

ORDINANCE NO. 68

AN ORDINANCE ADOPTING A MASTER PLAN FOR
BROOKTRAILS REDWOOD PARK

WHEREAS, Section 2 of Ordinance No. 63 requires the adoption of a master plan for Brooktrails Redwood Park; and,

WHEREAS, the Board of Directors of the Brooktrails Community Services District on October 27, 1988, received a draft master plan and did, on that date, open a public hearing on said draft master plan; and,

WHEREAS, the Board continued the hearing to its meetings of November 10, 1988, and November 17, 1988, to permit public input into its consideration of said draft master plan;

NOW, THEREFORE, BE IT ORDAINED BY THE BOARD OF DIRECTORS OF THE BROOKTRAILS COMMUNITY SERVICES DISTRICT AS FOLLOWS:

Section 1. The document entitled "Brooktrails Redwood Park Master Plan" attached hereto is hereby adopted as the master plan for the Brooktrails Redwood Park.

Section 2. This ordinance shall become effective thirty (30) days after its adoption. Within fifteen days after its adoption, the District Secretary shall post copies of this ordinance on the bulletin board in three places within the District as follows: the District Office, the Community Center, and the Golf Pro Shop.

INTRODUCED on the 10th day of November, 1988, at a regular meeting of the Board of Directors of the Brooktrails Community Services District.

ADOPTED this 17th day of November, 1988, at a regular meeting of the Board of Directors of the Brooktrails Community Services District by the following vote:

AYES: Stephens, Bothwell, Nicholas, Van Der Wende, Orth

NOES: None

ABSENT: None

Charles A. Orth

Charles A. Orth, President

ATTEST:

Michael L. Phelan

Michael L. Phelan, Secretary

CHAPTER I -THE HYLEOPOLIS

"The only known hyleopolis in the United States is located in the mountains of northern California's Mendocino County. It is called Brooktrails and it combines a resort community with a conservation forest.

"Hyleopolis is taken from the Greek - for a forested area and a city."

- United Press International Newsfeatures, March 8-9 1969.

The above quotation summarizes the subject of this master plan - Brooktrails Redwood Park. As will be discussed in later chapters, the "Park" is land owned by the Brooktrails Community Services District, about 2,500 acres. But the "Park" is more than the land, it is a concept which was part of the community from its inception.

History

In the 1890's, a logging railroad ran from the Little Lake Valley to a sawmill near what is now Summer Lake in Brooktrails. The area was home for the Northwestern Lumber Company.

As logging operations were completed, the land was sold to the Diamond D Ranch, a dude ranch offering more urban Californians the experience of life on a working ranch in the redwoods.

The original ranch lodge burned down in the mid-1950's and was replaced with the current lodge, which has motel and cabin units still providing a place for people outside the area to stay within the Park.

In 1960, the Frank Company was formed by Earl Maize Jr., with Bob Harrah, Max McKee, and Frank Crawford. Maize originated the proposal to convert the lumbering and ranch lands into a planned development. So the Frank Company bought the Northwestern and Diamond D holdings and started dividing the land.

The Brooktrails Company Ltd. of Beverly Hills and New York, a group of investors 90 percent owned by John Olh, acquired the Frank Company in 1967. From their efforts came the Brooktrails Redwood Park concept.

Ultimately, the land was subdivided into 6,000+ lots ranging in size from one-sixth of an acre to 230 acres. Critical to the project was the dedication of approximately 2,500 acres to the Brooktrails Resort Improvement District (BRID).

Philosophy

In a *New York Times* article published on December 17, 1967, the philosophy of this dedicated area was expressed by the key players in the development, Robert J. Beaumont, a then 32-year-old Beverly Hills entrepreneur and President of the corporation, and Gerald Partain, then a professor of forestry economics at Humboldt State College and consultant to Brooktrails:

"The Board of Supervisors of Mendocino County, a north coastal area, is represented on the board of the Brooktrails Resort Improvement District, to which the developer dedicated some 2,000 acres for conservation. There is no way, Mr. Beaumont emphasized, for the developer to regain control of the acreage and change his plans about conservation, even if he ever wished to do so.

"Dr. Gerald Partain...has been retained by the Brooktrails Resort Improvement District as a consultant for the conservation and recreation aspects. He expressed excitement over the prospect of setting up a management plan for the conservation area, 'trying our hand at something other than timber production.'

"A naturalist guide is in preparation. The park lands are a refuge for deer, raccoon, red fox, and other animals. Professor Partain expects the lands to be a kind of laboratory for his students. He said a good job performed here in management practices should convince 'developers who are out to make their buck that conservation practices pay better than jamming houses together.'"

In the spring of 1969, Beaumont announced that Partain had received a federal research grant. In an article in the *Redwood Guardian* of that date, the two reiterated the philosophy underlying the development:

"'Brooktrails is the first community in the United States to blend a four square mile redwood and mixed growth forest conservation park with a contiguous, fully improved residential area,' explained Beaumont.

"'When it was initiated late in 1967,' continued Beaumont, 'Brooktrails not only represented the largest land map ever recorded at one time in the State, it was also so unique that there was no technical term such as metropolis or megalopolis to describe the overall masterplan.'

"'Accordingly, Professor Partain who had been appointed Conservation Director of the Brooktrails Resort Improvement

District, developed the term hyleopolis, which denotes a preserved natural grove within a populated area,' continued Beaumont. '"

Ultimately, Partain and his associates completed two key reports which are appendices of this plan. The first of these, Brooktrails Conservation Areas Study Report, contains a fairly complete analysis of plant cover in the area and initial key policy recommendations on protection from fire, insects, plant diseases, and hunters. It also outlines use policy recommendations including such subjects as demonstration gardens, trails, and the lakes. (See Appendix A)

The second report, Land Development and The Hyleopolitan Concept, provided some further insight into the concept and the results of a survey of property owners in the early period of the development. (See Appendix B).

Within the framework of this historical and philosophical background, this master plan represents an effort to establish policy which will provide continuity in the effort to accomplish the broad and somewhat lofty goals of the original development.

CHAPTER II - THE PARK

Ordinance 62 adopted by the Board of Directors of the Brooktrails Community Services District (BCSD) establishes the Brooktrails Redwood Park. That ordinance spells out the purpose and use of the park which constitute the first policies of this plan as follows:

(a) The park constitutes much of the watershed of the District and, as such is a facility incidental to the water system of the District.

(b) The District shall not use the Park for any purposes other than those enumerated in Section 13070 of the Public Resources Code of the State of California as provided in the original dedication of the land in the Park.

(c) The primary public purpose of the Park is hereby declared to be for the protection, conservation, and management of the trees, other vegetation and wildlife therein, in order to retain and create a natural environment readily available for the passive enjoyment of the property owners and residents of the District.

(d) General public use for active recreation shall be pursuant to a master plan for such use in the Park adopted or amended by ordinance of the Board of Directors following a public hearing.

Within that legal framework, the planning for and use of the Park must be expanded.

Planning History

The developers of Brooktrails had a plan for the Park. On a large map of quality multicolor print, the golf course, the lakes, the tennis court and swimming pool, and the massive open space areas were all indicated.

On December 18, 1974, the BRID Board of Directors, by then independent from the Mendocino County Board of Supervisors, adopted a Master Plan for the Brooktrails Recreation Area.

That plan designated intensive use for the area south of Summer Lake including: swimming pool, tennis courts, recreation building, playground, horse shoe pits, volley ball court, handball court, shuffle board court, badmitton court, boccie ball court, archery range, stables and training area,

and various redwood decks.

Development History

The developers built the "lower nine" portion of the golf course. They provided for the "upper nine" to be built from assessment bond funds, work which was completed under BRID.

Because of drought conditions and financial realities, the District ceased to maintain the upper nine in the late 1970's.

Additionally, the development included a community center building located next to the District Office which has been expanded and improved by the Brooktrails Property Owners Association.

The District has developed a par course along the trail south of Summer Lake, a children's playground near the Community Center building, a playing field south of Summer Lake, and is in the process of completing another playing field in that area.

Operation and maintenance of the Park is very limited. The District does maintain the golf course and contracts for the operation of the pro shop. The District maintains the playing fields.

Maintaining and protecting the passive use areas of the Park has been virtually neglected. Gerald Partain noted the need for ongoing monitoring and active maintenance activities related to management of both the flora and fauna.

In 1984 a management plan for the passive use area was prepared by Lawrence D. Camp and Associates. That plan included an extensive inventory of existing timber and conditions in the Park. The plan entitled Management Plan for the Brooktrails Community Services District Greenbelt Area and the inventory entitled Timber Inventory for Brooktrails Community Services District Greenbelt Area constitute over 100 pages of documentation. They are not included in this plan. However, the Summary of Management Recommendations for the Brooktrails Greenbelt is included as Appendix C. The other two will be available for review at the District office.

Several times in its brief history it has been proposed that the District hire a ranger or rangers to manage its forested areas, but no action has been taken.

CHAPTER III - THE MASTER PLAN

Three classes of use are incorporated within the policies established by this plan. They include (1) active use areas, (2) neighborhood use areas, and (3) passive use areas.

Active Use Areas

The active use area of Brooktrails Redwood Park is designated in this plan as the area beginning at the south boundary of the District along Willits Creek, northerly along the creek through the golf course to the easterly side of the upper end of Lake Emily, and including the area of the upper nine of the golf course. One additional area should be considered in the future, the area north of Poppy Drive along Willits Creek which may become a large lake for water supply. At that time, an equestrian use facility should be considered, as the lake would be large enough to mitigate the nutrient problem resulting from horses. (See the Active Use Area map.)

"Active Use Area" means that area where active use facilities are developed to be used by the entire community and visitors.

Within the Active Use Area, three specific "sub-areas" can be identified as follows: (1) the area beginning at the current community center southerly to the south District boundary; (2) the golf course, including the upper nine; and (3) the easterly side of Lake Emily.

In Sub-area (1) the District has, or intends to, acquire or construct the following facilities: swimming pool, tennis courts, picnic area, par course, walking trails, community arts/performing arts center, Summer Lake, and playing fields.

In Sub-area (2) the District has, or intends to, construct an 18-hole golf course and small picnic facilities near Beeler Pond.

In Sub-area (3) the District has, or intends to, construct fishing and hiking facilities on the easterly side of Lake Emily.

Neighborhood Use Areas

"Neighborhood Use Area" means a small area where facilities such as playground equipment, benches, neighborhood vegetable gardens, etc., are located for the use of the residents of the neighborhood.

A neighborhood as used in this study means an area which may be surrounded by arterial streets or topographic barriers and which may be connected by Park lands which connect to logical locations for neighborhood use areas.

A neighborhood map is included herein for general reference. No "Neighborhood Use Areas" are specifically designated in this plan. Instead, neighborhood residents will be encouraged to locate such areas and suggest facilities development suitable for the particular neighborhood.

Passive Use Areas

"Passive Use Areas" includes all areas of Brooktrails Redwood Park not designated as Active Use Areas or Neighborhood Use Areas and which have not been designated for some other public or utility use by the District.

Passive use areas will not be developed except for trails and demonstration gardens. They are intended to be available for the passive enjoyment of the residents and hikers with access limited to designated trails and small areas. The primary emphasis will be on enjoyment through observation in a manner consistent with the objectives of protection of the watershed and wildlife.

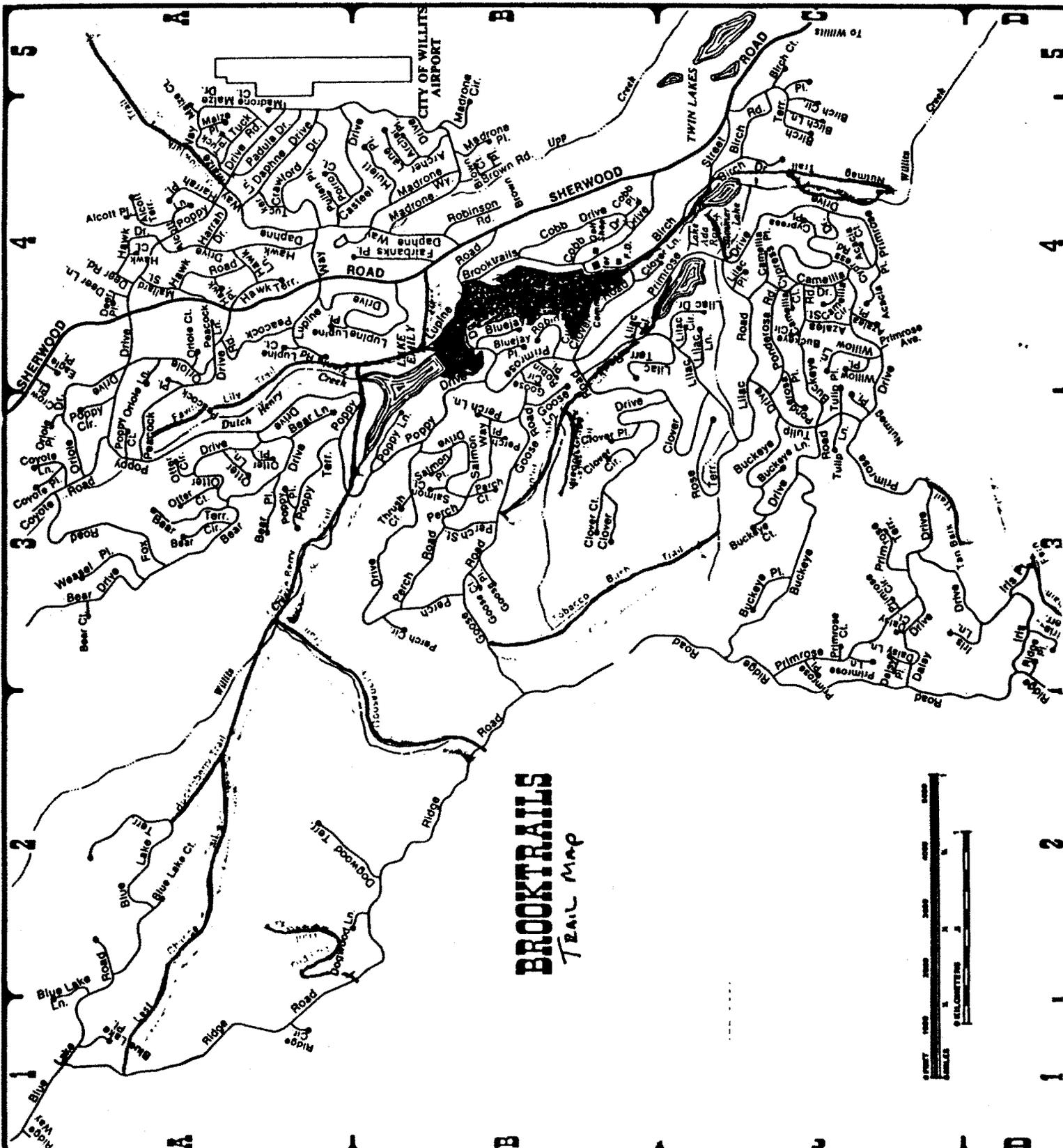
Demonstration gardens will be developed as indicated in pages 17-19 of the Brooktrails Conservation Areas Study Report (Appendix A).

Trails will be developed and maintained pursuant to the "Trail Map" included herein, with concepts outlined for hiking trails, exercise trails and wandering trails as indicated in pages 19-21 of aforementioned study (Appendix A). Specific trails may include parking and staging or resting areas.

Efforts will be made by the District to develop forest protection and maintenance programs keeping in mind the suggestions contained in the Management Plan for the Brooktrails Community Services District (a summary of the recommendations is contained in Appendix C).

CHAPTER IV - REGULAR PLAN REVIEW

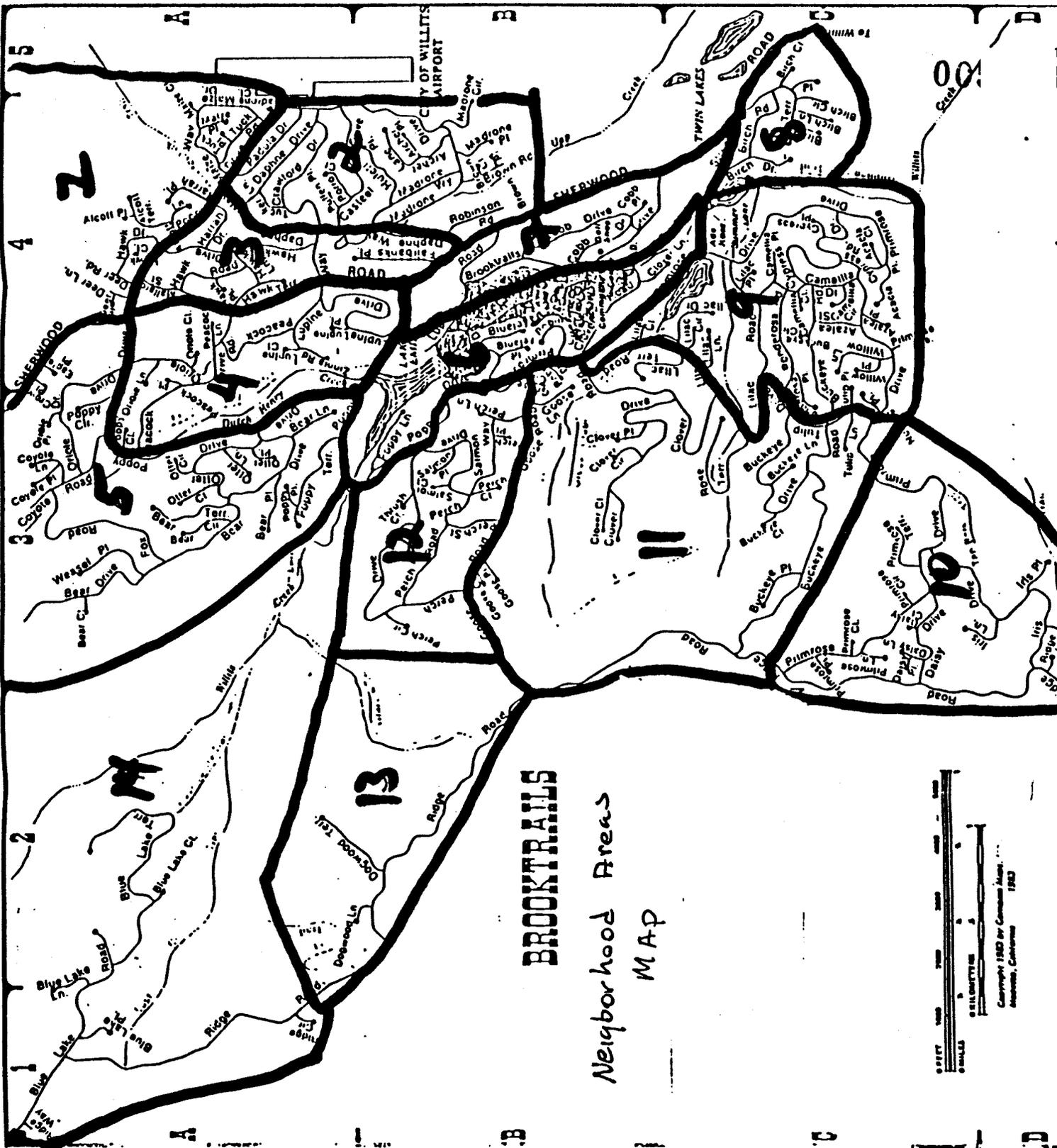
It is the intent of the District to update this plan on a regular basis, no less frequently than every two years. While it is understood that a need exists to provide continuity in terms of the use types indicated above, it is expected that conditions and facts will change as Brooktrails develops.



BROOKTRAILS
TRAIL MAP



1 1 1 2 3 4 5



BROOKTRAILS

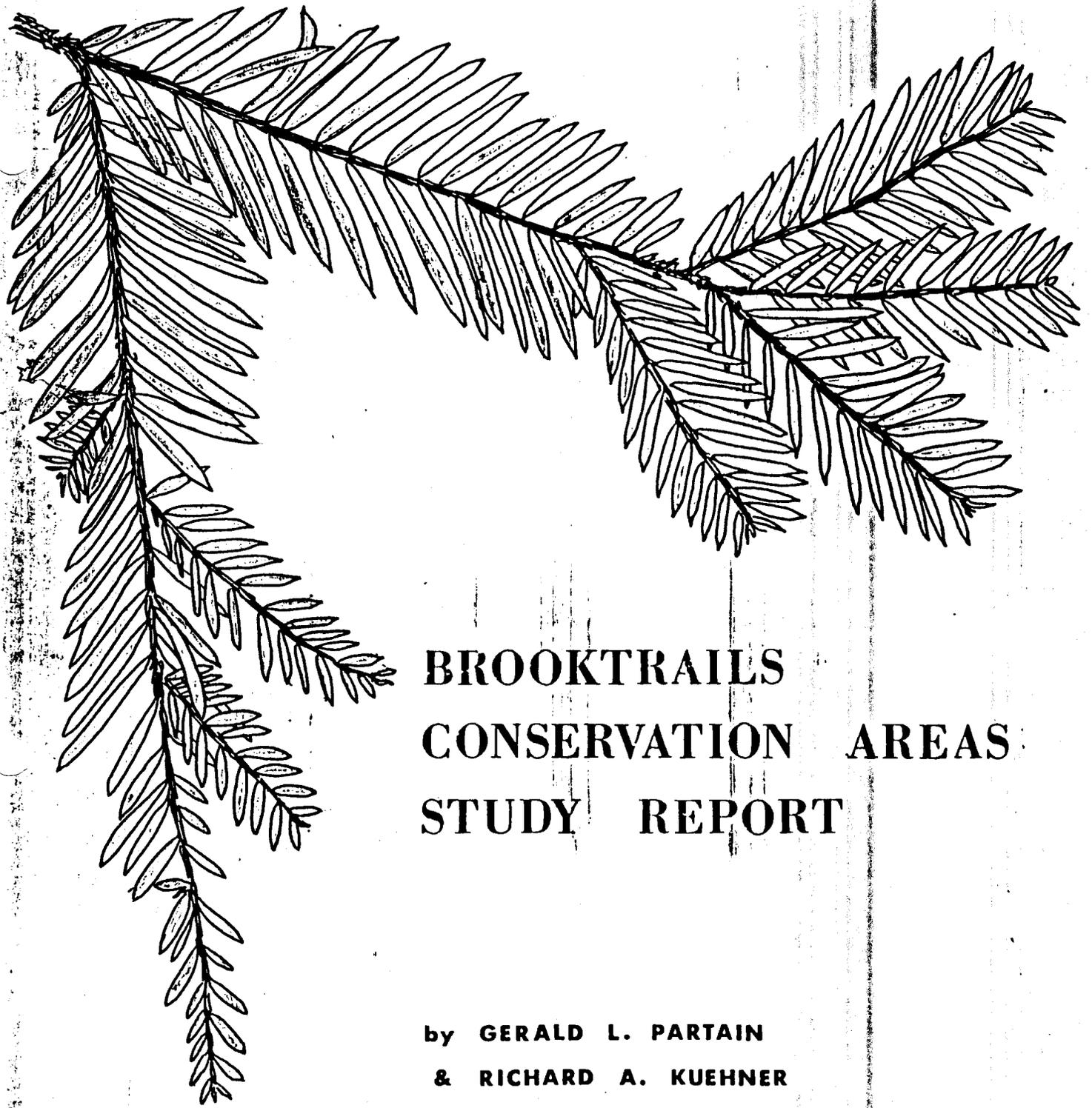
Neighborhood Areas

MAP



Copyright 1982 by Compass Maps, Inc.
San Francisco, California 1982

APPENDIX A



**BROOKTRAILS
CONSERVATION AREAS
STUDY REPORT**

**by GERALD L. PARTAIN
& RICHARD A. KUEHNER**

MARCH, 1968

STUDY REPORT OF THE CONSERVATION AREAS
IN THE BROOKTRAILS RESORT IMPROVEMENT DISTRICT

INTRODUCTION

The study area for this report is located 2.5 miles northwest of Willits, California. The area contains approximately 4000 acres, of which about 2000 are reserved for conservation areas.

Climate

The climate at Brooktrails varies from warm and dry in the summer to cool and wet in winter. Some summer fog is found along the western edge of the property and an occasional light snowfall occurs. Generally, the climate is mild and suited to year-round living.

Topography

The topography varies and includes steep creek bottoms and ridges, which generally have heavy vegetative cover, gently sloping, heavily timbered hillsides, and open, rolling hill country. Elevations extend from about 1450 feet above sea level to 2500 feet. The main drainage is Willits Creek running diagonally from the northwest to the southeast corners of the District.

I PLANT COVER ANALYSIS

A. We have identified seven easily distinguished forest types in Brooktrails.

1. Redwood--is a common forest type found throughout the Redwood Region. The sites are usually cool and moist although the redwood generally prefers more summer fog, it does well on these relatively fog-free sites. The slopes are frequently steep in this forest type.
2. Redwood-Hardwood--is a group of trees and shrubs that prefer moist sites with good soil. This forest type also likes summer fog and the plants grow very rapidly in valley bottoms and on cool, steep slopes.
3. Douglas fir-Hardwood--is a forest type found on the upper slopes that get good precipitation in the winter but little in summer. The sites are frequently rich and provide reasonable growth rates even though they are usually out of the summer-fog belt.
4. Incense Cedar-Pine--is a forest type indicative of dry, poor, rocky soils. Plant growth here is slow and the trees may be stunted.
5. Grass-Woodland--is a forest type of rolling hills on which trees, in clumps or singly, intermingle with natural prairie-like openings. The area is usually warm and has well-drained soils.
6. Chaparral--is a collection of several shrubs which grow on some south and west facing slopes. The slopes may get some fog in summer, but the hot sun and poor soil prevents forest growth.
7. Streamside woodland--is the forest type that usually occurs along watercourses. The plants in this community like to keep their feet in or near moisture most of the year. The plant growth is generally very rapid.

B. Identification and listing of trees

(Note: The scientific and common names of trees and shrubs are listed along with the identifying features, growing requirements, growth rate and habits and plant locations. The order of the list follows that found in the "Brooktrails Natural Landscaping Guide", prepared as a part of this study.)

Sequoia sempervirens - Redwood

Identifying features--Evergreen with thick, fibrous, reddish-brown bark; leaves are short, pointed and flat and form a flat spray on the branches; cones are ablong and small.

Growing requirements--Moist soil, moderate temperatures, likes summer fog and bare mineral soils, prefers full sun, but will grow in light shade.

Growth rate and habits--2 to 5 feet a year in early years, 2 feet a year thereafter; may reach 40-50 feet in 20 years. Sprouts, which occur frequently, may grow even faster.

Plant location--in redwood and redwood-hardwood forest types.

Pseudotsuga menziesii - Douglas fir

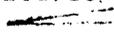
Identifying features--Evergreen, 1 to 2 inch long needles encircle branch; 2 to 3 inch long cone with forked bracts.

Growing requirements--Good drainage, variety of soils, needs sun; will stand some shade.

Growth rate and habits--Rapid in good, moist soils; slow on poor sites; reaches 12-18 feet in 10 years.

Plant location--in Douglas fir-hardwood, redwood-hardwood, incense cedar-pine and grass-woodland forest types.

Pinus ponderosa - Ponderosa Pine

Identifying features--Evergreen, 3-needles grouped in a bundle (); only native pine at Brooktrails; cones 2-5 inches long.

Growing requirements--Very hardy, will grow in good soils or poor, on dry sites or on well-drained moist sites.

Growth rate and habits--Depends upon growing site; fast on good soils with adequate moisture and good drainage; slow on dry, rocky sites; when mature may be 150 feet.

Plant location--in incense cedar-pine and grass-woodland forest types.

Libocedrus decurrens - Incense-Cedar

Identifying features--Evergreen, scale-like leaves in flat sprays; fibrous, yellow-brown bark; opened cone is like a miniature "duck-bill".

Growing requirements--Prefers a deep, well-drained soil, but will grow on many soil types including very rocky soils; does well in shade.

Growth rate and habits--Slow-growing, only 90 feet high at 200 years; has a narrow, pyramid crown which occupies little space.

Plant location--in incense cedar-pine forest type.

Arbutus menziesii - Madrone

Identifying features--Evergreen, large (3 to 8 inch) long, simple leaves; bright red clusters of fruit in late fall or early winter; red-brown smooth flaking bark.

Growing requirements--Grows well on thin, rocky soils and is resistant to drought, but accepts well-drained soils and moderate shade.

Growth rate and habits--Moderate to 80-100 feet; crown is wide spreading and grotesquely attractive in old trees.

Plant location--in redwood-hardwood, Douglas fir-hardwood, incense cedar-pine, and grass-woodland forest types.

Lithocarpus densiflorus - Tanoak

Identifying features--Evergreen leaves with or without spine tips along margins; fruit a unique acorn with a "bur" top.

Growing requirements--Thrives in a rich, well-drained soil, but grows well on igneous, metamorphic, or sedimentary derived soils; withstands dry summers and light shade.

Growth rate and habits--Slow; in dense stands will reach 70-90 feet; in the open it is shrubby.

Plant location--in redwood, redwood-hardwood and Douglas fir-hardwood forest types.

Quercus kelloggii - California Black Oak

Identifying features--Deciduous, 3 to 8 inch long leaves with pointed bristle-tipped lobes; acorn cap is large compared to nut (); attractive red-yellow fall color.

Growing requirements--Prefers sandy or gravelly soils and full sun, will also grow on thin, rocky soils; withstands dry summers.

Growth rate and habits--Slow to 50-60 feet, trunk usually short supporting a large, open crown.

Plant location--in incense cedar-pine and grass-woodland forest types.

Quercus garryana - Oregon White Oak

Identifying features--Deciduous, 3 to 6 inch long leaves with smooth, rounded lobes; acorn cap looks too small for the nut.

Growing requirements--Will grow in most soils, prefers rich loam, full sun and dry summers.

Growth rate and habits--Slow to 50-60 feet, trunk usually short and crooked with round-topped crown.

Plant location--in incense cedar-pine and grass-woodland forest types.

Quercus chrysolepis - Canyon Live Oak

Identifying features--Evergreen, leaves with serrate or smooth margins; bushy tree or large shrub; branches extend to ground.

Growing requirements--Variety of well-drained soils, will live in shade when young, but likes full sun in old age.

Growth rate and habits--Slow, remains shrub-like on poor sites, attains 40-60 feet on better sites with a large, spreading crown.

Plant location--in Douglas fir-hardwood and chaparral forest types.

Acer macrophyllum - Bigleaf Maple

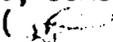
Identifying features--Deciduous, large, 4 to 12 inch diameter, palm-shaped leaves; double winged fruit; only maple at Brooktrails; yellow-red fall color.

Growing requirements--Deep, moist, well-drained soils; full light or filtered shade.

Growth rate and habits--Rapid on good sites, will live but grow slowly on dry sites; not recommended for lawn areas, maple is heavy user of soil nutrients and moisture.

Plant location--in streamside-woodland and grass-woodland forest types.

Salix spp. - Willow

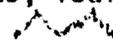
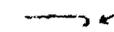
Identifying features--Deciduous; many species of willow are difficult to tell apart, some have an extra leaf at the base of a larger leaf (); the winter bud is covered by a single scale (); fuzzy buds in spring we call "pussy-willow".

Growing requirements--Variety of soils, but must have moisture; likes the full sun; found along streams.

Growth rate and habits--Moderate on most willows at Brooktrails; fast along permanent watercourses.

Plant location--in streamside-woodland and redwood forest types.

Alnus rubra - Red Alder

Identifying features--Deciduous, leaf dull green, leaf margins doubly serrate () with rolled edges (); fruit a cone.

Growing requirements--Survives on a variety of soils, prefers well-drained loams, requires much moisture, but survives dry summers well; does not like shade.

Growth rate and habits--Fast growth first 10 years, slower thereafter; may reach 60-80 feet.

Plant location--in streamside-woodland and redwood forest types.

Alnus rhombifolia - White Alder

Identifying features--Deciduous, leaf shiny green, leaf margins singly serrate () without rolled edges as in red alder; fruit a small cone.

Growing requirements--Deep, moist soils; constant moisture, does well in watered lawns and along streams.

Growth rate and habits--Fast growth on good sites, will reach 50-80 feet; broad conical crown.

Plant location--in streamside-woodland forest type.

Castanopsis chrysophylla - Golden Chinquapin

Identifying features--Evergreen, leaves golden underneath, narrow and pointed with smooth margins; fruit is a nut enclosed in a bur.

Growing requirements--Prefers moist, open soils and full sun, will grow in drier climatic conditions and moderate shade.

Growth rate and habits--Slow growing, is a shrub on poor sites and a large tree on good sites.

Plant location--in redwood-hardwood and Douglas fir-hardwood forest types.

Umbellularia californica - California Laurel

Identifying features--Evergreen, leaves very aromatic, leaves used as spice "bay leaf"; also called "bay tree" and "Oregon-Myrtle".

Growing requirements--Prefers moist sites and good soil, but will grow under a variety of conditions; does well in moderate shade or full sun.

Growth rate and habits--Slow, forming a mound, or umbrella, of dense yellow-green leaves if in the open.

Plant location--in grass-woodland and Douglas fir-hardwood forest types.

Fraxinus latifolia - Oregon Ash

Identifying features--Deciduous, compound leaves with 3 to 9 leaflets (); fruit a small hard seed with a 1 inch long wing; yellow fall color.

Growing requirements--Deep, moist, fertile soils; prefers full sunlight; good for watered lawns and along streams.

Growth rate and habits--Moderately fast, to 60-80 feet; growth is shrubby on dry sites.

Plant location--in streamside-woodland and Douglas fir-hardwood forest types.

Aesculus californica - California Buckeye

Identifying features--Deciduous, only native tree in California with clusters of 5 to 7 radiating leaflets (palmately compound); loses leaves in late August; fruit very large, unique (see photo), and poisonous.

Growing requirements--Good soil, dry or moist; full sunlight.

Growth rate and habits--Slow, even on good sites it remains a shrub or small (10-20 feet) tree.

Plant location--in grass-woodland forest type.

Cornus nuttallii - Mountain Dogwood

Identifying features--Deciduous, leaves opposite each other on branch; leaf veins almost meet then run parallel to the leaf margins (); clusters of small flowers surrounded by 4 to 6 white, showy false petals; reddish fall color.

Growing requirements--Deep, moist, fertile, well-drained soil; withstands dense shade, prefers filtered light.

Growth rate and habits--Slow to 25-30 feet, has a bushy habit with many stems if in the open.

Plant location--in streamside-woodland, redwood-hardwood, and Douglas fir-hardwood forest types.

C. Identification and listing of major shrubs

Arctostaphylos spp. - Manzanita

Identifying features--Evergreen, leaves 1 to 2 inches, smooth edges; branches crooked; bark smooth, red or brown.

Growing requirements--Variety of soils, generally on dry sites with full sunlight or light shade.

Growth rate and habits--Slow, forms a rounded shrub from 3 to 15 feet in height.

Plant location--in Douglas fir-hardwood, incense cedar-pine, grass-woodland, and chaparral forest types.

Corylus cornuta var. californica - California Hazel

Identifying features--Deciduous, leaves fuzzy, rounded 2 to 3 inch diameter, thin; branches zig-zag; fruit a beaked nut.

Growing requirements--Prefers deep, moist soils and light shade.

Growth rate and habits--Moderate, to form an open, spreading shrub 5 to 12 feet tall.

Plant location--in redwood, redwood-hardwood and streamside-woodland forest types.

Ceanothus velutinus - Snow Bush

Identifying features--Evergreen, leaves thick, large 2 to 3 inch diameter, 3 prominent veins on leaf.

Growing requirements--Thrives in most soils, wet or dry.

Growth rate and habits--Moderate, small 2 to 5 feet, round-topped shrub.

Plant location--in Douglas fir-hardwood forest type.

Ceanothus integerrimus - Deer Brush

Identifying features--Evergreen, thin leaves with smooth margins, clusters of very small white or blue flowers in spring.

Growing requirements--Thrives in most soils, wet or dry, withstands partial shade.

Growth rate and habits--Moderate to fast, to 3 to 12 feet; on dry sites leaves are small and more elliptic; on moist sites leaves are larger and more rounded.

Plant location--in redwood, redwood-hardwood and Douglas fir-hardwood forest types.

Ceanothus foliosus - Wavyleaf Ceanothus

Identifying features--Evergreen, small ($\frac{1}{2}$ ") leaves, wavy and finely toothed; blue flowers; low shrub.

Growing requirements--Dry slopes, full sunlight.

Growth rate and habits--Slow, forms an irregularly shaped shrub up to three feet in height.

Plant location--in Douglas fir-hardwood and chaparral forest types.

Rhamnus californica - Coffeeberry

Identifying features--Evergreen, smooth surfaced, elliptic leaves with prominent raised veins below; $\frac{1}{4}$ inch diameter berries mature from green to red to dark purple.

Growing requirements--Light, rocky soil; sun or partial shade.

Growth rate and habits--Rapid growth, shrub 6 to 8 feet.

Plant location--in Douglas fir-hardwood, incense cedar-pine, grass-woodland, and chaparral forest types.

Heteromeles arbutifolia - Christmas Berry

Identifying features--Evergreen, elliptic, thick, leathery leaves, with or without serrations; large clusters of red berries in late fall; also called toyon.

Growing requirements--Variety of soils, drought tolerant, prefers full sun.

Growth rate and habits--Moderate, may form a large 6 to 10 foot bushy shrub or a multiple-trunked small tree 15-25 feet.

Plant location--in chaparral forest type.

Vaccinium ovatum - Evergreen Huckleberry

Identifying features--Evergreen, small (1 to $1\frac{1}{2}$ inch long) thick leaves, blue edible fruit along stems and at the ends of stems.

Growing requirements--Well-drained soils, sun or shade, will withstand dry summers.

Growth rate and habits--Moderate, forms an erect shrub 2 to 8 feet high.

Plant location--in redwood, redwood-hardwood and Douglas fir-hardwood forest types.

Ribes spp. - Gooseberry

Identifying features--Deciduous, leaves small $\frac{1}{2}$ to 1 inch palm-shaped; one to three sharp spines at each leaf attachment point.

Growing requirements--Light, rocky soil, but adapts to others; sun or shade; moist or dry.

Growth rate and habits--Moderately rapid on good sites; 3 feet on dry sites, may grow to 10 feet in shade with moisture.

Plant location--in streamside-woodland, Douglas fir-hardwood and redwood-hardwood forest types.

Rubus vitifolius - Western Blackberry

Identifying features--Evergreen, 3 to 5 leaflets per leaf (); spine covered leaves and branches.

Growing requirements--Prefers well-drained but moist sites and sun.

Growth rate and habits--Fast to form a trailing or climbing shrub 15 to 20 feet long; fruit is edible.

Plant location--in redwood, streamside-woodland and Douglas fir-hardwood forest types.

Rubus thyranthus - Himalaya Berry

Identifying features--Evergreen, five 1-3 inch leaflets, radiating like spokes of a wheel; spines on leaves and branches.

Growing requirements--Prefers well-drained but moist sites in full sun or partial shade. This naturalized plant usually starts along road cuts or other disturbed ground.

Growth rate and habits--Probably the fastest growth of the Rubus species; the stout trailing stems reach 20-30 feet; fruit large and edible.

Plant location--in streamside-woodland forest type.

Rubus leucodermis - Western Raspberry

Identifying features--Deciduous, 3 to 5 leaflets per leaf (); spiny branches and leaves are covered with a whitish bloom.

Growing requirements--Grows best in canyons and near streams.

Growth rate and habits--Fast, to form a semi-erect shrub 3 to 6 feet high, later growth is more straggling; fruit is edible.

Plant location--in Douglas fir-hardwood forest type.

Rubus laciniatus - Cutleaf Blackberry

Identifying features--Evergreen, 3 to 7 leaflets per leaf (); leaf margins deeply cut; branches covered with thorns.

Growing requirements--Prefers moist sites and sun.

Growth rate and habits--Fast to form a trailing or climbing shrub 4 to 10 feet long; the fruit is sweet and edible from this escaped, cultivated plant.

Plant location--in streamside-woodland forest type.

Rubus parviflorus - Thimbleberry

Identifying features--Deciduous, 3 to 6 inch diameter palm-shaped leaves; long straight stalks, little branching.

Growing requirements--Prefers good, moist soil, will withstand dry summers; moderate shade or full sun.

Growth rate and habits--Fast, to 3 to 8 feet; sprouts and spreads easily.

Plant location--in redwood, redwood-hardwood and Douglas fir-hardwood forest types.

Sambucus caerulea - Blue Elderberry

Identifying features--Deciduous, leaves have 3 to 9 fleshy leaflets; branches have large spongy pith; large cluster of small blue berries.

Growing requirements--Variety of soils but needs moisture; frequently found along streams where summers are dry; grows well in partial shade.

Growth rate and habits--Fast to 6 to 10 feet, on good sites may reach 25-30 feet.

Plant location--in redwood-hardwood and streamside-woodland forest types.

Symphoricarpos albus - Snowberry

Identifying features--Deciduous, leaves thin and opposite; numerous branches, very small in diameter.

Growing requirements--Variety of soils; grows best in shade, but will endure sun.

Growth rate and habits--Moderate to 2 to 6 feet, a small shrub of irregular form.

Plant location--in redwood-hardwood and Douglas fir-hardwood forest types.

Rosa spp. - Wild Rose

Identifying features--Deciduous, leaves oval to roundish, odd-pinnate (4-5); branches prickly, flowers rose-pink.

Growing requirements--Variety of moist soils; partial to shade.

Growth rate and habits--Slow; erect, sprawling or climbing shrub; does best in open woods.

Plant location--in redwood-hardwood and Douglas fir-hardwood forest types.

Adenostoma fasciculatum - Chamise

Identifying features--Evergreen, $\frac{1}{2}$ inch long needle-like leaves; clusters along branch.

Growing requirements--Prefers dry slopes and ridges; variety of soils.

Growth rate and habits--Slow to form a diffuse shrub 2 to 10 feet.

Plant location--in chaparral forest type.

Haplopappus arborescens - Goldenfleece

Identifying features--Evergreen, long, slender leaves, yellow flowers in summer, many clustered, erect branches.

Growing requirements--Well-drained soils, dry slopes, sun.

Growth rate and habits--Moderate, forms an erect shrub 3 to 12 feet high.

Plant location--in chaparral forest type.

Eriodictyon californicum - Yerba Santa

Identifying features--Evergreen, elliptic, 3 inch long narrow leaves, intricate network of veins on a leaf that is dark green above and white below.

Growing requirements--Sandy or gravelly soils, full sun.

Growth rate and habits--Moderate, an erect shrub 3 to 12 feet tall.

Plant location--in chaparral forest type.

Baccharis pilularis var. consanguinea - Coyote Bush

Identifying features--Evergreen, leaves have 3 main veins from their base; clusters of cream-colored flowers remain on shrub several months.

Growing requirements--Grows on most soils, but does best in good soils with deep moisture; requires little water once established.

Growth rate and habits--Moderate growth into a multi-branched erect or rounded shrub 3 to 12 feet high.

Plant location--in Douglas fir-hardwood, grass-woodland and chaparral forest types.

Garrya fremontii - Silktassel

Identifying features--Evergreen, leaves similar to manzanita but are opposite along the branches; flowers and fruit hang in 3 to 8 inch long tassels.

Growing requirements--Grows well on variety of soils in partial shade or full sun; found mostly on dry slopes.

Growth rate and habits--Moderately fast growth to 6 to 10 feet; a yellowish-green appearing erect shrub.

Plant location--in chaparral forest type.

Holodiscus discolor - Oceanspray

Identifying features--Deciduous, chevron-shaped leaves; also called "arrow-wood" because of the many long straight branches coming from the ground.

Growing requirements--Rich, moist soils; sun or partial shade.

Growth rate and habits--Moderate, a bushy shrub 5 to 12 feet.

Plant location--in redwood and redwood-hardwood forest types.

Gaultheria shallon - Salal

Identifying features--Evergreen, rounded, thick and leathery leaves; clusters of urn-shaped flowers; a favorite greenery of florists.

Growing requirements--Adapts to a wide range of soils, moisture and light conditions.

Growth rate and habits--Slow in full sun and about 2 feet tall; fast in deep shade with abundant moisture, 6 to 8 feet; a dense shrub on good sites.

Plant location--In redwood and redwood-hardwood forest types.

Lonicera hispidula - Common Honeysuckle

Identifying features--Evergreen, leaves are thin, simple and opposite; plant usually vine-like, trailing on other plants; clusters of 1/2" diameter red berries.

Growing requirements--Wide variety of soils, prefers moist sites and some shade.

Growth rate and habits--Moderate, vine that may grow to 6 to 15 feet.

Plant location--In redwood, redwood-hardwood, Douglas fir-hardwood and streamside-woodland forest types.

Phoradendron spp. - Mistletoe

Identifying features--Evergreen, clumps of pale-green growth on branches of oak trees; fruit a small berry.

Growing requirements--A parasitic woody plant mostly on oaks, may occur on ponderosa pine, Douglas fir and incense-cedar.

Growth rate and habits--Slow; forms irregularly shaped; the popular Christmas mistletoe.

Plant location--in incense cedar-pine and grass-woodland forest types.

Toxicodendron diversilobum - Poison-Oak

Identifying features--Deciduous, 3 to 5 leaflets per leaf (); buds are naked (not covered by bud scales); short, spur branches form a wide (60-90°) angle with the main stem; bright red fall color.

Growing requirements--Unfortunately, this *undesirable plant grows on a variety of soils and survives varying moisture conditions. At Brooktrails, it seems to prefer the drier, open sites.

Growth rate and habits--Moderate growth rate, but it may take any number of forms; vine, multi-stemmed bush, or small tree.

Plant location--poison-oak may be found in all forest types at Brooktrails.

*Not recommended for landscape use or fall floral arrangements, as the oils in the plant are toxic.

II PROTECTION

A. Fire

Brooktrails lies in a critical forest fire area. The type and amount of vegetation, steep slopes, and dry summer weather all combine to produce a hazardous condition. The introduction of large numbers of people into this area will greatly increase the risk of forest fires starting. It is imperative, therefore, that the Brooktrails Resort Improvement District give serious thought to the recommendations listed below.

1. Provide acceptable fire hydrants (4" top outlet) spaced not to exceed 750 feet.
2. Encourage early initiation and completion of the fuelbreak planned by the State Division of Forestry along the west side of the District.
3. Recognize that the State Division of Forestry does not have the responsibility for fire protection of structures except as they may spread fire to surrounding forest areas.
4. Plan some form of cooperation with existing fire departments. This might be done by annexation to an existing Fire District or by developing your own fire department and joining the mutual aid effort available in the area. You could easily qualify to purchase surplus fire equipment, at low initial cost, from the State Division of Forestry. Such equipment should be purchased as soon as possible and made ready for the coming fire season. Fires during the road construction phase are easily started and could be disastrous.

5. Encourage adherence to those sections of the State Public Resources Code applicable. Your attention is called specifically to Chapter 3, Section 4291, "Reduction of Fire Hazards Around Buildings". (It is unnecessary to include in this report all these sections. It would be better to work directly with the State Forest Ranger at Howard Forest.)
6. Incorporate fire prevention in all on-site publicity concerning property owners. This can be done in a way to educate the public to the danger and yet not detract from the desirability of the area as a homesite.

B. Insects

No serious problems of insect infestation have been detected, but continuous observation should be made as a precautionary measure. Such a measure could be incorporated in any continuing studies that are made on the area.

C. Diseases

Here again, no serious problems have been noted, but the procedure suggested for insects should be followed here.

D. Animals

It is assumed that the "No Hunting" policy will be continued on the District. Such a policy is wise, but may cause animal population problems that will require attention in the future. Once again, a continuing study of the area would consider game populations and conditions.

III CONSERVATION USE AREAS

- A. General Statement on Selection of Conservation Area Uses
Objectives in selecting allowable recreation uses and

their location, include the following:

1. Select uses that the majority of Brooktrails residents can, and would, utilize. We do not recommend planning for small specific group uses at the expense of the whole community.
2. Select uses that require minimum development.
3. Select uses whose development is relatively self-perpetuating and maintaining.
4. Select compatible uses for each site. That is, eliminate physical conflicts between recreation uses.

B. The Demonstration Garden

The primary objective of the demonstration garden is to provide a focal point where Brooktrails residents may see and study the representative natural forests (depicted in micro scale) and thus be convinced of the unique Brooktrails environment.

A Continuing Experience--

Use of the demonstration area can be a continuing educational and recreational experience. Names of trees and forests may at first mean little to Brooktrails residents. But, once one plant name is learned, it can become a game to learn another. Then another. And then comparing "plants occurring on your lot with those found on mine". And on, and on. The greater the knowledge, the greater the involvement and enjoyment.

A Picnic Area Too--

A picnic-focal point area will make the demonstration area more than just a study area. Here people can see a few plants, have a picnic, look at more plants, or just walk the trails. The important point is that a variety of activities is offered to please a broad range of interests.

Hill-top Site--

All physiographic aspects (north, south, east and west) are necessary for the growth of the distinct forest types. Only on a hill are all physiographic aspects found close together. Thus, the demonstration area should be constructed around the top of a hill.

A Focal Point--

The hill summit is the ideal spot for a gazebo. From the gazebo (a light, open structure), the various forest type gardens will radiate in pie-shaped segments. The gazebo can be the meeting point for people coming to the demonstration area and those returning from the garden trails. Located high on a hill, the gazebo will afford a view for almost 360 degrees.

The Forest Microclimates--

The various forest types exhibited in the demonstration area have very specific growth requirements. Great care must be taken to place each demonstration forest type in



its proper soil-vegetation microclimate. Without proper forest placement, much costly artificial watering and shading will be necessary.

The Species Microclimates--

Just as the forest types require proper general soil-vegetation microclimates, individual species have even more exacting requirements. Some plants require full sun, others relish the shade of taller species. These individual plant requirements are discussed in the "Brooktrails Natural Gardens Guide".

Park Away from the Focal Point--

The location of the automobile parking facilities in the demonstration area is critical. Parking should be on the side of the hill, thus requiring a short walk to the gazebo. In this way, the massive bleak design structure of a parking lot will not conflict with the light, airy design of the gazebo.

C. Trails Systems

General Objectives -- Trails can be for hiking, horse-back riding, bicycle riding, and motorcycle riding.

The critical objective here is to select non-conflicting and non-site deteriorating trail uses.

Hiking Trails

Hiking trails may be used for several types of hiking experiences. One trail use is to reach a goal or

destination such as the aquatic parks or stables. Another use is for strenuous or moderate exercise. And the third general category of use is "wandering".

The Destination Trail--

The destination trails are the easiest trails to design and maintain. They merely require (1) as many origins as possible to service the various houses or communities, and (2) a relatively direct route to the various possible destinations. The trail can be narrow (one or two persons wide) and have parallel sides (a strong directional design factor).

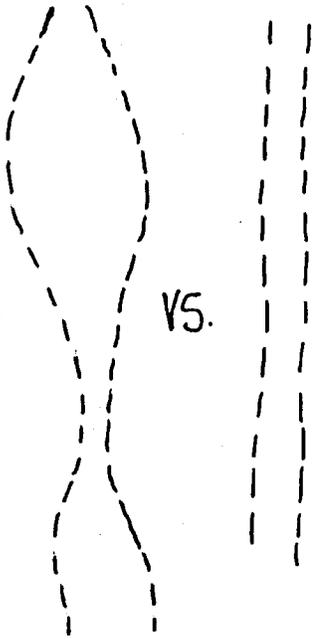
The Exercise Trails--

Strenuous or moderate exercise trails are similar to destination trails but are an experience in themselves. Here the experience while on the trail is usually more important than a particular destination. This type of trail might include sharply winding curves, and frequent challenging changes of pitch (steepness). Exercise trails may overlap the destination trails even though exercise trails are frequently steeper. Alternate "switch backs" can be provided for the slower, less energetic, hiker at the steeper parts of the trail.

Wandering Trails--

Wandering trails may be similar in construction to the trails above, but the experience differs in that the





hiker is liable to stop, go, turn around, or return home almost anywhere along the trail. The experience here is one of slowly moving along, varying one's speed in sequence with the width of the trail and the open and confined spaces beside the trail. The trail design here is one with irregular (non-parallel) sides. The wanderer should not only be permitted, but encouraged by the trail design to wander. By varying the trail width, the traveler may wander from one side to the other as well as along the length of the trail. He may be encouraged to view a stream or other natural object at the wide points of the trail.

Wandering Trails Need Easy Access--

Wandering trails would probably be used in the warm summer evenings after dinner, thus they should be short and close to home. Every block (or housing unit) should have easy access (say $\frac{1}{2}$ mile or less) to a wandering trail if its use is to be assured.



Benches Add Emphasis to Wandering--

Rustic benches along the trails provide a spot for resting or a picnic. The benches may be placed where a view of a stream is worth contemplating or just in the middle of a long relatively monotonous stretch of trail for added necessary variety.

D. Horseback Riding Trails

Separate Trails for Horses--

It is desirable to have a separate trail circuit for horses and one for hikers. Horses will loosen the top two to six inches in a sandy soil making hiking on the same trail difficult. Also, horses will create a thick layer of dust on clay soils. Both sandy and clay soils are found at Brooktrails.

The horseback riding trails are similar to the destination trails in that there are no steep grades or sharp turns.

Loop Trails Desirable--

Loop trails with their focal point of the stables area, are ideal for short guided horseback rides. The horseback riding trail system location will depend on where the stables are relocated.

E. Bicycle Trails

Much bicycling could be confined to the paved roads, but a bicycle trail around one of the lakes could be an interesting feature. Single and tandem bicycles could be rented. (See discussion of Lake #2, for further discussion of bicycle trails.)

Hard surface or relatively smooth trails are required for bicycles.

F. Motorcycle Trails

Paved trails are necessary for motorcycles if erosion and constant trail maintenance are to be avoided. Thus,

motorcycles should be confined to the paved roads as trail paving would be costly and very difficult.

G. Camping Areas

Further study is necessary to determine what level of camping is possible in the Brooktrails Resort Improvement District. Consideration must be given to the following points:

Many Experience Levels Possible--

Camping may be provided at many different experience levels -- from primitive to modern. In the Brooktrails area, a primitive campground would require one acre of land for every one to three camping units. Any more units per acre would not afford the privacy and seclusion associated with a primitive camping experience. A semi-modern campground with trailer facilities can be expanded to five or six units per acre, but the experience will preclude much chance for privacy.

Land Availability May Preclude Semi-Modern Campgrounds--

The semi-modern campground, to accommodate 100 family units would require 30 to 40 acres of relatively flat, easily accessible, land. Such land is not available within the present boundaries of Brooktrails.

Potential Fire and Management Costs May Preclude Primitive Camping--

It was suggested that primitive camps be located in

the canyons of the conservation areas. But campfire areas or stoves would no doubt be required. Such fires, by nature of the location of the campsites, would NOT be near the road for easy patrol or safety checks. Further, if a fire should spread, little would stop its engulfing nearby homes.

Maintenance costs would be high because of the necessarily remote locations of these campgrounds. Periodic (perhaps bi-weekly) clean-up trips would be necessary to clean up the litter which would no doubt accumulate. The campsites located in the canyons, because of the topography, would be very close to the stream and thus potentially pose a pollution problem.

A final decision on camping policies should be left until the District has an opportunity to study the area after construction of roads is completed and lot boundaries are firmly fixed and marked.

H. Picnic Areas

Picnic areas will range from simple to relatively elaborate. Some picnic sites (discussed in other hiking sections) will be no more than a bench along a trail. Other areas (discussed in other sections of this report) include the gazebo picnic area, and the bicycle-picnic areas. One additional and a "feature" picnic site is located on a hill "Lake

Mountain" between Lake Ada Rose and South Lake.

"Lake Mountain" Picnic Development is Unique--

The feature of these picnic sites would be individuality and a choice of views of either lake or the forest. Each family picnic spot will be separated from each other and from group picnic sites by vegetation screens. The paths connecting the individual picnic spots will encircle the hill. A group picnic site could be provided on the lower slopes of the hill for groups of residents or resident clubs. (See "Recommendations for Immediate Attention" for further details.)

IV AQUATIC PARKS

A. General Objectives

Each lake will be developed around a distinct theme or image. The recreation uses, for health reasons, will not include any sport which would allow water-body contact or the use of any internal-combustion powered boats.

B. Lake Ada Rose

The Theme--

Fishing both from boat and shore should be emphasized. The water level should be kept full or high and not drawn down.

Dock Facilities Should Be Functional--

Dock facilities should be simple and easily accessible, and located on the south side adjacent to the overflow. Parking and launch facilities (if desired) should be convenient and functional. Rental boats, life-jackets, etc., could be made available at the dock site. Fresh water and toilet facilities should be available in the general area.

The Fisherman Trail--

A fisherman trail around the lake is a necessity. If no formal trail were made, fishermen would cut their own trail with damaging erosion as the result. This trail can be simple (one person wide) and should closely follow the highwater line of the lake.

Picnic Areas Nearby--

Picnic areas would not be located right at Lake Ada Rose but should be on the hill overlooking the lake to the southeast and possibly up the stream to the southwest of the lake.

C. South Lake

The Theme--

Bicycling could be the theme of this lake area. The lake will be used for water supply, thus drawdown will limit the fishing possibilities. Thus a good imposed

use feature can be a bicycle rental and trail system. The bicycle trails should encircle the lake with much variation in the sequential ride.

A Sequential View--

The trails will not offer a continuous view of the lake (and thus be monotonous), but will offer glimpses of the lake (climaxes) separated by transitions of tree-enclosed spaces.

A Bicycle Picnic--

Picnic areas, accessible by bicycle, can be located in secluded spots along the bicycle trail. This would offer a unique picnic experience not found elsewhere at Brooktrails.

D. North Lake

The Theme--

Here the theme will revolve around wandering trails and fly fishing from shore. Both wandering and fly fishing are very compatible activities. They both are relaxing, relatively quiet, and contemplative activities.

Fly Fishing Facilities Economical--

Facilities required for fly fishing are minimal. A small trail near the lake edge is the minimum development.

Also A Casting Pond--

A casting practice area can be inexpensively constructed at one end of the lake. All that is necessary is a few

floating target rings, a cleared ground or grass area, and minimum clearance from overhead trees.

The Activity Focal Point--

A simple display on "how to cast" or "Ten steps to fly fishing" could be constructed near the casting area. This display board could be an attractive focal point. Fly fishing or casting are sports that require working toward a degree of excellence or skill. As such, these activities can involve a person's interest for a long time, often many years. They can be more compelling than the more passive sports such as hiking.

Wandering Trails Fit the Topography--

The wandering trails will be constructed to encircle the lake similarly to the bicycle trails of South Lake. The trails can be relatively narrow and more "zig-zag" than those designed for bicycles. The country around North Lake is steep; thus narrow, intricate trail designs are most fitting to the site character.

V RECOMMENDATIONS FOR IMMEDIATE ATTENTION

A. Lake Ada Rose

1. Develop dock, parking and rental facilities on south side of lake. (Launching facilities may not be needed if only small boats are used on the lake. A lack of launching

ramps could contribute to better control of boats on the lake.)

2. Run drinkable water to the area and install separate men's and women's restrooms. The location and type of restrooms would be subject to county Health Department approval.
3. Clear a fisherman's trail around the lake.
4. Provide a water source and system for occasional watering of the planted bare slope during the coming dry season.
5. Plant catchable size rainbow trout. (Suggest about 500 every 3-4 weeks from May 1 to October 1. This keeps the fish eager to bite and makes life more fun for the fishermen.)
6. Employ one or more persons to serve as attendant and/or lifeguard.

B. Lake Mountain Picnic Area

1. Develop a trail leading from the southeastern corner of Lake Ada Rose to the top of the hill. The trail could lead almost all the way around the hill ending at the peak.
2. Install 5 to 10 picnic tables and half as many simple grills along the ridge of the hill. The picnic sites should be screened by vegetation from adjacent picnic areas.
3. Selectively remove some of the vegetation to open up views of the lakes, lodge area, etc.
4. Install men's and women's restrooms in an appropriate location near the crest.

C. Demonstration Area

1. Select and designate an area for this specific purpose.
2. Proceed with a survey of the area to determine:
 - a. vegetation to be preserved or removed
 - b. best trail locations
 - c. possible parking areas
 - d. locations for picnic tables, etc.
3. Design the demonstration planting area.
4. Collect and plant the trees and shrubs native to the area which are not already present on the site.
5. Design and construct a "gazebo" as the focal point of the area.
6. Layout trail system and picnic areas.
7. Provide a parking area and restrooms.
8. Provide and install all necessary signs.

VI RECOMMENDATIONS FOR FUTURE ATTENTION

- A. Further study is required in order for the District to establish long range policies regarding use of the conservation areas.
 1. A camping policy must be determined. You are referred to an earlier section of the report on "camping areas". Temporary camping areas could be located along the creek west of the golf course; but a thorough study of needs, access, protection, etc., should be made before a permanent policy is established.
 2. A general activities area should be located near the lodge (perhaps the old stable site). This area could provide group

activities such as volleyball, croquet, tennis, bocce ball, or any other activity that would be desirable from the users view.

3. There is the possibility that a small outdoor theatre in a natural setting would have great appeal to residents of the area. Concerts, plays, nature lectures, etc., could be performed in the theatre. (One possible site may be up the small creek just south of Lake Ada Rose. This property is on conservation land and relatively close to the developed area around Lake Ada Rose.)
4. It will be necessary to relocate the stables. It would seem advisable to locate them away from the congested lodge area. Better access to trails could be provided if the stable relocation is carefully considered. Once the stable is relocated, a trail system could be developed.
5. Many other uses of the conservation areas will require further consideration after construction has been completed on roads, water, sewers, etc. The trail systems must be laid out. Areas could possibly be located for a pistol and rifle range, archery and other desirable facilities.

B. Continuing Study Should Be Made On Human Demands, Needs, and Impact On The Conservation Lands!

Such studies, beginning at an early date, have the advantage of following the development of the District from the early planning and construction phases to the final developed and inhabited phase. A few of the many possible continuing studies are listed here.

1. Survey of the changing needs and demands of residents and users of the District conservation lands. This study would provide valuable information for the District on which to base long-range policies and allow for modification of the policies as conditions change.
2. The impact of the developed areas on the conservation lands should be studied extensively, but continuously. The impact on vegetation, soil, animals, and water quality and amount are but a few of the cause and effect relationships that are in need of further study.

Studies of this nature could be conducted by cooperative effort between the District and some college or university. Graduate students in the appropriate field could use the studies as bases for theses. Frequently, matching funds are available for such work. In this way, the District could get two dollars worth of research for an investment of one dollar. The District is encouraged to institute such studies as are deemed desirable. Contributions of these studies could be unique and most revealing. They could provide valuable information to guide the future of this project and the many others like it that are certainly to follow.

VII ADDITIONAL SERVICES

In addition to the preparation of this report and recommendations, we have:

1. Prepared for publication a "Brooktrails Natural Garden's Guide".

The "Guide" consists of photographs, drawings, and text material concerning the identification, growing requirements, growth rate and habits of all the native trees and the major shrubs found at Brooktrails. A copy of this material was given to Mr. Laurence August in January, 1968. Mr. August, I understand, is making arrangements for publication of the "Guide".

2. Aided in planning and conducting a seminar on the Community/Conservation Concept at Brooktrails on March 14 and 15, 1968.
3. Planted about 1000 beach pines, 500 Douglas-firs, and 100 toyon (Christmas berry) plants in the Lake Ada Rose area, mostly on the bare slope on the southwest side. Also, one pound of California poppy seed was sown in the lake area.
4. Met with several newsmen to discuss the Community/Conservation Concept.

All of these additional activities we consider to be partial fulfillment of our contract with the Brooktrails Resort Improvement District.

APPENDIX B

THE AUGUST ORGANIZATION

3 N. La Cienega Boulevard • Los Angeles, California 90069 • (213) 652-7340

LAND DEVELOPMENT
AND THE
HYLEOPOLITAN CONCEPT

BY:

GERALD L. PARTAIN
PROFESSOR OF FORESTRY ECONOMICS
HUMBOLDT STATE COLLEGE
ARCATA, CALIFORNIA

THE AUGUST ORGANIZATION

3 N. La Cienega Boulevard • Los Angeles, California 90069 • (213) 652-7340

LAND DEVELOPMENT AND THE HYLEOPOLITAN CONCEPT

The population of the United States is now well over 200 million and moving toward some 275 million by the year 2000, just 30 years or one generation gap from today. Such a population growth, while adding to labor and consumer forces, brings with it difficulties for all sectors of the economy. More food is needed, so are more schools, better transportation systems, greater racial equality, and advanced education technology.

As the population grows, so does the infra-structure to support it, and more space is required. But, our space is fixed, for all practical purposes, and our alternative to expansion is more intensive use of what we have. More intensive use of space compounds some of our existing problems and introduces new ones. Let us look briefly at one new problem, land developments in rural areas.

The history of migration from the farm to the cities and back to the suburbs is well-documented. The growth of one megalopolis along the east coast of the country is rapidly becoming apparent, and another threatens southern California; however, a new trend is developing. People are disenchanted with large cities, commute problems, and the

inability to breathe deeply and enjoy it. Those who can afford to do so, or who think they can, are buying land far from the cities and plan to escape to these retreats. It is this new trend that is our concern here.

Land developers have never been noted for blindness to land and housing trends, and certainly there is a healthy attempt on their part to meet the current demand for developed rural land. However, one important question arises immediately; is the combination of an eager city refugee and an aggressive land developer apt to destroy the very qualities of a site which attracted both initially?

To begin supplying partial answers to this question, a study has just been completed in Northern California. The study was conducted at Brooktrails Redwood Park, Willits, California, about 150 miles north of San Francisco. This hyleopolis (a name we have used in this study to identify an urban or suburban type development with contiguous open space or conservation areas) consists of over 5200 acres and over 50% of which, or some 4 square miles, is dedicated to conservation areas which cannot be developed. Support for this study came jointly from Brooktrails Co., Ltd. of Beverly Hills, California, the developer, and from matching McIntire-Stennis federal research funds at Humboldt State College in Arcata, California. Carroll M. Justice, a forestry student at Humboldt State College conducted the study under the guidance of Gerald L. Partain, Professor of Forestry Economics at the school.

The study had two basic objectives. First, we wanted to learn all we could about the motivation of the buyers. Why did they buy here? What do they plan for their land? What do they want in the conservation areas? Second, we wished to discover the impact of the developed areas on the undeveloped, or conservation areas. The undeveloped areas vary in size, shape and location and it was thought that a continuing study would yield information towards some optimum mix of developed and undeveloped areas in a hyleopolis of this kind.

A survey of the owners revealed that most of the heads of household were over 40 years of age, earned between 10 and 20 thousand dollars a year, had children, lived in the suburbs, were either employed technicians or professionals and they wanted to escape the crowds, noise and pollution of large cities.

Almost 50% of the buyers had land investment in mind when making the decision to buy. However, many indicated that their property value would have to appreciate 100% before they would sell. More than half of the owners plan to build for full-time residence, vacation, vacation rental, rental, or retirement use.

The conservation areas and the redwood setting proved to be strong incentives for buyers. A large majority of the owners who responded asked for no development of the conservation areas. They did not want bridle trails, picnic areas, etc. They wanted most to know that these mini-wildernesses were there for their use if they so desired.

All developers might note that buyers were willing to pay for the conservation concept at Brooktrails and thus make such hyleopolitan communities economically feasible. They did not mind small lots, indeed, some preferred them if they had access to the community open areas. They displayed an interesting back-to-nature movement, but not too far back, in that they demanded their property have all the normal services of a fully developed community, such as Brooktrails, but they preferred to be adjacent to the open areas rather than the commercial section.

In addition to the survey, several permanent plots were established in the conservation areas. These sites were marked so as to be unobtrusive, soil and vegetation information was taken, and photographs of the plots were made. The plot locations were marked on maps and aerial photographs. This information will be preserved and annual checks will be made to determine any changes in the sites. Observation of the study plots will be a long term project, but it is fortunate that the plots were established before any disturbance of the adjacent developed areas. This way it will be possible to trace the condition of the sites through a wide range of development stages.

The small beginning made in this study to learn something of the effect upon man and his environment when considered in the hyleopolitan setting permits us to draw limited conclusions that will be helpful to developers, planning commissions, government agencies, and groups

directly or indirectly associated with the hyleopolitan concept. We know that people are willing to pay for "open" space. They are also happy to have someone else manage these areas, but they want to have veto rights. Most buyers don't want to care for a large area of land and many who do want to don't know how, therefore, they will settle for smaller lots if they have access to nearby or adjacent open areas. Perhaps, most important of all, is the desire of buyers to live in an environment free of air, water, and aesthetic pollution. This is the real challenge of the hyleopolis. Can the developer and the buyer cooperate in a way that the quality environment of these developments will be preserved? The results of this study point to the need for such cooperation if we are to prevent the spread of all the undesirable features of our cities to rural areas.

One suggestion is to establish an owner-developer cost-sharing foundation to study, prevent, and control befouling of the environment. The developer would provide for a major part of the financing, but hopefully he would be joined by property owners concerned with the protection of a quality environment. The non-profit foundation thus formed would be directed by appropriate and concerned professionals on a part-time basis. These directors would establish priorities for research projects, award scholarships and arrange for publication of all studies.

The basic and applied research conducted by this foundation would be used to anticipate and prevent potential problems associated with maintaining a quality environment for future and rural land developments.

But, perhaps the most valuable contribution of the foundation and the research it sponsors would be to encourage the development of courses of study related to the ecology of hyleopolitan communities. It is highly probable that as the hyleopolitan concept is emulated throughout the United States, a new course of study, specifically designed for this new environment, will evolve. This would open a variety of subjects from engineering to forestry to environmental design. It is also reasonable to predict that within the foreseeable future, experts trained in the hyleopolitan concept will be an integral part of residential living, just as the new breed of urbanologists have become so important to metropolitan development.

If the problems of more intensive use of our land area are to be mitigated in the least degree, many sacrifices must be made. The developer must contribute by accepting lower profits. The buyer must accept higher land costs and taxes, and governmental agencies must make more efficient their assistance, more realistic their regulations, and more effective their incentives and controls.

When this study was begun the terms "ecology", "pollution" and "environment" were not as commonplace as they are now, but now that they are popular we should take advantage of this concern for environmental quality and act to prevent rather than delay and correct our mistakes.

FINAL REPORT

Brooktrails Co., Ltd. - McIntire-Stennis
Cooperative Forestry Research

Project No. 13

THE OPTIMUM MIX OF UNDEVELOPED AND
DEVELOPED LAND WITHIN A HYLEOPOLIS

Carroll Justice, Student Investigator

Gerald L. Partain, Professor of Forestry Economics
Principal Investigator

Preface

This study was undertaken in 1969 and was financed jointly by Brooktrails Co., Ltd. and Federal McIntire-Stennis funds. The study was conducted within the Department of Forestry, School of Natural Resources at Humboldt State College in Arcata, California.

The accelerating demand for rural land resources requires management decisions concerning their allocation. Should rural lands be zoned or otherwise restricted to specific uses, such as undeveloped wilderness areas, commercial forest land, agricultural or commercial land development? Or, can all these uses be permitted and allowed for in some overall, master plan? Because of the need for more information on this topic, this study was undertaken.

Our thanks go to the Humboldt State College Forestry Program and the Humboldt State College Real Estate Research Department for aid in developing the questionnaire, to the Humboldt State College Computer Center for aid in compiling questionnaire data, and to Brooktrails Co., Ltd. for aid in contacting owners along with their financial support. We also want to express our gratitude to all those concerned owners who took the time to complete the questionnaire and return it.

Summary of Results

1. The majority of those purchasing property are over 40 years of age and can be classed as middle and upper income groups. The majority already own some property, mostly their own single family homes in suburban areas.
2. Few of the owners have a long history of rural community living. Most past rural activity has been in the form of camping or related activities.
3. The principal reason for buying property was investment. Secondly, the lots were purchased because of the natural quality of the area and the specific vegetation patterns within the area. The redwood setting was particularly influential.
4. The planned future use of the property was about evenly divided between building for various reasons and investment in the land only.
5. The property owners do not have specific uses for the conservation areas in mind. Aesthetic enjoyment seems to be the most important use plan for the area.
6. Property size and location with regard to topography was not of great importance, although the owners would like to have larger lots, which were located away from commercial areas within the development.
7. Most owners thought the conservation areas were adequate size, while some thought they were too small.
8. Most owners would like to have their property value at least double if they were to sell, while 25% would not sell at all.

The Problem

With increasing pressures from a rapidly rising population, the resource land manager is faced with a two-fold problem of land allocation. First, demand for land and its accompanying resources has multiplied several fold in recent years. And secondly, the land and its resources are in limited supply. Because of this situation, several resources-oriented fields are competing for the same raw material.

In the past, forest and range management programs have dominated wildland use programs. But, they are now being forced into a secondary position by the rapidly expanding recreation oriented programs of both government and private agencies. With the advent of high-intensity recreational use of our natural wildland areas, the populations of the overcrowded urban and suburban areas have begun migrating to the rural environment.

Trend Towards Rural Communities

Several types of land development projects have attempted to answer this mass migration to rural environments. The migration may be to vacation homes, present full-time residences or future retirement homes. But, whatever the primary owner objectives are, all want the advantages of close community life and a quality environment of natural surroundings.

Change of Basic Land Allocation

With demand for environmental quality ever-increasing, the rural land developer is discovering the need for preserving the natural ecology of the area. In the past, most developers have had only immediate economic considerations of the project in mind. Because of this, they were quite happy to clear as much of the development as possible for home sites, and thus destroy the same environmental quality they were trying to sell. The developer then frequently camouflaged the destruction by planting trees and shrubs.

With the land developer gaining the insight of environmental quality, the picture of the rural land development has begun to change. It is no longer uneconomic to leave portions of the development in natural or "unimproved" areas. These undeveloped areas serve as natural buffers, separating developed sections of the communities. They also serve to protect and

Change of Basic Land Allocation (Cont'd)

preserve wildlife, vegetation, and water quality, all environmental qualities so important to society today. These natural qualities act as important economic, as well as psychological considerations to buy. By preserving these qualities, the developer can improve the returns on his investment and, at the same time, the lives of the homeowner can be enriched.

Need for Planning Information

With conservation area allocation only a recent innovation, there is a great need for basic planning information. How large should the undeveloped area be? What should be the configuration of the conservation areas, and where should they be located within the communities? And, what can be done to maintain aesthetic quality while allowing recreational activity within these areas? With this type of information, land planners will be able to meet better the demands of all concerned.

Most frequently, in rural land developments, the plan for natural areas has been dictated by economic and engineering considerations. Quite often this has not given the desired effect of preserving environmental quality within a highly developed community. The developer needs information on minimum requirements and standards for open areas to permit more intelligent planning.

Because of the deficits in planning information, studies which offer insight into the problem are direly needed.

Methodology

The study was conducted through the auspices of Brooktrails Co., Ltd. of Beverly Hills, California, and the Federal Government through McIntire-Stennis funds. The study was conducted in two separate sections. First, a questionnaire was prepared to sample the desired arrangement of rural land developments. Secondly, permanent sample plots were established within existing buffer zones. It is the purpose of these plots to sample the effect of man on the quality of the buffer zones.

All activities were conducted at, or through, the Brooktrails Redwood Park development, 150 miles north of San Francisco, near Willits, California. This development has dedicated over

Methodology (Cont'd)

50 percent of the available land to natural areas, which envelop some four square miles, and therefore offered an excellent opportunity for study.

In order to sample the desired arrangement of the undeveloped areas, a questionnaire was sent to most property owners within the community. This questionnaire attempted to ascertain what property owners liked about the area, what uses they had for the undeveloped areas, and, what they thought of the undeveloped areas within the community.

Analysis of Findings

With the necessity for a general basis for the questionnaire, many needs can be served by the data gathered. Information will be available not only to the resource manager, but to the future land developer as well. The information presented in this report will pertain to the overall trend of most data. Specific analysis will be given to certain data which is of special interest. Actual data information will be presented in both tabular and written form. An analysis of this data found in the tables will also be given.

To conduct the study, 3000 questionnaires were mailed to present property owners. Of these, 760 were returned, for a return percentage of 25%. This percentage could not be improved by followup letters, because the identity of the owners remained anonymous.

Personal Data

The owners were not required to answer the personal section of the questionnaire, therefore, the returns will not add up to 100%.

Age Class	0-25	26-30	31-35	36-40	41-45	46-50	50 +
Husband's Age	5.8	10.4	10.4	10.9	12.0	12.6	28.3
Wife's Age	8.0	11.7	9.8	8.4	12.0	13.2	22.3

TABLE I

AGE OF OWNERS - PERCENT

The data presented in Table I, show the distribution of property owners by age in percent. As can be seen, the ages are distributed quite evenly, except for the over 50 age bracket. This trend coincides with the trend for rural area retirement for the nations older citizens.

Income Dollars	0 - 5,000	5- 10,000	11,- 15,000	16,- 20,000	21,- 25,000	25,000
Husband's Income	18.3	27.0	34.9	12.9	4.1	2.8
Wife's Income	70.8	22.4	5.8	.6	.0	.3

TABLE II

INCOME OF OWNERS - PERCENT

The values found in Table II indicate that the majority of the property owners are in a middle income category. This might point the direction for future promotional plans by developers.

	Self-Employed Professional	Self-Employed Technician	Employed Professional	Employed Technician
Husband's Occupation	3.7	2.3	40.2	42.1
Wife's Occupation	.6	.8	23.3	18.0

TABLE III

OCCUPATION OF OWNER - PERCENT

Table III lists the occupations of the property owners in percentages. As can be seen most are employees, with an equal distribution of professional and blue-collar workers.

The principal place of residence of the property owners is in suburban areas of metropolitan centers. Some 60% come from these areas. Metropolitan areas account for another 36% of the owners and 4% come from rural areas.

At present, 57% of the Brooktrails property owners own their own residence or are in the process of buying it. Twenty percent own rental units and only 14% own any type of vacation home or property.

Of those who do own other property, most indicated it was for investment purposes. It was also shown that only 11% of the property owners have had much experience with rural living in the past.

Owners were asked to rank a number of reasons for buying at Brooktrails. The results of that question are shown in Table IV.

	1st Choice	1st & 2nd Choice	First 5 Choices Totaled
Investment	45.3	58.7	78.9
Redwood Setting	21.7	41.1	68.3
Escape the City	14.7	26.1	48.4
Aesthetic Values	10.4	25.6	47.7
Rest & Recreation	13.4	23.8	50.0

TABLE IV
REASONS FOR BUYING - PERCENT

Respondents were given a list of 15 reasons from which to select. The single most important reason chosen was investment, as over 45% of the owners listed this as their first choice, or their top priority. A total of 58.7% marked investment as either their first or second choice among the 15 reasons, and 78.9% included investment as one of the top five reasons for buying. The redwood setting was a clear second most important feature of the property. The fact that 68.3% of the owners included the redwood environment in their top five reasons for buying demonstrates the drawing power of the redwoods even though they are young growth. Three other objectives, "rest and relaxation", "aesthetic values", and "to escape the city", were of about equal importance to owners. All ten of the other reasons were ranked well below the five shown here.

Of those who listed investment as their primary reason for buying, 50% indicated they would not sell unless their property doubled

in value. The question might be raised as to whether they are really buying for investment, are extremely optimistic, or both.

It is important to society that developments of this type be given a good chance to succeed. To succeed, owners must be willing to hold their property and actually build on it.

Notice that more than one-half of the owners did not list investment as their main reason for buying. The conclusion here that about half of the owners wish to build is further strengthened by reference to Table V.

	1st Choice	1st & 2nd Choice	First 5 Choices Totalled
Investment	46.9	56.4	67.0
Retirement Home	25.7	38.8	51.2
Vacation Rental	20.6	31.0	41.2
Full-Time Residence	14.3	20.3	33.1
Full-Time Rental	3.1	6.0	21.6

TABLE V

PLANNED USE OF THE PROPERTY - PERCENT

Note again that less than one-half of the respondents listed investment without building as their primary desired use of the property.

Retirement homes are planned by approximately 25% of the owners. This conclusion agrees with the large percentage of owners in the 50+ age class.

The vacation rental concept offers many new horizons to the property owner and the developer. The property owner can reduce his expenses, while the developer expands his services by handling the rentals for the home owners. The opportunities to actually rent vacation homes in this area may be some years in the future, but 20.6% of the owners are looking to the future with that in mind.

Use of Conservation Areas

Owners were given a list of ten activities associated with the enjoyment of the natural areas. In Table VI rankings of the five most frequently listed activities are shown.

	1st Choice	1st & 2nd Choice	First 5 Choices Totaled
Aesthetic Enjoyment	23.5	35.5	54.6
Hiking	21.2	37.8	67.7
Camping	16.1	27.9	46.7
Fishing	15.5	28.1	52.2
Swimming	15.2	28.3	54.3

TABLE IV

ACTIVITIES ENJOYED - PERCENT

The desired uses shown here generally support a policy of managing the natural areas for minimum development and change. The support for camping is difficult to explain if we assume the owner is living on his property at Brooktrails. Even so, it seems clear that most owners simply want to walk through the natural areas and enjoy them as mini-wildernesses, unspoiled and undeveloped, surrounded by development and civilization.

Property Characteristics

Questions concerning property size, slope, aspect and other physical characteristics showed no particularly strong preferences. Although replies show that owners would like to have larger lots, it is not of great importance. Most would prefer to buy lots located away from commercial areas and near the conservation, or natural areas. This trend offers more justification for extensive conservation areas and the desirability of using them as buffers.

In analyzing the remarks of property owners, it was found that 25% of those commenting think the conservation areas are of adequate size, 25% think they ought to be larger and 50% were not consciously concerned with the size of the area and therefore it is assumed they are satisfied with the size of the conservation areas.

PLOT #1

Date: 4-26-69

Plot Size: 6 feet x 20 feet

Aspect: North

Slope: -17%

Elevation: 1400 feet

Vegetation: Evergreen Huckleberry, 10%; Horse Tails, 90%; short grass, 100% and thickly covering the area.

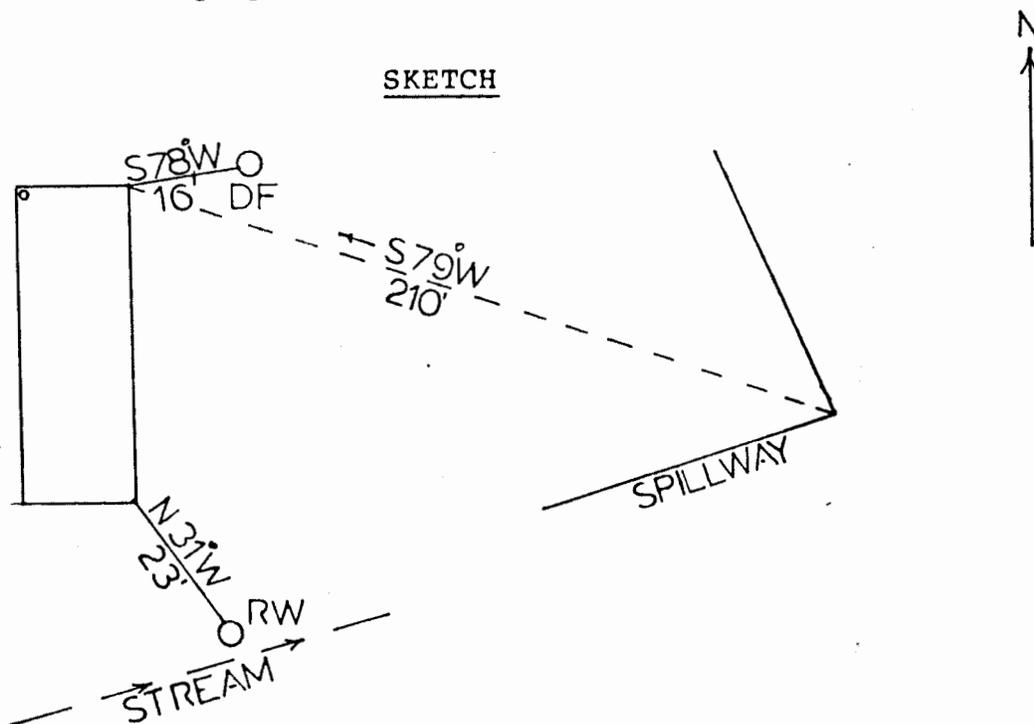
Plot Location: The northwest corner of the plot is located 210 ft from the west toe of the Lake Ada Rose spillway, on a bearing of S 79° W.

A steel pipe, 1-1/2" in diameter, marks the northwest corner of the plot.

Photographs: Photographs 1 and 2 are of Plot 1, and were taken facing in northerly and southerly directions respectively.

Plot Coordinates: Brooktrails Grading Plan Sector D5; Aerial Photograph, 3-26-66, 6623, #28.

SKETCH



PLOT #2

Date: 4-26-69

Plot Size: 6 feet x 20 feet

Aspect: East

Slope: -16%

Elevation: 1425 Feet

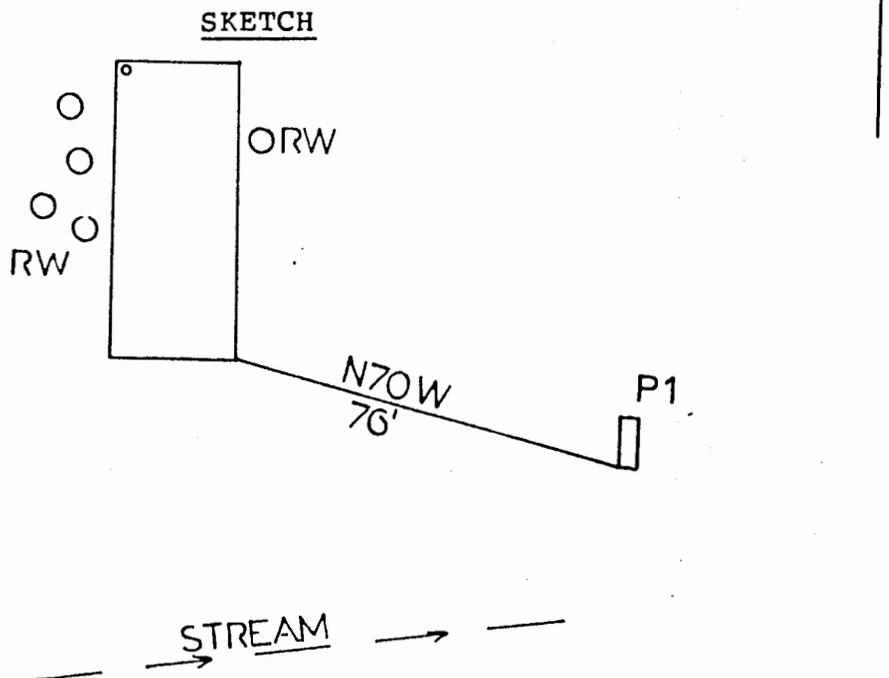
Vegetation: Douglas-Fir, 4' high, 10%; Evergreen Huckleberry, 15%; Manzanita, 10%; Slash, 90%; low height grass over the entire area.

Plot Location: The southeast corner of plot 2 is located 76 feet from the southwest corner of plot one, on a bearing of N 70°W.

A steel pipe, 1-1/2" in diameter, marks the northwest corner of the plot.

Photographs: Photographs 3, 4 and 5 were taken of plot 2, and were taken in northerly, southerly and easterly directions, respectively.

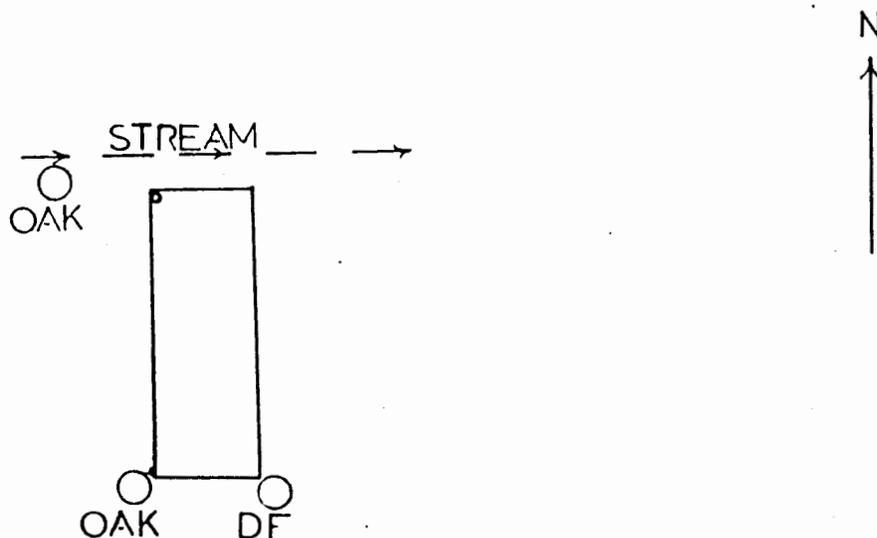
Plot Coordinates: Brooktrails Grading Plan Section D5; Aerial Photograph 3-26-66, 6623, #28.



PLOT #3

Date: 4-26-69
Plot Size: 6 feet x 20 feet
Aspect: North
Slope: -20%
Elevation: 1760 feet
Vegetation: Douglas-Fir Seedlings, 30%; short grass, 95%.
Plot Location: Consult copy of Grading Plan for exact location.
A steel pipe, 1-1/2" in diameter, marks the northwest corner of the plot.
Photographs: Photographs 6, 7 and 8 are of the plot and are taken in northerly, southerly and westerly directions, respectively.
Plot Locations: Brooktrails Grading Plan Section D2; Aerial Photograph 3-26-66, 6623, #23.

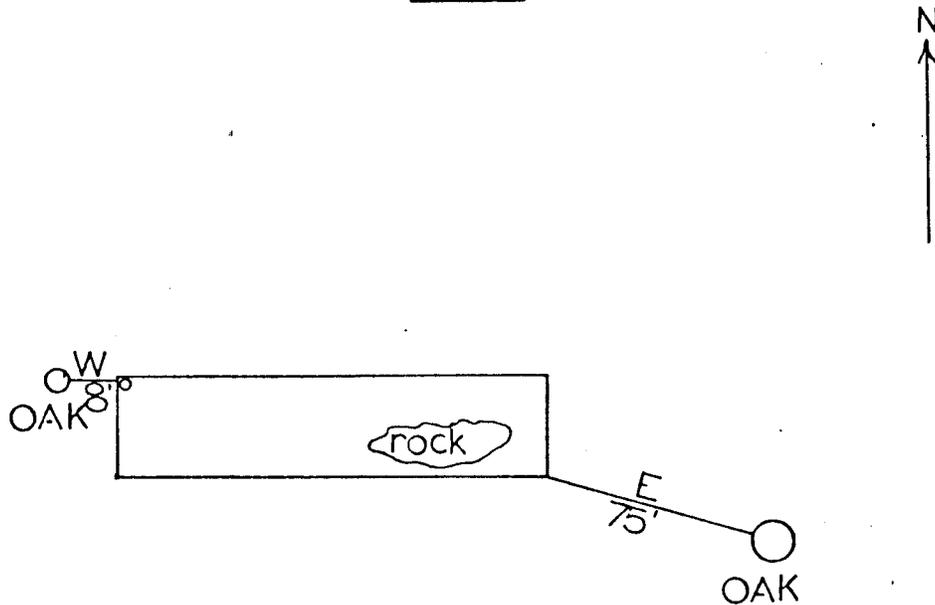
SKETCH



PLOT #4

Date: 4-26-69
Plot Size: 6 feet x 20 feet
Aspect: West
Slope: -17%
Elevation: 1790 feet
Vegetation: Short Grass, 100%
Plot Location: Consult copy of Grading Plan for exact location.
A steel pipe, 1-1/2" in diameter, marks the northwest corner of the plot.
Photographs: Photographs 9 and 10 are of the plot, and were taken facing east and west respectively.
Plot Location: Brooktrails Grading Plan Section C2; Aerial Photograph 3-26-66, 6623, #23.

SKETCH



PLOT #5

Date: 10-3-69

Plot Size: 6 feet x 20 feet

Aspect: Level

Slope: Level

Elevation: 1620 feet

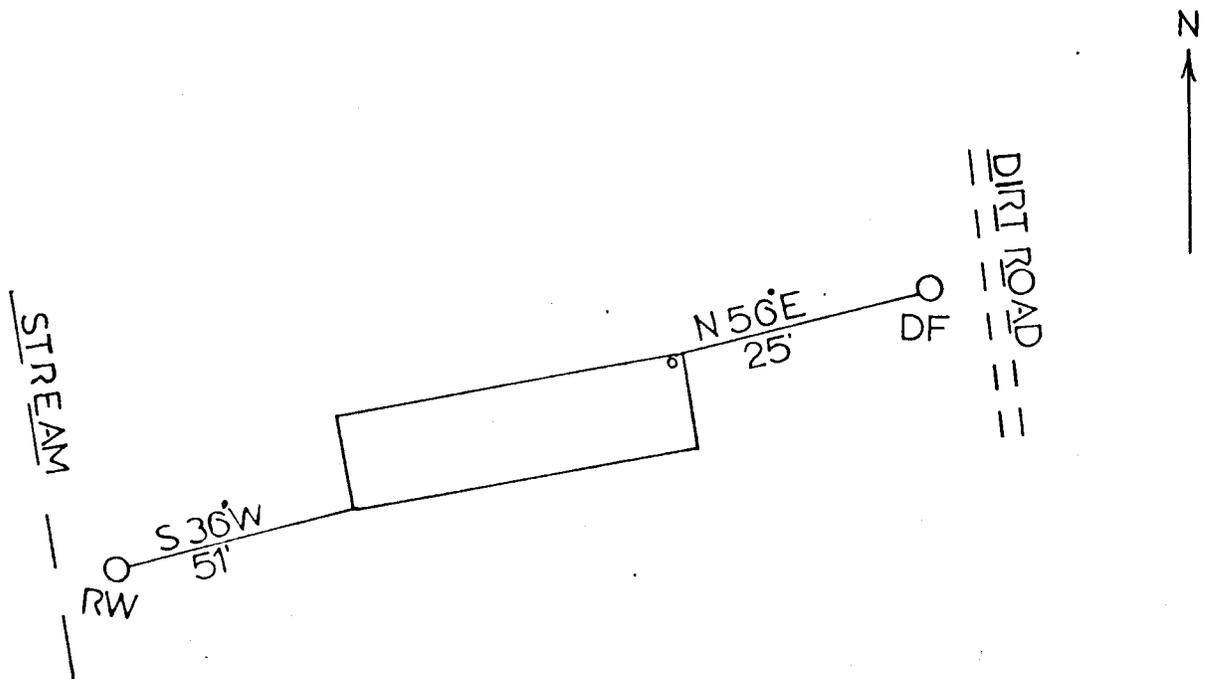
Vegetation: Grass, 12" - 24" high over 100% of the plot.
Horsetails 12" high over 70% of the area.

Plot Location: Brooktrails Grading Plan Sector D4; Aerial Photograph 3-26-66, 6623, #26.

A steel pipe, 1-1/2" in diameter, marks the northeast corner of the plot.

Photographs: Photographs 11, 12 and 13 are of the plot area, and are taken in eastern, northern and southern directions respectively.

SKETCH



APPENDIX C

CONSULTING FORESTER
AND LAND MANAGER

WILDLAND APPRAISAL
MANAGEMENT AND
IMPACT ANALYSIS

LAWRENCE D. CAMP

209 WEST STANDLEY STREET
UKIAH, CALIFORNIA 95482
(707) 462-5920



SUMMARY OF MANAGEMENT RECOMMENDATIONS FOR THE BROOKTRAILS GREENBELT

Reforestation Recommendations

The following recommendations recognize the diversity of the vegetation and resource uses in the Greenbelt area. The recommendations are general; site specific comments are beyond the scope of this report. The general recommendations should be used by the Board as guidelines for long range planning. The priorities suggested below are ranked based on consideration of costs, ease of reforestation and contribution to future income that can be derived from timber harvesting on the property.

- 1) Decide that portions of the Greenbelt area should be managed for hardwood firewood for use by the subdivision's residents. This management decision will assist in determining the level of hardwood control necessary on areas that have been harvested for firewood in recent years.
- 2) In areas that will not be managed primarily for firewood, initiate treatment of most of the hardwood sprouts and begin reforestation with conifers. An example of this is the proposed planting project site. The choice of species to be planted is again a major management policy decision. As a general guideline, I would recommend favoring the use of redwood on north and east facing slopes or where shade canopy exceeds 40% of full crown closure. Douglas-fir may also be used on sites, but shade canopy should be reduced by 10-15 percent to maintain adequate growth. On south or west facing slopes, Douglas-fir would be preferable on more shaded sites, i.e. 40% or more shade canopy, and deeper soils, i.e. 3 feet or more. On more exposed sites or shallow soils, either ponderosa or sugar pine should be planted. If desired the pine species could be used as a "nurse crop" to create a more suitable environment for planting Douglas-fir at a later time. These guidelines should be modified as necessary for each project after detailed on site investigation. These guidelines can be used for recommendations 3 through 5.
- 3) Begin the removal of hardwoods on the accessible gentle slopes, i.e. less than 40 percent, that have not been cut for firewood to date and will not be managed for firewood in the future. Examples of this include Greenbelt areas near Maize Way and along Buckeye Road.
- 4) Initiate an intensive planting effort following commercial harvesting in each management unit. Reforestation immediately after harvest reduces competition from unwanted vegetation and is usually less costly. Most of the planting would be interplanting among residual overstory trees. The primary purpose is to begin the longterm improvement of conifer stocking levels where they are presently too low.

- 5) Interplant understocked or unstocked areas on steeper ground such as the Greenbelt areas adjacent to Dogwood Terrace. Site preparation requirements will vary depending on location and vegetation present. Clearing small openings around each planting site may be sufficient on steeper, less accessible sites.

Where site preparation costs for full stocking would be very high, consideration might be given to limited site preparation and interplanting of conifers to a density of 200 trees per acre. Site preparation could be limited to removal of competing vegetation in the immediate area of the planting site, e.g. a circle 10-12' in diameter. This type of reforestation effort would increase present low levels of conifer stocking in these hardwood stands with a minimal amount of site disturbance.

Thinning Recommendations

Costs for precommercial and clean and release thinning are often higher than reforestation costs. However, since growth rates can be maintained or accelerated, the length of time until income can be realized from the investment is far shorter. Moreover, losses that may occur in an unmanaged stand from increased mortality in submerchantable trees, stagnated growth, and from insects, disease or fire, are less likely to affect a thrifty, thinned stand.

Choice of leave trees is dependent upon numerous factors including species, height, diameter, amount of mechanical defect, and growth characteristics such as internodal length or length between branch whorls, branch size, crown position relative to other trees in the stand, and the ratio between live crown and total tree height. Height and diameter should be above average. Disease and insect infested trees or those with major mechanical damage should be removed. Trees suffering from minor to moderate mechanical damage can be left if they will be of sufficient size for removal during the next harvest, otherwise they should be removed. Branch size should be average to below average for production of high quality lumber. Internodal length should be above average. Leave trees should have approximately 1/3 of their bole in live healthy crown, and be at least codominant in young, even-aged stands. Understory trees should not exhibit evidence of being suppressed or stagnated.

If all other variables are equal, the choice of leave tree species is based on the District's management goals and preferences. I would recommend leaving Redwood, whenever possible, particularly on north or east facing slopes. On the dry southern sites, or in the serpentine soils in Area 1, Ponderosa pine would be preferable rather than Douglas-fir, if it is present, because of its ability to grow on drier sites.

Large overstory hardwoods can be left if they are not interfering with conifer growth. Hardwoods less than 10" D.B.H. and growing within 10 feet of a conifer, or overtopping a conifer, should normally be removed when thinning a conifer stand, to eliminate competition and prevent future interference with height growth. High quality hardwoods should be left where there are no conifers present. Spacing between leave trees should be site specific, but an average distance of 10 feet by 10 feet is a minimum, except where spacing can be reduced to 4-5 feet between trees in the clump. Minimum distance between clumps should be 10 feet.

I would recommend that the District begin a clean-and-release treatment in stands that will be managed primarily for conifers where young vigorous conifers are intermixed with hardwoods. Conifers should comprise at least one-third of the stand before treatment is begun. Stands on slopes of less than 40% should be treated initially to be most cost effective. Provision should be made to reduce hardwood sprouting, i.e. stump treatment or follow-up spraying of sprouts with chemicals. Within clean and release project areas there will often be small areas, i.e. one-quarter to one-half acre, that are overstocked with young conifers. These areas should be precommercially thinned concurrently with the clean and release treatment using the general spacing guidelines described above. Thinning contracts should require proper slash disposal to reduce the risk of insect attack in the residual stand.

Recommendations to Control Insects

As indicated above, coniferous trees most susceptible to insect attack are usually stressed due to drought or stagnation from excessive competition. Implementation of an active forest management plan to reduce the risk of attack is the most effective vehicle to minimize the potential for future outbreaks.

1. Plan and implement a precommercial thinning program in the areas that are overstocked with reproduction. This can be done concurrently with reforestation efforts on adjacent sites within some of these same stands.
2. Ensure that contractual agreements for precommercial thinning and commercial harvesting provide for proper slash treatment or disposal.
3. Require the harvesting of trees highly susceptible to insect attack as a part of any future commercial timber sale.

4. Salvage blowdown and trees killed by endemic insect populations where economically feasible. This could include felling of dead or dying trees for sale as fuelwood on the smaller parcels of the Greenbelt area.
5. Consider participation in the gypsy moth monitoring program. There is no charge for participation and it might prevent establishment of a major insect pest.
6. Investigate treatment of Douglas-fir seed insects on superior quality trees if an active seed collection program is initiated in the future.

Recommendations for Control of Disease

1. Require the harvesting of commercial size trees infected with fomes pini in conjunction with any commercial harvest.
2. Require that precommercial size trees infected with fomes pini be removed during precommercial thinning operations.
3. Monitor the timbered areas for localized infestations of blackstain fungus. If detected, action should be taken to minimize future spread of the disease.
4. Leave scattered hardwoods or untreated stumps in areas that are cleared for conifer reforestation to reduce the risk of Armillaria mellea attacking planted seedlings.

Forest Land Conservation and Protection

Erosion Hazard Reduction

As described above, active erosion is not a major problem with the Greenbelt area. The limited streambank erosion observed appears to result from old logging and natural causes and does not appear to warrant the costly mitigation measures that would be required to stop the low levels of further damage.

The following measures are suggested as general policy guidelines for future timber management activities including site preparation, timber harvesting, and road construction. Requirements of the Forest Practice rules have been incorporated into the guidelines.

- 1) Restrict tractor equipment use on slopes greater than 50% preferably limiting use to slopes not exceeding 45%. Exceptions can be made, but should be examined on a case by case basis.
- 2) Tractor type harvesting equipment should not be operated on unstable areas if at all possible. Site specific mitigation measures should be proposed if equipment must be operated on unstable areas.
- 3) Tractor equipment should not work on dormant slides where slopes exceed 40% unless site specific measures are proposed.
- 4) Vegetation on active slides should remain undisturbed unless removal is agreed to by a C.D.F. staff geologist.
- 5) Skidtrails on slopes between 20-40% should be waterbarred to high erosion hazard standards. Skidtrails on slopes greater than 40% should be waterbarred to very high erosion hazard standards.
- 6) Keep heavy equipment at least 100 feet away from all stream channels except where natural vegetation or gentle slopes can provide a buffer zone for disturbed soils or where mitigation measures can minimize soil movement. Mitigation measures include practices such as use of straw mulch, grass seeding and placing energy dissipaters at the lower ends of culverts.
- 7) Prohibit wet weather activities except with the approval of the District manager.

Almost no new road construction will be needed to manage the Greenbelt, provided the paved road system is adequately maintained by the County and the existing low standard road system in the Greenbelt is restored by the District. Restoration will require removal of cutbank slumps, repair of fill slope slipouts, installation of roadside drainage ditches, installation of culvert for road drainage, and road surface grading along portions of all of the unpaved roads within the Greenbelt.

Virtually all of the stream crossings will need to be reconstructed. The old crossings have failed and will need to be replaced by either culverts or bridges, or the approaches to the streams modified to permit vehicular crossing during dry weather. It is recommended that permanent culverts be installed on the existing roads that cross the smaller tributaries of Dutch Henry and Willits Creeks. While more expensive initially, permanent culverts with trash racks at the upper end of the culvert would improve access for all types of forest management at lower longterm cost than the installation and removal of temporary culverts on a periodic basis. Permanent culverts should be sized to pass water flows for a 50-year storm. If permanent culverts must be limited due to initial expense, priority should be given to the main road system with temporary spur roads being restored as necessary.

If all-weather crossings are desired on the main forks of Dutch Henry Creek and Willits Creeks, either railcar or log bridges would probably be most economical because of the very large culverts that would be required to handle winter storm flows. As mentioned above, a temporary alternative for some bridges would be the modification of the approaches to the old crossings to permit a low water crossing during dry periods. This type of crossing would be suitable for light vehicular traffic and many forest management activities, but may not be suitable for firetrucks or logging trucks.

Access to existing logging roads from the subdivision's roads will present problems in some areas. During construction of the subdivision's roads, some logging roads were left with encroachments ending on the top of cutbanks or at the bottom of fill slopes. Minor construction will be necessary at these points if these roads are to be used. In other instances, logging roads have good existing approaches to subdivision roads, but these roads may require purchase of an easement through the lot, or purchase of the lot, or road construction to obtain access to an existing encroachment within the Greenbelt.

To reduce the potential for loss from a major fire in the Greenbelt, the following recommendations are offered:

1. Continue to give high priority to the maintenance and enhancement of the District's fire suppression organization. This should include adequate training in the suppression of vegetative wildfire as well as structural fires if it is not currently being done.
2. Continue the aggressive hazard abatement program around existing structures.
3. Request Mr. Dysart to review current practices relating to the inspection of small power equipment such as chainsaws, lawnmowers, and generators used by residents or contractors for compliance with state law.
4. Request Mr. Dysart to also review the District's educational effort on the dangers of wildfire to the residents and guests of the subdivision. Additional effort might include posting signs along roadways and trails to warn of fire danger.
5. Consider the development and presentation of short lectures or printed materials to the homeowners about fire safety, fire suppression and fire's adverse effects. Assistance for this type of effort can be obtained from the Calif. Dept. of Forestry. A good reference is Protecting Residences from Wildfires; a guide for homeowners, lawmakers and planners. Howard E. Moore, PSW Gen. Tech. Report PSW-50, May 1981.
6. Develop access within the larger Greenbelt areas as soon as possible by repairing the existing road system.
7. Require that forest management activities provide for proper treatment of slash. This should include lopping, piling and burning, or removal from the site.
8. Limit fuelwood management areas to small areas when located on or near ridges that can be used as fire breaks. Hardwood stumps should be treated to minimize regrowth through the use of herbicides, to reduce the number of trees per acre, and pruning of hardwood sprouts on trees that will be grown for fuelwood. After one or two sprouts per stump have established dominance i.e. reach a height of 3-4 feet, the balance can be removed.
9. Maintain or reduce the existing fuels adjacent to the paved streets of the subdivision to provide breaks in the crown canopy. This may require branch pruning or limited removal of entire trees.
10. Determine the feasibility of participating in the C.D.F. vegetative management program for fuel modification where the Greenbelt borders private lots. If the District cannot participate in the program, consider doing the work using volunteer labor of the residents, and the recommendations of the C.D.F. fuel management specialist in Ukiah.

Management Recommendations

The timber inventory data and the CRYPTOS yield projections indicate that the timber in the Greenbelt area can be successfully managed without significant adverse affects on the benefits i.e., watershed and aesthetic enjoyment, that the open space area produces.

An active timber management plan can generate periodic income for the District, reduce fire danger, improve access throughout the Greenbelt management units, and increase water flow. The recommendations that follow incorporate both the biological and economic factors that have been discussed previously.

1. In the areas that are poorly stocked with conifers begin a program of periodic hardwood cutting, stump treatment and reforestation with conifers. Harvests in this type of stand should be scheduled at intervals of at least 10 to 15 years to provide for adequate establishment of the planted conifers. Initially such harvests should probably be restricted to slopes of 50% or less to minimize soil disturbance and ensure that the hardwoods can be removed economically. Income from this type of operations will probably be limited because of low product values for firewood and high operating costs. However, firewood removal is a practical method to minimize site preparation costs for replanting and to reduce fire danger in the dense stands of hardwood.
2. Conifers in this type should not be harvested in this timber type unless trees are close to areas where hardwood harvesting might be occurring and there is a high risk of the tree dying within the next decade.
3. Similarly, in the areas moderately stocked with conifers, begin removal of hardwoods and reforestation as outlined in recommendation No. 1.
4. Plan for a selective harvest of conifers within the next decade to generate adequate funding for rehabilitation of the road system and expenses for reforestation and thinning. As indicated previously, any harvest exceeding 250,000 board feet should be deferred until the stumpage prices improve. It is suggested that a sale not be made until the District can receive a net price of \$190-\$200/M b.f. for young-growth redwood and \$65-80/M b.f. for Douglas-fir. The minimum size harvest that is normally considered economical is 200,000 to 250,000 board feet. Because much of the stand is relatively small, it is suggested that a maximum of 1-2 million board feet be

harvested initially. This will permit the residual stand to grow fairly rapidly and begin the process of developing a group of different size classes necessary for uneven-age management.

Future coniferous harvests should probably be deferred for at least 10 years to permit the stand to grow.

5. Periodically re-evaluate the District's management goals, and policies based on periodic reinventory of the timber.

I would suggest the following generalized guidelines for the removal of timber in the Greenbelt:

1. Remove trees in all merchantable diameter classes showing severe mechanical damage from fire or other causes or evidence of disease and insect infestation.
2. Remove understory trees to maintain growth of existing dominant and co-dominant trees. This will apply primarily to trees whose average diameter is less than 18" D.B.H.
3. Remove sufficient dominant and co-dominant trees in the larger diameter classes to permit the establishment of reproduction where it is presently absent.

Guidelines 2 and 3 are applicable to stands that are presently stocked.

Where there is a poor distribution of age and size classes, use the following guidelines:

4. In areas currently understocked, remove only high risk conifers, or those necessary to improve survival of regeneration i.e., "wolf type" trees.
5. Begin a planting program during the winter following harvesting where regeneration is presently inadequate.
6. Retain a sufficient number of high quality hardwoods in areas where they are harvested to provide shade for survival of conifer regeneration and to minimize the potential spread of Armillaria mellea.

A conservative approach has been used for making recommendations about timber harvesting. This approach has been used to permit an increase in the current levels of growing stock and to improve the quality of the existing growing stock, while maintaining maximum flexibility for changes of management goals and minimizing the risks associated with factors such as fire.

Management Decisions Necessary Prior to
Implementation of the Management Plan

1. Define the boundaries and number of management units desired by the District if different than those suggested previously.
2. Establish an interim policy on the desired distribution between hardwoods and conifers utilizing economic, biological, and aesthetic criteria.
3. Define the need and timing for future income from timber harvesting.
4. Determine management policies for investment of portions of any timber sale revenue for long term stand improvement work; i.e. reforestation, pre-commercial thinning, establishment of growth plots, and road improvements.
5. Establish the goal for maximum tree size for use in theoretical calculation of stand distribution characteristics.