TREATMENT COSTS COSTS PER ACRE ($) SITE PREP	PLANT	RELEASE	PRECOM. THIN.	TOTAL	TOTAL COST (MILLION $)	MEAN ANNUAL GROWTH (LAI, BD. FT. SCRIBNER) PERCENT OF MAX MAI	MAXIMUM MAI/AC	ESTIMATED MAI/AC	MAI (MMBF)	AVG. TOTAL CULTURAL COST/ MBBF
Eastside Pine												
Non-sprout, Manz/Tractor	7	300	310	160	170	540	7	100	270	220	2	28
Other Brush/Tractor	6	300	310	160	170	940	6	100	220	720	1	28
Grass-Forbs/Tractor	13	440	310	150	170	1070	14	100	220	220	3	32
Subtotal or Average	26	370	310	155	170	1005	26	100	220	220	6	30
Red Fir												
Other Brush/Tractor	7	300	170	150	240	860	6	100	060	860	6	7
Grass-Forbs/Tractor	26	450	220	150	230	1050	27	100	860	860	22	8
Grass-Forbs/Cable <60%	3	480	220	150	230	1080	3	100	710	710	2	10
Grass-Forbs/Cable >60%	2	530	280	140	240	1150	2	100	710	710	1	11
Subtotal or Average	38	429	214	149	232	1025	39	100	840	840	32	8
Mixed Conifer												
Sprouting Manzan/Tractor	47	300	340	160	170	970	46	100	610	610	29	11
Sprouting Manz/Cable <60%	8	480	340	160	170	1150	9	100	500	500	4	15
Sprouting Manz/Cable >60%	4	530	370	180	190	1270	5	100	500	500	2	17
Bear Clover/Tractor	33	450	340	360	170	1320	44	100	610	610	20	14
Bear Clover/Cable <60%	10	480	340	360	170	1350	14	100	500	500	5	18
Bear Clover/Cable >60%	4	530	370	210	150	1300	6	100	500	500	2	18
Other Brush/Tractor	76	300	340	160	170	970	74	100	610	610	46	11
Other Brush/Cable <60%	22	480	340	160	170	1150	25	100	500	500	11	15
Other Brush/Cable >60%	10	530	370	180	190	1270	13	100	500	500	5	17
Grass-Forbs/Tractor	17	440	310	150	170	1070	18	100	610	610	10	12
Grass-Forbs/Cable <60%	4	480	310	150	170	1110	4	100	500	500	2	15
Grass Forbs/Cable >60%	3	530	340	140	190	1200	4	100	500	500	2	16
Subtotal or Average	238	384	340	198	172	1094	260	100	580	580	130	13
Brushfield, Assumed to be Sprouting Manzanita, and Converted to Mixed Conifer												
Brush/Tractor	0	460	310	160	170	1100	0	100	610	610	0	0
Brush/Cable <60%	0	610	310	160	170	1250	0	100	500	500	0	0
Subtotal or Average	0	535	310	160	170	1110	0	100	555	555	0	0
Total or Average	307	389	321	188	179	1070	375	100	502	582	176	12

Total Annual Timber Yield - Sequoia NF 176 Million Board Feet (Scribner) Per Year
Average Mean Annual Increment Per Acre - Sequoia NF: 582 Board Feet (Scribner) Per Acre Per Year
Average Annual Vegetation Management Costs for Reforestation - Sequoia NF: 7.17 Million Dollars
Average Program Cost of Vegetation Management During Reforestation Per Thousand Board Feet (Scribner) Yield - Sequoia NF 12 Dollars

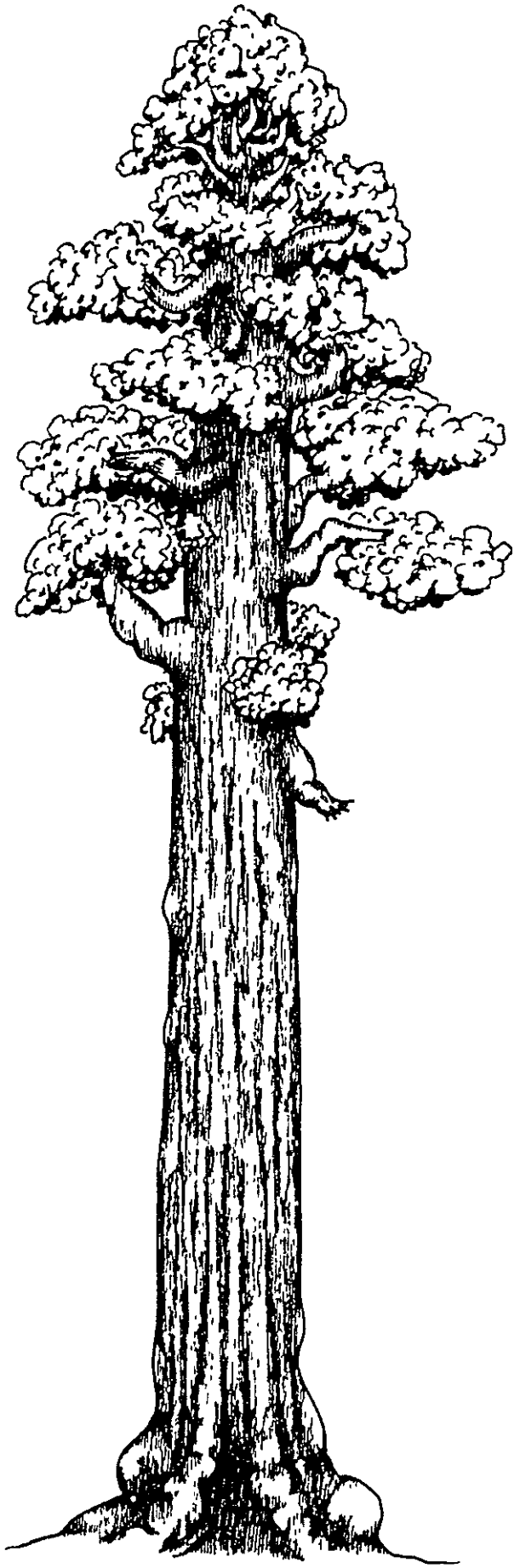
Table M.9 - Effects on Timber Management of Two Policies That Would Restrict Use of Herbicides
(Effects are displayed two mays: actual changes and. In parentheses. percentage changes)

Effect on:	Herbicide Policy:	LMP Alternative PRF	CUR	RPA	ANN	INT	PRO	WFV
Allowable Sale Quantity (MMBF)	No Herbicides	-40 (26)	-25 (28)	-27 (28)	-14 (22)	-35 (28)	-38 (30)	-28 (22)
	No Aerial Herb.	-1 (1)	neg	neg	neg	-1 (1)	-1 (1)	neg
Timber Sultable Land Base (Thousand Acres)	No Herbicides	-44 (15)	-28 (14)	-32 (15)	-21 (18)	-37 (14)	-39 (14)	-32 (15)
	No Aerial Herb.	0	0	0	0	0	0	0
Reforestation and Timber Stand Improvement Budget (Million Dollars) 1/	No Herbicides	+0.1 (3)	+0.1 (4)	+0.1 (4)	neg	+0.2 (6)	+0.1 (3)	neg
	No Aerial Herb.	neg	+0.1 (4)	+0.1 (4)	neg	+0.1 (3)	neg	+0.1 (6)
Average Cost per Thousand Board Feet (Dollars) 1/	No Herbicides	+8.10 (39)	+11.30 (44)	+11.30 (44)	+3.80 (27)	+12.30 (49)	+12.00 (47)	+3.60 (29)
	No Aerial Herb.	+0.10 (1)	+1.10 (4)	+1.00 (4)	neg	+1.00 (4)	+0.20 (1)	+0.80 (6)

1/ All reforestation and timber stand improvement Costs, except for anlmal damage control.

Table M.10 - Acres Suitable for Timber Management by Alternative, Forest Type and Regulation Class

FOREST TYP AND REGULATION CLASS		TH SAND OF ACRE BY ALTERNATIVE						
		PRF	CUR	RPA	AMN	MKT	PRO	WFV
EASTSIDE PINE	RC 1	0	13	19	0	36	26	0
	RC 2	26	13	0	0	0	10	19
RED FIR	RC 1	13	16	15	0	20	30	0
	RC 2	25	2	2	0	9	0	24
MIXED CONIFER	RC 1	188	152	172	11	200	210	0
	RC 2	50	0	0	103	0	0	175



Appendix O

TIMBER SUPPLY–DEMAND

APPENDIX 0

THE REGIONAL TIMBER SUPPLY-DEMAND SITUATION IN CALIFORNIA

This appendix was created to address public comment that requested additional information on the broad level timber supply and demand situation in relation to supplies from individual National Forests. Existing information from recent RPA assessments, the Pacific Southwest Regional Guide, Forest Service research publications, and the State of California's Forest and Range Resource Assessment Program was used for this purpose.

1. Historical Harvests from Public and Private Lands - Statewide

Timber harvest in California has been in a downward trend for over 30 years. In 1955, timber harvest in the State from all lands totaled 6 billion board feet. In that year, harvest from private lands was 4.9 billion and harvest from National Forest was 1.0 billion. Less than 100 million board feet were harvested from other public lands. Since that time, total harvest in the State has fallen steadily. By 1982, at the bottom of the last recession, harvests had fallen to 2.5 billion board feet. Since then, annual harvests have rebounded to 4 billion board feet. Harvest from private lands fell to 1.5 billion board feet in 1982 and have since rebounded to 2.2 billion board feet. Harvest from National Forests increased to a peak of 2.36 billion board feet in 1968. National Forest harvests then trended downward to a low of 0.9 billion board feet at the bottom of the last recession and have since rebounded to 1.96 billion board feet. Harvests from other public lands have been relatively stable at near 100 million board feet for the last three decades (*see* Table 0.1).

As shown in Table 0.1, harvest levels fluctuate widely from year to year rather than following a smooth pattern. Year to year variations are influenced primarily by changes in housing markets and general business conditions. Only over the long term do timber inventory and growth levels limit harvests.

2. Statewide Demand for Timber Products and the Relationship to Harvest Levels

With a population that has grown faster than the national average to over 26 million people and a high level of income per capita. California is one of the largest markets for lumber, wood, and paper products in the world. When discussing the relationship between the demand for timber products (lumber, wood, and paper) and the demand for timber harvest (stumpage), it is necessary to translate the demand for timber products into its timber harvest equivalent. Expressed in these terms, the demand for timber has been increasing, but at a slower rate than the growth in population. While the population has been growing, per capita consumption of timber has been declining. This has occurred due to the introduction of labor and material-saving technologies both in timber product manufacturing and in industries that use manufactured timber products. The result of these technological innovations has been a drop in per capita consumption of timber from 390 board feet annually in 1950 to 360 board feet annually in 1983. However, because population in the state grew from 10.6 million in

1950, to over 26 million at present, total demand increased from 4.1 billion board feet annually in 1950 to 9.3 billion board feet annually at present.

While the demand for timber products has been increasing, timber harvests in the state have been decreasing. The difference between the growing demand and the declining supply has been made up by increased imports to the state--primarily from Oregon, Washington, and Canada. The state has changed from a net exporter to a net importer of timber products over the last three decades.

California now relies on imports for more than one-half of its overall timber product needs. Although California receives only a small proportion of its imports from Canada, Canadian shipments to the United States have a significant effect on the state's ability to import timber products from the Pacific Northwest. In contrast to California's reliance on imports, the bulk of the timber products produced in both Washington and Oregon are exported to other states and countries. Increases in Canadian shipments to the eastern half of the United States have displaced timber products from the Pacific Northwest. The result has been an increase in the availability of timber products from the Pacific Northwest for California markets. Increased production in the South has also been displacing the Pacific Northwest in eastern markets, which has also increased the availability of products from the Northwest in California markets.

3. Broad Level Socioeconomic Effects

About 95 percent of California's population lives in urban areas. As consumers, the primary effect of changes in harvest levels in the state on them is a change in prices paid for timber products. A reduction in timber harvests in the state reduces competition among suppliers, raises market prices, and leads to increased use of imported products. Econometric analysis done for the 1985 RPA indicates that a one billion board foot change in harvest level would change lumber prices by about three percent. This translates into a $250 change in the price of the typical new house at current conversion efficiencies. For the United States economy as a whole, this would amount to a cost to buyers of about $400 million annually.

Another effect on the urban population is through "indirect and induced" employment. While the employment effects of changes in harvest levels is felt most strongly in the communities where the logging and sawmilling takes place, some broader level employment effects also occur. This is because most firms that manufacture and supply goods and services to logging and sawmill companies are typically located in the major urban centers rather than in the rural areas where the logging and milling takes place.

Logging and milling by itself typically requires four to seven person-years of employment per million board feet processed. Newer, more specialized and automated mills using readily accessible timber are at the bottom of this range, while more labor intensive operations are at the top of this range. This direct employment generates indirect employment in firms that supply goods and services to logging and milling firms and induced employment in firms and governments providing goods and services to those

employed directly and indirectly. In undeveloped rural areas there is little if any indirect and induced effect because suppliers are located outside of the area, and logging and sawmilling employees must "drive into the city" to make major purchases. In addition, on most National Forests a portion of the logs harvested are trucked well outside of the primary zone of influence for manufacturing into lumber products. As a result, total statewide employment effects of changes in harvest levels are larger than employment effects occurring in the primary zones of influence for individual National Forests. Employment effects on a statewide basis range between 10 and 20 person-years per million board feet of timber harvested. These employment effect estimates were made with input-output models constructed by the Forest Service and U.S. Department of Commerce. They reflect present technologies. As the trend toward increased timber utilization efficiency continues, employment generated per unit of timber processed is expected to decline.

4. The Outlook for Timber Supplies - Private Lands

Based on an examination of timber growth and inventory levels compared to historical harvest levels, timber supplies from private lands in California can be maintained or increased over present levels over the 10 to 15-year life of the Forest Plans. Recent harvest levels and timber growth and inventory levels are shown in Table 0.2. Private harvests averaged 2 billion board feet annually over the period 1978-1985. This compares with sawtimber growth on private lands of 2.3 billion board feet annually. Current private sawtimber inventory is 86.8 billion board feet or the equivalent of a 43-year supply (not counting growth) at current harvest rates and utilization standards. As timber utilization efficiencies increase, the effective supply will also be extended.

The picture changes somewhat when growth and inventory levels are divided among the major private ownership classes. Nonindustrial private owners hold 38 percent of the sawtimber inventory. These ownerships account for a similar percentage of annual sawtimber growth. Historically, these owners have harvested a much smaller percentage of the timber growth and inventory on their lands than have large industrial owners. Statewide, harvests from nonindustrial private ownerships have averaged only about 30 percent of annual sawtimber growth. This proportion has been higher in the northern parts of the state and lower in the central and southern Sierra. With increasing urbanization there is also the likelihood that the harvest rates on nonindustrial private ownerships may decline in the future.

Industrial owners hold 62 percent of the private sawtimber inventory. In contrast to nonindustrial private ownerships, harvest rates on industrial ownerships are 23 percent higher than annual growth. This means that without significant increases in growth, inventory depletion could lead to declining harvest levels in the next century. However, timber growth and inventory are sufficient to maintain harvests during the 10 to 15-year life of the Forest Plans.

5. Outlook for Timber Supplies - Imports

As discussed above, the Pacific Northwest is the primary source of imported timber products in California. Through displacement effects in national

markets, Canada and the South also play a major role in determining the supply of timber products from the Northwest that is available to California markets.

According to studies conducted by Forest Service research units, timber supplies from the South are likely to increase, but at a slower rate than experienced over the last 20 years, during the life of the Forest Plans. A decline or falldown in supplies from the South is in prospect for the next century without an increase in investment and timber growth.

Studies conducted in Canada indicate that sawtimber growth and inventory is not expected to restrain exports to the United States until after the turn of the century. However, recent tariff and trade negotiations are expected to moderate Canadian exports to the United States over the near term.

A decline in timber harvests in the Pacific Northwest over the next 10 to 15 years is expected. This is due to reduced availability of timber inventories on both public and private lands.

The overall outlook is that imports will continue to grow to support increased demands by California consumers over the next 10 to 15 years. However, imports will likely increase at a lower rate than over the last 20 years and may decrease in availability beyond the year 2000.

6. The Outlook for Timber Supplies - National Forests

The Allowable Sale Quantities set in individual Forest Plans are an indicator of future timber supply levels from National Forests in California. The Allowable Sale Quantity places an upper limit on the average annual amount of green sawtimber from suitable timberlands that can be sold from a National Forest in the first 10-year period of the Plan. Nonchargeable timber (dead timber and fuelwood from either suitable or unsuitable timberlands) is in addition to the Allowable Sale Quantity. The addition of nonchargeable volume usually increases the total amount sold by a few percentage points.

The amount of timber offered for sale in an individual year is determined through the budget process. When the amount of timber sold in an individual year is less than the Allowable Sale Quantity, sales in future years may be higher than the Allowable Sale Quantity, since the Allowable Sale Quantity is a limit on the average annual amount that can be sold over a 10-year period.

Total planned timber sales under the individual National Forest Plans in Region 5 is about 1.86 billion board feet annually. This is slightly above the average volume sold and above the 1.6 billion board foot average annual volume harvested over the past decade. Excluding the period of severe economic recession that occurred in the early 1980's, timber output under the Plans is roughly equal to the 1.85 billion board foot average annual harvest during the decade of the 1970's. Output under the Plans is slightly above the 1985 RPA "high bound" program sale offering goal of 1.8 billion board feet for the year 1990.

7. The Subregional Outlook - Overview

The picture is somewhat different when observed at the subregional level. Based on the historical pattern of log flows to mills, the state can be divided into six timber market areas: North Coast, Northern Interior, Sacramento, San Joaquin, Central Coast, and Southern California. National Forests play a significant role in the North Coast, Northern Interior. Sacramento, and San Joaquin areas.

Virtually all of the decline in the state's timber harvest that has occurred over the last 30 years has taken place in the North Coast market area on private lands. The outlook now is for relatively stable output from private lands over the 10 to 15-year life of the Forest Plans in all major market areas.

The relative contribution of National Forests to the timber supply differs markedly between market areas. In the North Coast area where the private timber supply has been falling most rapidly, National Forests supply only 13 percent of the timber. In the Northern Interior and Sacramento areas, National Forests supply 50 percent of the timber. In the San Joaquin area they supply 70 percent.

Timber outputs under the Forest Plans are lower than average annual sale levels over the last eight years in the Northern Interior area and higher in all other areas. This means that adverse impacts on local economies resulting from the Plans will be centered in Northeastern California.

8. The Subregional Outlook in the San Joaquin Timber Supply Area

Timber harvests in the San Joaquin area over the past eight years have averaged 407 million board feet annually. Harvests from National Forests account for 70 percent of the total volume harvested. The Stanislaus, Sierra, and Sequoia are the dominant National Forest suppliers, but volume from the Eldorado, Inyo, and San Bernardino is also milled in this market area. Timber outputs under the Forest Plans are above average sale levels during the last eight years by about 25 million board feet.

Private harvests in the area have averaged 131 million board feet annually over the past eight years. This is less than annual sawtimber growth on private lands of 145 million board feet annually. Private sawtimber inventory is 5.8 billion board feet - the equivalent of a 44-year supply (not counting growth) at recent harvest rates. Harvests on private lands are expected to be maintained near present levels during the 10 to 15-year life of the Forest Plans.

There are 14 sawmills with a combined eight-hour shift capacity of 1.8 million board feet in the San Joaquin Valley area. This means that mill capacity is over 60 percent above the available sawtimber supply on an annual basis.

Logs from the Sequoia NF are almost all milled in Tulare County at the southern end of the San Joaquin area. Normally only about 5 million board feet from the Sequoia flow north to Fresno and Madera counties. Within Tulare County, the Sequoia NF is the dominant supplier of logs to mills.

The Sierra, Inyo, and San Bernardino National Forests together typically supply about 25 million board feet of logs that are milled in the Southern San Joaquin Valley. Harvests from private lands in Kern and Tulare Counties have averaged about 4 million board feet annually over the last eight years. Overall, the Sequoia NF has historically supplied 75 percent or more of the logs milled in the two counties. This marketing pattern is expected to continue over the life of the Forest Plan. For additional discussion, see Chapter 3 of the EIS.

Table 0.1. - California Timber Harvests by Ownership, 1952-86

Year	Private	Other Public	National Forest	Total
		-billion board feet-		
1952	4.40	.05	.61	5.06
1953	5.32	.04	.63	5.99
1954	4.79	.05	.76	5.60
1955	4.93	.06	1.03	6.02
1956	4.69	.08	1.09	5.86
1957	4.36	.07	.92	5.35
1958	4.47	.09	1.11	5.67
1959	4.29	.12	1.48	5.89
1960	3.70	.11	1.33	5.14
1961	3.85	.11	1.38	5.34
1962	4.05	.11	1.38	5.54
1963	3.69	.11	1.66	5.46
1964	3.50	.11	1.86	5.47
1965	3.21	.14	1.92	5.27
1966	2.97	.11	1.93	5.01
1967	3.06	.11	1.89	5.06
1968	2.82	.16	2.36	5.34
1969	2.88	.12	2.00	5.00
1970	2.62	.10	1.84	4.57
1971	2.59	.13	2.06	4.78
1972	2.66	.12	2.22	5.00
1973	2.81	.10	2.01	4.92
1974	2.86	.11	1.73	4.70
1975	2.71	.10	1.52	4.33
1976	2.76	.08	1.89	4.73
1977	2.96	.09	1.74	4.79
1978	2.78	.08	1.80	4.66
1979	2.26	.09	1.73	4.08
1980	1.86	.07	1.51	3.44
1981	1.72	.04	1.09	2.86
1982	1.50	.06	.94	2.50
1983	1.89	.08	1.68	3.65
1984	2.09	.03	1.56	3.68
1985	2.17	.06	1.82	4.05
1986			1.96	

Sources: California Department of Forestry and Fire Protection
California State Board of Equalization
Bureau of Indian Affairs, USDI
Bureau of Land Management, USDI
Forest Service, USDA

Table 0.2. - Timber Harvest, Growth, and Inventory on Private Land in California

Area	Average Annual Harvest, MMBF 1978-1985	Net Annual Sawtimber Growth MMBF, 1982-1984	Sawtimber Inventory BBF, 1982-1984
North Coast	949	981	34.9
Northern Interior	520	563	18.0
Sacramento	415	502	20.7
San Joaquin	131	145	5.8
Other Areas	22	141	7.4
All Private Land	2037	2332	86.8
Industrial Private	1785	1458	53.8
Nonindustrial Private	252	874	33.0

Source: Harvest data from California State Board of Equalization and forest inventory data from Pacific Northwest Forest and Range Experiment Station, Forest Service, USDA as compiled by the California Department of Forestry and Fire Protection-Forest and Rangeland Resources Assessment Unit.

Table 0.3. - Average Annual National Forest Timber Sales Compared to Allowable Sale Quantities in Forest Plans

Timber Supply Area	National Forest	1979-86 Average Volume Sold, MMBF	Forest Plan Preferred Alternative MMBF
North Coast	Six Rivers	150.0	175.0
Northern Interior	Klamath (1)	223.6	198.0
	Modoc	59.5	52.0
	Lassen	174.7	154.0
	Shasta-Trinity	215.7	226.0
Sacramento	Mendocino (2)	80.7	93.0
	Plumas (3)	208.0	265.0
	Tahoe	141.7	178.7
	Eldorado (4)	146.7	138.0
San Joaquin	Stanislaus (5)	117.4	134.0
	Sierra	128.4	125.0
	Sequoia	77.2	97.0
	Inyo (6)	12.8	10.0
	San Bernardino	8.8	5.2
So.Calif.	Los Padres	1.3	3.8
R5	Total	1,747	1,855

(1) Typically 100-130 MMBF of logs flow into Oregon. Most of this amount is from the Klamath National Forest.

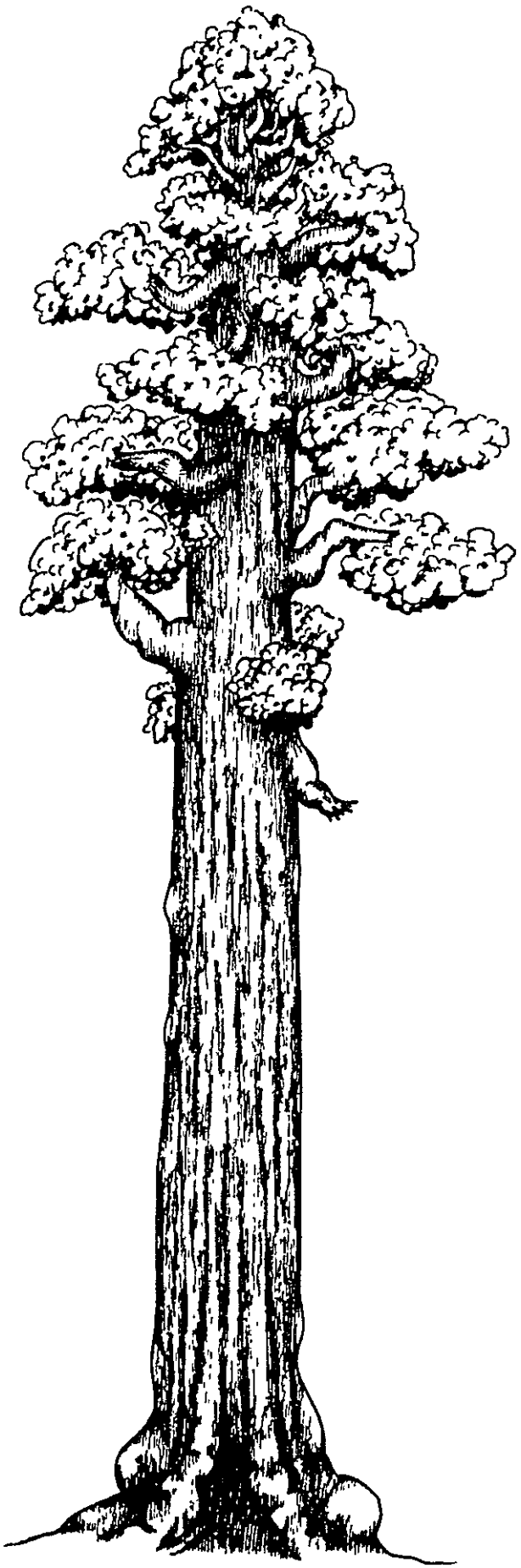
(2) Mendocino logs typically flow 40 percent to the Sacramento area, 40 percent to the Northern Interior area, and 20 percent to the North Coast.

(3) Plumas logs typically flow 40 percent to the Northern Interior area, 60 percent to the Sacramento area.

(4) Eldorado logs typically flow 60 percent to the Sacramento area and 40 percent to the San Joaquin area.

(5) Stanislaus logs typically flow 20 percent to the Sacramento area and 80 percent to the San Joaquin area.

(6) Inyo logs typically flow 50 percent to the San Joaquin area and 50 percent to the Northern Interior area.



Appendix P

DESCRIPTION OF MANAGEMENT OF NON–WILDERNESS ROADLESS AREAS

APPENDIX P

DESCRIPTION OF MANAGEMENT OF NON-WILDERNESS ROADLESS AREAS

Introduction

The California Wilderness Act of 1984 established that approximately 324,000 acres of roadless lands in 14 areas on the Sequoia National Forest would be managed for multiple-use (non-wilderness) values.

None of these non-wilderness areas have been considered for potential wilderness in the first 10-year planning period identified in this Environmental Impact Statement. These areas could be considered for wilderness values in future planning periods if they continue to meet criteria for wilderness designation.

Table P.1 lists non-wilderness areas by code number, name, and National Forest Service acreage in each. Table P.2 displays the management prescriptions under which each area would be managed under the various alternatives.

In order to understand the management of these areas, and how future management might result in change from existing conditions, the write-ups in Chapter 2 of this Final Environmental Impact Statement contain the Management Area Prescription Summaries (beginning with Table 2.4). Chapter 2 provides a description of what activities might occur within a particular emphasis area. Non-wilderness areas being addressed are basically undeveloped at the current time. An understanding of the typical activities and their relationship to the management emphasis as shown in Table P.2 are identified. In order to get more specific, it will be necessary to overlay the vegetation map (which includes the non-wilderness areas) with the management emphasis map and deal with specific areas.

Table P.1 - Non-wilderness Roadless Areas

Code Number	Name	NFS Acres (Net)
B5213	Staff	42,351
05199	Agnew	9,300
05200	Jennie Lakes	3,200
05204	Black Mountain	15,800
05205	Slate Mountain	13,100
05029	South Sierra	9,690
05206	Woodpecker	13,580
05211	Lyon Ridge	5,200
05208	Rincon	58.866
05209	Cannell	47,300
05210	Chico	43,700
05207	Domeland Addition	3,100
05215	Greenhorn Creek	29,400
05214	Mill Creek	29,800
		324,387

Table P.2 - Acres by Management Emphasis by Alternative for Non-wilderness Areas

Non-wilderness Area Number/Name		Acres. by Emphasis by Alternative						
		PRP	CUR	RPA	AMN	MKT	WFV	PRO
STAFF	Gen Disp				41,600			
(42,351 ac)	WL Disp	31.100	26.600	26,800	800	800	42,400	800
	Rng	8,700	8.600	8,400		32,300		32.300
	Sawtbr	2,500	7,100	7.100		9,300		9,300
AGNEW	Gen Disp		1,800	2,800	9,100	200	2,200	1,200
(9,300 ac)	Wtr Rec			100		1.500		200
	Dvlp Rec	200	200	200	200	200		200
	WL Disp	5.200	7,100			3,800	7.100	1,000
	Sawtbr	3,900	200	6,200		3.600		6.700
JENNIE LAKES	Gen Disp	600	200	1,700	2,100	200	200	200
(3,200 ac)	Dvlp Rec	1,100	1,100		1,100	1,100		1,100
	WL Disp						3.000	
	Sawtbr	1,500	1,900	1,600		1.900		1.900
BLACK MOUNTAIN	Gen Disp	4,300	3,200	2,700	5,000	2,700	2.700	3,200
	Wtr Rec	500	500	500	500	500	500	500
(15,800 ac)	Dvlp Rec					200		
	WL Disp	2,200	2,000	2.000	2,000	2.000	12.700	2,000
	Rng	3,300	4,600	5,400	3.100	3,300		4,600
	Sawtbr	5,500	5,500	5,300	5,300			5,500
	Wtr Yld					7.100		
SLATE MOUNTAIN	Gen Disp	1,700	1.700	1,700	10.900	1,800	1,700	1,700
	Wtr Rec					800		
(13,100 ac)	Dvlp Rec	2.300	2,300	2,300	2,300	2.500	2.300	2.300
	WL Disp						9.100	
	Sawtbr	9.200	9,200	9,200		900		9.200
	Wtr Yld					7.100		
SOUTH SIERRA	Gen Disp	2.500	9,700	1.700	9,700	700	1.700	
(9,690 ac)	Wtr Rec						800	
	WL Disp						7.200	
	Rng			8,000		1,600		2,500
	Sawtbr	7,200				7,300		7.200
WOODPECKER	Gen Disp	10.500	500	400	13.200	11.900		
(13.580 ac)	Dvlp Rec	400	500	400	400	400		400
	WL Disp						13.600	
	Sawtbr	2.700	12.600	10,800		1,300		
	Wtr Yld			2,000				13.200

* All figures are rounded off to the nearest 100 acres

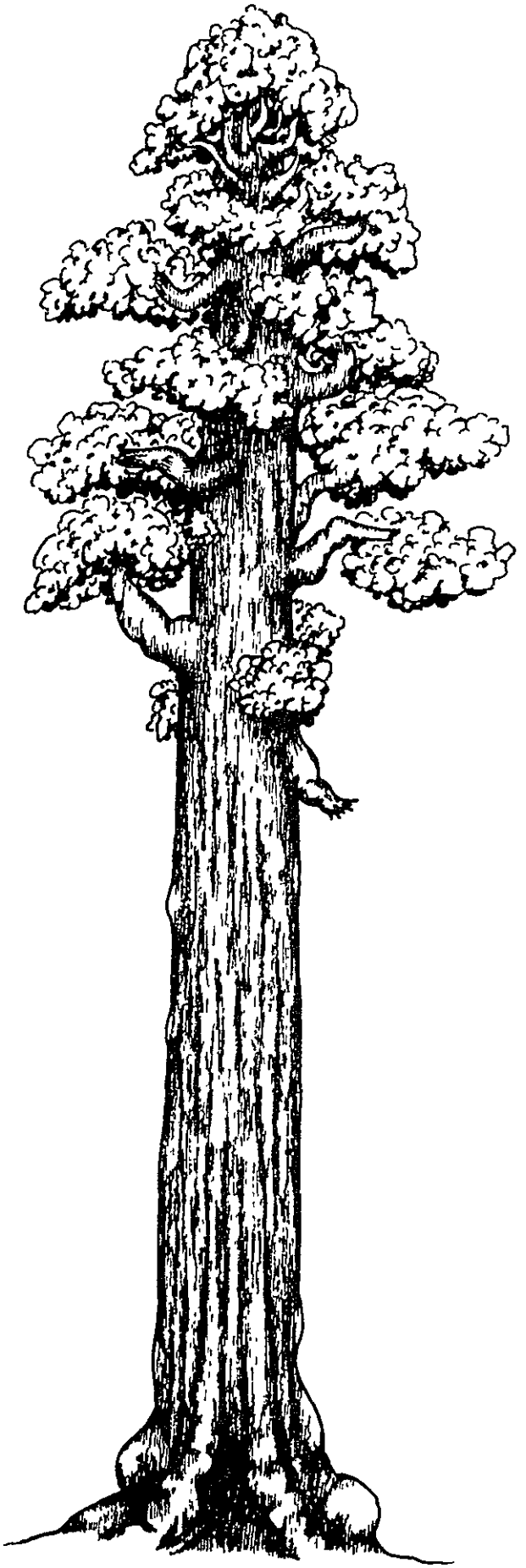
Table P.2 - Acres by Management Emphasis by Alternative for Non-wilderness Areas (con't)

Non-wilderness Area Number/Name		Acres. by Emphasis by Alternative						
		PRF	CUR	RPA	AMN	MKT	WFV	PRO
LYON RIDGE	Gen Disp		1,700	1,700	5.200	800	800	
(5.200ac)	WL Disp						4.400	
	Rng	1,700				1,000		1.700
	Sawtbr	3,500	3,500			3,500		3,500
	Wtr Yield			3,500				
RINCON	Gen Disp	3,200	53.600	9,000	36,400	3,100	1,700	
(58.866 BE)	WL Disp	26.500	100	22.700	22,500	3.500	57,100	3,500
	Rng			400		16,700		19.900
	Sawtbr	29,200	5.200	26,800		35.600		35.600
CANNELL	Gen Disp			1.600	27,000	28,600		
(47,300 ac)	Wtr Rec	3,100	3,100	3,100	3,100	3.100	3.100	3,100
	WL Disp	31,600	39.200	30.700	17,200		44,200	
	Rng	7,600		7,900		10,600		36,400
	Sawtbr	5.100	5.100	4.100		5.100		5.100
CHICO	Gen Disp	200	100	600	14,300	16,400		
(43.700 ac)	WL Disp	7,800	11.100		29,400	7.900	43.700	11,100
	Rng	28.900	25.800	39.000		12,600		25,800
	Sawtbr	6.800	6,800	1,100		6,800		6,800
	Wtr Yld			3.100				
DOMBLAND ADDITION	Gen Disp	2.000			3,100		800	
	WL Disp						2,500	
(3,100ac)	Rng			3.100				
	Sawtbr	1,100	3.100			3,100		3.100
GREENHORN CREEK	Gen Disp				27.400	13,700	13.700	
	Wtr Rec	2,000	2,000	2,000	2.000	2.000	2,000	2,000
(29.400 ac)	WL Disp						13,700	
	Rng	26.100	26,100	26.100		12.400		26.100
	Sswtbr	1,300	1,300	1,300		1,300		1,300
MILL CREEK	Gen Disp				29.600	17.100	17.800	
(29,800ac)	WL Disp	200	200	200	200	200	12.000	200
	Rng	28,800	28,800	28.800		11,200		28,800
	Sawtbr	800	800	800		800		800

* All figures are rounded off to the nearest 100 acres

Key to Abbreviations Used in Table P.2

1.	General Dispersed Recreation	Gen Disp
2.	Water-Oriented Recreation	Wtr Rec
3.	Developed Recreation	Dvlp Rec
4.	Wilderness	Wild
5.	Wildlife/Dispersed Recreation	WL Disp
6.	Range	Rng
7.	Sawtimber	Sawtbr
8.	Water Yield	Wtr Yld



Appendix Q

WATER QUALITY MANAGEMENT– BEST MANAGEMENT PRACTICES

APPENDIX Q

Water Quality Management

Best Management Practices

I. INTRODUCTION

The Forest Service water quality maintenance and improvement measures called Best Management Practices (BMP's) were developed in compliance with Section 208 of the Federal Clean Water Act, PL92-500, as amended. After a lengthy development and public review process from 1977 to 1979, the practices developed by the Forest Service were certified by the State Water Resources Control Board and approved by EPA. The signing of a 1981 Management Agency Agreement (MAA) resulted in the formal designation of the Forest Service as the water quality management agency for the public domain lands it administers. The BMP's are the measures both the state and federal water quality regulatory agencies expect the Forest Service to implement to meet water quality objectives and to maintain and improve water quality. There are currently 99 practices documented, 96 of which are certified and approved as BMP's. The three remaining practices are still being improved before referral to the state and EPA for certification and approval. In like manner, work continues on developing new management practices and evaluating the effectiveness of the existing BMP's. Due to the dynamic nature of management practice development and refinement, the original Forest Service publication documenting BMP's is continually being updated. The current draft publication reference is: WATER QUALITY MANAGEMENT FOR NATIONAL FOREST SYSTEM LANDS IN CALIFORNIA, U.S. Forest Service, Pacific Southwest Region publication, 1986. This publication is hereby incorporated by reference into this document. Work is underway to republish the updated version of this text as a Soil and Water Conservation Handbook.

Water quality management is administered on National Forest System lands through the continued implementation of BMP's and through the guidance of a 1981 Management Agency Agreement with the State of California Water Resources Control Board.

11. IMPLEMENTATION PROCESS

Forest Plans are broad level planning documents that encompass the entire Forest and a multitude of different management activities. Because of the physical-biological diversity of any given National Forest (e.g., different soils, vegetation, slopes, and presence of surface water) and the mixture of activities that can occur on various portions of the Forest, site-specific methods and techniques for implementing the BMP's are not identified at the Forest Planning level. For each individual project that is initiated to implement the Forest Plan, a separate site-specific environmental assessment is conducted. The appropriate BMP's necessary to protect or improve water quality and the methods and techniques of implementing the

BMP's are identified at the time of this on-site, project-specific assessment. In this manner, the methods and techniques can be tailored to fit the specific physical-biological environment as well as the proposed project activities. There are commonly many methods available for implementing a BMP. and not all are applicable to every site. An example is BMP 2.7 control of Road Drainage. This BMP dictates that roads will be correctly drained to disperse water runoff to minimize the erosive effects of concentrated water. There are many ways to drain a road correctly (e.g., outslope the road surface, install water bars, install French Drains, inslope the road surface, and install culverts). It is during the on-site environmental assessment of a specific road construction project proposal that the appropriate method or combination of methods to correctly drain the road are identified.

After the methods and techniques of implementing the appropriate BMP are identified, they are discussed by the project interdisciplinary team. As a result of discussions, the appropriate mix of implementation methods and techniques are selected and incorporated into the environmental document as required mitigation measures. These mitigation measures are then carried forward into project plans and implementation documents (e.g., contract language, and design specifications) to assure that they are part of the project work accomplished. Implementation on the ground is assured by the Forest Service official responsible for on-site administration of the project. Supervisory quality control of BMP implementation is attained through review of environmental assessments and contracts, field reviews of projects, and monitoring the quality of the water in the project area when warranted.

111. BEST MANAGEMENT PRACTICES

There are 99 practices identified in eight different resource categories. They are as follows:

TIMBER

- 1.1 Timber Sale Planning Process
- 1.2 Timber Harvest Unit Design
- 1.3 Use of Erosion Hazard Rating for Timber Harvest Unit Design
- 1.4 Use of Sale Area Maps for Designating Water Quality Needs
- 1.5 Limited Operating Period of Timber Sale Activities
- 1.6 Protection of Unstable Areas
- 1.7 Prescribing the Size and Shape of Clearcuts
- 1.8 Streamside Management Zone Designation
- 1.9 Determining Tractor Loggable Ground
- 1.10 Tractor Skidding Design
- 1.11 Suspended Log Yarding in Timber Harvesting
- 1.12 Log Landing Location
- 1.13 Erosion Prevention and Control Measures During Timber Sale Operations
- 1.14 Special Erosion Prevention Measures on Disturbed Land
- 1.15 Revegetation of Areas Disturbed by Harvest Activities
- 1.16 Log Landing Erosion Prevention and Control

1.17 Erosion Control on Skid Trails
1.18 Meadow Protection During Timber Harvesting
1.19 Streamcourse Protection
1.20 Erosion Control Structure Maintenance
1.21 Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
1.22 Slash treatment in Sensitive Areas
1.23 Five-Year Reforestation Requirement
1.24 Nonrecurring "C" Provision That Can Be Used for Water Quality Protection
1.25 Modification of the Timber Sale Contract

ROAD AND BUILDING SITE CONSTRUCTION

2.1 General Guidelines for the Location and Design of Roads
2.2 Erosion Control Plan
2.3 Timing of Construction Activities
2.4 Road Slope Stabilization (Preventative Practice)
2.5 Road Slope Stabilization (Administrative Practice)
2.6 Dispersion of Subsurface Drainage from Cut and Fill Slopes
2.7 Control of Road Drainage
2.8 Constraints Related to Pioneer Road Construction
2.9 Timely Erosion Control Measures on Incomplete Road and Stream Crossing Projects
2.10 Construction of Stable Embankments
2.11 Minimization of Sidecast Material
2.12 Servicing and Refueling Equipment
2.13 Control of Construction in Streamside Management Zones
2.14 Controlling In-channel Excavation
2.15 Diversion of Flows Around Construction Sites
2.16 Stream Crossings on Temporary Roads
2.17 Bridge and Culvert Installation
2.18 Regulation of Streamside Gravel Borrow Areas
2.19 Disposal of Right-of-way and Roadside Debris
2.20 Specifying Riprap Composition
2.21 Water Source Development Consistent with Water Quality Protection
2.22 Maintenance of Roads
2.23 Road Surface Treatment to Prevent Loss of Materials
2.24 Traffic Control During Wet Periods
2.25 Snow Removal Controls to Avoid Resource Damage
2.26 Closure or Obliteration of Temporary Roads
2.27 Restoration of Borrow Pits and Quarries
2.28 Surface Erosion Control at Facility Sites

MINING

* 3.1 Administering Terms of the U.S. Mining Laws (Act of May 10, 1872) for Mineral Exploration and Extraction on National Forest System Lands
3.2 Administering Terms of BLM Issued Permits or Leases for Mineral Exploration and Extraction on National Forest System Lands
3.3 Administering Common Variety Mineral Removal Permits

RECREATION

4.1 Sampling and Surveillance of Designated Swimming Sites
4.2 On-site Multidisciplinary Sanitary Surveys Will be Conducted to Augment the Sampling of Swimming Waters
4.3 Provide Safe Drinking Water Supplies
4.4 Documentation of Water Quality Data
4.5 Control of Sanitation Facilities
4.6 Control of Refuse Disposal
4.7 Assuring that Organizational Camps Have Proper Sanitation and Water Supply Facilities
4.8 Water Quality Monitoring Off-Road-Vehicle Use According to a Developed Plan
4.9 Sanitation at Hydrants and Faucets Within Developed Recreation Sites
4.10 Protection of Water Quality Within Developed and Dispersed Recreation Sites
4.11 Location of Pack and Riding Stock Facilities in Wilderness, Primitive, and Wilderness Study Areas.

VEGETATIVE MANIPULATION

5.1 Seed Drilling on the Contour
5.2 Slope Limitations for Tractor Operation
5.3 Tractor Operation Excluded from Wetlands and Meadows
5.4 Revegetation of Surface Disturbed Areas
* 5.5 Tractor Windrowing on the Contour
5.6 Soil Moisture Limitations for Tractor Operation
5.7 Contour Disking
5.8 Pesticide Use Planning Process
5.9 Apply Pesticide According to Label and EPA Registration Directions
5.10 Pesticide Application Monitoring and Evaluation
5.11 Pesticide Spill Contingency Plan
5.12 Cleaning and Disposal of Pesticide Containers and Equipment
5.13 Streamside and Wet Area Protection During Pesticide Spraying
5.14 Controlling Pesticide Drift During Spray Application

FIRE SUPPRESSION AND FUELS MANAGEMENT

6.1 Fire and Fuels Management Activities
6.2 Consideration of Water Quality in Formulating Fire Prescriptions
6.3 Protection of Water Quality from Prescribed Burning Effects
6.4 Minimizing Watershed Damage from Fire Suppression Related Watershed Damage
6.5 Repair or Stabilization of Fire Suppression Related Watershed Damage
6.6 Emergency Rehabilitation of Watersheds Following Wildfires

WATERSHED MANAGEMENT

7.1 Watershed Restoration
7.2 Conduct Floodplain Hazard Analysis and Evaluation
7.3 Protection of Wetlands
7.4 Oil and Hazardous Substance Spill Contingency Plan
7.5 Control of Activities Under Special-Use Permit
7.6 Water Quality Monitoring
7.7 Management by Closure to Use (Seasonal, Temporary, and Permanent)
7.8 Cumulative Off-Site Watershed Effects.

GRAZING

8.1 Range Analysis, Allotment Management Plan, Grazing Permit System, and Permittee Operating Plan
8.2 Controlling Livestock Numbers and Season of Use
8.3 Controlling Livestock Distribution Within Allotments
8.4 Rangeland Improvements

* These are the two practices that have not been recommended for certification and approval as BMP at this time.