BEEGUM WATERSHED ANALYSIS

March, 1997

Yolla Bolla Ranger District

South Fork Management Unit

Shasta-Trinity National Forests

TABLE OF CONTENTS

INTRODUCTION

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United States Fish and Wildlife Service (served on team)
National Marine Fisheries Service

Format/Core Topics: The format used in this analysis is based on the six step process outlined in "Ecosystem Analysis at the Watershed Scale", Version 2.2 (August, 1995), and in the Forest white paper, "Efficiency in Ecosystem Analysis - Plan to Project" (September 18, 1995). These publications identify seven core topics which represent the major ecological elements in a watershed. For the Beegum Watershed Analysis, two of these core topics were combined (hydrology and stream channel) and a new core topic was added (fire and fuels). Therefore, the core topics addressed throughout the Beegum Watershed Analysis are:

Erosion Processes
Hydrology/Stream Channel
Water Quality
Vegetation
Fire and Fuels
Species and Habitats
Human Uses

Management Objectives: Three management objectives were identified for the Beegum Watershed, and these were used to focus the analysis:

1. Timber production

2. Wildlife (deer habitat) management

3. Fuels management

The depth and extent of analysis is not equal for all core topics. This is due to the focus of the watershed analysis based on these management objectives, and also on the wildlife and habitat information needed for consultation with the U.S. Fish and Wildlife Service.

Stratification: Two methods for stratifying the Beegum Watershed were used in this analysis. First, subwatersheds were delineated, because this stratification is useful in analyzing cumulative watershed effects. Twelve subwatersheds were identified (see map, page Intro-3): Dutchman Gulch, Corral, Lower Beegum, Lower Middle Fork Beegum, Lower South Fork Beegum, North Fork Beegum, Pole Corral Creek, Post Creek, Round Mountain, Tedoc, Upper Middle Fork Beegum, and Upper South Fork Beegum.

Second, the watershed was stratified in to eight ecological units, based on bedrock geology, landform, soils and potential natural vegetation. Actually, there are only six ecological units, but because one of the ecological units (Round/North Star) consists of three non-contiguous areas, each is identified as a separate unit (see map, page Intro-5).

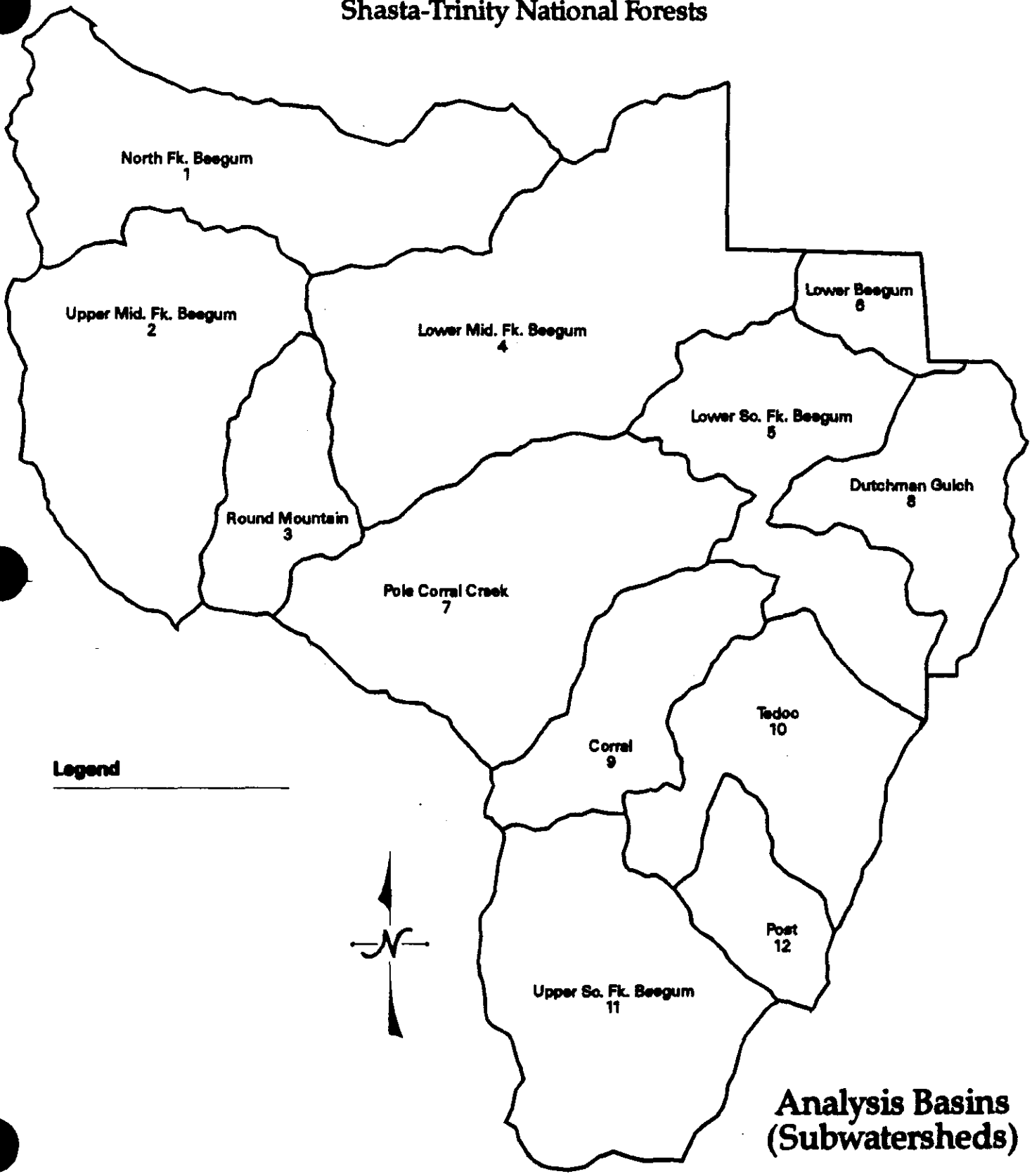
1. Snake Lake: This unit extends in a northwest-southeast manner through the middle of the watershed, extending from the very northwest corner of the watershed, by Little Black Rock Mountain, to south of Tedoc Gap in the southeastern corner. It is comprised of small bedrock blocks of widely ranging lithologies which "float" in a highly sheared serpentinite matrix, of the Rattlesnake Creek Terrane. It has widely developed, massive slump earthflows, which have contributed to the development of numerous slump ponds, meadows, wet areas and thoroughly disrupted drainages. Vegetation in this unit is characterized by low density Grey pine/canyon live oak communities, shrub communities characterized by manzanita and chamise, and Jeffrey pine communities.

2. Round/North Star (north): This unit is located in the northwest corner of the watershed adjacent to the North Fork of Beegum Creek. This is a resistant bedrock unit comprised of massive blocks of granitics, metasediments and metavolcanic rocks of the Rattlesnake Creek Terrane. The slopes are moderately steep and dissected. Vegetation in this unit is characterized by medium density mixed conifer communities. Ponderosa pine and Douglas-fir comprise the predominant species at mid-elevation sites, with lesser stocking of sugar pine, incense cedar, and white fir. Higher-elevation mixed conifer sites are comprised of predominately white fir, with lesser degrees of stocking of associated conifer species. Lower-elevation mixed conifer sites have reduced stocking levels of white fir, with increased stocking levels of ponderosa pine. The highest elevation sites within the unit are comprised of stands of mostly pure white fir. California black oak comprises a significant stand element at mid to lower elevation mixed conifer sites, especially on better sites.

3. Noble Ridge: This unit lies along the northern boundary of the watershed and underlies Noble Ridge. It is comprised of sandstones of the lower Hayfork Terrane which have highly dissected, steep sideslopes. Beegum Canyon cuts through this unit and many active or recently active debris slides are evident adjacent to the channel. Vegetation is characterized by low density Grey pine/canyon live oak communities, shrub communities characterized by manzanita and chamise, and Jeffrey pine communities.

Beegum Creek Watershed Analysis

U.S.D.A Forest Service
Shasta-Trinity National Forests



Analysis Basins (Subwatersheds)

Scale 1:24000

Map File: beeshed11.apr February 11, 1997

Beegum Creek Watershed Analysis

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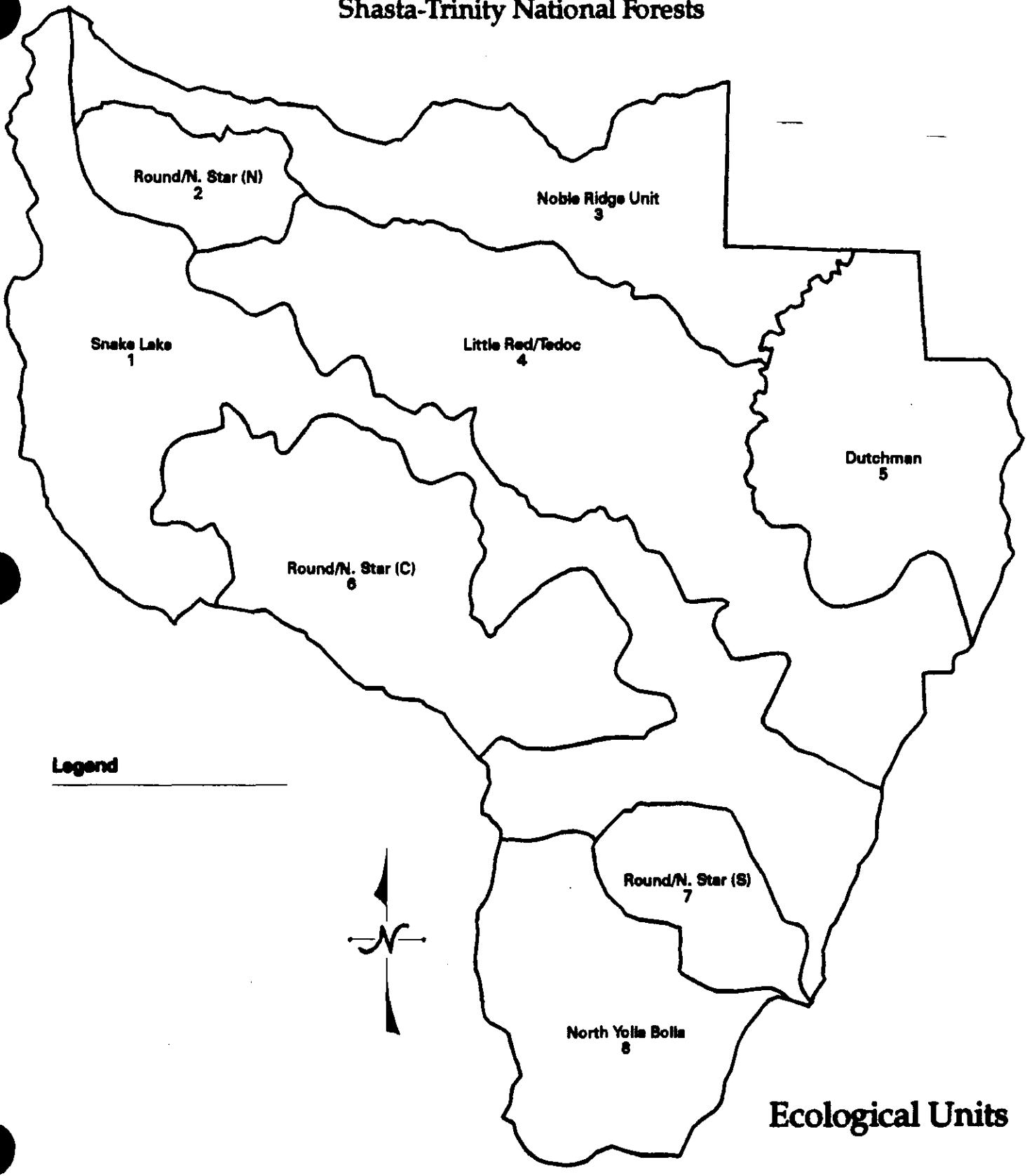


Ecological Units

Scale 1:24480

Map File: eco_6x11.gis February 13, 1997

4. Little Red/Tedoc: This ecological unit is comprised of peridotite and serpentinized peridotite blocks of the Rattlesnake Creek Terrane. It is massive in nature and has many small debris slides and colluvial slopes. Due to soil chemistry, it is very poor site quality. It lies in the center of the Beegum watershed, extending from Gum Springs to Tedoc Gap. Vegetation is characterized by low density Jeffrey pine and Grey pine/live oak communities. Shrub communities are characterized predominately by manzanita, with a lesser component of chamise.

5. Dutchman: This unit lies in the eastern portion of the watershed in the Dutchman Gulch subwatershed. The geology of this unit is similar to the Round/North Star units, but the vegetation is characterized by low density Grey pine/canyon live oak communities, shrub communities characterized by manzanita and chamise, and Jeffrey pine communities.

6. Round/North Star (central): This unit, located in the Round Mountain and North Star Mountain area, has the same characteristics as Round/North Star (north).

7. Round/North Star (south): This unit, located along Rat Trap Ridge, has the same characteristics as Round/North Star (north).

8. North Yolla Bolly: This unit lies in the southern portion of the Beegum Watershed extending from North Yolla Bolly Mountain to just south of Rat Trap Ridge. It is comprised of a minor sliver of the Galice Formation as well as the South Fork Mountain Schist. The uppermost slopes of the unit were glaciated during the Pleistocene and glacial cirques, a tarn lake and numerous moraines are evident. Large block glide landslides are developed within the schist. Vegetation in this unit is characterized by high-density almost pure red fir stands on higher elevation sites. Mid elevation sites are comprised of red fir/white fir communities, with lesser stocking of Douglas-fir. Lower elevation sites are composed of mixed conifer communities, with stocking predominately comprised by ponderosa pine and Douglas-fir.

Step 1: CHARACTERIZE THE WATERSHED

Step 1 defines the analysis area and identifies the most important land allocations and management plan objectives that influence resource management in the watershed. The core topic discussions identify the dominant physical, biological and human features and processes that affect ecosystem function or condition.

Approximately one third of the Beegum watershed lies outside the Forest boundary in BLM or private ownership. Only that portion of the Beegum watershed within the Forest boundary is addressed in this watershed analysis. The analysis area is in the Yolla Bolla Ranger District, in Shasta and Tehama Counties, and is part of the Sacramento River drainage (see vicinity maps, pages 1 - 3 & 5).

The analysis area lies within the Beegum Management Area (#22). Primary objectives for this management area are timber production, wildlife (deer habitat) management, and fuels management. While all land allocations are represented in the analysis area (see map, Appendix II-9), the primary allocations are Adaptive Management Area (AMA)/Matrix (mostly Commercial Wood Products Emphasis - Rx VIII, and Wildlife Habitat Management - Rx VI) and Administratively Withdrawn Areas (mostly Unroaded Non-motorized Recreation - Rx I). The Administratively Withdrawn Area consists primarily of the East Beegum and West Beegum Released Roadless Areas. Management objectives for each land allocation are discussed in the Shasta-Trinity National Forests Land and Resource Management Plan (LMP).

Core Topics and Questions

EROSION PROCESSES: What erosion processes are dominant within the watershed? Where have they occurred or are they likely to occur?

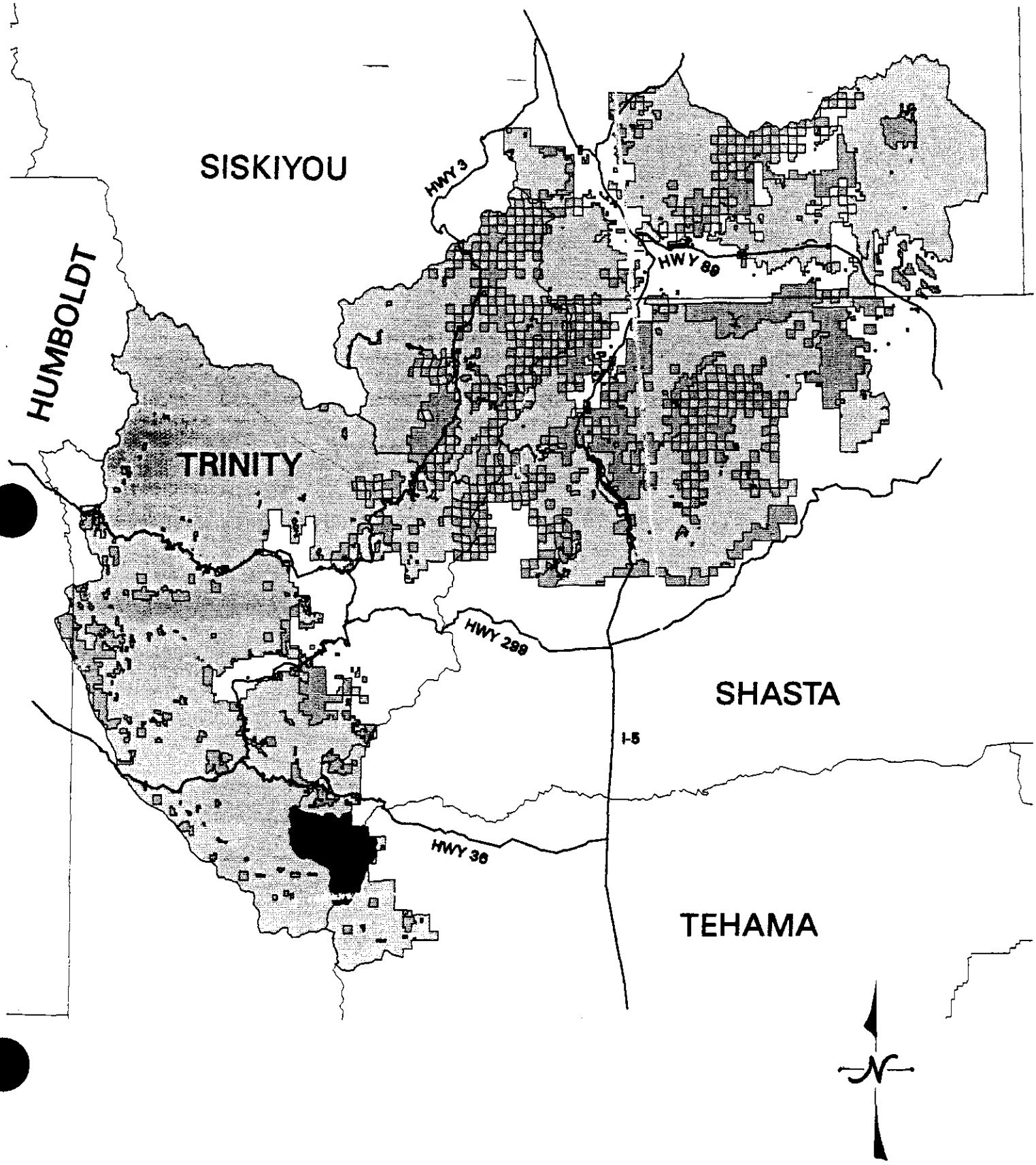
The Rattlesnake Creek Terrane, which underlies the majority of the analysis area, is characterized by blocks of widely diverse origins "floating" in a sheared serpentine-rich matrix. Massive slump earthflows have developed over thousands of years within this terrane. There are many areas within the watershed which are underlain by slump earthflows, which are characteristically identified by rolling benched topography, with wet meadows, ponds and small perennial streams. Regan Meadow and Snake Lake are two examples of slump earthflow features. In stark contrast, areas underlain by the large bedrock blocks are relatively stable and have minor mass wasting features developed. Slope instability hazards are widespread within the serpentine-rich melange areas, but are relatively local in nature.

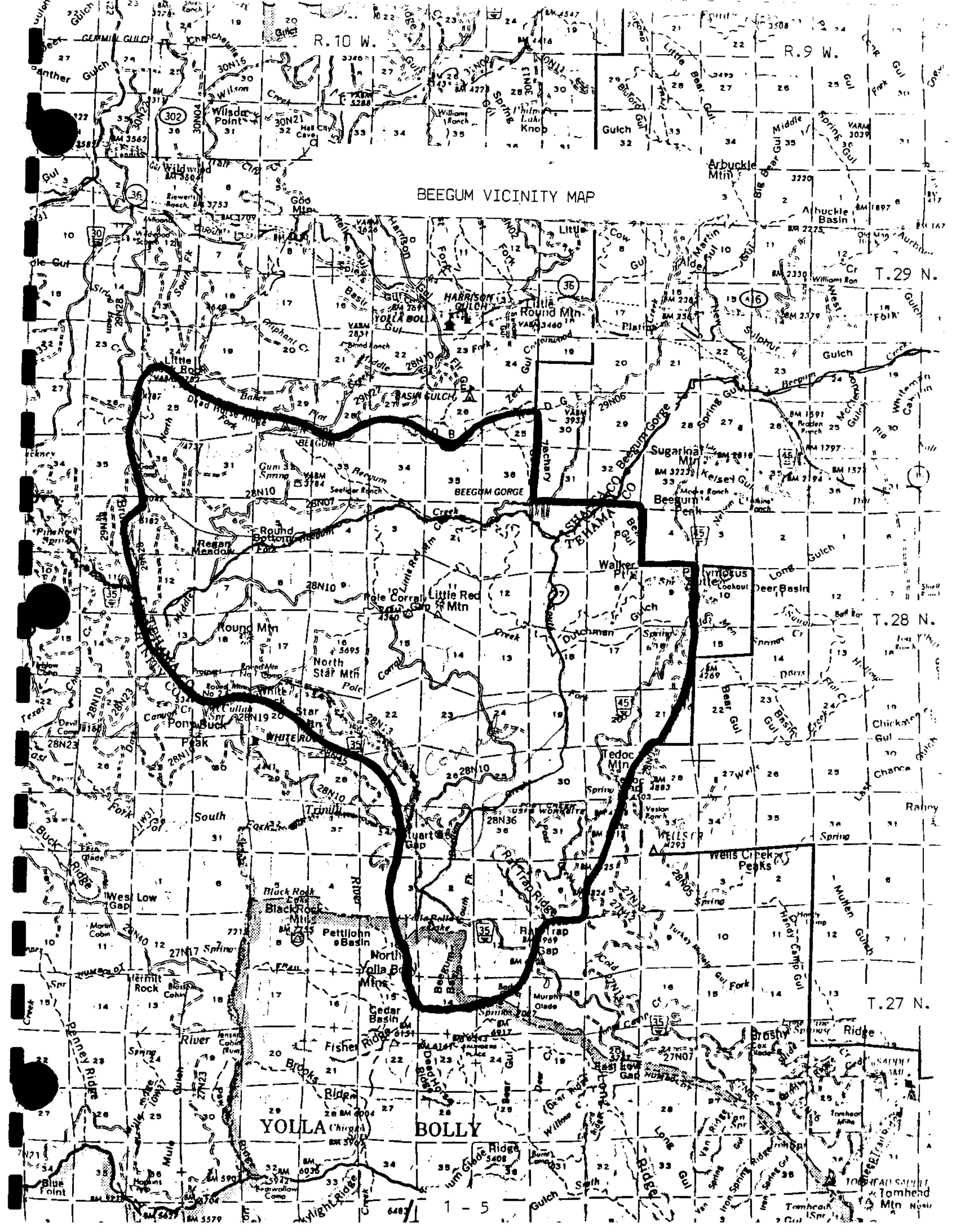
An overall increase in surface erosion rates within the Beegum Creek Watershed Analysis area has been observed. Surface erosion rates are characterized as low to moderate. Increases in surface erosion can be attributed to several human induced activities such as road construction, jeep roads, and skid trails. Evidence of elevated surface erosion rates has also been observed adjacent to stream crossings as a result of increased water yield.

Vicinity Map

Beegum Creek Analysis Area

U.S.D.A Forest Service
Shasta-Trinity National Forests




BEEGUM VICINITY MAP
R.10 W.
R.9 W.
T.29 N.
T.28 N.
T.27 N.
Beegum Gorge
BEEGUM GORGE
Little Round Mtn
Round Mtn
Little Red Mtn
North Star Mtn
Pony Buck Peak
Beegum Peak
Sugarloaf Mtn
Arbuckle Mtn
Arbuckle Basin
Tedoc Mtn
Wells Creek Peaks
Black Rock Mtn
Pettijohn Basin
North Yolla Bolly Mtns
Cedar Basin
Fisher Ridge
Rat Trap Gap
Stuart Gap
West Low Gap
Regan Meadow
Round Bottom
Dead Horse Ridge
Little Rock
Wilson Point
Walker Pt
Deer Basin
Yolla Bolla
Harrison Gulch
Hermit Rock
Blue Point
Tomhead Mtn
SHASTA CO
TEHAMA CO
YOLLA BOLLY

HYDROLOGY AND STREAM CHANNEL: What are the dominant hydrologic characteristics and other notable hydrologic features and processes in the watershed? What are the basic morphological characteristics of stream valleys or segments and the general sediment transport and deposition processes in the watershed?

There are a number of springs, seeps, meadows, and other wetlands located within the analysis area. The subwatersheds that have the highest concentration of such features are Upper Middle Fork Beegum and Round Mountain. These wet areas are mostly upslope of and within one-half mile of Road 28N10. They coincide with the locations of internested translational rotational slides that are found in this band. The outstanding wetlands within the analysis area are North Yolla Bolly Lake, Regan Meadow, spring at Round Mountain Number 1 Camp, and "Snake" Lake.

The high percentage of acreage on north-facing slopes allows above average duration of snowfall, which can significantly increase the amount of streamflow that results from a rain-on-snow event. The average streamflow is about 80 cubic feet per second (cfs), or an average water yield of 1.25 cfs per square mile of watershed. Base flows begin between July 15 and August 1, and usually return to higher flows between October 15 and November 1. Base flows are estimated to range from about 10 cfs to less than 1 cfs, with the lowest annual flows occurring usually in September.

The maximum flood flow for Beegum Creek at the National Forest boundary was approximately 6,000 cfs occurring on or about January 16, 1974 (extrapolated from data collected at a discontinued stream-gaging station at Middle Fork Cottonwood Creek). The highest mean daily streamflows and peak flows usually occur between December and April. The annual maximum peak flow for most years is estimated to range between 800 cfs and 1,600 cfs.

Beegum Creek is the major stream in the Watershed Analysis area. It is the largest tributary of Middle Fork Cottonwood Creek. Cottonwood Creek is a tributary of the Sacramento River. There are three major tributaries of Beegum Creek: North Fork Beegum Creek, Middle Fork Beegum Creek, and South Fork Beegum Creek.

In the upper stream reaches (first and second order streams) and in the steeper landforms, sediment is both transported into the channels from the adjacent uplands and riparian zones, and also generated within the channels primarily by downcutting. Sediment in these "A" channel types (Rosgen Stream Classification System, 1996) is efficiently transported downstream. "A" channel types (4% to 10% gradient) appear to have more instability problems than other channel types within the the Beegum Creek analysis area. This is most evident at the three subwatersheds in the Middle Fork Beegum Creek Watershed, and at the Pole Corral, Upper South Fork Beegum, and Post subwatersheds (South Fork Beegum Creek Watershed).

"B" channel types (2% to 4% gradient), common at lower reaches and at moderate sideslopes, are also efficient in transporting sediment. Some stream reaches of "B" channel types at the Middle Fork and South Fork of Beegum Creek have high inputs of sediment from upstream reaches and/or adjacent lands. However, these particles are efficiently transported downstream with minor changes in channel stability on-site.

WATER QUALITY: What beneficial uses dependent on aquatic resources occur in the watershed? Which water quality parameters are critical to these uses?

Currently, water quality within the analysis area appears to be in good condition. Sporadic measurements of summer water temperatures within the mainstem of Beegum Creek and its tributaries have indicated that high water temperatures are not a limiting factor in fish production. Visual estimates of turbidity levels have been characterized as low with abundant levels of aquatic invertebrates observed. Diversions for domestic and agricultural use are few within the analysis area.

The Shasta-Trinity Land and Resource Management Plan has identified a 2.5 mile reach of lower Beegum Creek as a candidate for eligibility under the Wild designation of the the Wild and Scenic River Act. The outstanding characteristic which defines this reach is the geologic nature of the Beegum Gorge. The lower portion of this stream is well incised into the surrounding bedrock, forming a gorge which is up to 1000 feet with near vertical rock walls.

VEGETATION: What is the array and landscape pattern of plant communities and seral stages in the watershed, and what processes caused these patterns?

Vegetation varies from chaparral at the lower elevations to mixed conifer at higher elevations. The eastern portion of the watershed lies in the "front country" or the interface between the Sacramento Valley and the east side of the Klamath Mountain Physiographic Province. This area is comprised of barren lands, oak stands, gray pine stands, commercial conifer stands and a mosaic of chaparral brushfields in various stages of seral stage development.

Exposed serpentines of the Rattlesnake Creek Terrane are inhabited by a specially adapted flora, including several very rare and local vascular plant species. Tedoc Mountain botanical Special Interest Area was established by the 1995 Shasta-Trinity LMP to highlight and conserve the remarkable flora and vegetation associated with the serpentine of Tedoc Mountain, at the upper end of Beegum watershed. Unique protected populations of plants adapted to harsh nutrient-poor serpentine sites, such as, Howell's linanthus, Stebbins' madia, pale yellow stonecrop, Peanut sandwort, serpentine goldenbush, Niles's madia, and Dubakella Mountain buckwheat are known to occur throughout this watershed. Brownie lady-slipper orchid, an old growth associated survey & manage species, is known to occur in the Pole Corral area.

Mixed Conifer is the most abundant vegetation type found in the watershed. Common components of mixed conifer include Douglas-fir (Pseudotsuga menziesii), white fir (Abies concolor), ponderosa pine (Pinus ponderosa), sugar pine (Pinus lambertiana) and incense cedar (Calocedrus decurrens).

Overstory vegetation types within the assessment area generally range from an open Jeffrey pine type to a well-stocked mixed conifer type to a well-stocked red fir type. The Jeffrey pine type is typically found on low-elevation sites on shallow, rocky, serpentinized soils. As elevation increases, conifer species become more prevalent, primarily a function of favorable environmental conditions for conifer survival and growth. The deeper, more developed soils support mixed conifer stands of Douglas-fir, ponderosa pine, incense cedar, and sugar pine. The higher elevation sites within the assessment area lend themselves to favorable conditions for white fir survival and growth, with white fir becoming a substantial

component of the mixed conifer type. The highest elevation sites within the assessment area lend themselves to favorable conditions for red fir survival and growth, with white fir a substantial component of the red fir type.

Hardwood species, predominately black oak, live oak, and white alder comprise a substantial stand component only on a limited number of sites throughout the assessment area. Black oak is generally a minor stand component on the more productive commercial-capable sites. Live oak is generally on the lesser productive commercial-capable sites, and on non-commercial sites. White alder is generally a substantial stand component along perennial stream-courses and immediately adjacent to year-round wet areas.

FIRE AND FUELS: What are the dominant fire and fuels characteristics and how how has fire affected vegetation patterns in the watershed?

Fire is an important natural disturbance agent in the Beegum Creek watershed, with lightning the primary ignition source. Ecosystems within the watershed, specifically those at lower and mid-elevations, have evolved under a frequent low-intensity fire regime. Higher elevation true-fir forest ecosystems in contrast, developed under a fire regime of infrequent high-intensity fires. Fire suppression efforts for over 80 years have set the stage for large catastrophic wildfires in both the decadent brushfields and the overstocked, moisture stressed timber stands. The Yolla Bolly Middle Eel Wilderness, a small portion of which lies in the Beegum watershed, has one of the few Class 1 Airsheds in the state. A Class 1 Airshed has the most stringent air quality constraints, which may severely impact opportunities for prescribed fire use within and adjacent to it.

SPECIES AND HABITATS: What is the relative abundance and distribution of species of concern that are important in the watershed? What is the distribution and character of their habitats?

Fisheries: A federally listed species, the Winter-Run chinook salmon is known to occur within the Sacramento River basin, however, there are no historical records that indicate that this species has ever been present within the analysis area. Small runs of West Coast steelhead and chinook salmon (petitioned species currently under review) have been observed in the mainstem and in the lower sections of the South, North, and Middle Forks of Beegum Creek during the last 25 years. However, numerous low flow barriers exist within the lower watershed which can cause seasonal variations in the range of migration for anadromous species. Present and historical information on anadromous fish populations is sparse, and may be an indication that anadromous fish were never well established within the analysis area. While past surveys have characterized habitat conditions as good, migration obstacles may be the key limiting factor in anadromous fish production.

Resident trout populations are prevalent throughout the watershed, inhabiting most perennial tributaries including the anadromous fish reaches. Habitat and water quality conditions have been reported as fair to good. Limiting factors affecting resident trout populations include high stream gradient, low flows, and limited spawning gravels. Seasonal use of intermittent streams for spawning and rearing habitat is likely to occur.

Wildlife: Beegum watershed lies within the Yolla Bolly Black-tailed Deer Herd boundary, specifically in the Beegum subunit boundary. This herd contains resident and migratory Columbian black-tailed deer. Deer use the Beegum watershed both as summer and winter range. They also migrate through the watershed from the Wilderness (summer range) down to winter range (lower Beegum Creek, BLM, and private land). The herd is estimated at 4,600 to 5,000 animals (based on 1981 data). Habitat conditions in the watershed have decreased in quality due to the lack of early seral vegetation, and minor competition for forage by cattle, the most critical of these being the lack of early seral vegetation.

There is one known American peregrine falcon (Endangered) eyrie on the east side of the watershed, but outside of the Forest boundary. The falcons from this eyrie forage within the Beegum Creek Watershed in the general area of Beegum Gorge and toward Walker Point, as well as to the south and east outside of the watershed boundary.

Five northern spotted owl (Threatened) activity centers lie within the watershed. Four additional owl activity centers lie outside the watershed but within 1.3 miles of the boundary, suggesting that these owls may be using habitat within the watershed (i.e., 1.3 miles is the accepted owl "home range" radius around the activity center). The current status of each activity center is unknown, but surveys are being conducted this year to reconfirm status. The watershed is bordered by Critical Habitat Unit (CHU) CA-36 on the NW corner of the watershed, and is within 2 miles of CHU CA-28. Both CHUs are encompassed by Late Successional Reserves (LSRs), RC-331 and RC-330, respectively. Though the habitat is fragmented by roads and old clear cuts, the western half of the watershed serves as an important dispersal corridor between the two CHUs/LSRs. Neighboring watersheds could contribute to the dispersal needs between the LSRs, but are currently less suitable because of stand age/density and higher fragmentation. All the dispersal habitat between the two LSRs is within Rx B. This dispersal habitat also represents the easternmost edge of the Klamath Province, directly abutting California's Central Valley, which is not suitable habitat (Recovery Plan for the Northern Spotted Owl - DRAFT, p.62). LSR RC 330, the larger of the two LSRs, though outside the watershed, is expected to provide suitable habitat for those owls currently in Matrix. **Until the functionality of this LSR is known, maintenance of ~~suitable~~ habitat, especially around and between the existing activity centers within the Matrix, will be important in allowing the continued viability of these activity centers and continued contribution to the population in the LSR.**

dispersal

California red-legged frog (Threatened) historically occurred in Shasta County. Although there are no records of this species in the Beegum watershed, it is assumed that they historically occurred in this area. This frog species requires dense, shrubby or emergent riparian vegetation closely associated with deep, still, or slow moving water. Although riparian vegetation can be found in this watershed, areas with deep, slow moving water is limited.

There is one known northern goshawk nest site in Beegum. Five other sensitive species have either been sighted or have suitable habitat and are suspected to occur in the watershed: pacific fisher, American marten, willow flycatcher, northern red-legged frog, and northwestern pond turtle. While suitable habitat exists for seven species of bats, there are no confirmed sightings of these species in the watershed.

HUMAN USES: What are the major human uses, including tribal uses, and where do they generally occur in the watershed?

Timber management has been the driving direction in this area over the course of the last 30 years. This management has directly supported the timber industry in the local area. The timber economy for many years provided the steady economic input to help support local social systems. Logging and saw mill jobs supported many families and helped maintain a cultural lifestyle centered around this work. Other pursuits in this area have been secondary or directly related to logging, such as reforestation work, timber stand improvement, firewood cutting, and some special forest products collecting.

Recreation activities have been minor contributors to the local economy. This area is used for roaded recreation including primarily deer hunting and related dispersed camping, and also wood cutting, auto touring, gathering of forest materials, and sight seeing. Wilderness recreation is also a part of this area in the immediately adjacent Yolla Bolla/Middle Eel Wilderness.

The transportation system in Beegum Watershed was developed primarily to meet timber management and recreational needs. This system includes approximately 142 miles of road and 33 miles of foot trails.

Portions of four range allotments lie in Beegum watershed for a total of 13,180 acres. Only 5,620 of these acres are actually suitable range. 2,900 acres are permanent range, and 2,720 acres are transitional range. The number of head is 45, for 209 animal unit months (AUMs). Range condition is generally fair to good. Riparian use is largely nonexistent due to the rugged nature of the main drainages in this watershed. The area of riparian use is estimated at 14 acres located within wet meadows in the upper reaches of the watershed. Cattle trespass has been a concern, especially into the Yolla Bolla-Middle Eel Wilderness. This concern has been addressed with some success by installing a fence and requiring greater permittee participation in the allotment management.

Heritage resources include four potential locations of spiritual importance to the Wintu people. In addition, there are known prehistoric sights along Beegum Creek and documented sites along the surrounding ridgelines. The watershed is also used for traditional gathering, which may include red bud, bear grass, and other materials for basketry and medicinal purposes.

Step 2: ISSUES AND KEY QUESTIONS

In this step, key questions are developed to focus the analysis on the key elements of the ecosystem, based on the issues and the management objectives.

The following is a general list of resource concerns, points of interest, and unique or relevant features or uses identified for the Beegum watershed:

1. Threatened, Endangered, and Sensitive (TES) species (especially northern spotted owl, California red-legged frog, peregrine falcon, and west coast steelhead)
2. Cumulative watershed effects (are any subwatersheds at or near the threshold of concern?)
3. Lack of prescribed fire in the front country brush fields in recent years has led to increased fire risk and decreased wildlife habitat.
4. Yolla Bolla deer herd (Beegum subunit) - California Department of Fish and Game has a management plan for this herd.
5. **Highly fragmented mixed conifer stands**
6. Late Successional Reserve: southern portion of the watershed lies in the South Fork Mountain LSR.
7. **quantity and distribution of old growth**
8. anadromous fishery, Sacramento River drainage
9. **dispersal habitat**, especially between LSRs north and south of the watershed
10. fuelbreak system
11. **timber production**
12. Adaptive Management Area
13. Released Roadless Areas: East and West Beegum Released Roadless Areas lie within this watershed (most of these areas are designated as Administratively Withdrawn Areas).
14. private inholdings
15. Wilderness and Wilderness access
16. Beegum Gorge
17. Wild and Scenic River
18. heritage resources
19. front country
20. botanical Special Interest Area
21. Class 1 airshed
22. water quality
23. recreation (deer hunting, fishing, camping, sightseeing)
24. range allotments
25. special forest products
26. mining
27. Christmas tree/fuelwood gathering

Some of these points (13 - 27) are not considered as key issues in this analysis, because they are not relevant to the focus provided by the three management objectives (timber production, wildlife (deer habitat) management, and fuels management). The issues that are relevant to the management objectives (1 - 12) can be adequately covered by the the core topic discussions. However, some key questions were developed to further focus or highlight specific issues. Responses to these key questions can be found in Step 5 of this analysis.

EROSION PROCESSES: No key questions identified.

HYDROLOGY/STREAM CHANNEL: No key questions identified.

WATER QUALITY: No key questions identified.

VEGETATION:

What harvest levels are ecologically and environmentally sustainable from the watershed?

FIRE AND FUELS:

Where are the high fire risk/hazard areas in the watershed, and how can the risks/hazards be minimized in these areas?

What and where are the critical and unique resources at risk from catastrophic wildfire in the watershed?

SPECIES AND HABITATS:

What are the goals for deer in this watershed, and what are the critical limiting factors to attaining these goals?

What areas in the chaparral habitat are most important for fisher?

What areas in the chaparral habitat are most important for the peregrine falcon, and how is this area providing for the foraging needs of the falcon?

What percent of the "capable" ground is currently in old growth/late successional status?

Where and why is dispersal habitat a concern in the watershed?

Where and why is suitable California red-legged frog habitat a concern in the watershed?

What is the distribution of West Coast steelhead and chinook salmon within the analysis area? What is the current condition of anadromous fish habitat within the analysis area?

HUMAN USES: No key questions identified.

STEP 3: CURRENT CONDITIONS

This step provides a more detailed analysis, documenting the current range, distribution and condition of the core topics and the key ecosystem elements identified in Steps 1 and 2.

EROSION PROCESSES: What are the current conditions and trends of the dominant erosion processes prevalent in the watershed?

The project area straddles the boundary between two physiographic provinces; The Coast Ranges to the south and the Klamath Mountains to the north. These provinces are separated by a regional fault known as the South Fork Mountain Fault, which parallels the East Fork of the South Fork Trinity River and extends east into the Beegum watershed through Stuarts Gap and Rat Trap Gap. Four different bedrock formations or terranes are present within the project area, each of which trends as belts in a north northwest manner. From south to north they are the South Fork Mountain Schist, The Galice Formation, the Rattlesnake Creek Terrane and the Western Hayfork Terrane. In addition, a small outlier of the Great Valley Sequence lies on the eastern edge of the watershed, and a small area overlain by glacial till is located on North Yolla Bolla Mountain. See the Beegum Watershed Analysis Planning File for more information on bedrock geology.

The Klamath Mountains have been uplifted and eroded at least several times in their most recent history. There are many remnants of the old eroded surface throughout the Klamath Mountains. The Pattymocus Prairie, located just east of the watershed is a remnant of the old eroded surface. Beegum Creek has incised itself into the watershed. The gorge itself is 500 to over 1000 feet deep with walls which are nearly vertical. Slopes developed on the Hayfork Terrane and large blocks within the Rattlesnake Creek terrane have undergone significant fluvial erosion, resulting in densely dissected mountain sideslopes. Mass wasting has also influenced many slopes within these bedrock lithologies. In contrast, areas underlain by the small block melange and South Fork Mountain Schist have been strongly developed almost exclusively through mass wasting processes. Therefore, depending on individual bedrock terranes, mass wasting and fluvial erosion are the dominant erosion processes which influence sediment regimes in the watershed.

Each of the major bedrock units has a characteristic mass wasting character, due to the difference in the lithologies and structure of each unit. The following mass wasting features are well represented within the Beegum Watershed.

Translational-Rotational Landslides: Translational-rotational slides occur primarily within the large block and small block melange within the Rattlesnake Creek Terrane. This type of slide occurs mostly in association with at least one of the following: serpentinized shear zones, lithologic contacts and wet steep zones such as inner gorges. Some of these slides are extremely large, especially within the large block melange. Many of these large deep-seated slides are ancient, having developed under different climatic and tectonic influences. It is unlikely that they can be reactivated under current conditions.

Debris Slides and Debris Avalanches: These mass wasting features are extremely common within the Hayfork Terrane and large block melange of the

Rattlesnake Creek Terrane, especially within and adjacent to Beegum Gorge. Failures often occur within low-order stream reaches or adjacent to higher order stream channels such as Beegum Creek. The preponderance of debris avalanches occur near the head of natural first order drainages (hollows) sometimes represented only by subtle inflection on the slope. Thus, it is the more subtle features which can be the most hazardous. The scars characteristically are long and narrow in shape. Debris slides and avalanches generally occur in response to significant precipitation events.

Internested Translational-Rotational Slides: Small block serpentine melange zones within the Rattlesnake Creek Terrane commonly exhibit this slide type. Creep indicators such as "pistol-butted" and "jackstrawed" trees are commonplace. In the higher hazard types, springs and bogs occur. Bedrock and structural properties such as downslope oriented bedding or foliation, shear and fault zones or melange areas are often responsible for the occurrence of widespread internested areas.

Slump Earthflows: Slump-earthflows are well developed in the small block melange of the Rattlesnake Creek Terrane. Many extend from the ridgetop to the streams, encompassing thousands of acres. These slump-earthflows are the dominate topography influencing processes within the small block melange.

Generally, slump-earthflows are relatively slow moving masses of clay-rich materials. These features are complex, involving many components of different types of mass movement. In general, slump-earthflow movement occurs during the winter and spring where under fully saturated conditions pore water pressures are elevated and intergranular resistance is reduced.

Sediment is usually transferred to the fluvial system near the distal end of the earthflow where channels have developed. Channel instability in the form of bank failure, active headcuts, and lateral gullies is common at the distal portion of most slump-earthflows. Earthflow movement rates are sometimes rapid enough to cause channel abandonment and migration on an annual basis.

Valley Inner Gorges: Although inner gorges are found throughout the project area, proportionately, they are present within only a small percentage of the land area. Nevertheless, due to their location directly adjacent to stream channels, active slides within the inner gorge can contribute significant quantities of sediment directly to the fluvial system. The depth of the inner gorge can range from 25 up to 1000 feet along the Beegum Gorge. Sideslopes vary from 60 to 110 percent.

Slope Stability Hazards: Slope stability hazards exist within the Beegum Watershed. Some areas such as those underlain by the small block melange and South Fork Mountain Schist have extreme natural hazards, while other areas have relatively low hazards. No Ecological Unit Inventory has been performed for the watershed, therefore, the hazard analysis has not been completed.

Soil Erosion: Of the areas with a high potential for soil erodibility (mostly in the Little Red/Tedoc and the Snake Lake ecological units), there does not appear to be any areas that are of a high concern. The recently completed Tepost Timber Sale is one area with a high potential for soil erodibility.

Soils with a high potential for roadbed deformation are found in all of the eight ecological units.

The roads with current erosion problems appear to be as follows:

1. Snake Lake ecological unit - 28N18, 28N29, 28N36, 28N68, 28N68A, 29N39, 29N39A, 29N40, 29N40A, 29N40B, 29N92 and 29N92A,

2. Round/North Star ecological unit - 28N10, 28N13, 28N14, 28N32, 28N32A, 28N32B, 28N36, 28N64, 28N64B, 28N64D, 28N82, and 28N84.

3. Noble Ridge ecological unit - 29N06, 29N84, and 29N84A.

4. North Yolla Bolly ecological unit - 28N36.

Road 28N36 is found within three of the four ecological units listed above.

HYDROLOGY AND STREAM CHANNEL: What are the current conditions and trends of the dominant hydrologic characteristics, stream channel types, and sediment transport and deposition processes prevalent in the watershed?

The subwatersheds with the cumulative watershed effects values that are of most concern (see table below) are the Post Creek, Round Mountain, and Upper Middle Fork Beegum subwatersheds. All three watersheds show percentages for Equivalent Roaded Area that are moderate to high and values for miles of road/square mile of subwatershed that are well in excess of a **generally acceptable** 3 miles of open roads per square mile of watershed area.

SUBWATERSHED	ACRES	TOC	% ERA	MILES OF RD/ SQ. MI.	% of TOC (%ERA/TOC)
Dutchman Gulch	2,368	16%	5.21	2.37	33%
Corral	2,241	14%	4.50	3.17	32%
Lower Beegum	808	16%	0.06	0.04	1%
Lower M.F. Beegum	6,819	16%	3.70	1.72	23%
Lower S.F. Beegum	3,384	16%	1.72	1.21	11%
No. Fork Beegum	4,777	16%	3.88	2.34	24%
Pole Corral Creek	5,164	14%	7.82	2.80	56%
Post Creek	1,211	14%	11.68	3.48	83%
Round Mountain	1,711	14%	9.16	3.81	65%
Tedoc	2,999	14%	6.16	2.01	44%
Upper M.F. Beegum	4,878	14%	9.17	3.82	66%
Upper S.F. Beegum	4,384	12%	5.60	2.26	47%

NOTES: TOC = Threshold of Concern; % ERA = Percent Equivalent Roaded Area; % of TOC = Percent of Threshold of Concern (cumulative effects measurement).

The channels within the Beegum Watershed Analysis area generally appear to be in good condition with some exceptions occurring in the Snake Lake ecological unit and at several isolated road crossings. Generally, sediment transport and deposition processes occur such that the streams retain their stability. The major streams such as Beegum Creek, Middle Fork Fork Beegum Creek, and South Fork Beegum Creek have boulder or cobble dominated A and/or B channel types. Although these channel types tend to remain stable; the most stable of these channel types are boulder dominated B channels.

Most channels at upper elevations and tributaries tend to have A channel types with streambeds that are gravel or cobble dominated. These channels tend to have a high to very high sediment supply. They have a very high to extreme sensitivity to disturbances (increases in stream flows or sediment), and a very poor potential for recovery from disturbances.

The exceptions are channels within the North Yolla Bolly ecological unit, which frequently have A channel types with streambeds dominated by boulders and/or exposed bedrock. These streams tend to have very low sediment supplies, except for what sediment may be delivered from roads. They have a very low tolerance for disturbances (increases in stream flows or sediment), and an excellent potential for recovery from disturbances.

Ephemeral channels that do not have annual scouring and/or well-defined channel configuration are common in the analysis area, particularly in the Snake Lake and Round/North Star ecological units. They are often found at streams where streamflow was cut off by mass wasting, at ridgetops, and on serpentine soils.

These ephemeral channels do not qualify as Riparian Reserves, yet tend to have some of the same characteristics as streams at Riparian Reserves and at the same time they have distinctive features. Their soil depths are almost as shallow as those of surrounding soils, which are often in the 15 to 23 inch range. The textures of the organic soil horizons tend to be sandy loam to gravelly loam, but may contain higher contents of clay due to sediment delivery and deposition. Some ephemeral channels have clay textures in the subsoil horizons. Non-Riparian Reserve ephemeral draws commonly have riparian vegetation: Douglas-fir trees are common; cedar trees may also be present, as well as hazel and/or dogwood.

Specific examples of channel reaches that are unstable are as follows:

A. Snake Lake Ecological Unit

1. Stream at the outlet of Snake Lake, section 8, T28N, R10W. Its channel type is G3 with extensive gullying, active downcutting, headcut formations, streambank erosion, and bare and oversteepened, unstable streambanks.

2. Tributary of Middle Fork Beegum Creek, W 1/2, section 1, T28N, R11W. The stream reach at the downstream corner of Unit 34, Regan Timber Sale, continues to have downcutting and headcuts, along with bare streambanks. Its channel types are G4 and G3.

3. Headwaters of Middle Fork Beegum Creek, N 1/2, section 19, T28N, R10W. A minimum of three active slumps have destabilized A channel types between Road 28N64 and the springs at Round Mountain No. 2 Camp. These reaches are slowly regaining stability ; downstream of Road 28N64, the channel is generally stable.

4. Stream at the junction of Road 28N68 and 28N10, SW 1/4, section 6, T28N, R10W. An active headcut about 4 feet high is located just upstream of Road 28N68; it is potentially a danger to the fillslope and culvert at the stream crossing. It has an A4 channel type.

5. North Fork Pole Corral Creek and at least two other stream at Road 28N10 in sections 9 and 15, T28N, R10W. These streams were impacted by debris torrents that occurred in the early 1980's.

6. Tributaries of the South Fork Beegum Creek, sections 31 and 32, T28N, R9W. The cobble dominated A(3) channel types in the vicinity of Road 28N36 have been impacted such that the % Equivalent Roaded Area values are locally close to their Threshold of Concern, although the Tedoc Subwatershed in general has a low % Equivalent Roaded Area value, well below the Threshold of Concern.

B. Round/North Star Ecological Unit

1. Round Mountain Creek, within section 17, T28N, R10W - between Roads 28N14 and 28N10. This segment has predominantly A3 channel types with a few headcuts near Road 28N14, and a G3 channel type with some unstable streambanks near the 28N10 Road. Large concentrations of sediment mostly from the 28N14 Road and an old spur road of the 28N10 Road have impacted this stream.

2. Tributary of the Middle Fork Beegum Creek, W 1/2, section 18, T28N, R10W. Sediment from a gully in old Round Mountain Unit #16 (the result of a blocked culvert), and also from Roads 28N29, and 28N64 have been major factors in destabilizing A channel types in this stream. Gully formation and downcutting are two of the accelerated erosional channel processes. These processes have not had an adverse impact on stream reaches downstream in section 7.

Overall, most management activity related sediment is generated from open roads, and from downcutting at channel types with stream gradients of at least 4%. This sediment is largely transported on downstream of National Forest lands, eventually onto C channel types with stream gradients of less than 2%.

The C channels downstream of the National Forest boundary with predominantly cobble size materials in the streambeds handle sediment in a very different manner compared to the channel types within the Beegum Watershed Analysis area, which tend to have channel gradients of at least 2%. Because of the lesser stream gradients at C channel types, sediment is depositing at the streambed and/or accelerating streambank erosion at bends. The results can include less stable streambanks, accelerated meandering, increased sinuosity: in general, reduced channel stability and a greater sensitivity to increases in streamflow or sediment.

WATER QUALITY: What are the current conditions and trends of beneficial uses and associated water quality parameters?

While domestic water consumption and agriculture occur within the lower Cottonwood Creek watershed, anadromous and resident salmonids are the chief beneficiary of water quality in the Beegum Creek analysis area. Other aquatic species such as the California red-legged frog and northwestern pond turtle also depend on good water quality for their existence.

Parameters used for assessing salmonid water quality needs include water temperature, dissolved oxygen, turbidity, and flow. While a range of water quality requirements for salmonids can be shown for many of these parameters, it is important to understand that fish respond to an array of

physical, chemical, and biologic variables within their environment. Adaptation to these variables allows these species to persist in a range of environmental conditions that are suitable, but not always optimal, to the continued health and existence of salmonids within the analysis area.

No quantitative information currently exists to describe water quality conditions in the Beegum Creek watershed. Qualitative assessments made for previous timber sales in the watershed have characterized water quality as "good", and turbidity levels as "low" and "clear". Sporadic measurements of summer water temperatures have been reported between 12 and 16 °C (Round Mountain Environmental Assessment), which is within the range of acceptability for rearing salmonids.

Due to the lack of quantitative information, water quality issues will not be discussed further until step 6 of this analysis where "data gaps" will be identified.

VEGETATION: What are the current conditions and trends of the prevalent plant communities and seral stages in the watershed (riparian and nonriparian)?

Current vegetative conditions were analyzed with the use of timber inventory data collected for the 1990 Land and Resource Management Plan (LRMP) (Shasta-Trinity N.F., 1993). Delineated stands were classified according to the LMP timber stratification, wildlife habitat stage (Mayer and Laudenslayer, 1988) and seral stage (USDA Forest Service, 1994).

Table 1: 1990 LRMP Timber Size Classes

Seral Stage (DBH Range)	Size class	Crown Diameter
sapling (1-5.9")	1	0-5 feet; seedlings & saplings
early mature (6-10.9")	2	6-12 feet; poles
mid mature (11-24.9")	3	13-24 feet; small to medium timber
mid- to late mature (25-40")	4	25-40 feet; large sawtimber
late mat. to OG (40"+)	5-6	Greater than 40 feet; two-storied

Crown diameter classes are based on predominant crown size of commercial species stands or components of stands.

Table 2: 1990 LRMP Timber Crown Cover (Density)

Density Code	Crown Cover
S	Less than 20%
P	20-39%
N	40-69%
G	Greater than 70%

Crown cover percentages apply only to commercial component of total stand density. Ratio is total crown area to polygon area.

Landscape Ecology: To adequately describe broad vegetative patterns and disturbance regimes, the watershed was stratified into eight ecological units. These were based upon an analysis of landscape elements. These are the Snake Lake Unit, three Round/North Star Units (North, Central, and South), the Noble Ridge Unit, the Little Red-Tedoc Unit, the Dutchman Unit, and the North Yolla Bolla Unit.

The Snake Lake Unit (10,525 acres) is characterized by low density Grey pine/canyon live oak communities, shrub communities characterized by manzanita and chamise, and Jeffrey pine communities. Mixed conifer plantations account for approximately 8 percent of the analysis area.

The Round/North Star (N) Unit (1,390 acres) is characterized by medium density mixed conifer communities. Ponderosa pine and Douglas-fir comprise the predominant species at mid-elevation sites, with lesser stocking of sugar pine, incense cedar, and white fir. Higher-elevation mixed conifer sites are comprised of predominately white fir, with lesser degrees of stocking of associated conifer species. Lower-elevation mixed conifer sites have reduced stocking levels of white fir, with increased stocking levels of ponderosa pine. The highest elevation sites within the unit are comprised of stands of mostly pure white fir. California black oak comprises a significant stand element at mid to lower elevation mixed conifer sites, especially on better sites. Mixed conifer plantations account for approximately 4 percent of the analysis area.

The Noble Ridge Unit (4,895 acres) is characterized by low density Grey pine/canyon live oak communities, shrub communities characterized by manzanita and chamise, and Jeffrey pine communities. There are no plantations in this analysis area.

The Little Red-Tedoc Unit (8,907 acres) is characterized by low density Jeffrey pine and Grey pine/live oak communities. Shrub communities are characterized predominately by manzanita, with a lesser component of chamise. Mixed conifer plantations cover approximately 1 percent of the analysis area.

The Dutchman Unit (4,279 acres) is characterized by low density Grey pine/canyon live oak communities, shrub communities characterized by manzanita and chamise, and Jeffrey pine communities. Mixed conifer plantations cover approximately 1 percent of the analysis area.

The Round/North Star (C) Unit (5,386 acres) is characterized by medium density mixed conifer communities. Ponderosa pine and Douglas-fir comprise the predominant species at mid-elevation sites, with lesser stocking of sugar pine, incense cedar, and white fir. Higher-elevation mixed conifer sites are comprised of predominately white fir, with lesser degrees of stocking of associated conifer species. Lower-elevation mixed conifer sites have reduced stocking levels of white fir, with increased stocking levels of ponderosa pine. The highest elevation sites within the unit are comprised of stands of mostly pure white fir. California black oak comprises a significant stand element at mid to lower elevation mixed conifer sites, especially on better sites. Mixed conifer plantations account for approximately 9 percent of the analysis area.

The Round/North Star (S) Unit (1,617 acres) is characterized by medium density mixed conifer communities. Ponderosa pine and Douglas-fir comprise the predominant species at mid-elevation sites, with lesser stocking of sugar pine, incense cedar, and white fir. Higher-elevation mixed conifer sites are comprised of predominately white fir, with lesser degrees of stocking of associated conifer species. Lower-elevation mixed conifer sites have reduced stocking levels of white fir, with increased stocking levels of ponderosa pine. The highest elevation sites within the unit are comprised of stands of mostly pure white fir. California black oak comprises a significant stand element at mid to lower elevation mixed

conifer sites, especially on better sites. Mixed conifer plantations account for approximately 6 percent of the analysis area.

The North Yolla Bolla Unit (3,767 acres) is characterized by high-density almost pure red fir stands on higher elevation sites. Mid elevation sites are comprised of red fir/white fir communities, with lesser stocking of Douglas-fir. Lower elevation sites are composed of mixed conifer communities, with stocking predominately comprised by ponderosa pine and Douglas-fir. Mixed conifer plantations cover less than one percent of the analysis area.

Plant Communities: Based on the LRMP inventory of vegetation types, both natural and harvest-related **fragmentation** are evident in the current vegetation patterns in the Beegum Watershed. The matrix, the most abundant and connected vegetation type, consists of mid- to late seral mixed conifer forest. Much of the harvest-related fragmentation has occurred within the mixed conifer forested areas of the three Round/North Star Units (north, central and south). The vegetative patterns of the remaining area, which include matrix and patch elements of natural fragmentation, reflect highly diverse topographic elements and accompanying disturbance regimes. Topographic elements of most influence are slope and aspect. Fire and past harvest activities are the disturbance regimes having the greatest effect on the distribution of plant communities within the watershed.

Additional plant communities found in the Beegum watershed that are small in area extent but that contribute to the overall diversity of the landscape include the Jeffrey pine/western azalea communities and wet meadows within the central Round/North Star Unit analysis area.

Riparian Vegetation Communities: Riparian vegetation composition within the Beegum Watershed appears to be influenced by channel aspect, gradient, geomorphology, and hydrologic regime, as reflected by stream order. Upland plant communities located on the valley bottom floor or toeslope positions contribute shade and large wood to the system, and may be inundated during periods of peak flow. Many riparian areas host relatively high numbers of large trees as compared with the adjacent uplands, presumably due to a favorable topographic position (protected from intense stand replacing fires) and environment. Communities well-adapted to the moister conditions of the riparian zone are present and often consist of species that are tolerant of saturated soils associated with frequent flooding or a high water table. Additionally, opportunistic "pioneer" species may colonize in these areas characterized by repeated disturbance.

When stratified by stream order and fluvial surface, community types generally show a greater affinity to stream order, although the species of which they are comprised may be more closely associated with a given moisture regime and geomorphic surface than with stream order. For example, white alder communities typically appear within second through fifth order drainages, most notably on floodplains and islands. Pacific yew communities show no great fidelity to any one environment, but occur primarily on floodplains and terraces within second through fourth order drainages.

Hydrologic regime and stream geomorphology appear to be the most significant factors determining species composition within the riparian area. Riparian vegetation ranges from absent in the driest ephemerals and intermittents, to bigleaf maple/white alder/Pacific yew in first order channels that are moist enough to support perennial riparian species.

Where the channel is an intermittent, sclerophyllous species, including prince's pine and dwarf Oregon grape frequently co-occur with more hydrophytic species.

Most lower elevation, first and second order riparian communities are dominated by Douglas-fir or by Douglas-fir and canyon live oak. Vegetation composition along intermittent streams does not vary substantially with elevation. Big leaf maple is ubiquitous, occurring in both perennial and intermittent channels, but white alder, mountain dogwood and Pacific yew appear to be limited to higher-order channels where water availability is greater year-round. Alder occurs most frequently along active channels and floodplains where frequent flooding and high light levels permit establishment. Pacific yew occurs on floodplains, terraces and stream banks at the moistest sites, and is frequently associated with old-growth Douglas-fir and a well-established shrub component of dogwood and/or California hazel.

Higher order channels offer a wider range of geomorphic surfaces and moisture regimes, and thus support a greater number of community types than first and second order channels. Forested floodplains and terraces generally support a mix of Pacific yew and hardwoods, including shrubs. The degree to which elevation influences the distribution of riparian species is not clear. Red fir/alder communities dominate higher elevation riparian sites within the Beegum Watershed.

Insolation appears to influence the distribution of riparian plant communities. The degree to which a channel is incised determines to some extent the amount of solar radiation received by, and the relative humidity of, that channel environment. It is clear that there is a certain degree of confluence influence, the increased humidity found near the mouth of tributaries draining into higher order channels. Due to microclimatic factors, riparian vegetation may persist for several hundred feet up a tributary that would otherwise not support hydrophytic species.

Regulated Forest Opportunities:

Forest Goals

-Provide a sustained yield of timber and other wood products to help support the economic structure of local communities and to supply regional and national needs (LMP, Timber #35, page 4-5).

Forest-Wide Standards & Guidelines

-Emphasize the regeneration harvest of understocked and poorly-growing stands, whether using even or uneven-aged systems (LMP, Timber e., page 4-27).

Matrix Lands (Description)

-Substantial portions of the management direction for the Forest were directed by the Northwest Record of Decision (NW ROD), also known as the President's Forest Plan (NW ROD, Introduction, page 4-1).

-Regulated harvest from Matrix (and AMA) lands (NW ROD, table on page A-4).

-Production of timber and other commodities is an important objective for the Matrix (NW ROD, page B-1).

-Most timber harvest and other silvicultural activities would be conducted in that portion of the Matrix with suitable forest lands, according to standards and guidelines. Most scheduled timber harvest (that contributing to the probable sale quantity [PSQ] not taking

place in Adaptive Management Areas) takes place in the Matrix (NW ROD, page C-39).

Management Prescriptions

-Timber yields from Prescriptions III, VI and VIII are regulated harvests and are chargeable to the Allowable Sale Quantity (LMP, Appendix L, page L-7).

-Prescription VIII - Intensive (Timber) Management is identified as an Emphasized Management Practice. "This timber management regime assumes a wide range of...silvicultural treatments including...appropriate final harvest methods...including regeneration cutting systems such as clearcutting, green tree retention, and shelterwood cutting" (LMP, Appendix L, page L-7).

Tentative Ten-Year Timber Sale Program

-Reasons for Harvest - Stands to be managed intensively-Harvests will be carried out for the following purposes...to regenerate stands to meet regeneration acreage allocations to provide planned future yields (LMP, Appendix C, page C-1).

-Harvest Priority - Regeneration is the means by which productivity can be increased and regulation approached. The understocked and poorly-growing strata should receive first consideration (LMP, Appendix C, page C-1).

-Timber Management Controls - The Forests' goal is to approach regulation through scheduled regeneration harvests over a period of time called the "conversion period". Regeneration harvests to achieve regulation include 2,000 acres of green tree retention and 1,500 acres of selection cutting per year (LMP, Appendix C, page C-3).

Estimated Capable, Available and Suitable (CAS) Lands in Beegum Watershed: The following tables itemize the estimated number of CAS acres available within the Beegum Creek analysis area displayed by ecological unit. Information presented is as per the LMP90 database (see map, Appendix II-10). The vegetation types are identified by size class and density code (see tables on page 3-6). The UX vegetation type indicates plantation. The following components and assumptions were used in constructing this table: 1) Prescription III, VI, and VIII lands only by ecological unit, minus buffered Riparian Reserve acres; 2) Productivity class High and Low for density S and P; productivity class High, Low, and Null (un-attributed) for density N and G; 3) Plantations are located upon suitable lands only; 4) that an additional 15% of indicated available lands are unmapped Riparian Reserves; and 5) Regenerability must be determined at the site-specific level to ensure adequate regeneration within five years of final harvest.

Ecolog. Unit	Veg Type	Gross CAS Acres	Net CAS Acres	Volume/Acre	Total Volume/ Veg Type
SNAKE LAKE	UX	850.8	723.2	0.0	0.0
	2S	0.0	0.0	8.2	0.0
	2P	0.0	0.0	8.2	0.0
	2N	111.1	94.4	22.4	2,115.3
	2G	42.2	35.9	22.4	803.5
	3S	1,076.1	914.7	16.8	15,366.7
	3P	2,393.2	2,034.2	16.8	34,174.9
	3N	1,532.2	1,302.4	28.9	37,638.5
	3G	855.8	727.4	28.9	21,022.7
	4S	0.0	0.0	16.8	0.0
	4P	0.0	0.0	16.8	0.0
	4N	47.2	40.1	28.9	1,159.5
	4G	82.2	69.9	28.9	2,019.2
Sub-Total:Snake Lake		6,990.8	5,942.2		114,300.3
ROUND/N STAR (N)	UX	50.8	43.2	0.0	0.0
	2S	0.0	0.0	0.0	0.0
	2P	0.0	0.0	0.0	0.0
	2N	0.0	0.0	0.0	0.0
	2G	0.0	0.0	0.0	0.0
	3S	187.3	159.2	16.8	2,674.6
	3P	378.3	321.6	16.8	5,402.6
	3N	185.6	157.8	28.9	4,559.3
	3G	129.6	110.2	28.9	3,183.6
	4S	0.0	0.0	16.8	0.0
	4P	0.0	37.3	16.8	0.0
	4N	31.7	26.9	28.9	778.7
	4G	60.4	51.3	28.9	1,482.6
Sub-Total: Round/N Star (N)		1,023.7	870.2		18,080.9
NOBLE RIDGE	UX	0.0	0.0	0.0	0.0
	2S	0.0	0.0	8.2	0.0
	2P	0.0	0.0	8.2	0.0
	2N	14.8	12.6	22.4	281.8
	2G	0.0	0.0	22.4	0.0
	3S	105.5	89.7	16.8	1,506.5
	3P	147.0	125.0	16.8	2,099.2
	3N	37.0	31.5	28.9	908.9
	3G	0.0	0.0	28.9	0.0
	4S	0.0	0.0	16.8	0.0
	4P	0.0	0.0	16.8	0.0
	4N	5.9	4.4	28.9	127.7
	4G	16.0	13.6	28.9	393.0
Sub-Total:Noble Ridge		326.0	276.8		5,317.1

Ecolog. Unit	Veg Type	Gross CAS Acres	Net CAS Acres	Volume/Acre	Total Volume/ Veg Type
LITTLE RED/TEDOC	UX	44.2	37.6	0.0	0.0
	2S	0.0	0.0	8.2	0.0
	2P	0.0	0.0	8.2	0.0
	2N	0.0	0.0	22.4	0.0
	2G	0.0	0.0	22.4	0.0
	3S	490.7	417.1	16.8	7,007.3
	3P	654.5	556.3	16.8	9,345.8
	3N	151.1	128.4	28.9	3,710.8
	3G	6.1	5.2	28.9	149.8
	4S	0.0	0.0	16.8	0.0
	4P	0.0	0.0	16.8	0.0
	4N	0.0	0.0	28.9	0.0
	4G	10.5	8.9	28.9	257.9
Sub-Total:Little Red/Tedoc		1,357.1	1,153.5		20,471.6
DUTCHMAN	UX	34.9	29.7	0.0	0.0
	2S	0.0	0.0	8.2	0.0
	2P	0.0	0.0	8.2	0.0
	2N	0.0	0.0	22.4	0.0
	2G	0.0	0.0	22.4	0.0
	3S	104.0	88.4	16.8	1,485.1
	3P	124.9	106.2	16.8	1,783.6
	3N	103.7	88.1	28.9	2,547.4
	3G	0.0	0.0	28.9	0.0
	4S	0.0	0.0	16.8	0.0
	4P	0.0	0.0	16.8	0.0
	4N	0.0	0.0	28.9	0.0
	4G	0.0	0.0	28.9	0.0
Sub-Total:Dutchman		367.5	312.4		5,816.1
ROUND/N STAR (C)	UX	472.8	401.9	0.0	0.0
	2S	0.0	0.0	8.2	0.0
	2P	0.0	0.0	8.2	0.0
	2N	0.0	0.0	22.4	0.0
	2G	0.0	0.0	22.4	0.0
	3S	143.4	121.9	16.8	2,047.8
	3P	720.1	612.1	16.8	10,283.0
	3N	623.3	529.8	28.9	15,311.4
	3G	1,334.0	1,137.9	28.9	32,769.7
	4S	0.0	0.0	16.8	0.0
	4P	0.0	0.0	16.8	0.0
	4N	0.0	0.0	28.9	0.0
	4G	141.5	120.3	28.9	3,475.9
Sub-Total:Round/N Star (C)		3,435.1	2,919.9		63,887.8

Ecolog. Unit	Veg Type	Gross CAS Acres	Net CAS Acres	Volume/Acre	Total Volume/ Veg Type
ROUND/N STAR (S)	UX	99.2	84.3	0.0	0.0
	2S	0.0	0.0	8.2	0.0
	2P	0.0	0.0	8.2	0.0
	2N	0.0	0.0	22.4	0.0
	2G	0.0	0.0	22.4	0.0
	3S	0.0	0.0	16.8	0.0
	3P	10.3	8.8	16.8	147.1
	3N	158.3	134.6	28.9	3,888.6
	3G	123.2	104.7	28.9	3,026.4
	4S	0.0	0.0	16.8	0.0
	4P	0.0	0.0	16.8	0.0
	4N	0.0	0.0	28.9	0.0
	4G	0.0	0.0	28.9	0.0
Sub-Total:Round/N Star (S)		391.0	332.4		7,062.1
NORTH YOLLA BOLLA	UX	2.6	2.2	0.0	0.0
	2S	0.0	0.0	8.2	0.0
	2P	0.0	0.0	8.2	0.0
	2N	0.0	0.0	22.4	0.0
	2G	0.0	0.0	22.4	0.0
	3S	0.0	0.0	16.8	0.0
	3P	0.0	0.0	16.8	0.0
	3N	2.6	2.2	28.9	63.6
	3G	0.0	0.0	28.9	0.0
	4S	0.0	0.0	16.8	0.0
	4P	0.0	0.0	16.8	0.0
	4N	0.0	0.0	28.9	0.0
	4G	0.0	0.0	28.9	0.0
Sub-Total:North Yolla Bolla		5.2	4.4		63.6

Plant Populations of Concern (Threatened, Endangered, Proposed, Candidate, and Sensitive Plants): There are no federally listed, or proposed for listing, plant species in the Beegum watershed analysis area. Plant species of concern known to occur in the area fall into four categories: 1) sensitive plants, 2) Shasta-Trinity endemics, 3) old growth associated vascular plants (survey and manage species), 4) noxious weeds and other exotic pest plants.

Sensitive plants are those which are considered candidates for listing under the Endangered Species Act of 1973 and that are known or highly suspected to occur on National Forest System Lands. Five Region 5 Forest Service listed sensitive plants, Tedoc linanthus (Linanthus nuttallii ssp. howellii), Peanut sandwort (Minuartia rosei), Stebbins' madia (Madia stebbinsii), pale yellow stonecrop (Sedum laxum ssp. flavidum), Niles' madia (Madia doris-nilesiae); and three endemic to the Shasta-Trinity National Forests, serpentine goldenbush (Ericameria ophitidis), Oregon willow herb (Epilobium

oreganum), and Dubakella Mtn. buckwheat (Eriogonum libertini) are known to occur in the Beegum watershed.

Botanical diversity and endemism in the Beegum Creek watershed are very high. Eight of the forty plus sensitive or endemic plants of the Shasta-Trinity National Forests are known to occur in this watershed, and there is suitable habitat for more. Suitable habitat for these eight species has not been thoroughly surveyed for in the Beegum Creek Watershed. Additional sites are likely to be present.

TES plants of Riparian Habitats

Epilobium oreganum (Oregon willow herb) is endemic to southwestern Oregon and northwestern California. Habitat is limited to wet, gently sloping meadows, bogs, and streambanks in partial shade, from 500 to 7,800 feet elevation. Most populations of Oregon willow herb are small. The majority of the sites are somewhat isolated, due to the patchy distribution of their bog habitat. There is one known occurrence of Oregon willow herb in this watershed. This population, near Boy Scout pond, has about 300 individuals. The plant is apparently palatable to cattle. Most of the damage observed at this site was from cattle trampling. It is unknown what effect these grazing impacts have on the viability of the species. Oregon willow herb has also sustained relatively minor impacts from recreational use of its riparian habitat. These impacts are likely to increase with increased recreational use of the watershed.

TES plants of Rocky Habitats

Sedum laxum ssp. flavidum (Pale yellow stonecrop) is an endemic to the southern Klamath Ranges, where it grows on rock outcrops, generally in mixed conifer/oak woodlands from 1,150 to 6,000 feet elevation. The viability of this species is significantly dependent on the Beegum watershed, where there are 3 known occurrences. Habitat for pale yellow stonecrop is unlikely to be affected in the future unless extensive rock harvesting takes place.

TES Plants of Ultramafic Habitat

Small inclusions of ultramafic soil are present throughout the Rattlesnake Creek Terrane. Many of these inclusions are smaller than one acre, too small to be mapped at the Order 3 scale. Sensitive and endemic plants that inhabit these sites in Beegum watershed include Eriogonum libertini, Minuarti rosei, Ericameria ophitidis, Madia stebbinsii, and Madia doris-nilesiae.

Eriogonum libertini (Dubakella Mountain buckwheat) is geographically restricted to ultramafics of the Rattlesnake Creek Terrane. In this watershed, there are 8 documented populations from Tedoc Mountain in the south to the headwaters of the North Fork Beegum Creek in the north. Habitat consists of openings predominantly within Jeffrey pine/incense cedar and chaparral vegetation, from 2,500 to 5,500 feet elevation.

Minuartia rosei (Peanut sandwort) is endemic to the ultramafics of the Rattlesnake Creek Terrane of western Tehama and eastern Trinity Counties, where it grows on gravelly barrens and in openings in Jeffrey pine and mixed conifer forest from 2,500 to 5,800 feet elevation. There are 18 known occurrences of Peanut sandwort in the analysis area.

Ericameria ophitidis (Serpentine goldenbush) is geographically restricted to the Rattlesnake Creek Terrane. Habitat may be pavement-like serpentine semi-barrens or openings in Jeffrey pine/incense cedar woodland, with canopy closure of 10% or less, from 2,600 to 5,600 feet elevation. There are 11 documented occurrences of Serpentine goldenbush in this watershed.

Madia stebbinsii (Stebbins' madia) may also be an endemic to the Rattlesnake Creek Terrane, where it inhabits low montane ultramafic semi-barrens from 2,100 to 6,000 feet elevation. The plant occupies chaparral and forest margins, typically associating with Jeffrey pine, gray pine, and shrubs. Some habitat for Stebbins's madia has probably degraded since 1994 due to fire exclusion and will continue to do so unless fire is reintroduced. There is 1 known occurrence of Stebbins' madia in the Beegum Creek watershed.

Madia doris-nilesiae (Niles' madia) may also be an endemic to the Rattlesnake Creek Terrane, where it grows in shrubby, open areas along ridgetops and on moderate to steep slopes within mixed conifer/oak forest from 2,100 to 5,500 feet elevation. Typical associates include gray pine, Jeffrey pine, and shrubs. There are four known occurrences of Niles' madia in this watershed. All known populations but one are on ultramafic soils, but it is rarely found growing directly on heavily serpentinized areas, preferring the adjacent areas where soils are less toxic. Some plants appear to do well on the loose, piled soil at the edges of roads and trails, and they are absent or do poorly where soil compaction is high.

TES Plants of Forested Habitats

Sensitive plants of forested habitats are likely to be affected by human activity in the watershed including Linanthus nuttallii ssp. howellii.

Linanthus nuttallii ssp. howellii (Tedoc linanthus) is a narrow endemic known from a five-square mile band of the North Coast Range in Tehama County. There are four known occurrences within the watershed. These are located in the area within Rat Trap Gap and the west side of Tedoc Mountain. The number of individuals per population ranges from 30 to about 2,000 plants. The areas vary in size from 1/4 of a acre to about 2 acres. This subspecies inhabits level to gently sloping ground with 20-50% cover of mixed conifer forest, especially Jeffrey pine and incense cedar, from 4,000 to 5,800 feet elevation. This plant is found on the Neuns-Deadwood soil family complex and on ultramafic soils at the base of Tedoc Mountain. Current habitat conditions appear to be relatively healthy, except for those populations that are growing in young plantations that will most likely be released from competing vegetation in the near future.

Survey & Manage species: plants, lichens, & fungi

One S&M vascular plant, Cypripedium fasciculatum (Brownie lady-slipper), has been documented in the Beegum watershed at the headwaters of Pole Corral Creek. Other occurrences of this species in the watershed are likely. On the Shasta-Trinity National Forests, this species prefers riparian habitat. This orchid typically grows in tight clusters in isolated populations that contain from one to over 2,000 individuals. Suitable riparian habitat for this old-growth associate has been reduced and degraded through past logging. This plant is included on a list of species to be protected through survey and manage standards and guidelines in the Shasta-Trinity National Forests Land Management Plan (LMP), appendix R (USDA Forest Service, 1995).

Noxious Weeds and Other Exotic Pest Plants

Non-native plants are found throughout the watershed, especially at lower elevations. The presence of pasture grasses and associated weeds are common, but in most cases their introduction was intentional. Habitat for the exotic pest plants, yellow star thistle (Centaurea solstitialis), bull thistle (Cirsium vulgare), cheat grass (Bromus tectorum), and mullein (Verbascum thapsus) is abundant throughout the watershed and will probably increase with future disturbance-related management activities, such as logging and road building.

Refer to the Beegum Watershed Planning File for more information on the plant species of concern which occur, or are suspected to occur, in the analysis area.

FIRE AND FUELS: What are the current conditions and trends of fuel loading and fire hazard and risk in the watershed?

Current conditions in the Beegum Watershed are partially a result in the alteration of the historic fire regime through years of successful fire suppression. Over eighty years of organized fire suppression and roughly 50 years of timber harvest with reforestation has resulted in high accumulations of ground fuels and continuous stands of dense timber and brush inter-spaced by even-aged pure conifer plantations of various ages and acreages.

At lower and mid-elevations fire exclusion has led to overstocked, moisture stressed timber stands increasing their susceptibility to insects and disease. Decadent chamise brush fields at the lower elevations are fire dependent, their volatility increases annually. Accumulation of these factors are setting the stage for large catastrophic wildfires.

Recorded fire information, vegetation types, and ages indicate that the Beegum Watershed had a historic fire regime of low-to-moderate severity. Through almost a century of fire exclusion by highly successful fire suppression we have altered the historic fire regime to one of moderate-to-high intensity.

Fire hazard and risk: "Risk" refers to wildfire causative agents, such as lightning, chainsaws or campfires. "Hazard" is a rating assigned to a fuel complex that reflects its susceptibility to ignition, the wildfire behavior and severity it would support, and/or the suppression difficulty it represents. A fuels reduction program can pursue one or both of two strategies: risk management (reduce or eliminate sources of ignition), or hazard management (alter the fuel complex by modifying the kind, arrangement, volume, condition, and/or location of fuels).

Rural interface areas are present within and adjacent to the watershed. The small towns of Wildwood and Platina are located along State Highway 36 north of Beegum Watershed. Recorded human fire starts are primarily along major roads and trails within the watershed, as would be expected (see map, Appendix II-11).

Jon Wideman, Implementation Fuels Specialist, South Fork Management Unit, with input from the Shasta-Trinity N. F. Fuels Committee, completed the South Fork Management Unit "Hazard Risk Analysis". Hazard risk analysis is

the process of determining the estimated fire behavior of a given land base. It incorporates into the analysis such features as past fire occurrence, aspect, slope, fuel model, and weather conditions. The output of the analysis is rated by considering flame length and rate-of-spread. The Hazard and Risk Analysis indicates the Beegum Watershed as having low to medium risk ratings.

Fuelbreaks: The Yolla Bolla District has constructed and maintained an effective fuelbreak system dating back to the 1970's. Currently there are approximately 26 miles of ridgetop fuelbreaks within the Beegum Watershed. Of these, 22 miles are in need of maintenance to remain effective (see map, Appendix II - 7). The extent of needed maintenance is minimal in most areas.

ECOLOGICAL UNIT	MILES (Apprx.)	CONDITION
Dutchman	4 miles	Needs Maintenance
Little Red/Tedoc	2 miles	Needs Maintenance
North Yolla Bolla	2 miles	Needs Maintenance
Round/N. Star(C)	1 mile	Good
Round/N. Star(C)	3 miles	Needs Maintenance
Round/N. Star(S)	2 miles	Needs Maintenance
Snake Lake	3 miles	Good
Snake Lake	9 miles	Needs Maintenance

These fuelbreaks have enabled fire suppression personnel to safely and effectively "catch" the last two large fires on the Yolla Bolla District (outside of Wilderness Areas) that would have burned many additional areas (personal communications with district fire personnel).

Fire and vegetation: All conifers species in the Beegum Watershed are resistant to fire as mature individuals. As saplings ponderosa pine is most resistant, followed by Douglas-fir, incense cedar, red fir, and white fir. Thus, in frequent-fire forests, ponderosa pine and Douglas-fir become stand dominant. In infrequent fire forests, fire intolerant species such as white fir, red fir, and cedar become the dominant species.

Fire suppression activities have led to retarding rates of fire disturbance which has allowed the ingrowth of fire intolerant species, specifically incense cedar and white fir. Many of the larger pines have either died or were systematically harvested. Natural regeneration of all species has occurred in greater numbers, further increasing stand densities. Smaller size classes now account for a higher percentage of the total stand. The increasing competition for available light, water, and nutrients creates stress on vegetation, facilitating suppressed growth, lack of vigor and susceptibility to damaging attacks by insects and pathogens. Fire exclusion has created forest patterns of even-age vegetation which has greater opportunity to develop larger, more severe fires.

The lower elevations of Beegum Watershed are occupied with pure brush fields and chaparral communities. Chamise, a fire dependent shrub, dominates the shrub cover on the hottest and driest sites. As available moisture increases so does the presence of other brush species, mainly manzanita and ceanothus. Although these brush fields have been partially burned through the use of prescribed fire in previous years, on the whole, most of the brush is decadent. Approximately 20 years after burning, chaparral brush and associates are fully mature and approaching decadence (i.e. more dead material is produced each year than new growth). At approximately 25 years, about 30% of the biomass is dead increasing to 50% around 50 years old.

Chamise is adapted to an average fire cycle of 20 to 40 years, other chaparral species are resilient to fire intervals of 10 to 100 years (Fire Effects Information System). Chamise chaparral needs recurrent fire to enable vigorous perpetuation and is labeled a fire-dependent vegetation.

Plantations: There are over 2,000 acres of conifer plantations existing in the Beegum Watershed, representing a significant investment in dollars as well as our forests of the future. The historic frequent fire regime for the watershed shows these plantations are at risk to wildfire before they reach maturity.

Fire and riparian areas: Fire effects can influence water yield, peak flows, and flood flows. A major effect of fire is to increase the amount of overland flow of water, that can lead to floods. Fire causes an immediate but short-term increase in erosion that can cause catastrophic damage. Fire does not increase the long-term or total sediment yield, just the timing of it. In frequent-fire watersheds, recurring fire cycles regulate the sediment yield by flushing out stored, unstable sediments. Thus sediment yield is moderate each year, without catastrophic volumes even in high flood years. By altering or excluding the natural role of fire in the watershed, sediment flows have also been altered, vegetation and ground fuels are providing effective temporary sediment "traps" holding sediment yields until these traps are removed through wildfires or high precipitation events. In years when both of these events occur in the watershed catastrophic results can be expected.

Fire effects on upslope areas may be more important to riparian habitats that fire actually occurring within the riparian zone. Indirect effects include the movement of sediment, biomass, or water through riparian zones. Where riparian areas are not burned, there is less downstream damage from fire.

Fire and meadows: There are small meadows scattered throughout the Beegum Watershed, the most significant are within the North Yolla Bolla and the Snake Lake Ecological Units.

Wet meadows in the Beegum Watershed are disappearing or becoming smaller. This can be attributed to several factors which include a lowering of the groundwater table related to channel downcutting, human uses, and fire suppression allowing overstocking of vegetation throughout the watershed. Cumulative effects of these factors has facilitated the encroachment of upland vegetation into the meadows.

Prior to organized fire suppression, fires and livestock grazing were regular processes in the maintenance of meadows and grasslands. A late season fire could frequently be carried through meadows once the herbaceous growth had cured. This type of fire would generally kill most tree seedlings attempting to occupy the site. Perennial grasses produce seeds in abundance 1 to 2 years after germination; most woody plants require several years to reach seed-bearing age. Fires that are frequent enough to inhibit seed production in woody plants usually restrict the shrubs to a relatively minor part of the grassland or meadow.

Infrequent fire tends to favor large trees over grasses and herbs in plant community/forest interface areas. Recurrent burning and grazing historically maintained the grasslands and meadows, as well as provided a defense from the encroaching shrubs and forest.

Fire and fish and wildlife: The impact(s) of fire on fish and wildlife may be beneficial, detrimental, or without effect, depending on timing, scope, severity, and area, site characteristics (soil type and depth, slope, moisture, exposure), and on species under consideration (Neitro et al. 1985).

The primary effect of fire on fish is in habitat deprivation. Fire can increase water temperature and sediment as well as result in the long-term loss of woody debris from stream channels. The most long lasting and severe effects on fish habitat from fire occurs when it is associated with the loss of streamside vegetation (Swanson et al., in press).

The major influences of fire on wildlife are impacts on vegetation structure and composition, dead and down woody material, and snags. The loss of dead and down woody material and snags removes essential habitat components for a variety of wildlife and reduces species diversity. Wildlife species adapted to a specific arrangement and amount of habitat components. The greater the diversity of habitats, the greater diversity there is in wildlife species (Odum, 1971).

Fire is an important disturbance that influences both input and removal of coarse woody debris. The role of coarse woody debris includes nutrient and carbon storage, site for plant establishment, the maintenance of soil stability, and the presence of wildlife habitat. In frequent-low-severity fire regimes the input of coarse woody debris is relatively continuous, with small amounts added with each fire. Fire may be the primary means of coarse woody debris removal in these regimes. In infrequent high-severity fire regimes huge inputs of coarse woody debris occur following fire. Decay or decomposition is more important in forests with long fire return intervals (J. B. Kauffman, 1990).

Fire and air quality: Wildfires are a potential source of large amounts of air pollutants. The size, intensity, and occurrence of a wildfire depend on such variables as meteorological conditions, species of vegetation and their moisture content, and the weight of combustible fuel per acre (available fuel loading). Fuel type and fuel loading are of primary importance on smoke emissions generated. Presently smoke generated from wildfire is regarded as an "act of nature" and not regulated of monitored by State Air Quality Management Districts, while restrictions on the use of management prescribed fire increases annually in the form of smoke management.

The Yolla Bolla Middle Eel Wilderness has been classified as a Class I Airshed. Class I Airsheds are designed for the most stringent degree of protection from future degradation of air quality.

SPECIES AND HABITATS: What are the current habitat conditions and trends for the species of concern identified in steps 1 and 2?

Fisheries: Beegum Creek is a fifth order tributary to Cottonwood Creek, draining approximately 40,750 acres. The analysis area includes six major tributaries, the South, Middle, and North Fork of Beegum Creek, and Tedoc, Round Mountain, and Pole Corral Creeks. Two species of anadromous fish utilize the lower 12 miles of Beegum Creek and its tributaries during various stages of their life-histories (see map, Appendix II - 8). The range of anadromous fish habitat extends into the Noble Ridge, Little Red Mountain/Tedoc, and Dutchman Ecological Units.

Presently, small runs of adult spring chinook migrate into Beegum Creek during April and May and hold over through the summer months. This area provides key refugia for adults, providing cool water temperatures and deep pools needed to buffer generally warmer water temperatures that occur in many downstream tributaries. Spawning occurs during late September through October, however, little information exists as to what extent Beegum Creek is utilized for spawning. There is some speculation that a portion of those fish holding in the Beegum gorge migrate downstream into Cottonwood Creek where more suitable spawning habitat may exist (Richardson et al 1978; Upper Sacramento Management Plan 1989). There is no existing information on juvenile chinook salmon life history within the Beegum Creek analysis area.

Sparse populations of winter-run steelhead enter the lower Beegum gorge area from November through March. Spawning generally occurs from January through April. Their has been some indication that an unknown percentage of adult steelhead often residualize in freshwater following spawning activities (CDF&G, pers. comm.). Previous spring chinook surveys have revealed an abundance of "rainbow trout" within the anadromous reach, however, it is not clear what percentage, if any, may be juvenile steelhead. No other information exists on juvenile steelhead densities within the analysis area.

The anadromous portion of Beegum Creek flows through moderate gradient, fairly well confined channel (Rosgen channel types A and B). These channels function predominantly as transport channels moving smaller sized bedload, sediment, and other debris downstream into lower gradient, less confined deposition areas which occur in lower Cottonwood Creek. Disturbance sensitivity can range from low to extreme in these channels, with recovery potential ranging from poor to excellent depending on the type of substrate, gradient, and potential for stream bank erosion (Rosgen 1994).

Several qualitative assessments made of the North, South, and Middle Forks of Beegum Creek indicate that cobbles and small boulders are the dominant substrate size in these areas, classifying these channels as predominantly A3 and B3 channel types. A3 channels are very sensitive to disturbance and have very poor recovery potential. Furthermore, they tend to have high potential for streambank erosion (Rosgen, 1994). Large scale mass wasting is evident throughout these areas, contributing large concentrations of sediment into the channel. Conversely, B3 channels are more stable channels with lower sensitivity to disturbance, excellent recovery potential, and low stream bank erosional potential (Rosgen, 1994). While mass wasting is still evident in some areas, it does not appear to be major contributor of sediment into these channels.

Little quantitative habitat inventory information exists for the Beegum Creek watershed. A 1991 habitat inventory of the North Fork of Beegum Creek reports that pools comprise 19% of the habitats surveyed, with an average depth of 1.3 feet (CDF&G, 1991). Pools provide key rearing and holding habitat for juvenile and adult steelhead and chinook residing in the Beegum Creek watershed. Ocular assessments of fish cover were estimated at 40%, being largely comprised of boulders and whitewater. While this is the only quantitative assessment of current anadromous fish habitat conditions within the analysis area, it is speculated that similar conditions exist in the South and Middle Forks, and the in the mainstem of Beegum Creek.

Numerous fish barriers exist within Beegum Creek watershed which limit anadromous fish passage on a seasonal basis (see map, Appendix II - 8). These barriers can alter the distribution of anadromous fish annually and

may be the key limiting factor in anadromous fish production within the watershed.

Due to the existing geomorphology and upland vegetation surrounding the anadromous reaches of Beegum Creek, riparian zones play a minor role in channel morphology and fish habitat complexity. Riparian zones are characterized by narrow canopy enclosure predominantly comprised of white alder, live oak and cedar. Qualitative assessments of canopy closure have been estimated at 70-80% (Round Mountain EA). Although small, these areas are critical to the health of the streams, providing thermal regulation, bank stability, and an influx of terrestrial and organic debris for fish and other aquatic species. The upland areas are dominated by chamise, buckbrush, and manzanita, with sparse numbers of grey pine. Large woody debris recruitment from upslope areas is low. Estimates of large woody debris recruitment within the anadromous fish reaches was reported to be one piece/100 meters of stream (Round Mountain EA).

Wildlife:

Wildlife Biodiversity: Documentation from sightings, nest locations and habitat/distribution models (Timossi 1993) have indicated 202 species of wildlife (10 amphibians, 121 birds, 54 mammals and 17 reptiles) are associated with the habitat and elevations characteristic of the Beegum watershed (See Beegum Watershed Analysis Planning File for complete species list). Twenty of these species are of a concern on the Forest in terms of management priority (Priority rating 4.5+, 4 amphibians, 1 reptile, 13 birds and 2 mammals). However, this watershed analysis will deal only with the following types of species: Federally listed endangered, threatened or proposed species, Forest service sensitive species, and other species of concern (survey and manage, 'protection buffers', and high profile species - Neotropical Migratory Birds, Yolla Bolly Deer Herd). These species of concern are discussed in more depth in the 'Species of Concern' section found after the habitat discussions listed below. Habitat discussions can be found throughout the following sections: Late-successional/Old Growth Dependant Wildlife Species, Early-mid Seral/Multi-habitats Species, Neotropical Migratory Birds, Snag Dependant Wildlife Species, Dead/Down Dependant Wildlife Species, Aquatic and Riparian Dependant Wildlife Species.

For a list of species of special concern that are not found in the Beegum watershed because of historic distribution or suitable habitat availability, see Beegum Watershed Analysis Planning File.

Late-seral (Mature)/Old-Growth Dependant Wildlife Species: Twenty-eight late-seral/old-growth (LS/OG) dependent species are believed to occur within the Beegum Watershed. Suitable nesting/roosting and foraging habitat requirements (NR & F - as defined for Northern spotted owls) for old-growth dependent species are expected to be provided through LSR, MLSA, Unmapped LSRs, Riparian Reserves and Matrix 'old-growth' retention guidelines.

Suitable Nesting, Roosting and Foraging Habitat - See the Beegum Watershed Analysis Planning File for a description of suitable NRF habitat. Suitable NR habitat is most abundant in the North Yolla Bolla and Round/North Star (S) ecological unit (EU) within the LSR (see maps, Appendix II - 1 & 2). Within the LSR suitable NR habitat is fragmented only by plantation units. Units in the eastern section of the LSR exhibit heavy shrub growth and little conifer regeneration. Within Round/N.Star (C), Snake Lake and Round/N. Star (N) EUs, NR habitat becomes limited and highly fragmented. The matrix and AMA contain small patches of 90-150 acres,

around Round Mountain and along upper Middle Fork Beegum Creek. Fragmentation within the matrix/AMA is attributed to plantations, fires, and areas of naturally occurring small to medium trees (<24" dbh) and/or open canopied forest stands (3 SPNG, 4SP - see size and density class tables on page 3-6). In other EUs, NR habitat is practically non-existent.

Conversely, suitable foraging habitat is more abundant, less fragmented and occurs mostly within the western section (or upper end) of the watershed (high elevation - EUs: Round/N.Star (N), Snake Lake, Round/N. Star (C), Round/N. Star (S), and North Yolla Bolly. Foraging habitat is separated from NR in this Watershed Analysis (WA) because the predictive capability of the LMP90 vegetation map to predict currently existing 45 NG stands, based on 20 yr old vegetation data, is unknown. Based on a preliminary analysis of the Beegum WA vegetation, using 1995 aerial photos, less than half of the predicted 45 NG is actually in late-successional characteristics. A higher rate of predictability occurs from North Star Mtn. south and west to the LSR (Round/N. Star (C)&(S) and Yolla Bolly EU), than south and east or north or west of North Star Mtn (Snake Lake, Round/N. Star (N), Little Red/Tedoc EUs). This could be a function of soil types, i.e. what the land is actually capable of supporting. Therefore, the tables exhibiting NRF habitat for the watershed and for each northern spotted owl (STOC) activity center separate out NR from F habitat (see Appendix I, Tables 1 & 5). A more detailed analysis is required to determine how much of the foraging habitat is actually suitable.

Late Successional Habitat - As with the distribution of Suitable Habitat, LS/OG dependant species are distributed mostly within the western section of the watershed (see map, Appendix II - 3). Generally, the habitat these species are keying into includes late-seral multi-storied forested habitats with >70% canopy cover. Northern spotted owls require large (>24" dbh) snags or broken top trees for nesting. Pacific fisher and American marten require large (>20" dbh) dead/down woody material for denning. All species require dispersal habitat between areas of suitable habitat. Generally, dispersal habitat is mid to late-seral forested habitats with 40% or greater canopy closure. Riparian reserves containing riparian or forested habitat are also important dispersal corridors. For a species specific description of suitable habitat see the Beegum WA Planning File.

LMP guidelines for Matrix require 15% of the watershed to be retained as late-successional (old growth/mature habitat). Approximately 25% of the capable Federal lands in the watershed is late-successional (LS) (4 NG and 3 NG having late-successional characteristics) and of this 9% is old growth (4 NG). The Matrix lands, Rx8, contain a majority of the late-successional habitat, whereas LSR RC-330 and the Yolla Bolly EU contain most of the old growth habitat. Small fragments of old growth are found within the matrix lands in the Round Mountain and upper Middle Fork Beegum Creek. Based on the distribution and amount of LS, the 15% retention can be satisfied through the LSR, riparian reserves and the three 100 acre core areas (associated with STOC activity centers). Outside these reserved areas, other LS habitat may be retained due to poor access and rough terrain (Dutchman Gulch, Little Red/Tedoc EUs). With some LS habitat lost from timber sales, LS species populations are also expected to be affected. To what degree depends on how and where the remaining LS habitat is fragmented, the condition of the LSRs and whether connection to the LSRs is maintained.

Preliminary analysis (detailed analysis is being conducted outside the effort of this WA) indicates that LSR RC-330 has a larger amount of as well as less fragmented LS habitat than LSR RC-331 to the North. This indicates

that RC-330 is more functional and will be fully functional sooner than RC-331. The timeline for either LSR reaching a 'functional' state is unknown, and further analysis will be needed to determine if the LSRs will be able to provide sufficient habitat to counterbalance timber harvest affects within the Beegum watershed.

Dispersal Habitat - Dispersal habitat can be provided through management of whichever strategy provides the greatest benefit, such as retention of 100 acre cores, riparian reserves, LSRs, or analysis of 11-40. Within this watershed, dispersal habitat was analyzed using the traditional minimal habitat requirement for dispersal (>11" dbh and >40% canopy closure). This was applied because the riparian reserves (based on USGS base map without unstable areas) within the capable lands make up 23% of the landscape and provide 12% of the currently functioning dispersal habitat. Capable land, in this analysis, consists of all forested lands and plantations, including forested habitat which is not capable of ever reaching dispersal habitat conditions. These percentages should be recalculated once this "incapable" land is identified. The 100 acre cores make up another 1%. The section of the LSR within the watershed, if counted, would only contribute another 7%, but the importance of maintaining dispersal habitat is between the LSRs.

Currently, 42% of the capable land in the watershed (which includes "incapable" land; see discussion in paragraph above) is dispersal habitat. Another 41% is expected to become dispersal habitat within 50 years, and another 18% after 50 years. The majority of the capable dispersal habitat is found within the western portion of the watershed (west portion of Noble Ridge, Round/North Star-all, Snake Lake, Yolla Bolly EUs). As with suitable and LS habitat, dispersal habitat is limited and more fragmented in the northwestern portion of the WA (near LSR RC-331, Noble Ridge, Snake Lake, Round/N. Star (C) EUs) than in the southwestern portion of the WA (Round/N. Star (C)&(S) and Yolla Bolly EUs) (see Appendix I, Table 2 and see maps, Appendix II - 4 & 5). Because dispersal habitat to the west of the watershed is highly fragmented and is the main link between the two LSRs, the area is considered a high priority for management. Though not often thought of, dispersal habitat is also important for multi-habitat species such as deer and bear, or late successional species which utilize mature chaparral habitats, like fisher. Dispersal habitat, which these species would utilize between the forested habitat and the chaparral/oak woodland habitat, is also limited and fragmented (see maps, Appendix II - 4 & 5).

Dispersal habitat is often fragmented by hillsides or ridges of capable, but unsuitable dispersal habitat. The more extensive the bare or sparsely canopied hillsides and ridgetops, the more likely these areas will act as travel barriers for LS/OG dependant wildlife. For those species which can travel through such areas, there is still the danger of increased vulnerability to predation. Maintenance of contiguous dispersal habitat, following drainages and meeting closely at the ridgetops would benefit LS/OG dependant species.

Within the watershed, dispersal corridors have been identified (see map, Appendix II - 6). These corridors are intended to provide for distribution between LSRs RC-331 and RC-330, between activity centers (AC), and between forested habitat and chaparral/oak woodland. Recommendations regarding these corridors are discussed further in Step 6.

Early-Mid Seral or Multi Guild species: Within the watershed, 99 species of chaparral, shrub, and grassland associated species could occur (Timossi,

1991). Of these, 14 are species of concern: 3 game animals, 5 survey and manage species, and 6 neotropical migratory birds, including one which is Federally Endangered. Viability of these species is expected to be provided through special management direction for riparian areas, downed logs, snags, old-growth species, green-tree retention, hardwood retention, seral stage diversity management, forest health, and management plans for special land allocations. In addition to these management directions are special land allocations and individual species management plans.

Current habitat conditions, based on the needs described in the management plan and the current LMP90 vegetation layer and existing BE/BAs, can only be grossly determined. Within the chaparral/hardwood habitat, 64% is chaparral and 36% is hardwoods. The amount of hardwoods, which are mostly located along stream channels, is a natural function of the landscape. Annual grasslands and glades make up a small portion of the early seral habitat. Within the mixed conifer and true fir forested habitat meadows/glades could not be analyzed, though they do occur, especially within the northern section of the Snake Lake EU. Immature timber (XX1,XX2,XX3) makes up 8% of the forested habitat, open forests (<50% crown closure) make up 49%, and mature (50-100% crown closure) makes up 43%. Oak distribution and abundance varies with figures indicating 5 to 13 sqft/acre (Adamson & MacPherson 1991 and Adamson & Ratledge 1992). This analysis includes the late successional forested habitat found within the LSR and Congressionally Reserved Area. Therefore, outside these areas, the percentage of immature and open forested habitats would be greater.

Snag Dependant Wildlife Species: Thirty-four (34) wildlife species believed to occur within the Beegum watershed are dependent on snags for nesting. They make up 15% of all the wildlife species within the Beegum watershed. Twelve of the snag dependent wildlife species are primary excavators, those species which create cavities. This group includes the white-headed woodpecker and pygmy nuthatch. Snag densities are required to provide for these two species at the 100% population level (LMP 95). Forest observation records, breeding bird surveys, Christmas bird counts, and spotted owl surveys have confirmed their distribution in the Yolla Bolly District. Three of the snag dependant wildlife species are bark cavity dwellers. This group includes two survey and manage bat species. Other bats species, though may also utilize snags. See the Beegum WA Planning File for descriptions of habitat needs for Snag Cavity Dwellers and Bark Cavity Dwellers.

Current known snag densities: Preliminary surveys within two compartments (Corral & Round Mountain) and at seven survey points within old growth habitat indicate that snag densities within the watershed range from 2-4 snags/acre, sometimes reaching 6 and 8 snag/acre (Adamson & MacPherson 1991, Adamson & Ratledge 1992, and EUI 1996). Suggested snag densities based on the latest models indicate the following snag and recruitment densities are needed per acre based on the habitat and the cavity dependant species which are associated with them:

	snags/acre	recruitment/acre
Red Fir	1.5	4.5
Hardwoods	2.5	7.5
Riparian	3.0	9.0
Jeffrey Pine	4.0	12.0
Ponderosa Pine	4.0	12.0
Mixed Conifer	4.0	12.0

Whether these snag densities naturally occur within the watershed for each habitat type is currently unknown. Also, whether snag densities are met on a 40 acre average is unknown. On the acre average, most of the areas impacted by past timber harvest or located on poor growing conditions are expected to be less than the numbers suggested. For areas of timber harvest, this may be a reflection of a 1.5 snag/acre retention guideline versus the current suggested retention. For poor growth areas, levels may just be naturally lower than what is suggested. All other forested areas are expected to meet the current snag density suggestions, at least on the 40 acre average.

Most of the hardwood stands are considered non-commercial and emphasis has been on conifer trees, so, except for fuelwood cutting, harvest of hardwoods is expected to have a minimal impact on naturally occurring snag numbers. As a result, the snag density needs for wildlife within hardwood habitat is expected to be met.

Dead/Down Dependant Wildlife Species: Ten species of wildlife are dead/down wood dependent species. For a description of dead/down requirements for dependant species see the Beegum WA Planning File. The amount of dead/down within the watershed is unknown. Fuelwood loading analysis was not presented in this WA and therefore the amount of dead/down could not be analyzed. Only one report (Adamson & Ratledge 1992) indicates that dead/down levels, for matrix in the Round Mountain compartment, at 4-6 tons per acre.

Using snag levels as an indicator for dead/down, expectations of where dead/down levels meet the needs of dependant species would follow the same pattern as indicated for snags. Areas affected by timber harvest and where poor growing conditions exist are expected to have less than the recommended levels of dead/down. All other areas are expected to meet the recommended levels of dead/down. For small mammals, dead/down needs are expected to be met or exceeded throughout the Watershed.

Aquatic Ecosystems (Aquatic and Riparian Dependant Wildlife Species): Fifty-four (54) species of aquatic and/or riparian dependant species are believed to occur within the Beegum watershed. These include, but are not limited to Pacific giant salamander, Pacific treefrog, American dipper, great blue heron, tree swallow, yellow warbler, beaver, and western aquatic garter snake. Species of Concern include the California red-legged frog, Northern red-legged frog, Foothill yellow-legged frog, tailed frog, willow flycatcher, and Northwestern pond turtle (other species of concern are discussed under NTMB). Numerous stream systems are found within the watershed. Habitat requirements vary from intermittent standing water with varied amounts of vegetation and vegetation type to permanent, cool water, with instream cover and surrounded by dense riparian vegetation. Management of riparian reserves is expected to provide for species listed in the aquatic and riparian guilds. Possible conflicts with aquatic conservation strategy objectives affecting these aquatic species include cattle grazing in meadows and riparian areas.

Species of Concern:

Threatened, Endangered, and Sensitive Species:

American Peregrine Falcon (Endangered): There is one known peregrine falcon eyrie within the east side of the watershed, albeit the portion of the watershed that lies outside of the Forest boundary. The falcons from this

eyrie forage within the Beegum Creek Watershed in the general area of Beegum Gorge and toward Walker Point, as well as to the south and east outside of the watershed boundary.

Habitat enhancement and disturbance has been determined for this eyrie (Predatory 1994 and STNF 1995). Ledge enhancement is not recommended as ledges are abundant. No known disturbance to the eyrie, by motorists or nearby observation, occurred. There is a concern that large scale use of the 45 road by logging trucks during the breeding season could cause abandonment. Two direct disturbances were recorded (see Table below).

Vulture Rock Territory History - NI0040 (Predatory 1994 and STNF 1995)

Year Verified	Year Eggs Laid	Yr Young Verified	Yr Clutch Manipulated
1980-1995	1983-1992	1983-1987, 1989-1990	1983* 1984* 1991**

*Manipulated - eggs illegally removed and young fostered by registered falconer.
**In 1991 the fledglings were thought to be stolen (Kirven 1991). No other documentation for lack of success in 1990, 1992-1995

Other potential nest sites may occur within Beegum Gorge or within close proximity. This is based upon a survey of the area based on topography, aerial interpretation and actual field verification (Boyce & White 1979). The name, location and suitability rating is given in the table below. Though these have been identified, no other eyries have been confirmed.

Name	Legal	Suitability
Beegum Creek (92)	T28N R9W 7	Unsuitable
N Yolla Bolly Lake	T27N R10W 10,11	Low-unsuitable
N Yolla Bolly Mtns	T27N R10W 15	low-unsuitable
Black Rock Mtn	T27N R10W 8,9	high suitability - not surveyed
Wells Creek	T28N R9W 27	high suitability - not surveyed

California Red-legged Frog (Threatened): California red-legged frog historically occurred in Shasta County. Literature suggests that they can occur up to 4,500 feet elevation. There are no records of this species in Beegum watershed, although it is assumed that they historically occurred in the Beegum Watershed. The closest record of a RLF detection is T26N R7W S25, at a 25 acre farm reservoir in 1986 (Rarefind 1996). Although riparian vegetation can be found in the watershed, areas with deep, slow moving water is suspected to be limited. Streams with the highest likelihood for having suitable RLF habitat are Beegum Creek and its main forks. Locations where RLF are not likely to exist are Snake Lake and surrounding tributaries and possibly Boy Scout Camp. Though no bullfrogs have been detected at Boy Scout Camp, they do occur in the neighboring watershed.

Bald Eagle (Threatened): Though the Beegum watershed was not expected to contain suitable habitat (WHRTools 1995), incidental sightings have occurred along Beegum Creek from 1969-1991. It is believed that the bald eagle is foraging in Beegum Creek and its tributaries throughout the year (Adamson & Ratledge 1992). Beegum Creek and its tributary Middle Fork Beegum Creek are perennial streams and probably provide a year round source of resident rainbow trout for the eagle (Adamson & Ratledge 1992). These statements have not been confirmed through recent detections or surveys, but cannot be discounted.

Northern Spotted Owl (Threatened): Federal records show five spotted owl activity centers (ACs) are located within the Beegum watershed. An additional four ACs lie outside the watershed, but within the 1.3 miles of the boundary. These owls may be using habitat within the watershed (i.e. within their own home range). Surveys are being conducted this year to reconfirm status, particularly on activity centers that have not been surveyed in the last four to five years (see Appendix I, table 4).

Within the watershed, all ACs are above the incidental take threshold (see discussion for foraging habitat in "Suitable Habitat" section). For those ACs within 1.3 miles of the watershed boundary, only one (#813) is below the incidental take threshold at the territory level (.7 mile radius), the rest are above (500 acres suitable habitat)(Appendix I, Table 5). At the home range level (1.3 mile radius), the same AC has less than the incidental take threshold (1336 acres). Suitable habitat occurring within the watershed, therefore, is important for this owl AC. (Appendix I, Table 5)

For three of the activity centers (829, 847, 817), 100 acre owl cores have been mapped (location of activity centers is considered sensitive information and therefore is not presented in this document). Aerial photos, the late-successional habitat map, and the detection history for each activity center were used to determine which habitat was chosen. Officially, only activity center 817 is required to have a 100 acre core, because the others are not official activity centers based on the 1992 protocol definition (Pair or T. single). See Step 6 for further discussion and recommendations regarding the "unofficial" owl 100 acre cores.

Approximately 80 percent of the watershed has been performed to protocol for calling routes, Spotted Owl Habitat Areas (SOHAs), and timber sales, from 1990 to 1996 (Appendix I, Table 4). From 1989 to 1994 district biologists or private individuals conducted unofficial surveys within 80% of the watershed. About 20 percent of the watershed has not been surveyed for spotted owls. These areas are located in the eastern half of the watershed, mostly within hardwood and chaparral habitat. Timber sale boundaries fluctuated between years, with the survey areas not including the 1.3 mile buffer until 1992. So, while OK Corral was surveyed to protocol in 1990 and 1992, the boundaries differed, leaving the 1.3 mile buffer surveyed to protocol only in 1992. This applies also to the Cold Fork, Beegum, and Round Mountain timber sale areas.

Northern Red-legged Frog (Sensitive): While systematic surveys specific to the northern red-legged frog have not been conducted within the watershed, personnel responsible for past stream and wetland surveys looked for this species. No sightings of this species have been reported within the area. Red-legged frogs have been seen in the Smoky Creek approximately 10 miles west of the Beegum Watershed. Although red-legged frog habitat has not been surveyed or mapped, it is suspected to occur scattered throughout the watershed.

Northern Goshawk (FS Sensitive, CA Spp. Special concern, Category 2): Forest records include one possible nest site within the watershed and eight detections outside, but in close proximity to the watershed. A new nest site was suspected in the 1996 survey season, with reproduction, in the same vicinity of AC 817. Around this nest site suitable habitat is suspected to be 'preferred' as no formal analysis has been done, but the surrounding STOC activity centers exceed their 'preferred' requirements. All other sightings have occurred outside the watershed, with a majority west and SW of Round/N. Star (C) EU and one in Dutchman Gulch EU. All were detected between 1982

and 1990. Since suitable habitat requirements for the goshawk nest cores are similar to the STOC, the pattern of where suitable habitat exists should follow that of the STOC.

Willow Flycatcher (FS Sensitive, California Endangered): This species has been detected on adjacent ranger districts. Willow flycatcher habitat has not been mapped, but does occur throughout the watershed in relatively small, narrow, fragmented patches. While no surveys for this species or habitat has been conducted in the watershed, its presence, in modest numbers, is suspected.

Pacific Fisher (Category 2, FS Sensitive, Ca. Spp of Special Concern): Between 1988 and 1993, this species has been sighted throughout the watershed. These include sightings along Pole Corral Creek where the habitat consists of old chamise fields on south slopes, mature/broken expanses of brush on the north slopes and old growth oak stands in the drainages and interspersed with the hillside vegetation (Adamsom & MacPherson 1991 & Bratcher, pers. comm. 1996). Though this habitat seems atypical for fisher, they are known to utilize habitats based more on abundance/vulnerability of prey and overhead cover than on vegetation type (Ruggierro et al. 1994). The fisher sighted has been seen hunting squirrels and rabbits. The sex is unknown, though thought to be a male, the seasonal use is unknown, whether or not the area is used solely for hunting is unknown, and whether or not this habitat is a limiting factor is unknown (versus denning and resting habitats).

Though not required, management for fisher in these non-conifer habitats is expected to be taken into consideration when managing for chaparral/oak woodland dependant species and riparian reserves. Typical fisher habitat for this Forest is fragmented and located on the western side of the watershed (high elevation). Forested conifer habitat for Pacific fisher is expected to be provided through management for Northern spotted owl habitat, riparian reserves, old growth reserves, dead/down, green-tree retention and snag management in matrix lands.

American Marten (FS Sensitive, Ca. Spp of Special Concern): There are no sightings of this species within the watershed; however, suitable habitat exists. True fir occurs along some of the higher ridges within the watershed in small scattered stands. Wet areas and meadows surrounded by forested habitat also provide habitat (Adamson & Ratledge 1992). Otherwise, current habitat conditions are similar to other late seral/old growth associated species. Habitat for American marten is expected to be provided through management for Northern spotted owl habitat, riparian reserves, old growth reserves, dead/down, green-tree retention and snag management in matrix lands .

Northwestern Pond Turtle (FS Sensitive): While systematic surveys specific to this turtle have not been conducted within the assessment area, personnel responsible for past stream and wetland surveys looked for this species. This species has been seen in the watershed but population levels remain unknown. There are two ponds within the watershed that do contain turtles of more than one age class (Snake Lake and Boy Scout Camp). Other suitable pond turtle habitat exists scattered throughout the watershed but has not been surveyed or mapped.

Game Species:

Black-tailed Deer: A management plan for the Yolla Bolly Deer Herd was established in 1982 by the California Dept. of Fish and Game, Region 1 in cooperation with U.S. Forest Service, U.S. Bureau of Land Management and the U.S. Park Service. This plan indicates the population trends, suitable fawning habitat, and management for winter and summer range. Current information, supplementing and improving on the management plan, is being provided by CA Dept of F&G. The Beegum watershed lies specifically within the Beegum subunit boundary and makes up 10% of this subunit. This herd contains resident and migratory Columbian black-tailed deer.

Current concerns for the black-tailed deer are the conditions of the shrub and oak woodland habitats in the transitional and winter range (Walker, CA Dept F&G, pers. comm. 1996). Deer use the Beegum watershed as both summer and winter range. They also migrate through the watershed from the Wilderness, upper elevation forested habitat, and forest/chaparral interface (summer range) down to lower Beegum Creek, BLM and private land (winter range)(Appendix II, Map 6). When migrating, the deer forage on grasses and forbs in the early spring and into the summer and early fall, acorns in the fall, and shrubs year-round (Taber & Dasmann 1958 and Ramsey et al. 1982). A detailed description of optimal habitat needs for the chaparral and forested habitat are on page 33 of the Yolla Bolly deer herd management plan. Migration is primarily along most major streams (Ramsey et al. 1982). South slopes receive most use by grazing, whereas north slopes provide cover (Taber & Dasmann 1958).

Though the recommendations from the deer management plan seem to call for more open/immature forested habitat than what currently exists in the watershed, these needs may be met through future timber harvest or in adjacent watersheds where more open forested habitat is known to exist. The amount of early seral chaparral habitat is also unknown as the baseline vegetation map only classifies chaparral habitat by species. Based on the knowledge that fire has been absent from the chaparral/hardwood community for the last 15 years, and limited prior to that with the onset of fire suppression, most of the chaparral community is expected to be in a decadent, non-palatable stage. This is beneficial for other species and as hiding cover for deer, but limits the amount of forage available to deer and can limit movement.

Bats (Survey and Manage):

Eleven bat species may occur within this watershed, five of which are Survey and Manage species (long-eared myotis, fringed myotis, long-legged myotis, pallid bat and silver-haired bat). Some require caves, mines, abandoned wooden bridges and buildings (LMP 95) for roosting sites. Others require snags (see Snag Dependent Wildlife Species - Bark Cavity Dwellers), and still others utilize both types of roost sites. Foraging areas vary from shrub, chaparral and open fields to streams, lakes and or meadows; essentially, anywhere insects can be found. There are no confirmed sightings of any bat species in the watershed; however, suitable habitat exists. Special habitat needs, though, for the Survey and Manage species expect to be met through snag management, riparian reserves, and buffer zones around known roosting sites (caves, mines, bridges). The remaining six species of bats are also expected to be provided for through the above mentioned management.

Neotropical Migratory Birds (Watchable Wildlife Program - 'NatureWatch'):

Seventy-five (75) NTMBs are suspected to occur within the watershed. Examples include Cooper's hawk, sharp-shinned hawk, yellow warbler, and yellow-breasted chat in the riparian guild; green-tailed towhee, golden eagle, prairie falcon in the open-shrub guild; killdeer in the open-grass guild; and brown creeper, flammulated owl and varied thrush in the late seral guild. These species require breeding habitat and migration corridors. Because of alteration to breeding habitat and increased exposure to predation and parasitism many of these populations have undergone significant declines. Habitat preservation and restoration is the backbone of maintaining current populations of NTMBs. Following proper management of breeding habitat, exposure to predation and parasitism is expected to become reduced.

The general Forests standards and guidelines state that habitat is to be managed for neotropical migrant birds to maintain viable population levels. Management of riparian reserves, hardwoods, old-growth and late seral habitat, diverse seral stages, visual quality, protection buffers, snags, dispersal habitat and special lands will help preserve breeding habitat for NTMBs. Deer herd management is also expected to improve the habitat of NTMBs as well as residents which are dependant upon shrub habitats. The creation of edges is beneficial to most of these species. Also of importance is the proximity of water and the size of shrub patches. A preliminary attempt at determining the size of patches needed was conducted (USDA 1994), but only information about territory size found. Deer management which maintains large 40+ acre patches of shrub habitat (mostly late seral) is expected to be most beneficial at this time.

Other Species of Concern

		Managed Through				
Species	Status*	LS	RR	Deer	Snags	Sightings?
long-eared Bat	S&M, FSC	X	X		X	N
fringed myotis	S&M, FSC	X	X		X	N
long-legged myotis	S&M, FSC	X	X		X	N
pallid bat	S&M, CSC	X	X	X	X	N
silver-haired bat	S&M	X	X		X	N
tailed frog	FSC,CSC	X	X			N
foothill yl frog	FSC,CSC	X	X			N**
yuma myotis	FSC	X	X	X	X	N
Townsend's big-eared bat	FSC,CSC	X	X			N
sharp-shinned hawk	CSC	X	X			N
Cooper's hawk	CSC	X	X			N
golden eagle	CSC	X		X	X	Y***
California Quail	CSC		X	X		Y
Vaux's swift	CSC	X	X		X	N
yellow warbler	CSC		X			N
yellow-breasted chat	CSC		X			N

* FSC - Federal species of concern (in most cases replaced category 1,2)
S&M - Survey and Manage Species (LMP)
CSC - California Species of Concern

** In 1995 stream surveys were conducted along NF Beegum Creek, MF Beegum Creek and at White Rock. Both creeks were reported as having good yellow-legged frog habitat, though no individuals were found (Fellers 1995). In adjacent watersheds yellow-legged frogs were found and

consequently there is still a possibility that they do occur within the Beegum Watershed.

*** There are four confirmed sightings of golden eagles in the watershed. A pair have been seen this year near the falcon eyrie and were chased by the male peregrine falcon. The peregrine and eagle use similar habitats, though eagles have a broader range of nesting habitats than the peregrine. Except for possible predation on the young (not yet recorded for the Vulture Rock eyrie), are not expected to constitute a major threat to the peregrines.

HUMAN USES: What are the current conditions and trends of the prevalent human uses in the watershed?

Heritage: Currently, there are 54 archaeological/heritage sites recorded within the Beegum area. The majority of these sites have not been evaluated as to their eligibility to the National Register of Historic Places (NRHP). Consequently, any proposals addressing the three management objectives may adversely affect these sites. Each site which may be impacted (falls within the area of potential effect (APE) for the project) needs to have its historical significance evaluated (36 CFR 800.4 (c)(1)-(5). If the site is considered eligible to the NRHP, the criteria of effect needs to be applied and potential management actions proposed (36 CFR 800.5).

Only 537 acres have been surveyed of the approximately 40,750 acres in the eight ecological units making up the Beegum WA area. Under 36 CFR 800.4 (a) and (b) inventory will need to be done on the undertakings proposed in the various ecological units.

American Indian Tribal Uses: During public scoping, four areas in the Beegum Watershed were identified as having current spiritual importance to the Wintu people. It does not appear, however, that these sites are currently being used. As we move into project development, further historic research and personal interviews, in particular with the local Nor-El-Muk Wintu, will need to be done.

Another traditional practice within the WA area is gathering. Materials collected may include bear grass, red bud, and black oak to name a few. Basketry and traditional foods are the principal products.

Recreation: At this time, Beegum area has mainly dispersed recreation use. This use is highest during the fall hunting season. In addition, some fishing occurs along Beegum Creek. Other forms of dispersed recreation take place, but are at much lower levels then those mentioned above.

Economics/Social: The local communities bordering Beegum have been undergoing an economic downturn in the timber industry due in part to the reduced levels of timber harvest on public lands. Much of this reduction is in response to management concerns over endangered species, fisheries decline, and watershed quality. However, the reduction of timber harvest on public lands is only part of the economic picture. The timber industry itself is having to respond to international competition (Canada), reduction in the private land timber base, and the need to make production more efficient.

The local social system/community has been impacted. The recent closure of the Hayfork sawmill has directly affected the local area with the loss of 50

to 100 local jobs. There have also been indirect effects on local businesses, the school system, and other community functions.

More immediate and long term has been the income decline for families dependant on timber industry jobs. Many social and family problems (spousal, child, and substance abuse) have been related to the timber industry downturn. However, this relationship is not cause and effect. An economic downturn can have indirect effects which magnify weaknesses within communities, individuals, and family structures. These problems have deeper roots which must be addressed on the individual, community, economic, and government levels. Increased timber production would not solve the problem, only mitigate it. The local communities have been trying over the last few years to create new job markets, but success has been limited.

Transportation: The transportation system in the Beegum Creek Watershed is used primarily for land management and recreation activities. There are 142.09 miles of road in the analysis area which consist of 129.72 miles of Forest Service roads, 3.76 miles of jeep roads, and 8.70 miles of private roads. Of the 129.72 miles of Forest Service roads, 77.19 miles are native surfaced roads, 44.85 miles of aggregate surfaced, and 7.69 miles of chip sealed roads.

Due to the decrease in timber harvest activity and the declining road maintenance budget, maintenance efforts have been focussed primarily on high use, main roads. Despite decreased road maintenance, road conditions in the Beegum watershed remain relatively good, over all. There are isolated areas of concern due to surface erosion which could affect water quality. These areas occur mainly on jeep roads and other native surfaced roads that have been rutted by vehicle traffic during wet weather conditions and from the lack of maintenance to correct the problem.

There are 117.70 miles of open road in the analysis area with 66.13 being native surfaced roads, and 51.57 being rocked. Of the native surfaced roads, 16.53 miles are designated Level 1 roads. Once built, and the associated project work completed, these roads should be closed year-round. If not closed, these roads should be upgraded to Level 2 and maintained.

The overall road densities for the watershed are displayed below. The following road density tables indicate the total, open, seasonal closure, and year-long closure road densities, as well as the Level 1 road mileages, for each subwatershed.

ROAD DENSITY TOTALS (for the watershed)

All Roads (including jeep trails):	155.44 miles / 63.66 sq.miles	=	2.44 miles/sq.mile
Open Roads:	117.70 miles / 63.66 sq.miles	=	1.85 miles/sq.mile
Seasonal Closure Roads:	7.13 miles / 63.66 sq.miles	=	0.11 miles/sq.mile
Year-long Closure Roads:	4.89 miles / 63.66 sq.miles	=	0.08 miles/sq.mile

TOTAL ROAD DENSITY (including jeep trails)

SUB WATERSHED	MILES	SQ. MILES	ROAD MILES/PER SQ. MILE	MAINTENANCE LEVEL 1 ROAD MILES
CORRAL	11.08	3.50	3.17	2.70
DUTCHMAN GULCH	8.78	3.70	2.37	1.62
LOWER BEEGUM	0.05	1.26	0.04	0
LOWER MID. FK. B.	18.29	10.65	1.72	0.15
LOWER SO. FK. B.	6.40	5.29	1.21	0
NORTH FK. BEEGUM	17.44	7.46	2.34	5.14
POLE CORRAL CREEK	22.62	8.07	2.80	0.66
POST	6.58	1.89	3.48	0.14
ROUND MOUNTAIN	10.18	2.67	3.81	1.19
TEDOC	9.43	4.69	2.01	0.51
UPPER MID. FK. B.	29.11	7.62	3.82	3.76
UPPER SO. FK. B.	15.48	6.85	2.26	0.66

OPEN ROAD DENSITY

SUB WATERSHED	MILES	SQ. MILES	ROAD MILES/PER SQ. MILE	MAINTENANCE LEVEL 1 ROAD MILES
CORRAL	9.26	3.50	2.65	2.70
DUTCHMAN GULCH	6.77	3.70	1.83	1.62
LOWER BEEGUM	0	1.26	0	0
LOWER MID. FK. B.	10.98	10.65	1.03	0.15
LOWER SO. FK. B.	1.62	5.29	0.31	0
NORTH FK. BEEGUM	16.81	7.46	2.25	5.14
POLE CORRAL CREEK	17.96	8.07	2.23	0.66
POST	6.58	1.89	3.48	0.14
ROUND MOUNTAIN	9.42	2.67	3.53	1.19
TEDOC	9.43	4.69	2.01	0.51
UPPER MID. FK. B.	28.92	7.62	3.80	3.76
UPPER SO. FK. B.	13.16	6.85	1.92	0.66

SEASONAL CLOSURE ROAD DENSITY

SUB WATERSHED	MILES	SQ. MILES	ROAD MILES/PER SQ. MILE	MAINTENANCE LEVEL 1 ROAD MILES
CORRAL	1.81	3.50	0.52	0
DUTCHMAN GULCH	0	3.70	0	0
LOWER BEEGUM	0	1.26	0	0
LOWER MID. FK. B.	0	10.65	0	0
LOWER SO. FK. B.	0	5.29	0	0
NORTH FK. BEEGUM	0.63	7.46	0.08	0
POLE CORRAL CREEK	0	8.07	0	0
POST	0	1.89	0	0
ROUND MOUNTAIN	0.76	2.67	0.28	0
TEDOC	0	4.69	0	0
UPPER MID. FK. B.	0	7.62	0	0
UPPER SO. FK. B.	0	6.85	0	0

YEAR-LONG CLOSURE ROAD DENSITY

SUB WATERSHED	MILES	SQ. MILES	ROAD MILES/PER SQ. MILE	MAINTENANCE LEVEL 1 ROAD MILES
CORRAL	0	3.50	0	0
DUTCHMAN GULCH	1.36	3.70	0.37	1.36
LOWER BEEGUM	0	1.26	0	0
LOWER MID. FK. B.	0	10.65	0	0
LOWER SO. FK. B.	0	5.29	0	0
NORTH FK. BEEGUM	0	7.46	0	0
POLE CORRAL CREEK	1.03	8.07	0.13	1.03
POST	0	1.89	0	0
ROUND MOUNTAIN	0	2.67	0	0
TEDOC	0	4.69	0	0
UPPER MID. FK. B.	0.23	7.62	0.03	0.23
UPPER SO. FK. B.	2.17	6.85	0.32	2.17

STEP 4: REFERENCE CONDITIONS

This step describes the known or inferred history of the landscape, and how ecological conditions have changed over time as a result of human influence and natural disturbance. Historic information about the condition of the key ecosystem elements establishes a reference for comparison with current conditions.

EROSION PROCESSES: What are the historical erosion processes within the watershed, and where have they occurred?

Mass wasting has played a significant role in the geomorphic development of the Beegum watershed, particularly within the Snake Lake and North Yolla Bolly Ecological Units. Reconnaissance analysis indicates that mass wasting is the primary erosion process, responsible for the majority of sediment delivered to the fluvial system.

Aerial photographs from 1980 and 1990 were evaluated to assess the natural range of variability for active mass wasting in the watershed. Landslides which were evident on the 1990 photos were also evident on the 1980 photos. No evidence of landslide activation was apparent over that ten year period. The vast majority of active slides lie adjacent to Beegum Creek, especially within the inner gorge of the lower, steeper gorge section. All of these slides were activated by lateral scour of the stream channel related to large peak flows from large storm events.

Based on past field studies for the Regan and Corral timber sales, many slump earthflows within the Snake Lake ecological unit are active. Due to the nature of the activity, viewing of aerial photos does not reveal it. Portions of these large features generally creep periodically in response to storm events or disturbances such as roads and timber harvest. Many stream channels within this ecological unit are unstable both to the unconsolidated nature of the material as well as the movement of the area which forces the channel out of equilibrium. This type of movement is within the natural range of how these systems have operated since the end of the Pleistocene. Movement is accelerated through singular events or a combinations of factors including inappropriate land management activities or natural disturbances including wildfire, precipitation events or seismic events.

Historically, the rates of active surface soil erosion were mostly low to moderate up until about the 1950's. Active mining operations, roading, and timber harvesting between the 1950's and 1980's have locally increased the rates of active surface soil erosion.

HYDROLOGY AND STREAM CHANNEL: What were the historical hydrologic and morphological characteristics of stream valleys and the general sediment transport and deposition processes in the watershed?

The headwaters of the Middle Fork Beegum Creek in the Snake Lake ecological unit, and the headwaters of the South Fork Beegum Creek in the North Yolla Bolly ecological unit have had active sliding and/or slumping that have impacted these streams locally and the subwatersheds. However, natural recovery has been good. Over geologic time, watersheds and streams within the Snake Lake and Round/North Star ecological units have had small to

massive scale mass wasting that has impacted these units; most of these mass wasting features have been stable since well before the advent of roading and/or commercial logging.

WATER QUALITY: What were the historic water quality characteristics of the watershed?

See "Water Quality" discussion in Step 3. This core topic has been dropped until Step 6, where data gaps will be identified.

VEGETATION: What is the historic array and landscape pattern of plant communities and seral stages in the watershed and what processes caused these patterns?

Information regarding reference conditions for this watershed is limited. Aerial photos taken in 1944 were used as the point of reference for this analysis. The vegetative characteristics considered include plant community and canopy density. Broad vegetative patterns and disturbance regimes are described below for the ecological units identified in the Beegum watershed. For more information on historic fire regimes and their effects on vegetative characteristics, refer to the following core topic, Fire and Fuels.

The Snake Lake, Noble Ridge, and Dutchman ecological units were characterized in 1944 by low density Grey pine/canyon live oak communities, shrub communities characterized by manzanita and chamise, and Jeffrey pine communities, much as they are today. In general, stand density was less, and vertical structure less than current conditions because of more recent fire effects to stand stocking and structure.

The three Round/North Star units (north, central, and south) were characterized by medium to high density mixed conifer communities. In 1944 in general, ponderosa pine and sugar pine comprised a higher component of the mixed conifer type, with white fir a much lesser component, particularly in the lower canopy levels. Stand density was higher in the over-story component of the mixed conifer stands, and lower in the understory component. This difference is most likely related to harvest practices within the type between 1944 and today and aggressive fire suppression efforts.

The Little Red-Tedoc Unit was characterized in 1944 by low density Jeffrey pine and Grey pine/live oak communities. Shrub communities were characterized predominately by manzanita, with a lesser component of chamise, much as it is today. In general, stand density was less, and vertical structure less than current conditions because of more recent fire effects to stand stocking and structure.

The North Yolla Bolla Unit was characterized in 1944 by high-density almost pure red fir stands on higher elevation sites, much as it is today. Mid elevation sites were comprised of red fir/white fir communities, with lesser stocking of Douglas-fir. Lower elevation sites were composed of mixed conifer communities, with stocking predominately comprised by ponderosa pine and Douglas-fir. Stand density was high in the over-story component of the mixed conifer stands, and lower in the understory component. This difference is most likely related to harvest practices within the type between 1944 and today and aggressive fire suppression

efforts. A large contiguous matrix of late seral stands of mixed conifer was predominant across the analysis unit.

Plant Populations of Concern (Threatened, Endangered, Proposed, Candidate and Sensitive Plants): Distribution and abundance of rare plants in this watershed is governed by a combination of availability of suitable habitat, connectivity of habitat for dispersal and colonization, and losses of local population from human impacts, climatic fluctuations, and other environmental factors (or events) such as drought, floods, fires, predation, and diseases. Rare plants in this watershed are highly substrate specific. Habitat connectivity is dependent on geologic and soil patterns. Suitable habitat may not be inhabited if it is isolated from occupied sites, and sites of local extinctions may not be recolonized for long periods of time, especially if intervening habitat has been altered in the meantime.

TES Plants of Riparian Habitats

Historic abundance and distribution of rare plants of riparian habitat was probably somewhat greater than we find today. Local populations may have been impacted by human activities such as livestock grazing, road building, mining, and logging operations. Modern fire suppression efforts have contributed to encroachment of trees into riparian habitats, which has sped up succession of riparian systems toward drier plant communities. Over time, these changes in riparian habitat result in a loss of suitable habitat for Epilobium oreganum and other wetland obligates.

TES Plants of Rocky Habitats

Sedum laxum ssp. flavidum and other inhabitants of rock outcrops and talus would have been little changed from their distributions today. While their distribution would have been ultimately limited by suitability of substrate, elevation, and aspect (as they are currently); only a portion of suitable habitat would be occupied at any given time. Local extinctions caused by rock slides, severe weather events, and other natural disturbances would be slowly recolonized. Again, human activities may have caused local losses.

TES Plants of Ultramafic Habitat

Rare plants of ultramafic habitat are ultimately limited by the amount and distribution of suitable ultramafic soil. Some of these plants are very fragile, and undoubtedly, were more abundant prior to impacts from human activities in the watershed. Others have been impacted by fire suppression. For instance, the habitat for Madia doris-nilesiae is maintained by fire. With exclusion of fire from the ecosystem, not only is the absolute quantity of habitat decreased, but the available microsites become more isolated from each other and colonization of new sites is less likely. On the other hand, controlled or natural fire would have very little impact on Madia stebbinsii due to the sparse vegetation cover of the sites it prefers.

TES Plants of Forested Habitats

Linanthus nuttallii ssp. howellii and other inhabitants of forested habitats would have been dependent on natural disturbance events such as windthrow, fire, and animal trails to create new habitat for colonization. These species would have existed in a mosaic of forest seral stages, with

new openings colonized by seeds from adjacent established populations. Fire, as a natural disturbance, has been suppressed in recent times, negatively impacting these disturbance-dependent species. Human activities may have impacted local populations, but in some cases, the related disturbance to the habitat may have been beneficial.

Survey & Manage Species: plant, lichens, & fungi

Not much is known about Survey and Manage species. Historically, these old-growth associated species were probably more plentiful. Harvest and grazing activities from the late 1800's to present have reduced and fragmented the old growth habitat in the watershed. Fragmentation of suitable habitat would have hampered pollination of old-growth dependent vascular plants, and would have reduced successful dispersal of seeds and spores to favorable sites for all species in this group. Frequent cool fires would have favored more open stands with less understory competition. Older trees are more likely than younger trees to be occupied by lichens and associated with hypogeous fungi.

Cypripedium fasciculatum is a vascular plant in the survey and manage group that is thought to be dependent on cool ground fires for habitat maintenance. If this is true, then fire suppression of the last fifty years has been detrimental to this species, which is known to occur in the headwaters of Pole Corral Creek area.

Noxious Weeds and Other Exotic Pest Plants

Virtually no non-native plants would have been present in the watershed, since "native" is generally defined as whatever was here before European settlement. Some exotic plants arrived in the watershed with livestock, and some were brought as pasture plants or garden ornamentals. Pasture plants such as sweet clover migrated into the watershed along roads and streams. Mullein and other roadside weeds continue to migrate along roadsides and plantations. Exotic grasses such as wheatgrass and orchardgrass have been introduced into the watershed by the Forest Service for roadside stabilization purposes; these are well entrenched but show no signs of invading native plant communities.

FIRE AND FUELS: What were the historical fire regimes and fuel loading conditions in the watershed?

Ecosystems within the watershed, specifically those at lower and mid-elevations, have evolved under a frequent low-intensity fire regime. Higher elevation true-fir forest ecosystems in contrast, developed under a fire regime of infrequent high-intensity fires.

In years prior to organized fire suppression activities, fire was the environmental factor that initiated new successions, controlled the species composition and age structure of the forests and produced vegetation patterns upon which animal components of the ecosystem also depended. These fires thinned stands and helped maintain an "open and park-like" forest with an understory of herbs and shrubs. Ponderosa pine seedlings and saplings were thinned out by low-severity fires, and depended on fire to eliminate other competing vegetation. The principal cause of mortality in small trees following fire was crown scorch rather than damage to the cambium or roots. Vegetation remaining on site after fires had less

competition for moisture, giving them more resistance to insect attack and disease.

Forests in the Klamath Mountains that developed under pre-suppression era fire regimes were generally more open and had fire resistant trees such as ponderosa pine, sugar pine, and Douglas-fir as the most characteristic dominant trees. Stands contained a diversity of species and age classes but relative densities were lower. Many of the fires were of large extent and would burn for months. As would be expected, there was a good deal of site-by-site variation in terms of fire behavior, periodicity, and effects on associated vegetation. Where fuel buildup and high intensity conditions occurred at the time of burning, small areas of stand replacing fires would occur. Within these newly created openings or gaps, patches of regeneration were established. Within large gaps, fire tolerant (and shade intolerant) species were favored, given proper seedbed conditions. Unburned patches were left throughout the low intensity fire areas, where the fuel profile was discontinuous and/or the fire burned during low-intensity burning conditions.

Historically, oak woodlands and grasslands frequently underburned. Whether by Native Americans or lightning ignited fires, results were the killing of competing vegetation in the grasslands and increased the health and productivity in the mature oaks. Frequent fires in oak woodlands and grasslands also halt encroaching conifers.

Trinity National Forest fire records from the early 1900's through 1994 (until updated) record 110 fire starts within the Beegum Watershed analysis area. Twenty of these fire starts were human caused with the remaining ninety resulting from lightning. The largest recorded fire in the watershed was an un-named lightning fire in 1917, burning approximately 800 acres. The largest recorded human fire, the Zachary Fire, burned 515 acres in 1934. Approximately 85% of the recorded fire starts within the watershed have been held to 10 acres or less. For several decades on National Forest Lands 2-3% of the wildfires have accounted for 95% of total acres burned.

The Beegum Watershed and the ecosystems within have evolved in response to disturbance-recovery regimes that have recurred over millions of years. Disturbances often occur as a normal and essential part of ecosystem dynamics and are not always catastrophic events that cause damage. Disturbance type includes but is not limited to fire, wind, ice and freeze damage, water, landslides, insect and disease outbreaks, and those human caused (White & Pickett, 1985). Historically, fire has been the major disturbance factor within the watershed. The scale of a disturbance has a major effect on the composition of vegetation species and associated animal species. Recurrence of fire and recovery is an important mechanism for energy flow and nutrient cycling, and has historically maintained the structural diversity and overall health of the ecosystems within the watershed.

Fire, because of the climate of the Klamath Mountains, has created stands and controlled stocking and stand density. Moisture levels have remained somewhat constant from the beginning of the century, while effective fire suppression has allowed vegetation and natural fuels to steadily increase. Fire exclusion has resulted in moisture stress and unhealthy overstocked stands encroached heavily by fire intolerant vegetation.

Increases in vegetation levels, natural fuels, and biomass overall have increased fire behavior, fire effects (resource damage), fire sizes, suppression difficulty, hazards to firefighters, and fire suppression costs.

Insects and diseases, as well as wildfire are considered normal components and ecological processes within the watershed. Years of fire suppression have dramatically altered these natural processes, particularly in the low and mid-elevation areas of the Beegum Watershed. Current forest conditions are more susceptible to insects, diseases, and stand replacement fires than have been previously recorded. Dense understories of shade-tolerant and fire-intolerant white firs are now prevalent throughout the forest. These densely stocked understories are not only increasing moisture stress they provide a "ladder" into the overstory tree crowns, enabling the development of high intensity, stand replacing crown fires.

Fire regimes of the Pacific Northwest have been broadly categorized by Agee (1981) into three separate severity categories; high, moderate, and low. High-severity fire regimes are characterized by very infrequent (100 years or more between fires) high-intensity fires, generally stand-replacing, resulting in major vegetational changes on site. Moderate-severity fire regimes are characterized by infrequent (25 to 100 years between fires) fires that are partial stand-replacement, having significant areas of high and low severity. Low-severity fire regimes have frequent (1 to 25 years between fires) low-intensity fires with few overstory effects. The fire regime of an area will be primarily determined by regional climate and vegetation combined with local microclimate and topography (Agee, 1993).

Historically, the frequent, low-severity surface fires typical of this watershed killed only a small percentage of trees while consuming much of the coarse woody debris. Therefore input rates of coarse woody debris were slow and relatively constant. Fire exclusion and past timber harvest has resulted in the formation of a dense "midstory" of shade-tolerant conifers and shrubs. The overall increase in surface fuels and the laddering effect of existing vegetation has increased the threat and occurrence of crown fires where historically they were rare. Though fire regimes have been altered by land use, fires still greatly influence the watershed. Fire exclusion is a powerful form of vegetation manipulation, not likely to result in ecosystem preservation where the historic plant and animal communities were fire-dependent (Heinselman, 1971). Through fire exclusion and past management practices we are essentially trying to produce climax communities over the entire landscape, where such situations never occurred historically.

SPECIES AND HABITATS: What was the historic relative abundance and distribution of species of concern and the condition and distribution of their habitats in the watershed?

Fisheries: Historical information on anadromous fish runs or fish habitat conditions are sparse for the Beegum Creek watershed. Observations of spring chinook salmon within Beegum Creek have been recorded as early as 1974. Healey (CDF&G 1974, 1979; 1981; 1990) has reported sporadic observations of spring chinook within the Beegum gorge during the last 20 years. In 1993, a spring chinook was observed near the confluence of the North and South Forks of Beegum Creek (CDF&G 1993). Previous surveys had indicated that this area was inaccessible to chinook salmon due to a nine

foot falls located in the Beegum Gorge. Historical information concerning run size of chinook salmon within Beegum Creek has never been documented.

Historical angling reports of steelhead catches have been made in the North, South and Middle Forks of Beegum Creek, however, this gives no indication of the historical runs that may have existed within the watershed. The existing topography associated with the anadromous reaches of Beegum Creek have proven to be too difficult to monitor annual steelhead populations with any consistency. Annual distribution and abundance were most likely associated with spring runoff patterns.

Qualitative assessments of fish habitat conditions have been made of nearly every major tributary of Beegum Creek during the last 20 years, however, these surveys have proven to be unreliable in comparing current and reference conditions. Modern stream inventory methodologies are more quantitative in describing fish habitat and channel morphology conditions, covering much larger and continuous reaches of stream. Nonetheless, past qualitative assessments of fish habitat conditions have characterized these streams as being in "good" condition, with healthy riparian zones, and an abundance of "trout" and other aquatic species.

Wildlife: No historic records on wildlife population estimates, densities or distribution are known to exist for the Beegum Watershed. Wildlife use and species composition population trends are projected based on the habitat regime, known European influences on the watershed, and wildlife sighting records from 1971 to 1995. The distribution and abundance of wildlife species in the Beegum Watershed is dependant on the habitat regime and human use of the area. General information on the habitat regime of the watershed over time is known.

Prior to settlement in the mid 1800's, the transportation system consisted of trails associated with hunting, fishing, trading, and other activities of the native inhabitants. Some early explorers and trappers probably passed through this watershed in the early 1800's.

Many wildlife species that we are familiar with today were present at this time. Species that formed large herds (deer, elk), were far roaming (bear, wolverine), were restricted to special habitats (cavity nesters, bats), or were dependant upon old growth and late seral habitats may have been in greater numbers due to large expanses of habitat that was unencumbered by fences, settlements, or the mosaic of land use practices of the Europeans who were to follow.

In the late 1800's timber harvest, livestock grazing, and homesteading began changing the native landscape. Wildlife species populations requiring special habitats and sought after for recreational or commercial use were affected by these changes in the watershed and surrounding area. Species that may have proliferated in the human altered environments are expected to be more common today than before European settlement (bullfrog, European starlings, coyote, racoons).

Old Growth/Late-seral Dependant Wildlife Species: Pre-European settlement, large expanses of old growth, decadent forest habitat were found throughout the southwestern and western half of the watershed. Old growth/late-seral dependant wildlife species may have been in greater numbers due to large expanses of old growth forest habitat, especially in what is now Rx 7 (LSR).

Prior to 1944, most of the forested landbase within this landscape component seemed to be more open (<60% crown closure) than the forested habitat within the Round/N. Star C & S, North Yolla Bolly ecological units (Summary 1909, Aerial Photos 1944). From 1944 on, timber harvest activities removed and fragmented habitat important in providing nesting habitat, thermal and hiding cover. Most affected was the portion of the watershed within the Round/N. Star (C) & (S) and North Yolla Bolly EUs. Within the Snake Lake EU fragmentation of some suitable habitat along stream corridors and dispersal habitat over the entire landbase, occurred. Such fragmentation may have created islands of suitable habitat and restricted movement between these islands.

With fire suppression, the buildup of slash on the forest floor may have limited the visibility and hunting effectiveness of predators such as the spotted owl and northern goshawk. Dense understory regeneration by shade tolerant species, also a result of fire suppression, would obstruct movement of avian predators, further reducing the suitability of the habitat. Very little of the fire suppression type of habitat changes is believed to occur within the watershed. Grazing practices which encouraged the encroachment of meadows and glades (Summary 1909), may have also eliminated or reduced the amount of area available for those predators which hunted in these openings (Goshawks, bats). Clearcut timber harvests would have provided openings needed by these same predators, but at the cost of fragmentation. Harvest units were much larger than these natural openings and different in overall composition.

These habitat changes may have caused an initial decline in old-growth dependant species. Later, reductions in and restrictions on timber harvest began with the awareness toward the effects on wildlife populations, namely the Northern spotted owl and Northern goshawk. Despite these regulations, local populations of old-growth dependant species were not brought back to historic levels. Alongside these regulations owls within or just outside the LSR were still reproductively successful. The further away from the LSR the land is more fragmented and owls existing there were recorded as not being pairs or reproductively successful. This could be a function of survey efforts, but is expected to be more a function of the landscape and may reflect the effect of timber harvest on other oldgrowth dependant species.

Early-Mid Seral or Multi Guild Wildlife Species: Prior to European settlement, within the open shrublands and oak woodlands, deer foraged, small mammals created burrows and harvested seeds (rabbits, ground squirrels), and other open habitat/early seral dependant species thrived (California quail, green-tailed towhee, lizards). Oak woodlands, found in the eastern half of the watershed, supported hardwood dependant species (gray squirrel, band-tailed pigeon). In these habitats, the influence of Native Americans on the habitat was considered beneficial to wildlife, such as seasonal lighting of wildfires. Wildfires, both naturally and artificially started, usually burned cool and kept the hardwood understory relatively open, stimulated acorn production and vegetative growth, and maintained shrublands in a mosaic of seral conditions.

With European settlement, fire was suppressed and shrublands grew into decadent conditions. Most shrub habitats within the watershed existed naturally as a result of climate, the geological makeup of the landscape and recurring wildfires. In the shrublands which underwent natural 'maturation', browse species were negatively affected as the shrublands became unpalatable and new growth became out of reach. Also, as the

shrubland became decadent it provided less habitat for small to medium mammals, as branches near ground level matured or died. The accessibility for aerial foragers (golden eagle, great-horned owl) was reduced as less ground was exposed. Other species, though, which feed on berries or use shrubs as cover (bear, birds, deer) benefitted from the maturing shrubfields.

Within the oak woodlands, fire suppression reduced the amount of sprouting oaks which are utilized by deer and other wildlife browsers. Increased amounts of understory growth would also reduce the amount of precipitation available to overstory, acorn producing oaks, and hence, quite possibly the production of acorns. Recruitment may also be hindered since understory growth, usually tempered by frequent fire, might compete to the point that there isn't any understory regeneration which is suitable to grow into a healthy large acorn producing oak, once released.

Reduction in the quality of shrub and oak woodland habitat would certainly affect those species dependant upon them. Based on 1944 and 1995 aerial photos the pattern of shrub and oak woodland habitats is generally unchanged. What is noticed is an apparent increase in denseness in both habitat types and a spreading out of the oak woodlands. This may be a factor of black/white photos versus color, scale, or actual habitat changes. The only indicators of wildlife health believed to currently exist are fawn to doe ratios and the peregrine falcon's reproductive success. Current fawn to doe ratios reside at the CA Dept of Fish and Game, but a concern does exist about the need to improve the oak and shrub habitats (Dave Walker, CDF&G, pers. comm. 1996). The peregrine falcon eyrie had been reproductively successful up until 1990. A change in habitat in the last six years may have caused failure, but so could disturbance. Another possibility is the robbing of young by humans. Any improvement, though, in the shrub and oak woodland habitat to benefit dependant birds species such as the band-tailed pigeon, would certainly benefit the peregrine. In conclusion, there is little data to help determine if the change in habitat is detrimental to existing wildlife dependant species, but based on other studies, it is suspected, though to what degree is unknown.

Snags & Dead/Down Dependant Wildlife Species: Within harvested areas, snag dependant species habitat was reduced. Snag retention within these areas varied over time, with only the later years (post 1980's) retaining snags for wildlife use. How much of the watershed has been harvested is unknown, but wherever harvesting occurred recruitment for snags was eliminated. Thus, those areas harvested since the 1940s aren't expected to provide snags of benefit to most snag dependant species even by the late 1990s. The loss of the later seral stages and the replacement of these to younger, smaller trees, affected the amount of recruitment of large diameter snags and down logs, necessary for sustaining historical populations of snag and dead/down dependant species such as black bear, fisher and pileated woodpecker.

Aquatic and Riparian Dependant Wildlife Species: Prior to European settlement, natural grazers, such as the deer, utilized meadow and riparian areas. Springs would have flowed naturally and created semi-permanent, widespread wet meadow habitat or maintained areas of moist duff. Species that were restricted to aquatic or riparian habitats (amphibians, willow flycatcher) may have been in greater numbers and more widespread due to habitat that was unchanged by settlements or the mosaic of land use practices of the Europeans who were to follow.

In the late 1800's cattle grazing occurred unregulated throughout the watershed. Many springs were confined or developed into waterholes. The condition of meadows and riparian areas, though, being used more so by cattle, began to decline. Meadows most impacted exist within the Snake Lake and North Yolla Bolly ecological units. Riparian habitat was grazed severely limiting suitable nesting habitat for many neotropical migratory bird species. Likewise, aquatic amphibians dependant upon emergent vegetation for reproduction and cover were highly impacted by grazing.

By the 1960's, the Forest Service began reducing the number of cattle grazing on the Forest Service lands. Springs were not returned to their natural condition, but continued to provide water to cattle troughs and water holes. With the reduction in cattle, introduction of grazing regulations and periodic resting of the habitat it is expected that aquatic and riparian dependant species populations declined less quickly or stabilized. Much of the damage to riparian habitat, meadows and springs occurred in the early part of the century and it is possible that existing wildlife populations have adapted, maintained 1960's population levels, or may have become locally extirpated.

Bullfrogs were also introduced into the ecosystem, though at what time is unknown. The damming of springs for cattle or to improve human use facilitated the spread of the bullfrogs into systems where other native amphibians and small aquatic reptiles naturally occurred. These native wildlife populations were reduced in size or eliminated from the ecosystems which became inhabited by the bullfrogs.

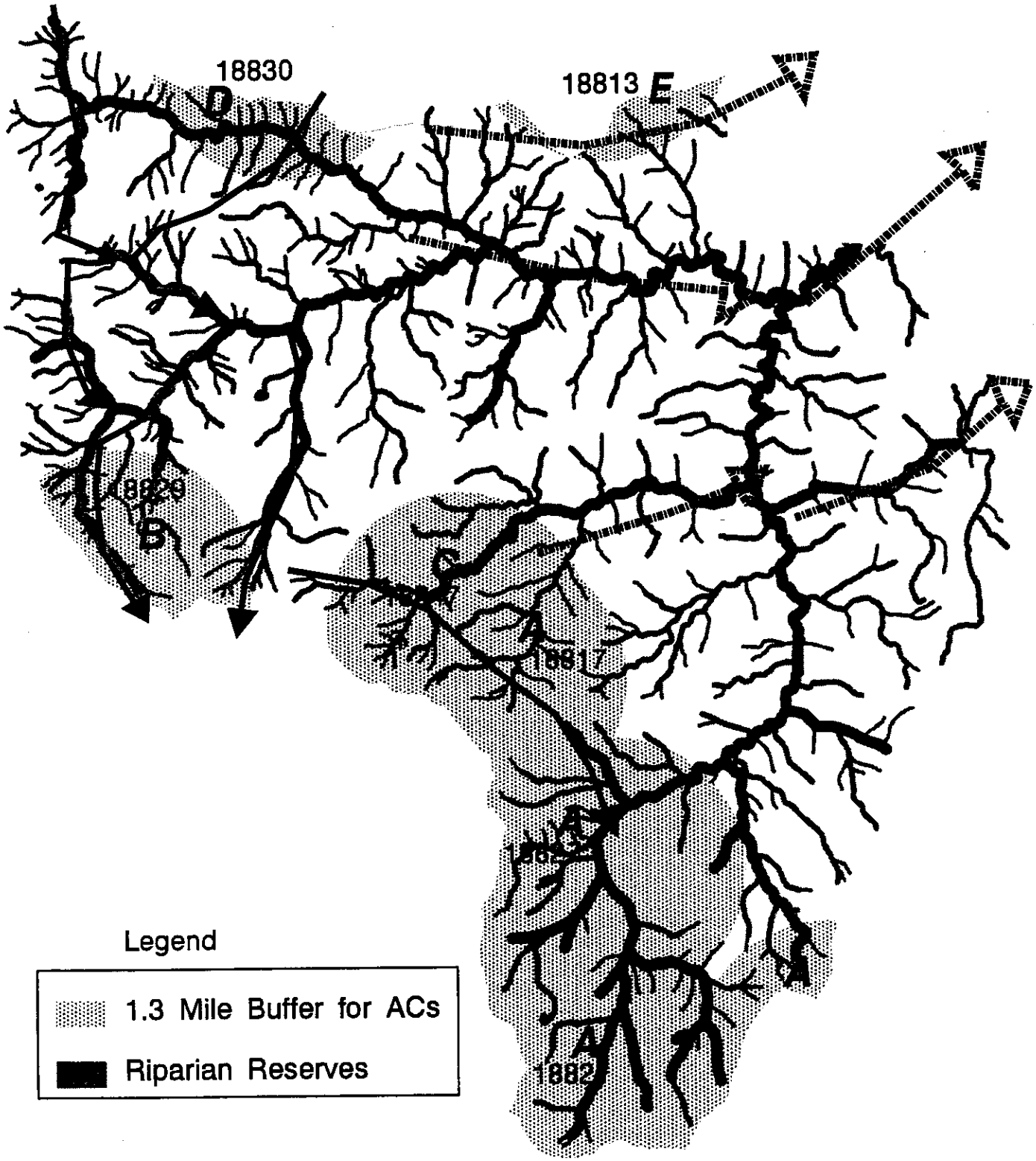
HUMAN USES: What were the major historical human uses in the watershed, including tribal and other cultural uses?

Heritage: Evidence from archeological investigations suggest early occupation of the Beegum and Yolla Bolla Mountain area occurred between 10,000 and 5,000 Years Before Present (YBP). Paleoenvironmental data indicates that between 10,000 YBP to 2800 YBP the temperature was warmer in the North Coast Ranges and Klamath Mountains. Alpine glaciers on South Fork Mountain and Black Rock Mountain receded, and streamflows in the South Fork of the Trinity were reduced. During this time, it is believed resources were more abundant and diverse. Early occupation of this area is represented by artifact assemblages characterized by wide stem projectile points, small serrated bifaces, flake tools, milling slabs and edge flaked spalls (Hildebrandt & Hayes 1984).

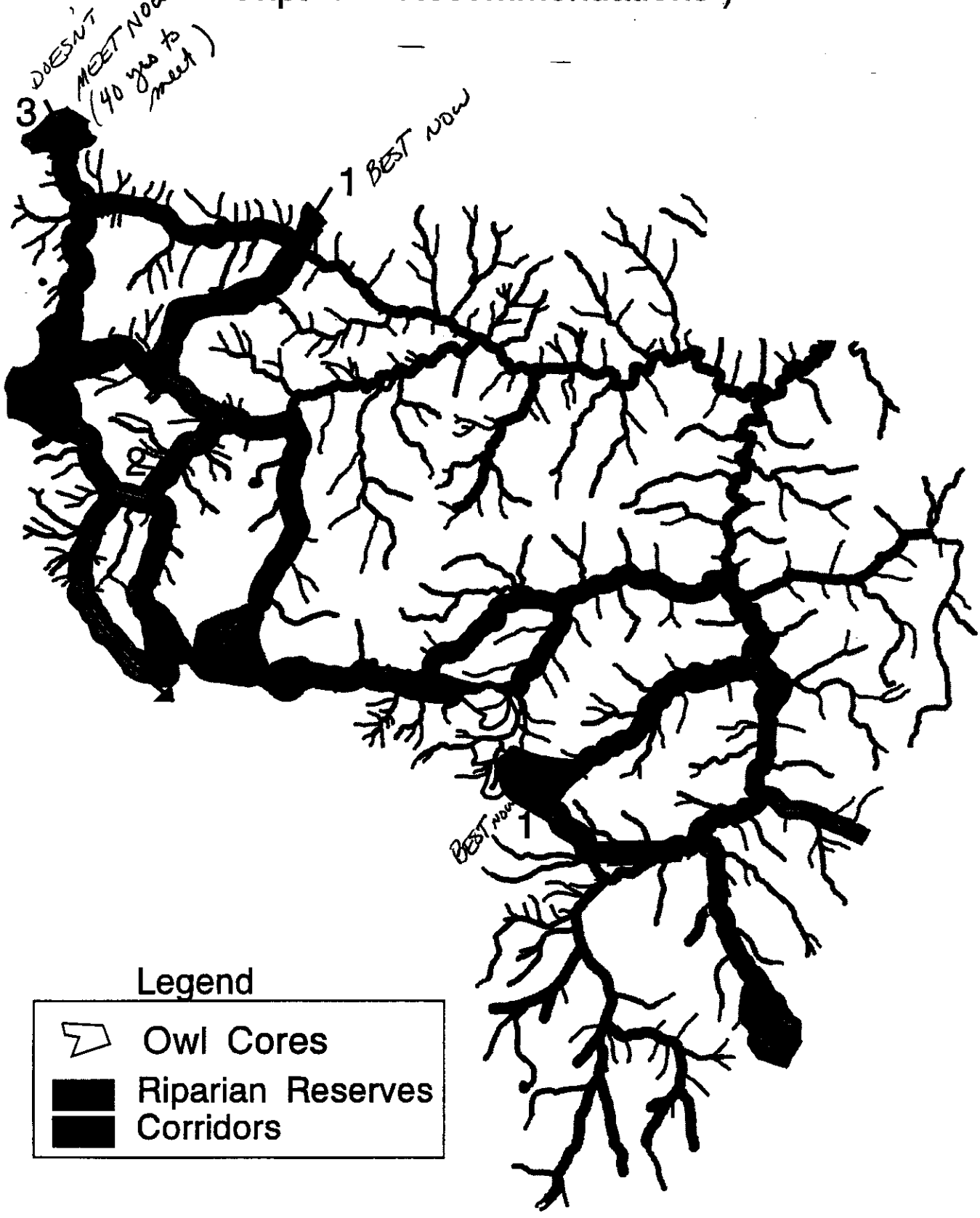
Starting around 2000 YBP the climate cooled significantly. This cooling period is thought to have lasted a thousand years and is referred to as the "Little Ice Age". During this time, it appears upland resources decreased in abundance and diversity. At this same time, the productivity of anadromous fish runs improved. Settlements in this area were probably located in areas where oaks were present in association with fish runs. At this time, it appears use of the South Fork of the Trinity River and the Beegum Creek watershed became limited to short term task activities carried out by small groups. Artifact assemblages representing this time include large corner notched, side notched, contracting stemmed and serrated leaf shaped projectile points, formed flaked tools, small non-serrated bifaces, manos and pestles (Hildebrandt & Hayes 1984).

Map 6

Identification of Forested Dispersal Corridors (solid line), Acitivity Centers (prioritized), and Deer Dispersal Corridors (dashed line).



Proposed Dispersal Corridors
(see Beegum Watershed Analysis "Chpt 6 - Recommendations")



Between 1494 and 1820 AD, it is suggested that the climate and upland habitat was similar to what it is today. During this time, it appears that semi-sedentary settlements occurred which indicated social-political complexity where production and exchange was occurring. The artifact assemblage representing this time would include small barbed corner-notched projectile point, mortars, pestles and clam disk beads used as money (Fredrickson 1974).

Indian peoples using this watershed exploited a mix of wildlife species. Habitat manipulation for vegetation and wildlife was accomplished through the use of fire.

The principal American Indian group occupying the Beegum watershed was the Nor-El-Muk Wintu (DuBois 1935, Merriam 1962, Powers 1878). This group spoke a Wintuan language related to the Penutian Stock of languages in California. An adjacent group located south of Cottonwood Creek is the Nomlaki. They also spoke a Wintuan language and shared many of the same Wintu material and social culture. However, our current state of knowledge only has the Nor-El-Muk using the Beegum watershed.

The Wintu depended upon the salmon for a substantial percentage of their food intake. Steelhead, suckers, trout, and freshwater shellfish and eel were utilized. The Nor-El-Muk were proficient fishermen and depended heavily on seasonal runs of salmon and other aquatic resources (Jensen 1979).

The most important plant food for the Wintu was acorn with the black oak being preferred. Manzanita berries were made into flour and consumed as a soup and cider. Various berries, wild fruits, bulbs, tubers, grasses, seeds and nuts were also eaten. The Wintu hunted deer, bear, ducks, geese, squirrels, rabbits and other small animals.

Trails were particularly important to the Wintu. Places along these routes held special meaning such as the sites of a legendary event or the home of mythological beings (Masson 1966). Indian trails were often used by early day trappers and explorers. Some of these trails evolved into wagon roads and highways.

The Wintu utilized fire to manage and conserve their resources. They burnt to control brush, promote growth of seed producing plants, mushrooms, herbs, bulbs and to enhance forage for deer and other game (Baumhoff 1978). Acorn groves were burnt for growth, production and for easier acorn collection. It has also been suggested that burning of acorn groves was utilized as a form of pest management. Grassy areas were burnt regularly to prevent encroachment by surrounding vegetation. They were also burnt for grasshopper harvesting. Burning was also conducted to clear and fertilize patches of ground for sowing tobacco and to promote growth of materials used in making baskets (Baumhoff 1978). Burning provided new tender young shoots for a desirable basket material which was easier to work and weave. Plant species that were burnt for utilization as basket material in this area included redbud, mock orange, hazel nut, choke cherry and willow (Patton 1994).

The first Euro-american explorations across the inland boundaries of California territory began in 1826, although trappers may have crossed the northern frontier before that time (Bancroft 1866). The first recorded crossing of northern California was that of Jedediah Smith in April of 1828. Smith and his party of men crossed the divide to the Hay Fork of

Trinity River, reaching it at Wildwood. They followed Hayfork Creek down to the South Fork of the Trinity River continuing on to the Klamath River.

American Indian Tribal Uses: American Indian use essentially follows the history described above. Religious and ceremonial sites were also important to the Wintu. Many places had religious significance including mountains, knolls, caves, rocks, rivers, water falls and other natural features. These areas were believed to be inhabited by spirits, each of which had its own significance and code of conduct. Although most of these sites are currently indistinguishable from other behaviorally unmodified areas, some areas were changed through minor rock realignments and or etching of petroglyphs.

Recreation: Through most of the historic period, recreation use was centered around hunting and fishing. Along with this, early settlers utilized and appreciated the Forest for the resources and beauty it provided.

Recreation over the past century has not changed significantly; only that more people are coming to the Forest to enjoy its varied beauty and resources. Currently, within the landscape, the flow of recreation use is centered mainly around hunting, primarily in the fall which can occur anywhere within the landscape. Hunting use is more concentrated to those areas containing early seral vegetation that is in close proximity to cover. Most of the human recreation use is confined to the road systems found within and adjacent to the Beegum area.

Economic/Social: Within the Beegum Watershed Analysis area, we have an estimated 8,000 to 5,000 years of recorded human history. American Indians were the first humans to flow through this landscape. Settlement and subsistence was focused in the late fall, winter, and early spring along the streams and valley bottoms in the landscape area. Into the late spring, summer, and late fall, the flow of human use moved up out of the canyons and valleys toward upland ridgelines and watersheds. Resources attracting the flow of human use were anadromous fisheries and game mammals. In addition, gathering and collection of plant material was done for food and utilitarian use.

In the 1850's American Indian pattern of landscape use was altered by Euro-American culture. As time progressed into the 20th-century Euro-American cultural concept of private/public property, agriculture, industrial, and transportation became dominant, which changed human flows within the landscape.

This early settlement by Euro-americans was focused around grazing in the higher elevations of the Beegum area, which centered around cattle, sheep, and horses. These occupations and activities have decreased in the last 50 years.

The communities adjacent to Beegum area have experienced a significant change in the their economies. In the decades following World War II, the timber industry was dominant within Trinity County, in particular, Hayfork and Harrison Gulch. Management of private timber holdings and National Forest land was focused on supporting this industry. In direct relation, many businesses and industries derived a significant portion of their income by providing goods and services to timber employees and companies. Local schools and County governments were also significantly supported.

Transportation: Development of this landscape element can be traced back to trail routes used by Wintu American Indian groups in this area. These early trails were later used by Euro-american settlers to access the surrounding high country for grazing of sheep and cattle. Still later, the Forest Service used many of these prehistoric trail routes and expanded this system for range management, forest inventory, and fire protection. From these trails, the current Forest Service road system developed.

STEP 5: SYNTHESIS AND INTERPRETATION

This step compares current and reference conditions, and explains significant differences or trends and their causes. The key questions developed in Step 2 are answered.

EROSION PROCESSES: What are the natural and human causes of change between historical and current erosion processes in the watershed? What are the influences and relationships between erosion processes and other ecosystem processes?

The dominant natural and human caused erosion process within the Beegum Watershed is mass wasting, as described in step 3. Compared to other watersheds within the adjacent South Fork basin, it does not appear that widespread instability was triggered by the 1964 flood event. Debris torrent deposits from the 1964 event are found adjacent to the middle fork of Beegum Creek, so it is obvious that some instability was triggered by the flood, but evidence is not widespread.

Natural instability is relatively high both in the Beegum gorge and in the Snake Lake ecological unit. Geologic work performed on past timber sales within the watershed have found many areas of local instability, especially within the large slump earthflows which are located within the Snake Lake unit. These slump earthflows extend from the ridgetop to the canyon and are many thousands of acres in size. Portions of the slump earthflows are highly active and very sensitive to management activities. Past harvest unit and road related slides attest to this.

Although it is apparent that local slope instability has been influenced by road construction and timber harvest, there are no indications that large areas have been destabilized, or that there is a trend toward increased instability due to management activities. However, if management activities are performed in certain areas within the watershed, instability could certainly respond. It is also apparent that naturally triggered instability in the gorge and in some areas within the Snake Lake ecological unit will continue to occur, which will influence stream channel stability and water quality. These processes seem to have always operated within this system, and therefore are within the natural range of variability for the system.

Surface erosion is a lesser erosional process within this watershed, but probably has responded to naturally occurring wildfires in the past. Surface erosion has been accelerated due to management practices. Road construction and timber harvest activities have tended to accelerate surface erosion by concentrating water and removing surface cover. Areas underlain by dioritic soils and soils derived from the Western Hayfork terrane are especially susceptible to surface erosion.

HYDROLOGY AND STREAM CHANNEL: What are the natural and human causes of change between historical and current hydrologic and stream channel conditions? What are the influences and relationships between hydrological processes, channel conditions and other ecosystem processes?

The causes of changes between historic and current hydrologic conditions are primarily roading and the logging of saw timber. This is true for

private lands where logging of whole sections of land at one time has occurred. A lack of funding and emphasis on road maintenance has allowed serious degradation of forest roads. Many of these roads, particularly level 1 roads, should have already been closed. This would have resulted in a reduction in the percent Equivalent Roaded Area for all of the subwatersheds that are currently above 40% of the percent Equivalent Roaded Area to Threshold of Concern ratio.

The most impacted subwatersheds in the analysis area are the Upper Middle Fork Beegum, Round Mountain, and Post Creek subwatersheds. All three of these watersheds have % Equivalent Roaded Area values that are at or above 65% of their corresponding Thresholds of Concern. In addition, their values for miles of road/square mile of subwatershed are well in excess of a generally acceptable 3 miles of open roads per square mile of watershed area. The Post Creek Subwatershed, at 83%, has the highest % Equivalent Roaded Area. It is the only subwatershed with a Condition Class 3, where the risk of initiating cumulative impacts is increased significantly (LMP, Final EIS, III-99 and Appendix H).

Of the remaining subwatersheds, only Tedoc (44%), Upper South Fork Beegum (47%), and Pole Corral (56%) have % Equivalent Roaded Area values that exceed 40% of their corresponding Thresholds of Concern.

A. Snake Lake Ecological Unit: The causes of channel instability can usually be tied to roading and timber harvesting. The raising of the water level of Snake Lake and the extension of Road 28N18 so that one of its culverts is the outlet of the lake without any armoring of the culvert outlet are the causes of channel instability at the outlet of Snake Lake. Logging and roading on about 1/2 of the approximately 140 acres at the headwaters of a tributary of the Middle Fork Beegum Creek in section 1, T28N, R11W resulted in cumulative impacts to the reach just downstream of Regan Unit #34. Debris torrents that have impacted streams in the Pole Corral Creek Subwatershed originated at roads located on private land. Roading and logging on sensitive soils (such as within the sale area of the Tedoc Timber Sale) have been factors that have cumulatively impacted tributaries of the South Fork Beegum Creek at Road 28N36 in sections 31 and 32, T28N, R9W.

   In contrast, the destabilized channel at the headwaters of the Middle Fork Beegum Creek was impacted by naturally-occurring, low magnitude slumps, where subsurface water has concentrated.

B. Round/North Star Ecological Unit: Large concentrations of sediment mostly from Roads 28N13 and 28N14, and an old spur road of the 28N10 Road have impacted Round Mountain Creek. Sediment from a gully in old Round Mountain Unit #16 (the result of a blocked culvert), and also from Roads 28N29, and 28N64 have been major factors in destabilizing A channel types in the tributary of the Middle Fork Beegum Creek that is in section 18, T28N, R10W.

C. North Yolla Bolly Ecological Unit: The headwaters of the South Fork Beegum Creek have maintained their stability despite high concentrations of sediment and increased water yields from roads and logging within the subwatershed. This has been possible because of the predominantly boulder-dominated and bedrock dominated A channel types where other A channel types would have been significantly more sensitive to roading and timber harvesting.

Roads at all ecological units - Many of the unstable stream reaches have been impacted by roads that were identified in Step 3 of this Watershed Analysis as roads with current erosion problems. Specifically, these roads are 28N10, 28N13, 28N14, 28N18, 28N29, 28N36, 28N64, 28N68, and 28N68A. Without controlling the erosion at these and other roads, the unstable stream reaches are more likely to remain unstable.

WATER QUALITY: What are the natural and human causes of change between historical and current water quality conditions? What are the influences and relationships between water quality and other ecosystem processes?

See "Water Quality" discussion in Step 3. This core topic has been dropped until Step 6, where data gaps will be identified.

VEGETATION: What are the natural and human causes of change between historical and current vegetation conditions? What are the influences and relationships between vegetation and seral patterns and other ecosystem processes in the watershed?

An analysis of the trends and causes of range was conducted by comparing aerial photographs from 1944 to the most recent photography, 1995, combined with extensive on the ground knowledge of the assessment area.

The Snake Lake Unit was characterized in 1944 by low density Grey pine/canyon live oak communities, shrub communities characterized by manzanita and chamise, and Jeffrey pine communities, much as it is today. In general, stand density was less, and vertical structure less than current conditions because of more recent fire effects to stand stocking and structure. Regeneration harvesting has resulted in increased fragmentation of the mixed conifer type, notably in the Brushy Ridge portion of the unit.

The North Round/North Star Unit was characterized by medium to high density mixed conifer communities. In 1944 in general, ponderosa pine and sugar pine comprised a higher component of the mixed conifer type, with white fir a much lesser component, particularly in the lower canopy levels. Stand density was higher in the over-story component of the mixed conifer stands, and lower in the understory component. This difference is most likely related to harvest practices within the type between 1944 and today and aggressive fire suppression efforts. The Jeffrey pine component has a generally well-developed understory layer of pine and incense cedar, likely a result of effective fire suppression efforts.

The Noble Ridge and Dutchman Units were characterized in 1944 by low density Grey pine/canyon live oak communities, shrub communities characterized by manzanita and chamise, and Jeffrey pine communities, much as they are today. In general, stand density was less, and vertical structure less than current conditions because of more recent fire effects to stand stocking and structure.

The Little Red-Tedoc Unit was characterized in 1944 by low density Jeffrey pine and Grey pine/live oak communities. Shrub communities were characterized predominately by manzanita, with a lesser component of chamise, much as it is today. In general, stand density was less, and vertical structure less than current conditions because of more recent fire effects to stand stocking and structure.

The Central Round/North Star Unit was characterized by medium to high density mixed conifer communities. In 1944 in general, ponderosa pine and sugar pine comprised a higher component of the mixed conifer type, with white fir a much lesser component, particularly in the lower canopy levels. Stand density was higher in the over-story component of the mixed conifer stands, and lower in the understory component. This difference is most likely related to harvest practices within the type between 1944 and today and aggressive fire suppression efforts. A large contiguous matrix of late seral stands of mixed conifer has been fragmented through regeneration harvest activity beginning in the early 1960's, notably in the Round Mountain area.

The South Round/North Star Unit was characterized by medium to high density mixed conifer communities. In 1944 in general, ponderosa pine and sugar pine comprised a higher component of the mixed conifer type, with white fir a much lesser component, particularly in the lower canopy levels. Stand density was higher in the over-story component of the mixed conifer stands, and lower in the understory component. This difference is most likely related to harvest practices within the type between 1944 and today and aggressive fire suppression efforts. A large contiguous matrix of late seral stands of mixed conifer and true fir types have been fragmented through regeneration harvest activity beginning in the early 1960's, notably in the Rat Trap Ridge area.

The North Yolla Bolla Unit was characterized in 1944 by high-density almost pure red fir stands on higher elevation sites, much as it is today. Mid elevation sites were comprised of red fir/white fir communities, with lesser stocking of Douglas-fir. Lower elevation sites were composed of mixed conifer communities, with stocking predominately comprised by ponderosa pine and Douglas-fir. Stand density was high in the over-story component of the mixed conifer stands, and lower in the understory component. This difference is most likely related to harvest practices within the type between 1944 and today and aggressive fire suppression efforts. A large contiguous matrix of late seral stands of mixed conifer and true fir types have been fragmented through regeneration harvest activity beginning in the early 1960's.

Plant Populations of Concern: This watershed includes a large number of rare plants, most of them are associated with ultramafics. Trends can be summarized by habitat group:

Riparian habitats: Epilobium oreganum and its riparian habitat has been damaged by livestock trampling; habitat effects have lessened since livestock use has decreased and logging operations avoid riparian zones. Viability of this species is still a concern since the known populations are few and the plant numbers are small.

Rocky habitats: Sedum laxum ssp flavidum and other inhabitants of rock outcrops and their rocky habitat have changed little in quantity and numbers since prehistoric times.

Forested habitats: Linanthus nuttallii ssp. howellii and its forested habitat have been impacted by logging and fire suppression. Both have had positive and negative effects.

Ultramafic habitats: Eriogonum libertini, Minuartia rosei, Ericameria ophitidis, Madia stebbinsii, and Madia doris-nilesiae and its

serpentine habitat have been impacted by road and landing construction to be used for timber harvest. Fire suppression has had an impact by letting encroaching vegetation invade the open areas that were maintained by periodic fires.

Survey and manage species: plants, lichens, and fungi: We have no record of survey and manage lichens or fungi from this watershed. One survey and manage vascular plant, Cypripedium fasciculatum, is found in the headwaters of Pole Corral Creek. Since these species are all assumed to be old-growth associates, the reduction and fragmentation of the old growth forests in the watershed can be assumed to have caused similar reduction and fragmentation of survey and manage species.

Noxious weeds and other exotic pest plants: Exotics are currently present in the watershed, but populations appear stable and are not invading newly disturbed areas. Recent changes in management practices, especially the emphasis on using native plant species only, should eventually lead to a decreasing trend in exotic pest plants.

14.3 MMBF/DEC.

Key Question Addressed

What harvest level is ecologically and environmentally sustainable from the watershed?

There are an estimated 11,800 acres net capable available suitable (CAS) lands within the Beegum analysis area. To move this area toward a regulated condition as provided for on matrix and AMA lands within the Shasta-Trinity LMP, an estimated 940 acres must be regeneration harvested per entry cycle (10 year period) assuming the indicated allowable sale quantity (ASQ) is disaggregated to the Beegum analysis area. Other threshold factors, including habitat connectivity, habitat fragmentation, cumulative watershed effects, unmapped Riparian Reserves, and regeneration potential must be considered during a site-specific analysis prior to proposing specific regeneration harvest treatment units within the Beegum analysis area.

FIRE AND FUELS: What are the natural and human causes of change between historical and current fire and fuel conditions? What are the influences and relationships between fire/fuels and other ecosystem processes in the watershed?

Alteration of the historic fire regime(s) in the Beegum Watershed through fire exclusion (results of effective fire suppression), is perhaps the most significant difference between existing conditions and historic conditions within the Beegum Watershed.

This year, as of September 1996, 49,644 wildfires have burned in excess of 1,134,000 acres of National Forest Lands nation wide. These figures show a steady increase of acres lost to wildfires. Where historically from 1905 to 1984 only 8 years show acres burned in excess of 400,000, in 7 of the last 12 years more than 400,000 acres have burned annually. The principal factors that have caused these conditions are previous drought years and fire exclusion from low-intensity fire adapted ecosystems (from Statements of James R. Lyons, Undersecretary National Resources and Environment U.S.D.A. 9/12/96). Since 1977 fire suppression costs have been increasing $17,400,000.00 annually (U.S.D.A. Fire Economics Analysis Report, 1995).

While the Beegum Watershed itself has not been directly impacted by any large wildfires in recent years, the Yolla Bolla-Middle Eel Wilderness area directly adjacent the southern portion of the watershed was impacted by the 2,500 acres Rock Fire in August of 1996. Since the Beegum Watershed developed under a frequent low-intensity fire regime there is a high risk of catastrophic fires developing within the watershed in the near future.

Historically periodic fires (at lower and mid-elevations) removed ground fuel accumulations and thinned existing vegetation, leaving fire tolerant vegetation and eliminating most fire intolerant vegetation. Absence of fire for 80 to 100 years has allowed ground fuels to accumulate watershed-wide as well as the ingrowth of shade tolerant, fire intolerant understory vegetation, primarily in the form of true firs within much of the timbered lands within the watershed.

Effects of Fire Exclusion: The persistence of species in Pacific Northwest forests through time is attributed to the vegetation adaptations to fire. If the fire regime is altered, then the capacity for that species to survive in an environment may be eliminated (Pyne, 1984). In pine and mixed-conifer forests, frequent fires result in mineral seedbeds that facilitate establishment of species such as ponderosa pine, sugar pine, and Douglas-fir. Fire exclusion, or infrequent fires will favor species such as true firs, incense-cedar, and other shade tolerant, fire intolerant species (Parsons, & DeBeneditti, S.H. 1979). When high-severity fires occur within ecosystems that have evolved under low-severity fire, ecological effects are well outside the natural range of variability. High-severity fires are outside the natural range of variability today primarily in the extent of area affected by high-severity. Historically there were always patches of high-severity within the areas burned by mostly low-to-moderate severity fires. This gives us our complex stand structures and patch patterns characteristic of the Klamath Mountains.

By continuing to suppress low-to-moderate severity fires, we are managing in a way that insures that the fires that will affect most of the landscape are the high-severity stand replacement type fires (Skinner, 1994). Impacts, from high-severity fires can include soil erosion, loss of soil organic matter and structure, soil cover, mineral nutrients, soil micro-organisms, and hydrophobic soil effects. Off site effects can include physical, biological and chemical changes in water quality.

Anytime a component of a watershed is modified or changed, the whole watershed will function differently. Fire is a major component of the watershed and by attempting to exclude it we are impacting the other components of the watershed, signs of these impacts are now beginning to materialize, what the long-range environmental impacts will be is unknown.

Areas having the highest fire risk are Snake Lake, Round/N. Star(C), North Yolla Bolla, and Round/N. Star(S). Areas were rated according to recorded fire occurrences, values at risk (plantations, etc.) and vegetation levels and conditions.

Risks and hazards can be effectively minimized through continuation and maintenance of the shaded ridgetop fuelbreak system, treating fuels in and adjacent to plantations, and re-introducing low-intensity fire back into the watershed through the use of management prescribed fire.

Key Questions Addressed

Where are the high fire risk/hazard areas in the watershed, and how can the risks/hazards be minimized in these areas?

The Shasta-Trinity Forest Hazard/Risk Analysis rates the over-all watershed as having low-to-moderate hazard/risk ratings. A more site-specific analysis incorporating values at risk, and vegetation levels and conditions rate the highest fire risk areas as Snake Lake, Round/N. Star (C), North Yolla Bolla, and Round/N. Star (S).

Hazards and risks can be effectively minimized through continuation and maintenance of the shaded fuelbreak system, treating fuels in and adjacent to plantations, pre-commercial and commercial thinning of overstocked timber stands (with associated activity fuel treatments), and re-introducing low intensity fire back into the watershed.

What and where are the critical and unique resources at risk from catastrophic wildfire in the watershed?

Values at risk and locations:

- T&E species and habitats (LSRs, etc.): Snake Lake, Round/N. Star (N), Dutchman, Round/N. Star (C), and North Yolla Bolla.
- Plantations: Dutchman, Snake Lake, North Yolla Bolla, and all Round/N. Star Units.
- Yolla Bolla-Middle Eel Wilderness: North Yolla Bolla Unit.
- Private lands: Noble Ridge, Dutchman, Round/N. Star(C), Round/N. Star (S), and Snake Lake Units.
- Commercial timber value: watershed wide.
- Water quality, riparian habitat, air quality, and visual quality: watershed wide.

SPECIES AND HABITATS: What are the natural and human causes of change between historical and current species distribution and habitat quality for species of concern in the watershed? What are the influences and relationships of species and their habitats with other ecosystem processes?

Fisheries: Natural changes in species distribution between historical and current conditions have probably not occurred. Natural fish barriers have existed for long periods of time, most likely a function of natural geologic and mass wasting features associated with the highly incised reaches within lower Beegum Creek.

A decline in salmon and steelhead populations, both juvenile and adult, has likely occurred. However, this decline may be largely a function of habitat degradation occurring downstream in the Cottonwood sub-basin and Sacramento River basin (dams, urbanization, agriculture, water diversion, stream channelization, etc.); increased ocean harvest rate, and environmental conditions. While the majority of fish habitat within the analysis area appears to be in good condition, it is likely that past management activities have caused some alterations to reference conditions. This is most evident in upland channels where road construction and riparian reserve management have altered flow regimes, sediment routing, channel stability, and large woody debris recruitment. Implementation of timber harvest, road building, and riparian reserve standards and guidelines outlined in the LMP should suffice in maintaining the current fish habitat conditions within Beegum Creek. Careful planning of future land management activities should occur to minimize the risk of cumulative effects. Managing multiple subwatersheds to a Class 3 rating or

above would put the existing fish habitat conditions at risk to cumulative effects, jeopardizing the existence of anadromous fish species within the Beegum Creek watershed, and compound existing habitat problems downstream. Should land management activities progress in this fashion, then the recovery of fish stocks within the watershed would never be realized. Other notes associated with anadromous fish issues include:

Historical and current information on anadromous fish populations are largely unknown leaving only professional speculation as to the extent of change that has occurred in the distribution, density, and habitat conditions for anadromous fish.

Fish habitat appears to be in good condition, however, no quantitative assessment of fish habitat has been made to verify this conclusion.

Several potential fish barriers exist which can vary anadromous fish production on a seasonal basis.

Anadromous fish habitat is dependent largely on upland processes (geomorphology, soils, vegetation) within the Beegum analysis area. Some of the upland processes and impacts affecting anadromous fish habitat within the analysis area are listed below:

Increases in road densities and removal of large percentages of forest canopy, particularly in riparian areas can directly, or indirectly affect stream temperatures, peak and timing of flows, surface erosion rates, large woody debris recruitment, sediment routing and storage, and mass wasting. Sub-watersheds that are most likely, or may currently affect downstream fish habitat, related the intensive land management activities, include Post, Round Mountain, and Middle Fork Beegum. These areas currently contain a combination of high road densities and high percentages of vegetation removal, which can lead to excessive surface erosion rates, alteration of sediment routing and peak and timing of flows, and additional mass wasting.

Natural disturbances can also affect the same hydrologic, geomorphic, and vegetative processes mentioned above. The resiliency of fish species within the Beegum analysis area allows them to adapt to varying scales of natural disturbance. However, the majority of land management activities with the watershed, which are generally dispersed, do not mimic natural disturbance patterns. New disturbance patterns may form causing a shift in habitat conditions that had not been previously exhibited. In response to the changes, fish species may not be able to adjust to the new habitat conditions, which can eventually lead to depressed or extinct populations of fish.

Alterations to hydrologic, geomorphic, and vegetative processes can affect egg to fry survival, juvenile survival, smolt production, adult spawning and holding requirements, behavioral patterns, allochthonus material input, food chain dynamics, and ultimately species survival.

Wildlife: Timber harvest, fire suppression and human disturbance have attributed to the major changes in wildlife habitat and local populations. Within the forested habitat, timber harvest has further fragmented dispersal habitat and suitable habitat. Removal of snags and limited retention in harvest units has affected snag cavity dependant wildlife species. Open harvest units temporarily increased the amount of forage for browsing species. Fire suppression allowed dense understory growth of

shade tolerant fir species, affecting movement of avian predators, changing the tree species composition and increasing the possibility of catastrophic fires. Within oak woodlands fire suppression has possibly reduced the mast producing capabilities of the mature oaks, affected the browsing of sprouting oaks, and increased the possibility of catastrophic fire within important fall/winter deer habitat. Chaparral habitats and grassy glades are also expected to be less palatable for deer with the absence of fire. The mosaic of chaparral seral stages may also be disappearing along with important browseways, small mammal populations, and native shrub dependant bird species. Human disturbance of the peregrine eyrie may be the key to why reproduction has not been recorded for the last six years. Falconers were responsible for fledgling removal in the 1980's and may be active again.

Key Questions Addressed

What are the goals for deer in this watershed, and what are the critical limiting factors to attaining these goals?

The goals for deer are to:

- Improve mast production,
- Provide browse in the form of oak sprouts, new growth on chaparral, and grasses/forbs, especially along migration routes,
- Create browseways through plantations
- Maintain cover along north facing slopes
- Identify migration corridors
- Improve upon the ability to assess deer habitat needs.

The ability to reintroduce fire so that it would be cost effective, safe and effective would be the limiting factor to improving foraging conditions. Marrying deer forage needs with fuelbreaks is one way to improve upon the forage found with chaparral habitat. Fuel reduction of the stands and then allowing fire within oak stands would be more cost effective as would burning south facing chaparral habitat.

Before burning is implemented, identifying migration corridors and improving the vegetation layer for chaparral and oak habitats is needed. The CA Dept of Fish and Game may have already identified migration corridors for the updated management plan. If not, partnership with CA Dept of Fish and Game would reduce the cost, time, and improve the ability to properly identify important migration corridors. Also, by identifying these corridors efforts to improve habitat can be focused and meaningful.

Improving the vegetation layer would also improve the Forest's ability to properly identify areas requiring management and meet the overall goals of improving deer habitat, not just habitat we think the deer use. The time commitment could be the limiting factor, though the commitment time for analysis and field verification is expected to be around two weeks. Updating the vegetation layer as well as analyzing the habitat using the new parameters could take another one to two weeks. The time spent, though, would provide years of important qualitative data for habitat improvement and could be shared with other agencies interested in the welfare of deer.

The creation of browseways within plantations is expected to be more readily applied within matrix lands than in LSRs or other reserves. If maintaining at least 30% of the browse well distributed throughout the plantation or as strips of 16-24 feet is acceptable, then meeting the

browseway goal is attainable. Providing browseways in both prescription lands would be desirable, but again LSRs have no timber funds to support such manipulation, and this is expected to be a limiting factor.

What areas in the chaparral habitat are most important for fisher?

This watershed analysis was not able to identify specific areas. With improvement of the vegetation layer for chaparral and oak woodland as proposed in Key Q#1, these areas could be identified. The main question is what type of use is the chaparral receiving and by what type of fishers? Again, this could not be identified in this WA. To determine the use patterns would require surveys using track plates and even observation of heavily used areas. The need to expend time and money on this does not seem justified since chaparral and oak woodland habitat are not expected to be manipulated unnaturally. Also, the fisher's primary habitat of late-successional habitat is expected to provide for the viability of the local population. Maintenance of the forest, chaparral, oak woodland interface, though, would allow for the fisher to continue utilizing the chaparral habitat and is something could be accomplished though awareness and proper management.

What areas in the chaparral habitat are most important for the peregrine falcon, and how is this area providing for the foraging needs of the falcon?

Again, as for Key Q#2, this question could not be answered definitively in this watershed analysis. Once the vegetation layer is updated for the chaparral and hardwood habitats, as proposed in Key Q#1 & 2, then the data can be analyzed to quantitatively answer this question. In addition to the improvement of the vegetation layer, observations of foraging behavior need to occur so that the foraging areas can be identified. With these two pieces of information efforts can be concentrated and maximized when improving peregrine foraging habitat. But is foraging habitat a limiting factor? In 1983 and 1984 the eyrie was raided and in 1991 was suspected of being raided. The peregrines may be successfully laying and hatching young, but once raided, reproduction is not seen by the researchers and hence not recorded. If this is the case, then foraging habitat would not be the limiting factor and no improvements would be crucial at this time. Identifying the foraging habitat is still important so that management of the eyrie can be more accurate and any changes in foraging could be monitored for the time when foraging may become a limiting factor.

What percent of the "capable" ground is currently in old growth/late successional status?

Only 9% of the capable lands in the watershed are old growth, though another 16% is considered late-successional. As mentioned in Step 3, the 15% retention requirements of late-successional habitat within the watershed is currently met through the LSR, Congressionally Reserved Area (CR), riparian reserves and owl cores. Outside these reserves 10% late-successional and an unknown percentage of old growth is present. Most of the old growth exists along the Middle Fork Beegum Creek. Within the reserves the LSR and CR contain the rest of the old growth. This habitat is fragmented by plantations.

Where and why is dispersal habitat a concern in the watershed?

As discussed in Step 3 under 'Wildlife: Dispersal Habitat', dispersal habitat is considered to be a concern within the northwestern portion of the Snake Lake ecological unit because of fragmentation, natural and man caused and the need to maintain dispersal between LSRs. Dispersal habitat within this part of the watershed is fragmented by harvest units and pockets of naturally open forested stands. This section of the watershed, though, contains the best dispersal habitat, between LSR RC-331 to the north and LSR RC-330 to the south, found in either this or the adjacent watersheds to the west. Maintaining dispersal between these two LSRs will enable populations of late successional dependant wildlife species to exchange genetically, reducing the chance of one or both of the LSRs from becoming genetic islands. Also, dispersal habitat, ideally found adjacent to late-successional habitat in riparian reserves, will enable outliers (animals pushed out of an already occupied area) to survive until they are able to reenter the LSRs (when the LSRs become 'saturated').

The other section of the Snake Lake EU found between the Round/N. Star (C) and North Yolla Bolly EUs also contains fragmented dispersal habitat. This area is important for dispersal of owls from AC 847 and 817 south into LSR RC-330. Improvement of dispersal habitat within both areas will also benefit many other wildlife and plant species.

Where and why is suitable California red-legged frog habitat a concern in the watershed?

The California red-legged frog is a concern in the watershed because of its current status, unknown current distribution and effect on proposed management activities. The concern regarding this species is not the condition of the habitat, but their current status and the limited knowledge regarding their current distribution. The Beegum watershed is within their historical distribution, but there are no documented sightings. Though California red-legged frogs may not occur within this watershed anymore, without surveys of habitat and for frogs, the assumption must be made that they do occur. This assumption will affect timber sales, habitat restoration and other projects proposed in the watershed.

So, preliminarily, areas within the watershed where the California red-legged frog habitat is considered a concern include the major creeks, perennial tributaries and ponds found below 4500' feet. These would include, but not be limited to; North Fork Beegum Creek, Middle Fork Beegum Creek, South Fork Beegum Creek, Pole Corral Creek, Little Red Mountain Creek, Dutchman Gulch, Post Creek, and Snake Lake. The bullfrog population at Snake Lake is a concern because it may facilitate the spreading of bullfrogs into other stream/pond systems, further reducing the populations and suitability of habitat for red-legged frogs and other native frog species and small aquatic reptiles. Regarding the creeks listed, sales which may be affected include See Horse and OK Corral. Unless surveys of the habitat and/or for frogs are conducted or U.S. Fish and Wildlife Service gives the go ahead, a limited operating period would be imposed for some of the units.

HUMAN USES: What are the causes of change between historical and current human uses? What are the influences and relationships between human uses and other ecosystem processes?

Heritage: Clearly, human uses in the Beegum area have changed dramatically since the earliest occupation over 8,000 years ago. These changes were the

result of the relative abundance and diversity of resources which fluctuated with climatic changes, as well as the nature and needs of the human populations. Prior to industrial forestry, humans had limited, but broad-scale influence on the landscape. Fire was the primary tool used by American Indians to enhance foraging and wildlife habitat. Initial Euro-american use of the land was through grazing which further altered vegetation and wildlife patterns. In the last fifty years, timber management has been the dominant factor of change.

In the last 30 yea, s Federal laws have mandated management of historical resources to identify, protect, and enhance their value. Under this direction, certain areas of Beegum have had extensive archaeological survey. Most of this work was generated by timber sale undertakings. However, much of the watershed has not been surveyed for heritage sites. Of those sites that have been recorded, most have not been evaluated for eligibility to the National Register of Historic Places.

American Indian Tribal Uses: For up to 8,000 years American Indian peoples lived within and utilized the Beegum watershed. Around the 1830's Euro-american fur traders brought into Trinity County the first wave of major cultural change. This event brought disease, violent conflict, and forced removal from ancestral lands. This initial contact decimated and extinguished many Indian tribes. Ancestors of those which survived face the ongoing challenge in this century of maintaining their cultural heritage, while increasing their role in the American economic and social system.

Today the Nor-El-Muk Wintu no longer depend on local resources for subsistence. They, however, still look to areas like the Beegum watershed to maintain and revive their traditional cultural practices.

Recreation: There has been little change in recreational use of the Beegum watershed other than an increase in the number of recreationists. Recreation is dispersed and generally confined to the roads and jeep trails. Based on the numbers and dispersal of recreationists, their influence on the landscape is minimal. Their greatest impact is probably the increased risk of fire.

Economic/Social: In recent history, the greatest change has been the economic downturn in the timber industry. The reduced harvest level on public lands due to various resource concerns (primarily old growth dependent species) has hurt the local economy and impacted local communities and social systems. The trend of ever-decreasing timber outputs on national forest land in this area seems to be turning around with the passage of the President's Forest Plan. In this plan, approximately 1/3 to 1/2 of the Beegum Watershed is designated in land allocations where timber harvest is allowed, if not emphasized.

Transportation: Beyond the foot paths and wagon trails, the transportation system in this area grew mostly between the 1920's and 1980's as part of the timber harvest activities. Recently, the trend has been for little new road construction due to reduced harvest levels, and a decrease in road maintenance due to declining budgets. Despite decreased road maintenance, road conditions overall remain good. However, isolated areas of surface erosion are a concern to water quality.

Step 6: RECOMMENDATIONS

In this step, recommendations are developed to meet management objectives and move the landscape from current toward desired conditions. The recommendations are based on the results of the previous steps.

Three sets of recommendations are provided in this step:

1. **Priority recommendations:** are based on the primary dysfunctions identified in Beegum, as well as the management objectives identified for this watershed analysis (timber production, wildlife (deer habitat) management, and fuels management).

2. **General recommendations:** are additional recommendations (listed under Timber, Wildlife, and Fire/Fuels) to meet the management objectives.

3. **Miscellaneous recommendations:** are not specific to meeting the three management objectives, but identify other resource concerns, data gaps, and possible mitigation measures to be considered during project development.

PRIORITY RECOMMENDATIONS:

Four primary dysfunctions were identified in Beegum that relate to the management objectives for this watershed analysis. Integrated recommendations were developed to address each of these dysfunctions and move the watershed toward the desired conditions. In developing recommendations to address each dysfunction, consideration was given to: 1) Where does the situation exist? 2) What can we do to improve the situation, and how can this recommendation integrate or link with other opportunities? 3) Are there any conflicts between the recommendation and other resource concerns, and if so, can they be mitigated? Each of the dysfunctions, followed by the recommendations addressing it, are listed below.

1. Northern spotted owl dispersal habitat conditions.

   The need for maintenance/enhancement of dispersal habitat is greatest between LSRs and Activity Centers. This can be accomplished by identifying key dispersal corridors, primarily along riparian reserves, and using vegetation management (plantation thinning and thinning from below) to enhance these areas. Other wildlife species would also benefit from the maintenance of this dispersal habitat. Potential conflict exists with timber management direction in the matrix land allocation that lies within identified dispersal corridors.

   Recommendations: Buffered riparian reserves, at least 1/4 mile in width, are recommended to meet dispersal habitat needs (see map, Appendix II - 12). Corridor #1 (two segments) currently provides the best dispersal habitat, and owl movement within the northern segment has been documented. Corridor #3 does not currently meet dispersal conditions, but is capable of attaining them. Corridor #2, in conjunction with the northern segment of corridor #1, currently provides an important linkage for owls and other late successional species between the two LSRs bordering the watershed. Corridor #3, once it attains dispersal conditions, will also provide this linkage in conjunction with corridor #2.

Maintain and enhance corridors #1 and 2 with plantation thinning and commercial thinning activities. GTR is not recommended within these buffers until corridor #3 can function as dispersal habitat in approximately 40 years. Develop corridor #3 into functioning dispersal habitat. Defragment this corridor using the top down approach (see following discussion). GTR is the recommended treatment. GTR is appropriate within the buffer, with residual trees "feathered out" from the riparian reserve. Once corridor #3 develops into functioning dispersal habitat, continue to maintain all 3 corridors for dispersal. At this point in time, the location of the buffer can be adjusted somewhat in any of the three corridors, if needed to meet timber management objectives. The buffer can be along both sides of the riparian reserve or one side of the riparian reserve or the other. Areas where both sides are buffered are recommended as a transition for areas where alternate sides are buffered. The flexibility provided by "floating" the corridor around the riparian reserve will open up previously deferred acres to timber management opportunities.

Other corridors shown on the map, but not numbered, are important for movement between high priority corridors, or along drainages where movement between forested habitat and oak woodland/chaparral habitat is expected. Overall, these unnumbered corridors are lower priority for management.

The potential conflict with timber management within the buffers is avoided in the long term by allowing the dispersal corridors to "float" around the riparian reserves. In this way, acres that provide for dispersal during one entry, may become available for timber management in another entry.

2. Fragmentation resulting from timber harvest activities.

Harvest induced fragmentation is greatest in the Pole Corral, Upper Middle Fork Beegum, Upper South Fork Beegum, and Corral subwatersheds. Reducing fragmentation can be accomplished through vegetation management in natural stands and plantations. There are two approaches to defragmenting the landscape: from the top down, and from the bottom up. Defragmenting from the top down can be accomplished by harvesting (GTR) natural stands between and around plantations to create larger areas of consistent landscape pattern. Defragmenting from the bottom up can be accomplished by thinning natural stands and plantations to enhance growth, so they attain the characteristics of the surrounding stands sooner. Potential conflicts exist with dispersal habitat and cumulative watershed effects concerns.

Recommendations: In the four subwatersheds listed above, outside the recommended dispersal corridors, manage timber to reduce fragmentation using both the top down and the bottom up approaches (see map, Appendix II - 13). The map indicates the predominant treatment for a given area, but various prescriptions may be appropriate within each area. GTR (from the top down) is recommended in isolated, highly fragmented stands in Pole Corral, Upper Middle Fork Beegum, and Corral. Change these fragmented areas from small "patch" elements to larger "matrix" elements, generally 60 to 100 acres. There are also opportunities for commercial thinning in Upper Middle Fork Beegum and Corral. In the Upper South Fork Beegum subwatershed, defragmentation is recommended using the bottom up approach only, because this area lies within LSR. Here, commercial and precommercial thinning is recommended.

The potential conflict with dispersal habitat concerns is avoided by following the dispersal corridor recommendations listed above.

Defragmenting from the top down may further impact marginal dispersal habitat, but in the long run, less fragmented landscapes will result providing better dispersal habitat overall.

The potential conflict with cumulative watershed effects exists, especially in areas where the top down approach is used. Cumulative watershed effects may be a limiting factor in some subwatersheds for the amount of area treated. Mitigation measures (e.g., road surfacing or road closure) are recommended to minimize cumulative watershed effects when feasible.

3. Overstocking (including oak woodlands) and altered plant communities due to fire suppression and unnatural fire regimes.

Most overstocked mixed conifer stands are in the Upper Middle Fork Beegum, Upper South Fork Beegum, and Corral subwatersheds. Overstocked oak woodlands are scattered throughout the front country. Reduced stocking can be accomplished with thinning from below. Reintroduction of fire into the ecosystem may also be utilized. Treating overstocked stands could also address timber management, fire/fuels, botanical and wildlife concerns. No potential conflicts were identified.

Recommendations: Thin overstocked stands to enhance growth, improve mast production in oak woodlands, and reduce fire/fuel concerns. Also, consider low-intensity prescribed fire as a tool to reduce or prevent overstocking and fuel buildup (see Fire/Fuels in the General Recommendations section).

4. Decadent shrub communities: a concern for both fire/fuels and deer habitat management.

Decadent shrub conditions are scattered throughout the front country and are usually worse on south facing slopes. Creating a mosaic of chaparral seral stages can be accomplished with prescribed fire or mechanical treatment. Potential conflicts exist with water and air quality concerns.

Recommendations: Create seral stage mosaics in the decadent shrub communities. Priority areas for treatment have been identified (see map, Appendix II - 14). Prescribed fire is recommended over mechanical methods, because it can be less ground disturbing, more economical, and does not require residual fuel treatment. For wildlife, 10 to 20 acre openings are preferred, but 40 to 60 acre openings best meet fire/fuels objectives. The larger openings are not detrimental to wildlife, but much of the resulting forage would go unutilized. Fluctuate opening sizes to meet both objectives, and locate openings around perimeters of decadent shrub fields. For wildlife, 40% in early seral stage (< 3 years old) is recommended. Therefore, treat 300 to 400 acres per year on south facing slopes, and 100 to 200 acres on north facing slopes. Spring burns are best to promote palatable species, while fall/winter burns are better for chamise and annuals. Alternate timing in adjacent areas. Keep fire out of perennial stream Riparian Reserves.

Potential conflicts with water quality concerns have been avoided by recommending fire over mechanical treatment, and recommending fire be kept out of perennial Riparian Reserves.

Potential conflicts with air quality exist, especially considering the stringent standards of the Class I Airshed of the Yolla Bolly-Middle Eel Wilderness. Windows of opportunity for burning will be limited, and close cooperation with the Air Quality Management District is needed.

GENERAL RECOMMENDATIONS:

Timber (by ecological unit):

In some cases, timber recommendations in this section reiterate those discussed in the Priority Recommendations listed above. **Minimizing harvest induced fragmentation is desired throughout the watershed.** Therefore, harvest opportunities identified in this section should also be designed to meet this objective. Where regeneration harvest is recommended, cluster harvest units to meet the desired landscape pattern consistency over 60 to 80 acre areas.

1. **Snake Lake Unit.** This unit has the largest number of available net CAS acres within the Beegum Assessment area. A preponderance of opportunity is in 3P and 3S stands, mostly within the Jeffrey pine type. Currently, many of these stands are two-storied with a moderately to well-developed second layer of advanced conifer, mostly Jeffrey pine, regeneration. Opportunity exists to harvest a portion of the overstory layer to enhance second layer development ("modified overstory removal"), and to provide stocking control of second layer. This would provide for current commodity yield, and improve stand vigor, resistance to damaging agents, and enhance development of dispersal habitat.

   Recommended dispersal corridors traverse this ecological unit. Provide for the development or maintenance of dispersal habitat conditions within or adjacent to these corridors as recommended in Priority Recommendation #1. Vegetation management opportunities consistent with this objective include precommercial thinning of mixed conifer plantations (XUX, XX1, XX2, or XX3), commercial thinning of over-stocked mixed conifer, true fir, and ponderosa pine stands (2N, 2G), and modified overstory removal/precommercial thinning in Jeffrey pine and ponderosa pine stands (3S, 3P).

   The Pole Corral Creek and Tedoc subwatershed areas of the Snake Lake Unit provide regeneration opportunities from a cumulative watershed effects (CWE) perspective. Identify isolated, highly-fragmented stands as the highest priority for regeneration treatment. Understocked stands, indicated by 3S, 3P, 4S, 4P, are also priority candidates for regeneration treatment.

2. **Round/North Star (North) Unit.** This unit has limited available net CAS acres. A preponderance of opportunity is in 3N and 3G stands, which include treatment areas identified within the Seebasin Environmental Assessment.

   One of the recommended dispersal corridors traverses this assessment unit. Provide for the maintenance and enhancement of dispersal habitat conditions within or adjacent to this corridor. Vegetation management opportunities consistent with this objective include precommercial thinning of mixed conifer plantations (XUX, XX1, XX2, or XX3), commercial thinning of over-stocked mixed conifer, true fir, and ponderosa pine stands (2N, 2G), and modified overstory removal/precommercial thinning in Jeffrey pine and ponderosa pine stands (3S, 3P).

   The North Fork Beegum subwatershed area of the Northern Round/North Star Unit provides for regeneration opportunities from a cumulative watershed effects (CWE) perspective. Identify isolated, highly-fragmented stands as

the highest priority for regeneration treatment. Understocked stands, indicated by 3S, 3P, 4S, 4P, are also priority candidates for regeneration treatment.

3. **Noble Ridge Unit.** This unit has very limited available net CAS acres within the Beegum Assessment area. A preponderance of opportunity is in 3P and 3S stands, mostly within the Jeffrey pine type. In general, these stands are isolated, with very limited accessibility. Opportunity exists to harvest a portion of the overstory layer to enhance second layer development ("modified overstory removal"), and to provide stocking control of second layer. This would provide for current commodity yield, and improve stand vigor, resistance to damaging agents, and enhance development of dispersal habitat.

   One of the recommended dispersal corridors traverses a very narrow band of this assessment unit. Provide for the maintenance and enhancement of dispersal habitat conditions within or adjacent to this corridor. Vegetation management opportunities consistent with this objective include modified overstory removal/precommercial thinning in Jeffrey pine and ponderosa pine stands (3S, 3P).

4. **Little Red/Tedoc Unit.** This unit contains a moderate level of available net CAS acres within the Beegum Assessment area. A preponderance of opportunity is in 3P and 3S stands, mostly within the Jeffrey pine type. Currently, many of these stands are two-storied with a moderately to well-developed second layer of advance conifer, mostly Jeffrey pine, regeneration. Opportunity exists to harvest a portion of the overstory layer to enhance second layer development ("modified overstory removal"), and to provide stocking control of second layer. This would provide for current commodity yield, and improve stand vigor, resistance to damaging agents, and enhance development of dispersal habitat.

   Cumulative watershed effects (CWE) of analyzed subwatersheds within this unit do not independently limit regeneration harvest opportunity. However, there are very few vegetation conditions conducive to GTR regeneration opportunity. 3N stands near Rat Trap Ridge provide the best indicator of this opportunity.

5. **Dutchman Unit.** This unit contains a very limited level of available net CAS acres within the Beegum Assessment area. A preponderance of opportunity is in 3P and 3S stands, mostly within the Jeffrey pine type. Currently, many of these stands are two-storied with a moderately to well-developed second layer of advance conifer, mostly Jeffrey pine, regeneration. Opportunity exists to harvest a portion of the overstory layer to enhance second layer development ("modified overstory removal"), and to provide stocking control of second layer. This would provide for current commodity yield, and improve stand vigor, resistance to damaging agents, and enhance development of dispersal habitat. Dwarf mistletoe infection in ponderosa and Jeffrey pine stands is high to very high, which may limit overstory removal opportunity.

   Cumulative watershed effects (CWE) of analyzed subwatersheds within this unit do not independently limit regeneration harvest opportunity. However, there are very few vegetation conditions conducive to GTR regeneration opportunity. 3N stands near Tedoc Mountain provide the best indicator of this opportunity.

6. **Round/North Star (Central) Unit.** This unit contains the second highest number of available net CAS acres within the Beegum Assessment area. A preponderance of opportunity is in 3P, 3N and 3G stands.

   Where recommended dispersal corridors traverse this assessment unit, provide for the development or maintenance of dispersal habitat conditions within or adjacent to the corridors. Vegetation management opportunities consistent with this objective include precommercial thinning of mixed conifer plantations (XUX, XX1, XX2, or XX3), commercial thinning of over-stocked mixed conifer, true fir, and ponderosa pine stands (2N, 2G), and modified overstory removal/precommercial thinning in Jeffrey pine and ponderosa pine stands (3S, 3P).

   The Pole Corral Creek and Corral Creek subwatershed areas of the Round/North Star (Central) Unit provide for regeneration opportunities from a cumulative watershed effects (CWE) perspective. Identify isolated, highly-fragmented stands as the highest priority for regeneration treatment. Understocked stands, indicated by 3S, 3P, 4S, 4P, are also priority candidates for regeneration treatment.

   The Round Mountain subwatershed has been impacted by recent regeneration harvest activity, and should be considered for regeneration entry later in the planning period, or considered for lesser impact silvicultural activities.

7. **Round/North Star (South) Unit.** This unit has limited available net CAS acres within the Beegum Assessment area. A preponderance of opportunity is in 3N and 3G stands.

   The Post subwatershed area of the Southern Round/North Star Unit has very limited regeneration opportunities from a cumulative watershed effects (CWE) perspective. Identify isolated, highly-fragmented stands as the highest priority for regeneration treatment.

8. **North Yolla Bolla Unit.** This unit has essentially no available net CAS acres within the Beegum Assessment area. A preponderance of opportunity is within the Late Successional Reserve, and therefore, defragmenting from the bottom up is recommended (see Priority Recommendation #2). Vegetation management opportunities consistent with this objective include precommercial thinning of mixed conifer plantations (XUX, XX1, XX2, or XX3), commercial thinning of over-stocked mixed conifer, true fir, and ponderosa pine stands (2N, 2G), and modified overstory removal/precommercial thinning in Jeffrey pine and ponderosa pine stands (3S, 3P).

Timber (General):

1. **Regeneration Opportunities on Understocked CAS Sites.** Conduct site-specific analysis of under-stocked stands which may be suitable for regeneration harvest on suitable (CAS) lands through the development of silvicultural prescriptions. Indicators of stand conditions which may be candidates include size/density stands of 3 S or P, or 4 S or P. Subwatersheds currently deficient in connectivity habitat may be priority for treatment.

2. **Thinning Opportunities on Overstocked Young Growth CAS Sites.** Conduct site-specific analysis of well-stocked stands which may be suitable for intermediate (thinning) harvest on suitable (CAS) lands through the

development of silvicultural prescriptions. Indicators of stand conditions which may be candidates include size/density stands of 2 N or G. Thin overstocked stands to restore vigor and prevent mortality. Many mature stands in the watershed are beyond the natural range of variability in carrying capacity due to fire suppression and the subsequent encroachment of a shade tolerant understory. This has led to conditions of low vigor, resiliency to stressors and excessive mortality.

3. **Regeneration Opportunities on CMAI CAS Sites.** Conduct site-specific analysis of stands which may be suitable for regeneration harvest on suitable (CAS) lands which have culminated mean annual increment (CMAI) through the development of silvicultural prescriptions. Indicators of stand conditions which may be candidates include size/density stands of 3 N or G, or 4 N or G.

4. **Plantation Thinning Opportunities** Conduct site-specific analysis of plantations which may be suitable for stocking-control (thinning) through the development of silvicultural prescriptions. Indicators of stand conditions which may be candidates include size/density stands of UX or XUX. Subwatersheds currently deficient in connectivity habitat may be priority for treatment.

5. **Ponderosa Pine/Jeffrey Pine Thinning Opportunities.** It is recommended that ponderosa and Jeffrey pine stands be thinned to reduce the probability of successful bark beetle group kill. Older stands should be thinned, while younger stands could be managed through a combination of thinning and underburning. These treatments may be integrated with fuels reduction activities to achieve mutual benefits. In areas where the sudden death of a group of pine has resulted in the accumulation of unacceptably high levels of fuel, the risk of mortality can be lowered by thinning. Thinning pine stands will reduce the probability of a successful Dendroctonus group kill by both increasing the amount of soil moisture available to each leave tree, as well as by increasing the spacing between leave trees to the outer limits of effectiveness of the aggregating pheromone. The only reliable and effective method to thin existing stands of thick-barked mature pines is to mechanically cut some trees. Prescribed fire can be used to open up some very young pine stands, or to maintain an open condition in an older pine stand after it has been thinned.

6. **Sugar Pine Enhancement Opportunities.** Locating resistant parent trees and outplanting resistant stock are critical to maintenance of sugar pine at or near historical levels in Beegum watershed. Other management activities such as pruning and localized Ribes removal may be used in stands where only non-resistant sugar pine are available and it is desired to recruit sugar pine as a part of the future overstory. Although sugar pine will not disappear from the watershed, without some actions to protect it and promote regeneration of resistant trees its demographics will change as immature trees will not be available to move into mature and overmature age classes.

Wildlife

1. 100 acre core areas around northern spotted owl activity centers: Officially, only activity center (AC) 817 is required to have a 100 acre core, based on the 1992 protocol definition (pair or territorial single). However, it is recommended that cores be designated around ACs 829 and 847,

based on their past history and the possibility that undocumented pairs may exist at these sites.

2. Maintain, protect or improve suitable habitat found within the 1.3 mile spotted owl territories until the LSRs are determined able to absorb and provide for these owls.

   Owl activity centers have been prioritized for improvements/maintenance of suitable habitat, based on their current and historical status. Owl ACs 817, 827, 821 and 820 are top priority, because each has had a pair with reproductive status within the last four years. Of these, the ACs which are outside the LSR may be considered of higher 'risk' because of the potential for future timber sales in the AC. The more fragmented the habitat the less suitable the habitat, the more the owl is impacted. AC 829 is second priority, because of its single status and its use is documented to occur also outside the WA. AC 847 is third priority, because of its single status and lone detection in 1994. ACs 830 & 813 are fourth and fifth priorities, because the activity center cores and most of the owl activity are located outside the watershed.

   LSR assessments have not be conducted for the LSRs to the north and south of Beegum. Until the LSRs are determined capable of providing for the activity centers currently located outside the LSRs, maintenance of these activity centers for reproductive capability is essential. In addition, as the LSRs become functional, the activity centers could be important in contributing to the population's viability, and in bringing the LSR up to its required capacity (if it isn't already).

3. Plantation release: Enhance plantation growth, create browseways for deer.

4. Thinning within riparian reserves: Enhance late-successional habitat, improve dispersal habitat, reduce fragmentation.

5. Thinning in plantations and other non-suitable stands: reduce fragmentation of LS habitat within owl home ranges, reduce risk of catastrophic fire to activity centers, and improve dispersal habitat.

6. Thinning in suitable habitat outside activity center 1.3 mile boundaries: reduce risk of catastrophic fire to activity centers, reduce harsh edge by feathering between suitable habitat within the 1.3 mile boundary and GTR units outside the boundary.

7. Retain dispersal habitat alongside riparian reserves: improve dispersal habitat, protect riparian reserve habitat.

8. For timber harvest units: maintain interior forest by harvesting from the outside of habitat in or by harvesting near existing openings; concentrate GTR along periphery of units to provide feathering.

9. Snag management: retain snags and recruitment trees as described in Step 3.

10. Underburning within riparian reserves: After initial reduction of fuel loading through thinning, within AMAs first, enhance LS habitat, improve dispersal habitat, reduce fragmentation.

11. Establish fuelbreaks: protect LSR from catastrophic fire from outside or within the LSR.

12. Manage bullfrog population in Snake Lake: Consult with USFWS regarding opportunities (drain lake, drop culvert, poison, etc).

13. Survey for California red-legged frog: determine habitat suitability or presence within major suitable creeks which would be affected by future timber harvesting (e.g. Middle Fork Beegum Creek).

14. Survey for western pond turtle: determine presence/absence in habitat currently and potentially disturbed by cattle, recreation, bullfrog populations, or timber harvesting (e.g. Boy Scout Camp, Snake Lake, water holdings).

15. Survey for Northern spotted owl: survey suitable habitat (areas potentially affected by timber harvest a priority), historical activity centers (a priority) to facilitate future consultation, monitor harvest activities on owls, and monitor the functionality of the LSR.

16. Survey for migration corridors: determine migration/dispersal corridors for N. spotted owl and black-tail deer to facilitate placement of habitat improvement projects.

17. Thinning within oak stands: reduce fuel loading, encourage sprouting, improve the habitat for mature oaks, improve mast production. Work together with CA Dept Fish and Game to ensure correct application of this recommendation.

18. Underburning within oaks stands: After fuelwood loading is reduced; to encourage sprouting, improve the habitat for mature oaks, improve mast production. Work together with CA Dept Fish and Game to ensure correct application of this recommendation.

19. Burn in chaparral: create mosaic of seral stages, enhance browse, reduce fuels. Target chamise-first and experiment with different prescriptions.

20. Update LMP90 vegetation layer: provide seral stage breakdowns for chaparral and hardwood habitats using aerial photos; provides the ability to properly assess needs of wildlife species utilizing these habitats (fisher, deer, peregrine falcon, NTMBs) and determine project areas.

21. Survey for wildlife species: conduct general surveys to improve knowledge of wildlife species utilizing the Little Red/Tedoc and Dutchman ecological units, especially NTMBs and eagles.

22. Survey/Monitor peregrine falcon eyrie: determine if fledgling theft is occurring, determine main foraging areas for future enhancement.

23. Survey for Northern goshawks: determine status of possible nest site.

Fire/Fuels

1. Continue construction of ridgetop shaded fuelbreak system. Recommended priorities for new construction have been identified (see map, Appendix II-15).

2. Perform maintenance on existing fuelbreak system as needed.

3. Reintroduce low-intensity fire to the watershed. (Ridgetop fuelbreaks and existing roads can be used as primary control lines).

4. Underburning of the timberlands and mosaic burning in the "Front Country" brushlands.

   In timberlands underburning would begin from ridgetops, contouring down slope, with various width strips being burned annually. (Widths of strips will be determined by site-specific difficulty ratings). Some pre-treatment maybe required, such as understory removal and/or mechanical removal of high dead/down fuels, etc. Initial underburning is recommended within AMA areas of the watershed.

   In the chamise and mixed chaparral brushlands, burning would be used to create a mosaic effect across the brushfields. Coordinate chaparral burning with adjacent private landowners and appropriate State and Federal Agencies to optimize multi-resource & multi-agency benefits. Selection and prioritization of areas will be guided by the following LMP criteria:

   1) the effectiveness of producing multi-resource benefits benefits through modification of the specific vegetation associations;
   2) the cost effectiveness of the project;
   3) the degree of fire protection provided by conversion;
   4) the risk to watersheds; and
   5) the natural fire regime.

5. Plantation Protection (from wildfire): Thin plantations to Silvicultural Rxs, and treat created slash to Regional specifications. Establish firelines and/or fuelbreaks around plantations or groups of plantations.

6. Prepare a Late Successional Reserve Fire Plan.

7. Perform a comprehensive fuels inventory on all proposed projects sites, prior to and following project implementation. Inventories will be used as part of a monitoring plan as well as mandatory requirements for burn plans.

8. Prepare a monitoring plan (integrate with other specialties when possible).

9. Treat activity fuels to F.S.M. 5150 requirements on all vegetation manipulation (including timber sales) projects within the Beegum Watershed.

10. Treat natural fuels in the following order of priority: 1.) public safety; 2.) high investment situations (structural improvements, powerlines, plantations, etc.); 3.) known high fire occurrence areas; and 4.) coordinated resource benefits, i.e. ecosystem maintenance for natural fire regimes.

MISCELLANEOUS RECOMMENDATIONS:

Fisheries/Hydrology

1. Recommendation for Assessment of Proposed Management Practices within Riparian Reserves: The Record of Decision for the Northwest Forest Plan specifies that "Watershed analysis will identify critical hillslope, riparian and channel processes that must be evaluated in order to delineate Riparian Reserves that assure protection of riparian and aquatic functions. Riparian Reserves are delineated during implementation of

site-specific projects based on analysis of the critical hillslope, riparian and channel processes and features." (B-13)

It is further stated that "The prescribed widths of Riparian Reserves apply to all watersheds until watershed analysis is completed, a site-specific analysis is conducted and described, and the rationale for final Riparian Reserve boundaries are presented through the appropriate NEPA decision-making process." This is not the case on the Shasta-Trinity National Forests. In the Forest LRMP, widths for Riparian Reserves are based on guidelines presented on page C-30 of the ROD, and those lands are actually allocated to Riparian Reserves. Therefore, setting the criteria for determining the width of Riparian Reserves is a moot issue, however, identification of the type of stream channel or wetland, the agreement of site tree height, the identification of potentially unstable and highly unstable lands and prescription of activities which are deemed appropriate within them remains an issue.

This WA has analyzed the critical hillslope, riparian and channel processes for each of the different Ecological Units. It is recommended that we use that knowledge at the site scale, to set the specific Riparian Reserve boundaries, based on the local conditions such as site trees and geomorphology, and evaluate practices or activities proposed within or adjacent to them. There should be no intent to reduce the boundaries widths, as described within the Forest LRMP. As described above, practices proposed within Riparian Reserves should be analyzed at the site-specific project level and that consistency with the Aquatic Conservation Strategy objectives and analysis of effects be performed through the appropriate NEPA decision-making process.

2. Evaluate ephemeral stream function on an ecological unit basis to assess the potential for controlled burning, fuels reduction or timber harvest suitability. Road crossings proposed during future management activities would be assessed at the NEPA level. Any future crossings should have to ability to handle 100 year storm events.

3. Exclude any GTR or additional road building within the Post Creek sub-watershed over the next decade due of the relatively high ERA levels which presently exist.

4. Consider excluding additional road building within the Round Mt. and Upper MF Beegum subwatersheds due to relatively high road densities and ERAs. Limit road building activities within the Corral subwatershed to not more than 5.0 linear miles of road based on potential for cumulative watershed effects for Corral Creek.

5. Limit timber harvest and fuels reduction activities within the Round Mt. subwatershed to low disturbance level, short duration projects, and those silvicultural treatments aimed at increasing the health and growth of managed stands due to relatively high existing disturbance levels.

6. In the Pole-Corral subwatershed, limit GTR opportunities to 400 acres per decade. Limit additional road building activities to no more than 4.0 miles based on potential for cumulative watershed effects for Pole-Corral Creek.

7. In the MF Beegum subwatershed, limit GTR opportunities to 200 acres per decade based on potential for cumulative watershed effects for Middle Fork Beegum Creek. Look for silvicultural treatments aimed at increasing the

health and growth of managed stands due to relatively high disturbance levels.

8. Look for opportunities for road maintenance, including surface drainage, surface treatments and culvert upgrades with timber harvest plans and other proposed projects. Specifically, survey roads 28N10, 28N64, 28N32, 28N13, 28N36, 28N29, 28N68, 28N39, and 28N14.

9. Work with transportation planners to locate roads which could be closed or obliterated. Prioritize road closure or obliteration within Upper Middle Fork Beegum, Round Mtn., Post Creek and Corral watersheds. Focus on the level one roads for closure or obliteration. Include pipe removal or upgrades within these closed roads as appropriate.

10. Improve or reconstruct water-bars during fuel break maintenance.

11. For any prescribed burning in the lower Beegum watershed, construct firelines outside of the perennial stream component of the Riparian Reserves to prevent fire from burning out these relatively narrow and sensitive riparian areas.

12. Establish water quality monitoring plans for the Beegum watershed. There has been little quantitative water quality data collected in this area. Although water quality appears to be good, trends in water quality are unknown, due to this data gap. As a minimum, collect water temperature data.

13. Work with Fish and Game biologists to continue gathering information on adult spring chinook populations in the Beegum Creek analysis area.

14. Collect quantitative baseline stream habitat and riparian information on the Beegum watershed.

15. Perform a Watershed Improvement Inventory for upper portion of the Dutchman ecological unit to assess presence of gullies which can be rehabilitated.

16. Conduct detailed slope stability analyses as a part of NEPA analyses for any vegetation manipulation within the Snake Lake, Dutchman, Southern Round/North Star and North Yolla Bolla ecological units.

Botany/Sensitive Plants

1. Remove trees encroaching on meadow systems (through harvest and/or prescribed fire) to maintain hydrology of meadows to support wetland species.

2. Expand fenced area at Boy Scout Camp to protect sensitive plants.

3. Study grazing effects on meadows during allotment plan updates to assess impacts, enhancement needs, exclosure needs, etc.

4. Interpret natural features of watershed (interpretive brochures, nature trails) to educate users to voluntarily reduce impacts to sensitive areas.

5. Cooperate with County Agricultural Dept. to reduce weed infestations and prevent the spread of undesirable weeds into natural areas of watershed.

6. Survey for Survey and Manage species to determine if any are present in the watershed and to comply with the ROD and LMP.

7. Relocate Cypripedium fasciculatum and develop management recommendations to comply with survey and manage standards and guides from the ROD and LMP.

8. Survey plantations for sensitive plants where habitat was identified during project planning and in those units where a population of sensitive plants existed close by.

9. Develop a management plan for Tedoc Mountain Special Interest Area.

10. Develop a species management guide/conservation plan for Linanthus nuttallii ssp. howellii.

11. Survey riparian areas for Epilobium oreganum.

12. Identify native grass populations to use as seed sources to meet future needs for fire rehabilitation, watershed restoration and when ground disturbances occur.

Heritage Resources, Social/Economic, Tribal Uses, Transportation

1. Undertakings related to the three management objectives have the potential to adversely affect historic heritage properties. One of the key areas we know about, which has many recorded sites, is the ridgeline system in the Rat Trap and Brushy Mountain areas. Many of these sites, in particular those referred to as gap sites (e.g., Rat Trap and Stuart's Gap), have been ongoing management problems. First, they are flat saddles which are currently used for dispersed camping, equipment staging, and road construction material storage. All of these activities have impacted these sites to various degrees. It is recommended that these sites, in particular those suffering the greatest impacts, be tested for their eligibility to the National Register of Historic Places. Testing would fulfill a number of management needs. If a site is determined eligible, we can design protective or mitigative measures, and if it is not, we no longer need to spend valuable time managing the site.

2. Fuels reduction work and wildlife burning in the brush dominant areas of Beegum will need archaeological survey, if these are carried through to NEPA analysis. These areas have not had that much survey done and the potential of finding sites, particularly along Beegum Creek is very possible.

3. Further work needs to be done to better document the importance and current use of four spiritual and traditional use areas within Beegum. Future management in the Beegum Watershed could affect these properties. We need more information on these areas to determine if adverse effects could happen and propose actions to mitigate impacts or actions which could enhance these sites.

4. Pursue a variety of the opportunities identified in this analysis to meet economic/social needs, as well as ecological needs. Implementation of proposed projects would benefit the economic and social well being of the local communities, and inject much needed money and capital into the local economy. Work generated would not create a dramatic growth situation, but would help lessen the impact of the current economic downturn.

5. Consider opportunities to enhance traditional gathering in conjunction with fuels and wildlife recommendations. Enhancement could be through burning in bear grass, or pruning on redbud, as examples. Special Forest Products management would be another avenue. The bear grass burning in the summer of 1994 in Butter Creek was very well received by the local American Indian community. More projects of this kind would be welcomed.

6. Clean up flagging and paint on trees in the recently acquired private parcel, much of which is within the Wilderness.

7. Develop a Transportation Plan for the entire watershed. This plan should 1) define the existing and proposed road system needed to access and manage the watershed, given all public, resource and administrative needs, 2) identify the maintenance needs over time for the system, 3) identify traffic regulations and seasonal closures necessary to protect the transportation system from roadbed damage and provide for resource protection, 4) identify measures necessary to maintain or improve stream crossings, 5) identify surface stabilization needs to control erosion and allow for seasonal use, and 6) identify roads that can be closed for long periods of time and or decommissioned to lower road density per square mile.

APPENDIX I

Wildlife Tables

Table 1. Suitable NR & F Habitat Analysis Within the Watershed, by Land Allocation / Prescription (Percentages incomplete)

Landscape Component Rx	N/R	Foraging	Potential in 50	Potential aft 50	Not Capable
Beegum Watershed					
AWA	3	820	2,438	1,452	7,691
CRA	53	329	239	374	527
LSR	1,944	879	239	420	114
Matrix	620	10,797	4,065	3,068	2,557
Total...	2,620	12,825	6,981	5,314	10,889
Noble Ridge Unit					
AWA	3 (6%)	263 (73%)	146	443	2,637 (77%)
Matrix	46 (94%)	99 (27%)	168	129	797 (23%)
Total...	48 (1%)	362 (8%)	315	556	3,435 (73%)
Dutchman					
AWA	0	160 (56%)	574	103	2,209 (78%)
LSR	0	0	0	0	102
Matrix	0	127 (44%)	224	58	532 (19%)
Total...	0	287 (7%)	818	161	2,843 (69%)
Little Red/Tedoc					
AWA	0	368 (47%)	1,659	903	2,788 (76%)
CRA	0	12 (2%)	100	289	239 (6%)
Matrix	11	403 (52%)	868	568	672 (18%)
Total...	11	783 (8%)	2,628	1,760	3,699 (42%)
Round N. Star (N)					
Matrix	116	842	163	182	88
Snake Lake					
AWA	0	29	59	3	57
LSR	14	189	79	22	0
Matrix	279	5,903	1,900	1,430	425
Total...	293	6,121	2,038	1,455	482
Round N. Star (C)					
Matrix	160	2,954	714	549	43
North Yolla Bolla					
CRA	53	317	139	85	288
LSR	1,799	399	135	363	12
Total...	1,852	716	274	448	300
Round N. Star (S)					
LSR	131	291	25	35	0
Matrix	0	469	8	107	0
Total...	131	760	33	142	0

(% of capable land - 17,997 acres)
Suitable NR - 4 NG, (no 5 SPNG)
Foraging - 3NG; 3,4 P pcH (expected to now be 4NG based on 20 yrs growth)
Pot in 50 yrs - 4S; 3,4 P pcL or ""; 2NG, XX2 & 3; 3S, 1,2SP, XX1 Pc H.
Potential after 50 yrs - 3S, 1,2 SP, XX1 pc L or ""
Non-Capable - HCO, HNC, NC, KPX, LPX, GR, NF, SX

Table 2. Dispersal Habitat in the Watershed, by Land Allocation & Rx.

Landscape Component		Potential			
Rx	Capable	in 50	aft 50	Not Cap	Capable
Beegum Watershed					
AWA	536	2,727	1,451	7,691	4,714
CRA	2,159	251	365	527	2,775
LSR	873	503	323	114	1,699
Matrix	8,013	7,772	2,758	2,557	18,543
Total...	11,581	11,253	4,897	10,889	27,731
Rip Res	3,373	2,298	968	2,370	6,639
Noble Ridge Unit					
AWA	114	299	443	2,637	856
Matrix	111	202	122	797	435
Total...	225	501	565	3,434	1,291
Rip Res	88	93	162	863	343
Dutchman					
AWA	109	626	102	2,209	837
LSR	0	0	0	102	0
Matrix	117	254	58	532	429
Total...	226	880	160	2,843	1,266
Little Red/Tedoc					
AWA	284	1,743	903	2,788	2,930
CRA	12	10	289	239	402
Matrix	285	997	568	672	1,850
Total...	581	2,841	1,760	3,679	5,182
Rip Res	228	694	390	749	1,312
Round N. Star (N)					
Matrix	523	597	182	99	1,302
Rip Res	116	119	44	27	279
Snake Lake					
AWA	29	59	3	57	91
LSR	86	192	22	0	300
Matrix	3,830	4,362	1,321	425	9,513
Total...	3,945	4,613	1,346	482	9,904
Rip Res	1,354	945	235	98	2,534
Round N. Star (C)					
Matrix	2,681	1,308	441	43	4,430
Rip Res	581	184	42	9	807
North Yolla Bolla					
CRA	2,147	150	76	288	2,373
LSR	366	284	266	12	916
Total...	2,513	434	342	300	3,289
Rip Res	716	93	62	42	871
Round N. Star (S)					
LSR	421	27	35	0	483
Matrix	466	52	66	0	584
Total...	887	79	101	0	1,067
Rip Res	250	8	12	0	270

Capable & Meets - 3,4,5,6 NG; HCO Capable in 50 yrs - the rest
Cap >50 yrs - 3S, 1,2 SP pc L or "" Not Cap - HNC, NC, SX, KPX, GR, NF

Table 3. Dispersal Habitat by 1/4 township.

1/4 township	Capable & meets	Capable not meet	Excluded Areas
29.0N10WC	1,941 (50%)	1,903	1,423
29.0N10WD	654 (30%)	1,553	2,455
29.0N11WA	1,419 (32%)	3,065	98
29.0N11WD	998 (17%)	4,721	221
28.0N09WA	13 (10%)	120	709
28.0N09WB	274 (20%)	1,124	3,833
28.0N09WC	1,509 (43%)	2,012	585
28.0N10WA	738 (21%)	2,770	2,555
28.0N10WB	1,660 (36%)	2,915	768
28.0N10WC	3,249 (58%)	2,327	252
28.0N10WD	2,710 (54%)	2,335	107
28.0N11WA	1,598 (26%)	4,438	113
28.0N11WC	3,179 (68%)	1,491	68
28.0N11WD	3,414 (58%)	2,457	76
27.0N09WB	3,701 (73%)	1,372	6
27.0N10WA	3,542 (75%)	1,144	1,067
27.0N10WB	3,471 (72%)	1,434	1,050

Capable & meets = % based on the capable acreage in the 1/4 township
Excluded areas = acreage in the 1/4 township not capable or not included (eg. private)

Table 4. Reproductive History of the Five Northern Spotted Owl Activity Centers within the Beegum Watershed and the Four Activity Centers Located within 1.3 Miles of the WA.

Owl#	Master #	Status	Status Verified	Young Verified
817	TE090	Pair	1990, 1991, 1992, 1994, 1995	1991
821	TE059	Pair	1982, 1990, 1991, 1992	1990, 1992
827	TE088	Pair	1989, 1990, 1992	1992
829	TE013	Single	1974, 1990, 1993	None
847	none	Single	1994	None
813	SH041	Pair	Last verified 1990	None
820	TR168	Pair	Last verified 1992	1992
830	SH001	T.Single	Last verified 1996	None
834	TE099	Single	Last verified 1996	None

Table 5. Amount of Suitable Habitat in Acres for each Activity Center within the Beegum Watershed (see Suitable Habitat discussion for interpretation of this table)

		.7 mile Territory			1.3 Mile Territory		
Owl#	Master #	N/R	Foraging	Total	N/R	Foraging	Total
817	TE090	0	686	686	0	2,468	2,468
821	TE059	262	295	557	1,027	782	1,109
827	TE088	452	197	649	1,270	995	2,265
829	TE013	125	581	706	343	1,703	2,046
847	none						
813	SH041	0	439	439	0	1,304	1,304
820	TR168	442	433	875	1,296	1,365	1,664
830	SH001	21	568	589	236	1,533	1,769
834	TE099	370	308	678	1,138	1,319	2,457

Table 6. Survey Areas, Years Surveyed, and Years Surveyed to Protocol

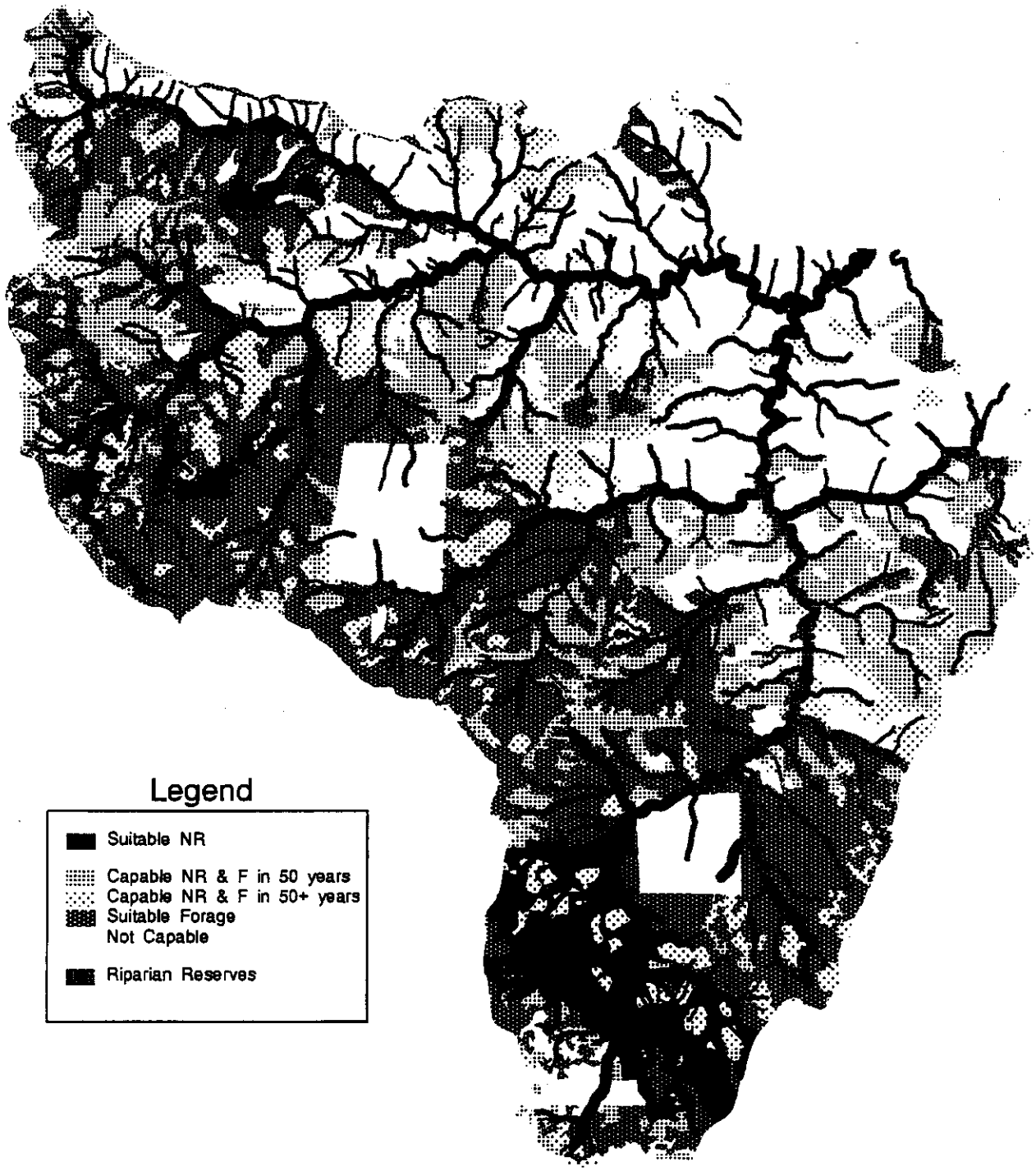
Survey Areas	Years Surveyed	Years to Protocol
Beegum Small TS	1990 (6v), 1992 (3v)	1990, 1992
Brushy Wind SS	1990 (6v)	1990
Cold Fork TS	1990 (6v), 1992 (3v)	1990, 1992
Horse TS	1989 (4v), 1996 (3v)	1989 (3v - protocol), 1996
OK Corral TS	1990 (6v), 1991 (Hv) 1992 (3v), 1994 (4v) 1995 (2v)	1990, 1992, 1994
Rat Trap TS	1990 (6v), 1991 (Hv) 1992 (3v)	1990, 1992
Regan TS	1993 (3v), 1994 (3v a,b)	1993, 1994
Round Mtn. TS	1991 (6v), 1992 (Hv), 1993 (3v), 1994 (3v)	1991, 1993, 1994
See Horse TS	1992 (3v), 1996 (3v)	1992, 1996

APPENDIX II

Maps

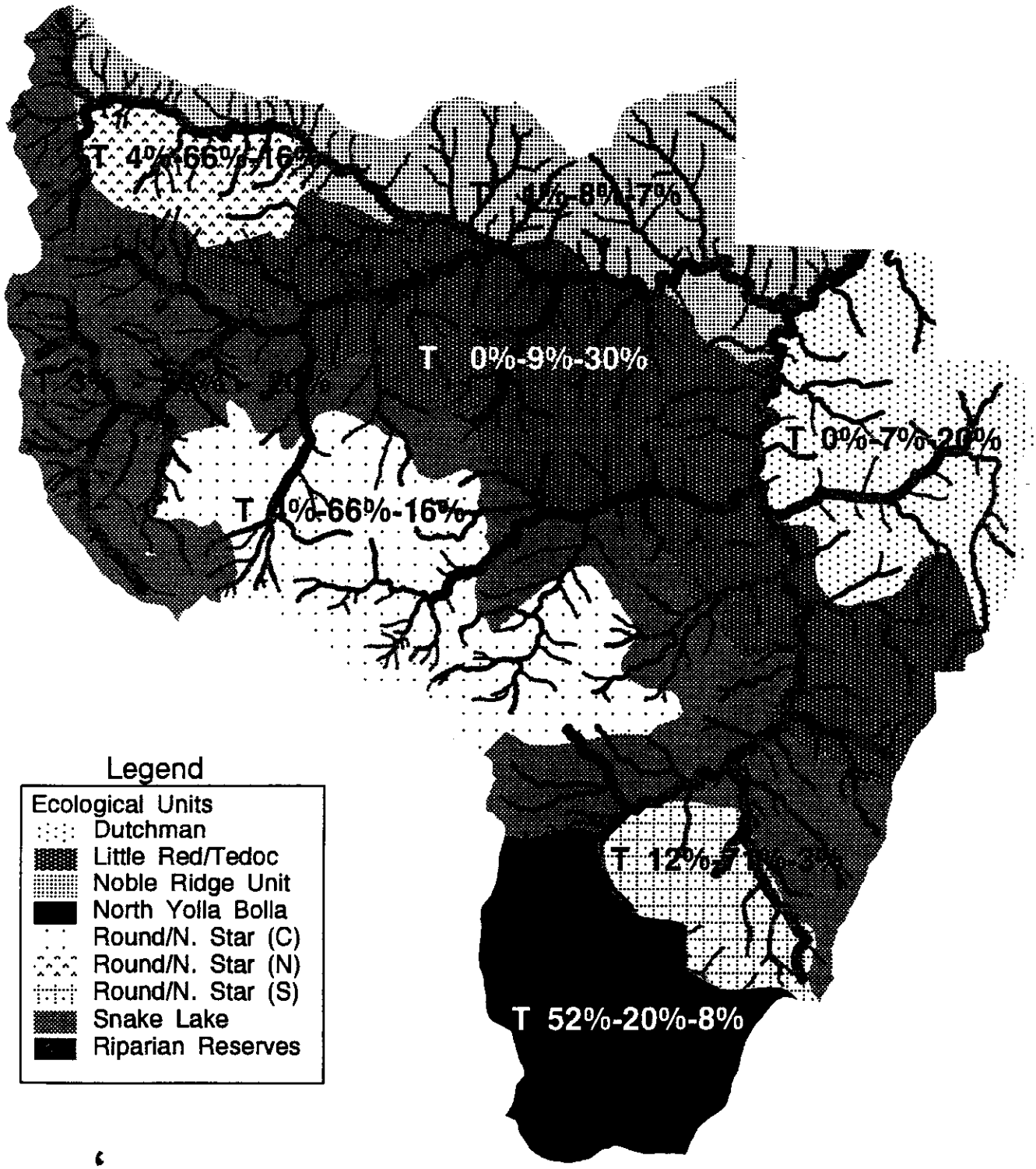
Map #1

Suitable Northern Spotted Owl Nesting, Roosting (NR) and Foraging Habitat for Beegum WA



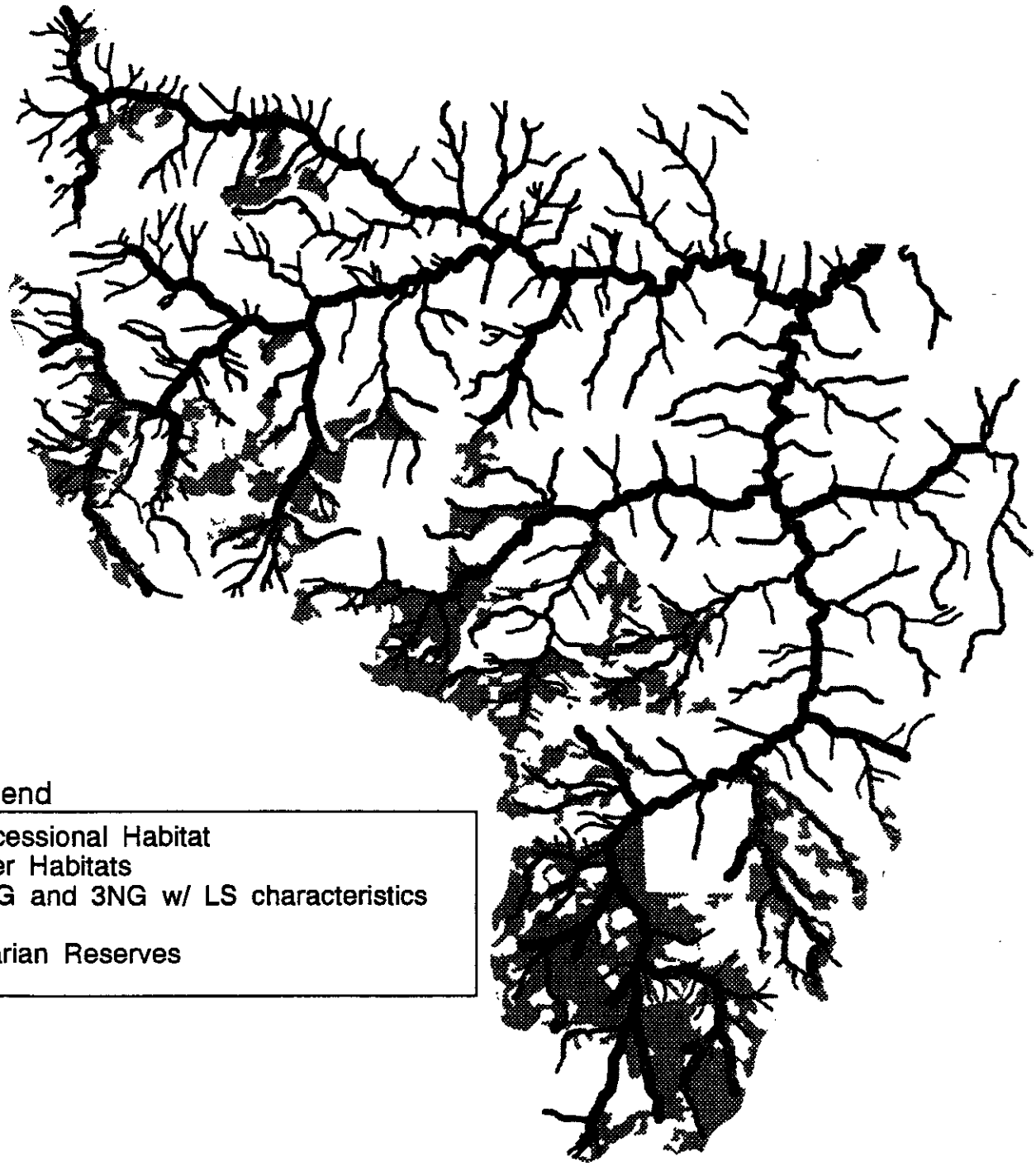
Map #2

Suitable Nesting, Roosting (NR) and Foraging (F) Habitat for Northern Spotted Owls for all Capable Lands in the Beegum WA by Ecological Unit: % NF - % F - % Capable NRF in 50 yrs



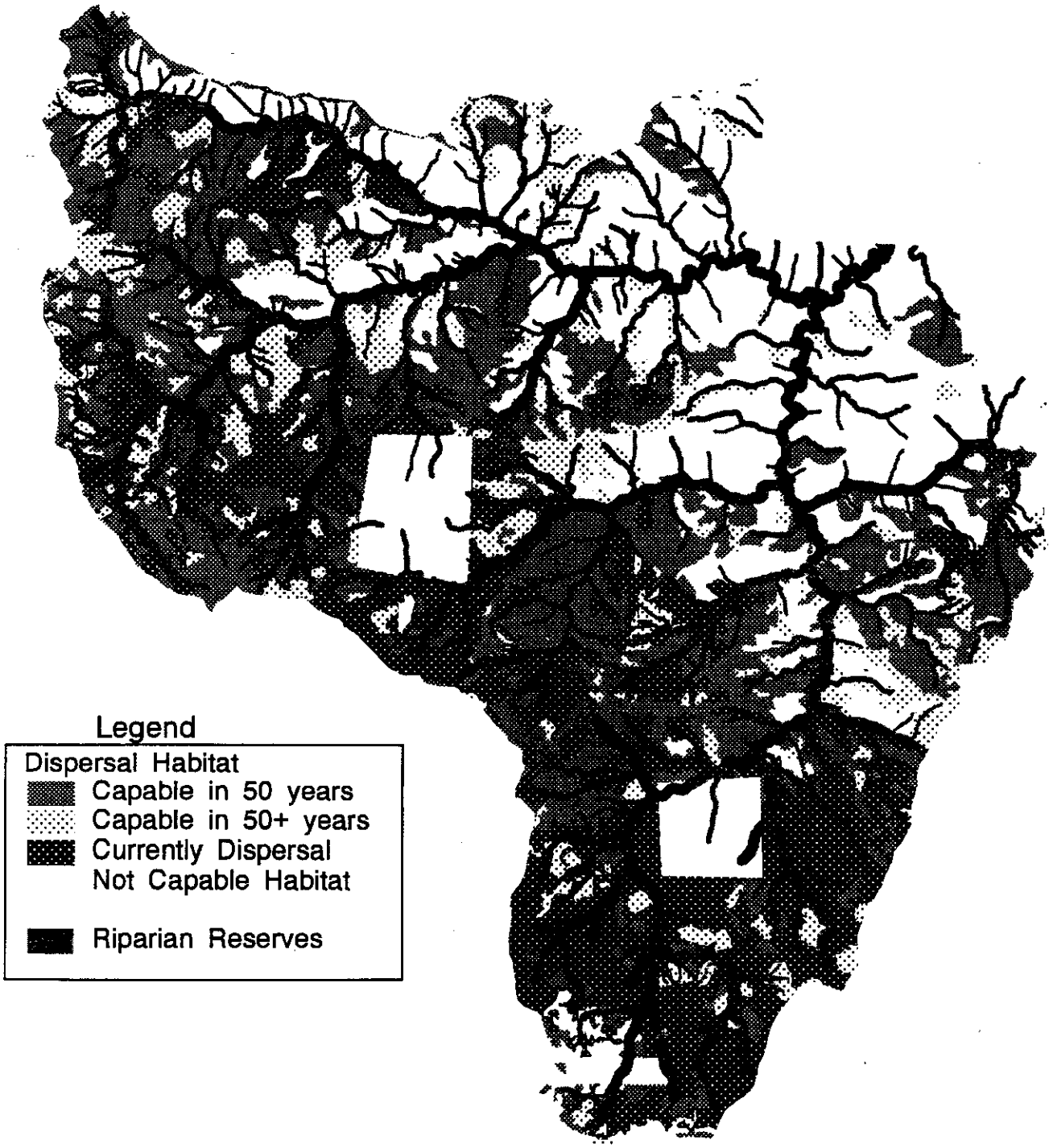
Map #3

Late Successional (LS) Habitat for Beegum WA Used to Determine the 15% Retention Requirement



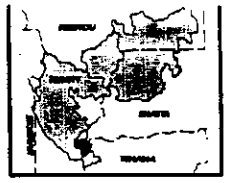
Map #4

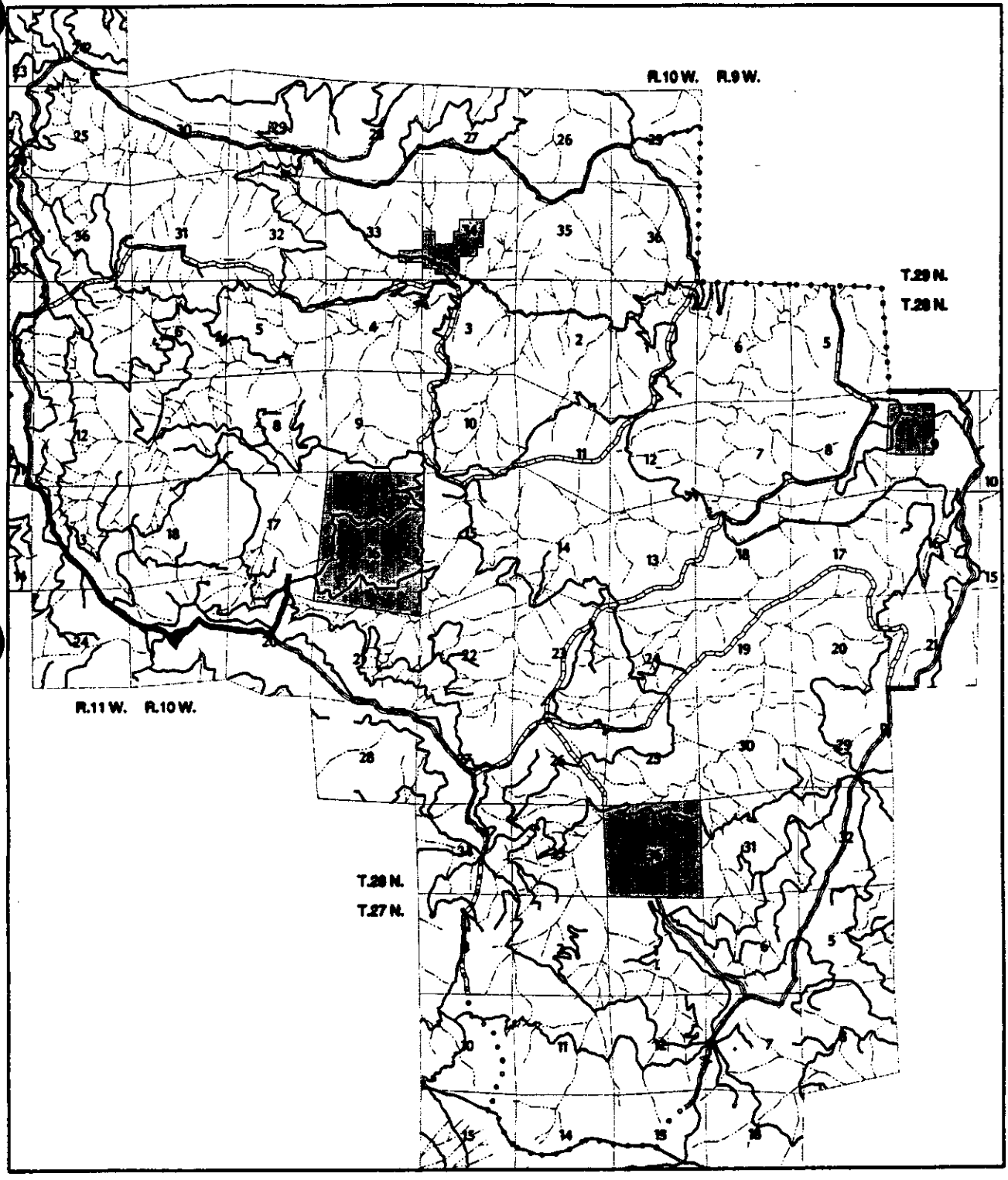
Dispersal Habitat for Beegum WA



Beegum Creek Watershed Analysis

U.S.D.A Forest Service
Shasta-Trinity National Forests





Fuelbreak Maintenance

Legend

- Existing
- Proposed
- Maintenance

Scale 1:63,360

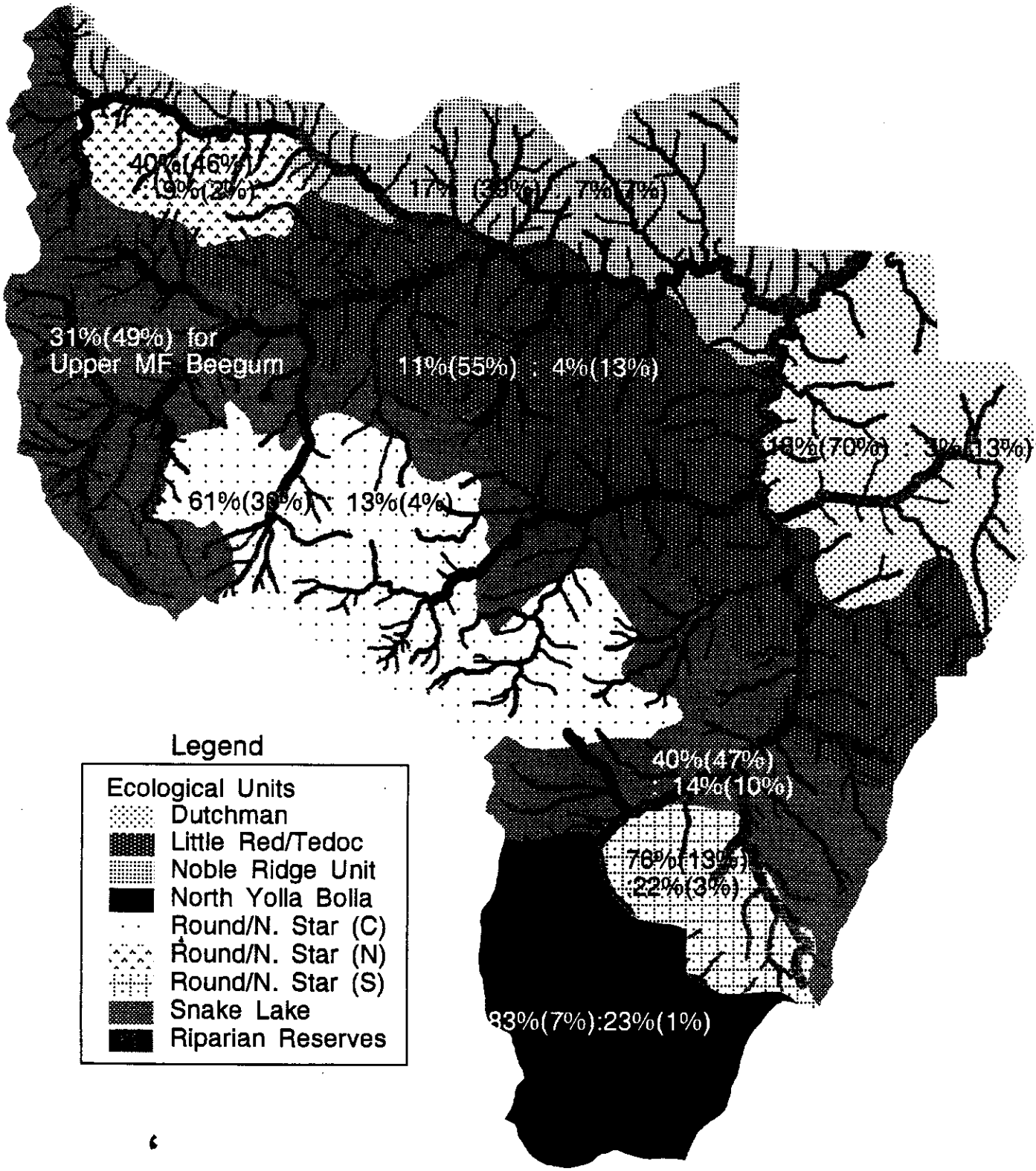
0 1 2 3 Miles

Prepared by Hayfork Ranger District
Projection: UTM Zone 10
1927 North American Datum

February 27, 1997 Map File: tbk_maint_17.gra

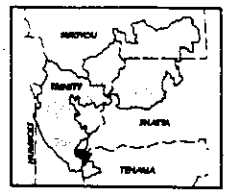
Map #5

Dispersal Habitat for Beegum WA: % Dispersal (% in 50 years); % Riparian Reserves currently Dispersal (% in 50 years) for Capable Lands by Ecological Unit



Beegum Creek Watershed Analysis Area

U.S.D.A Forest Service
Shasta-Trinity National Forests



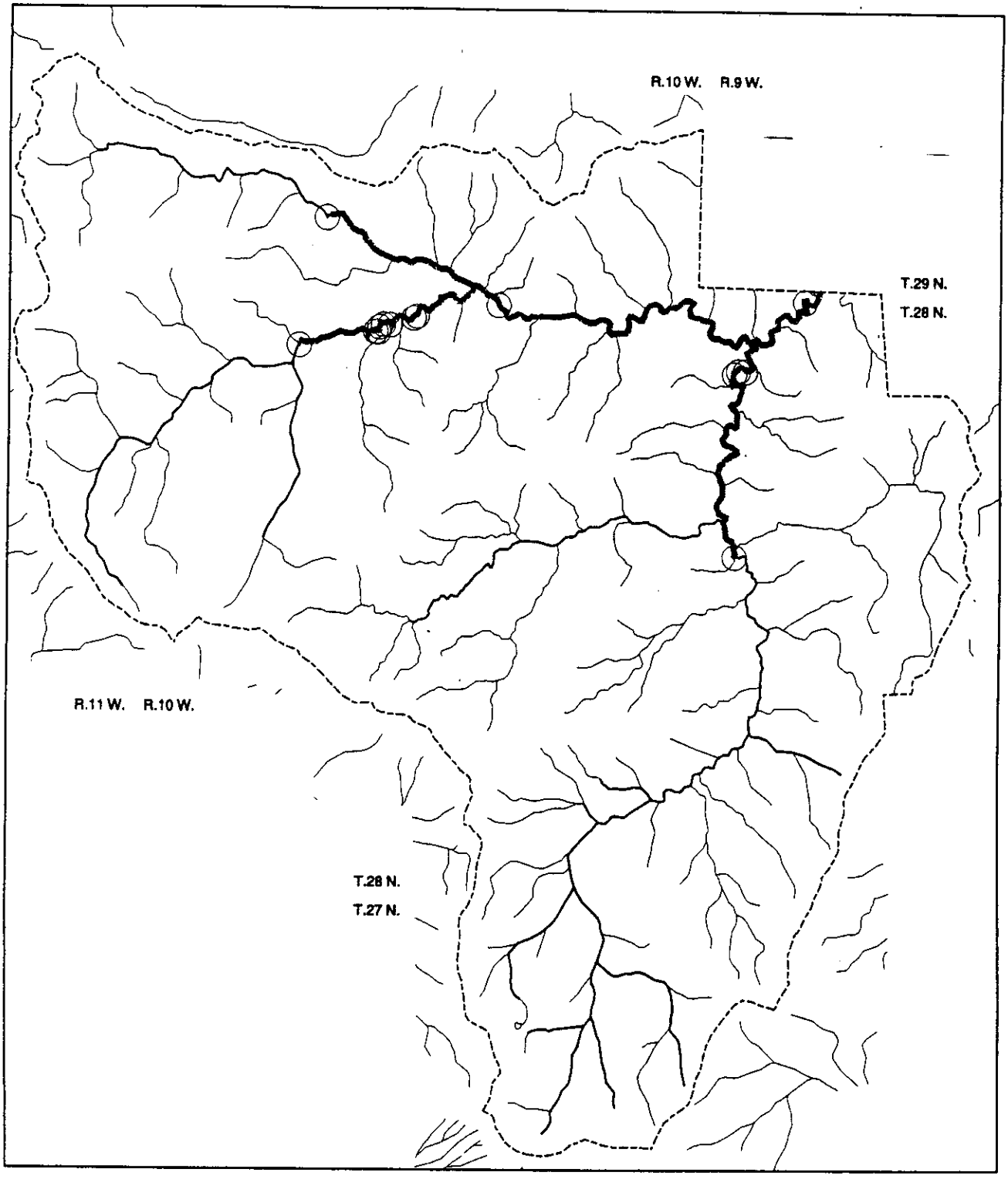


Figure 1
Fish Distribution

Legend

Potential Fish Barriers

Anadromous Fish

Resident Fish

Scale 1:63,360

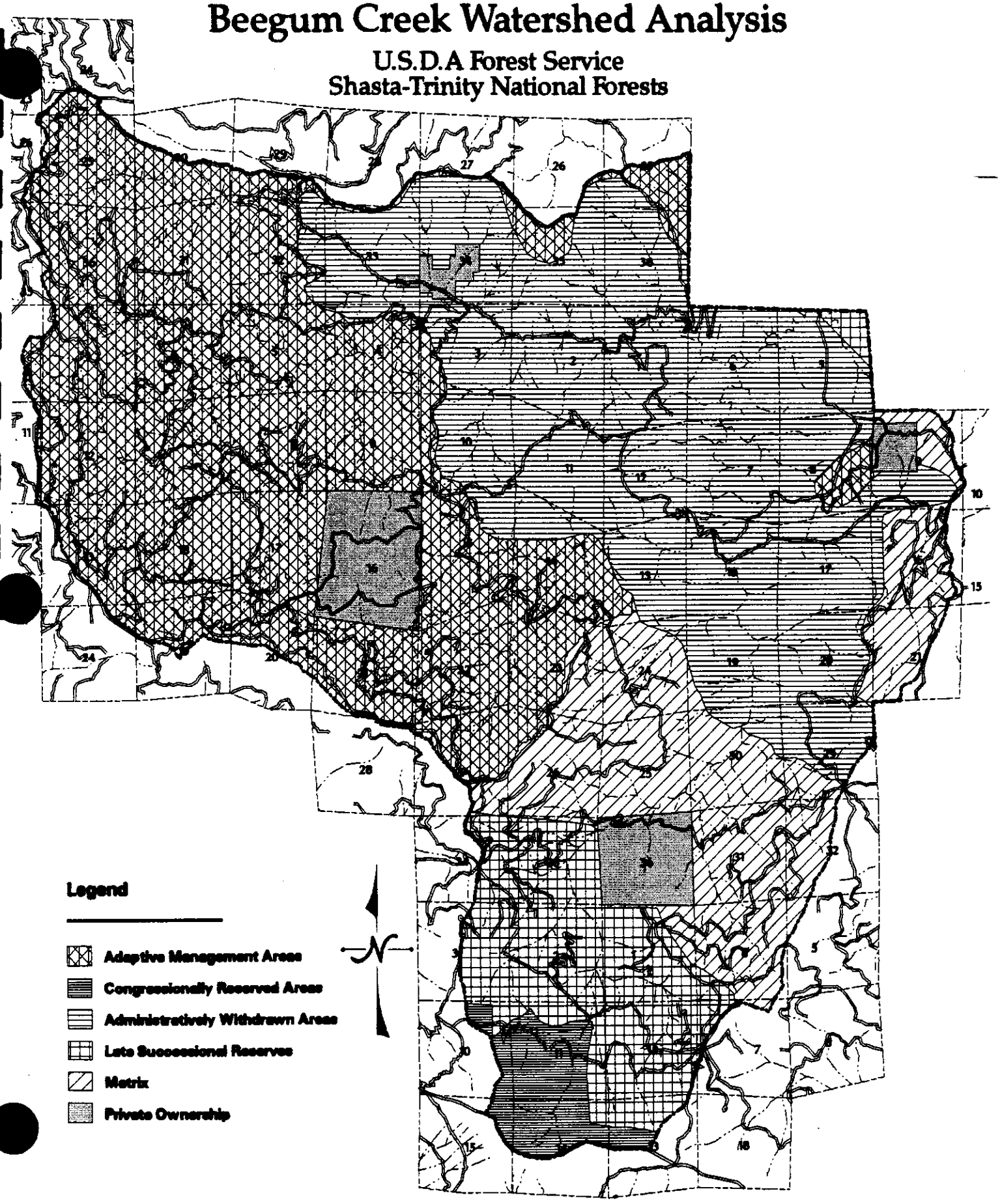
0 Miles 1 2 3

Prepared by Hayfork Ranger District
Projection: UTM Zone 10
1927 North American Datum

September 17, 1996 Map File: fish.gra

Beegum Creek Watershed Analysis

U.S.D.A Forest Service
Shasta-Trinity National Forests

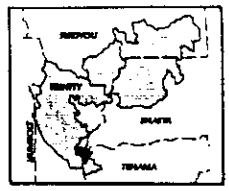


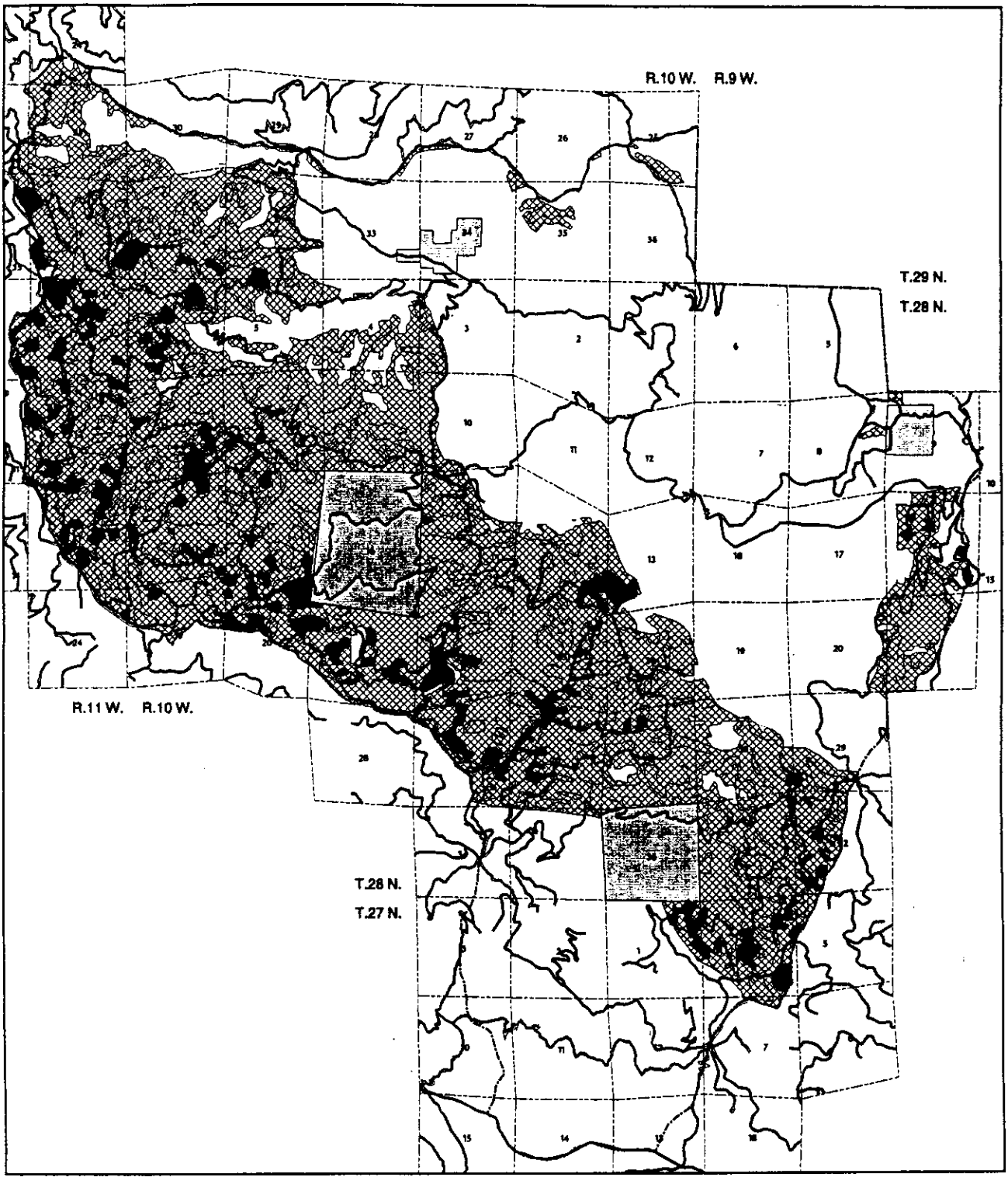
Map File: land_alloc.apr February 6, 1997

Land Allocations

Beegum Creek Watershed Analysis

U.S.D.A Forest Service
Shasta-Trinity National Forests





C.A.S. Lands

Legend

- C.A.S. Land
- Plantations
- Private

Scale 1:63,360

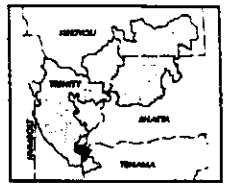
0 1 2 3 Miles

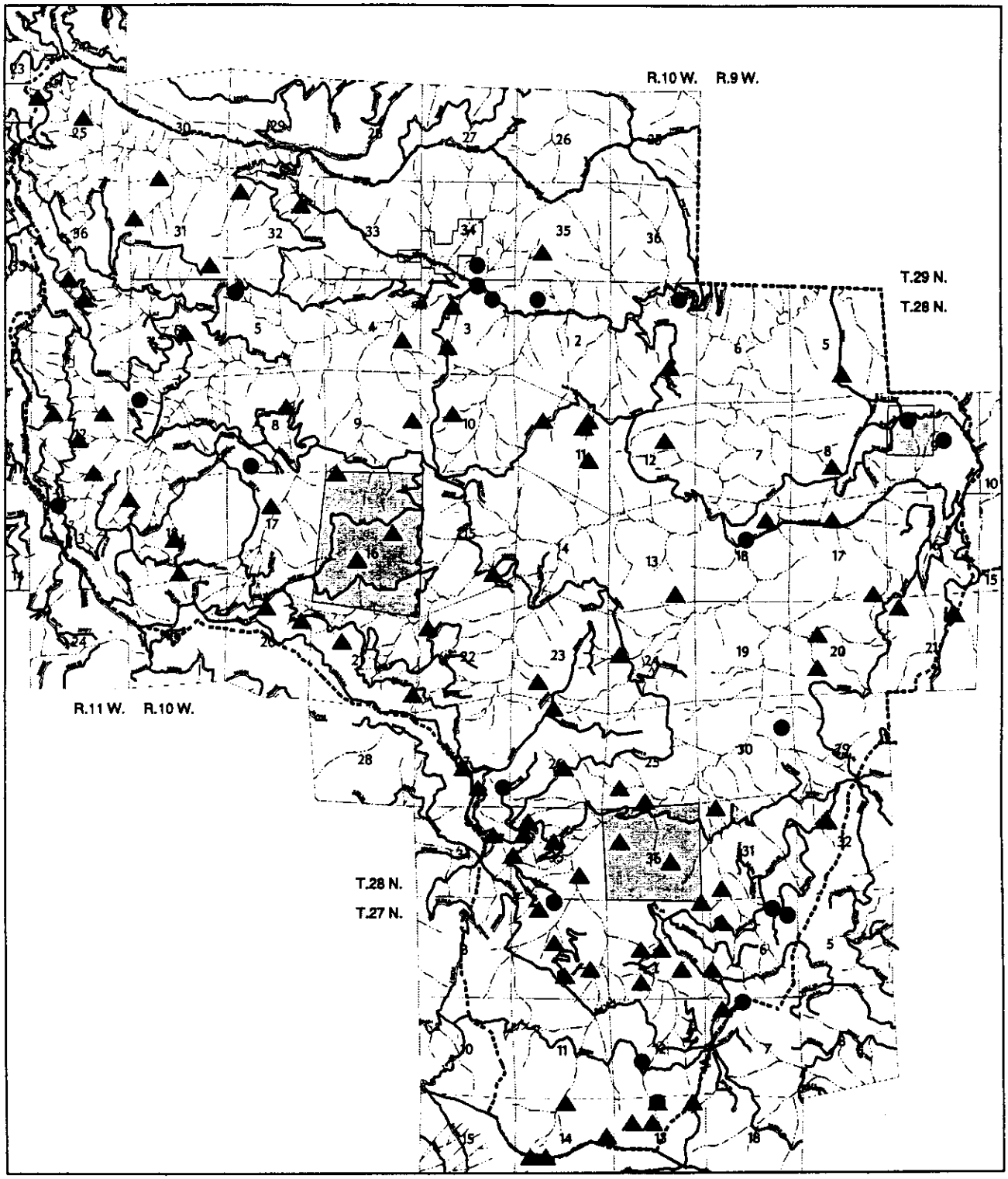
Prepared by Hayfork Ranger District
Projection: UTM Zone 10
1927 North American Datum

February 21, 1997 Map File: cas_17.gra

Beegum Creek Environmental Analysis

U.S.D.A Forest Service
Shasta-Trinity National Forests





Fire Starts

Legend

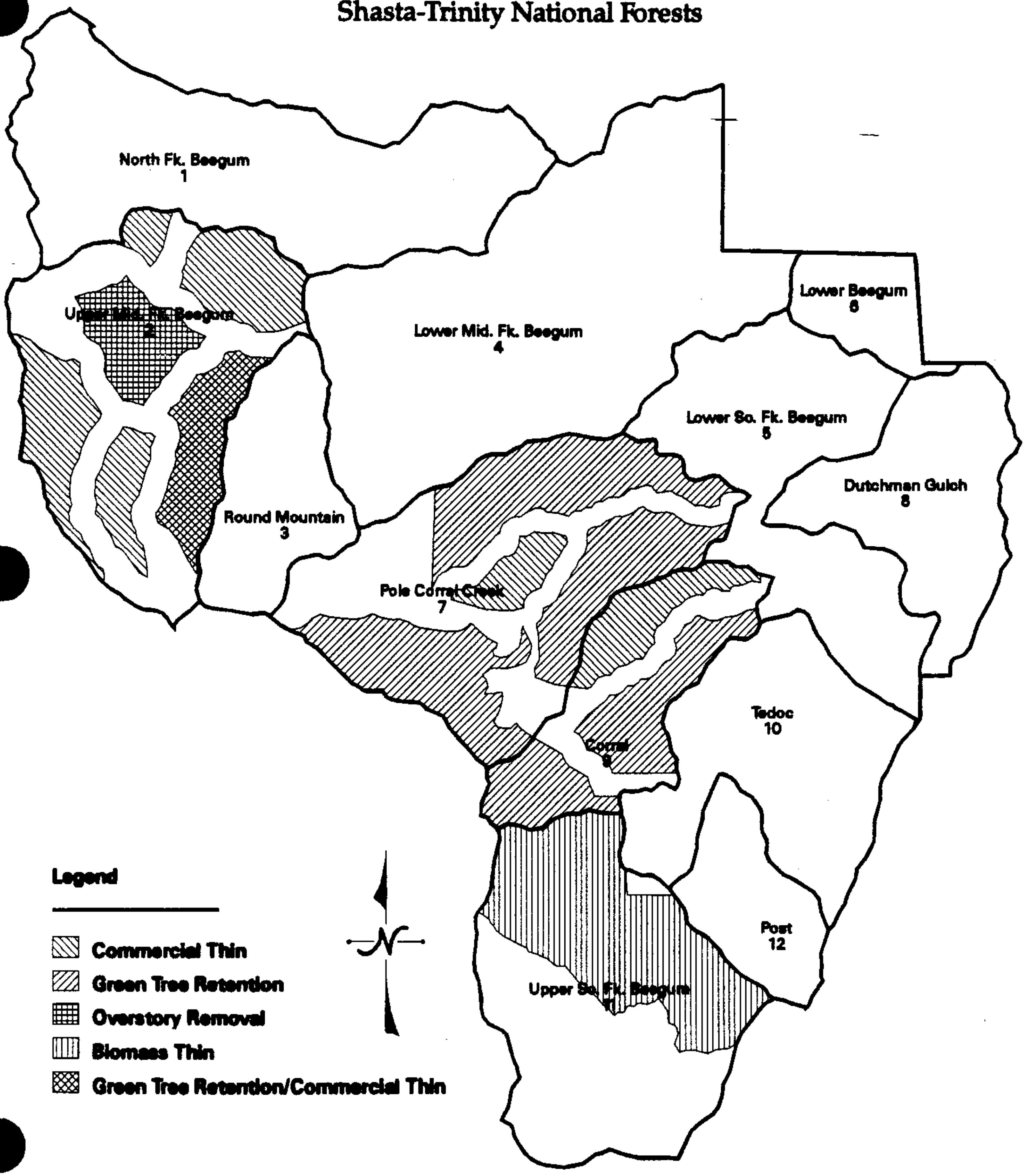
- Lightning Caused
- Human Caused

Prepared by Hayfork Ranger District
Projection: UTM Zone 10
1927 North American Datum

Scale 1:63,360

Beegum Creek Watershed Analysis

U.S.D.A Forest Service
Shasta-Trinity National Forests

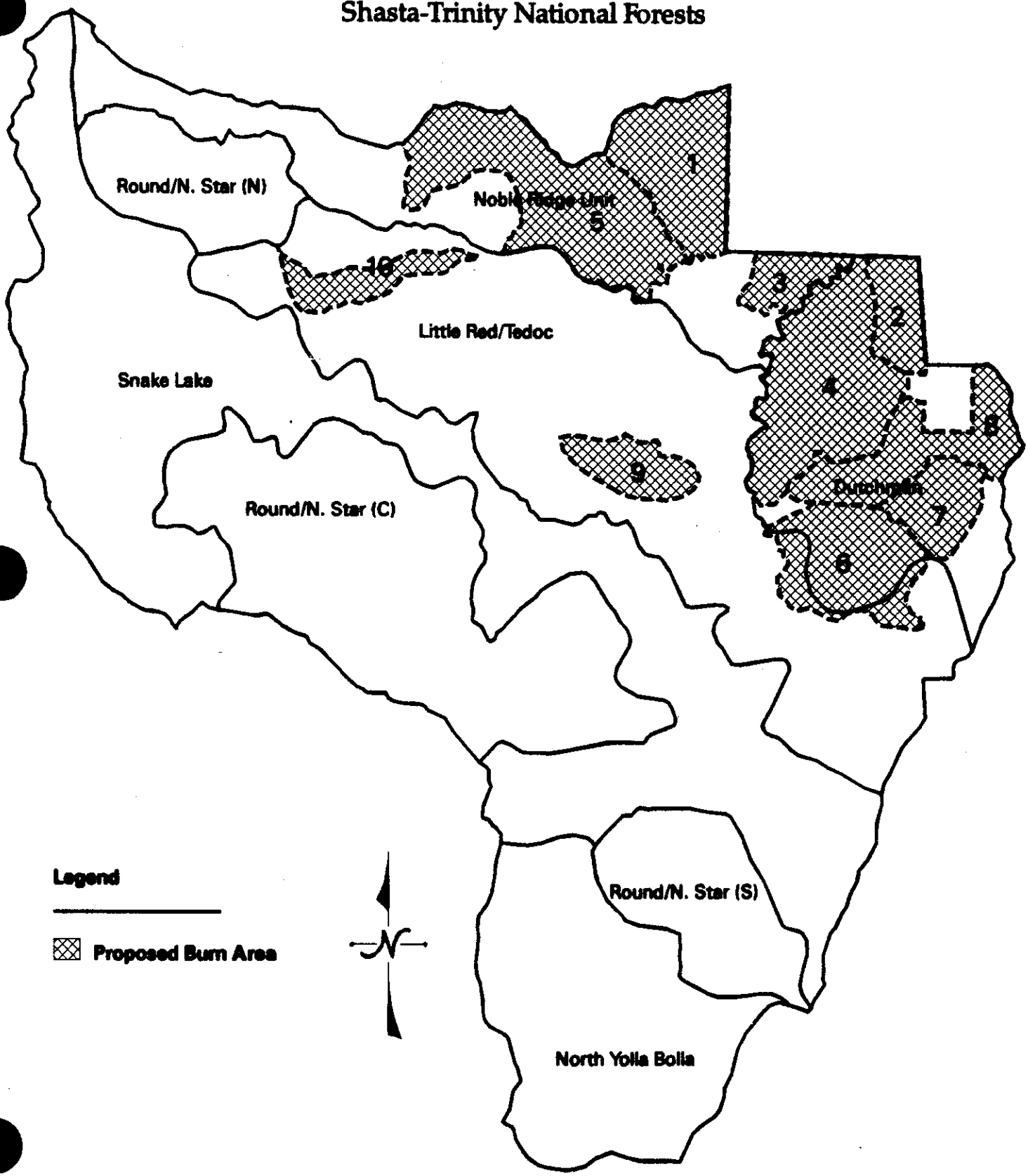


Scale 1:84480

Prescriptions

Beegum Creek Watershed Analysis

U.S.D.A Forest Service
Shasta-Trinity National Forests



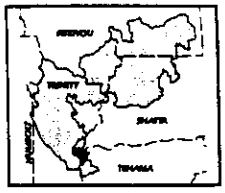
Scale 1:24000

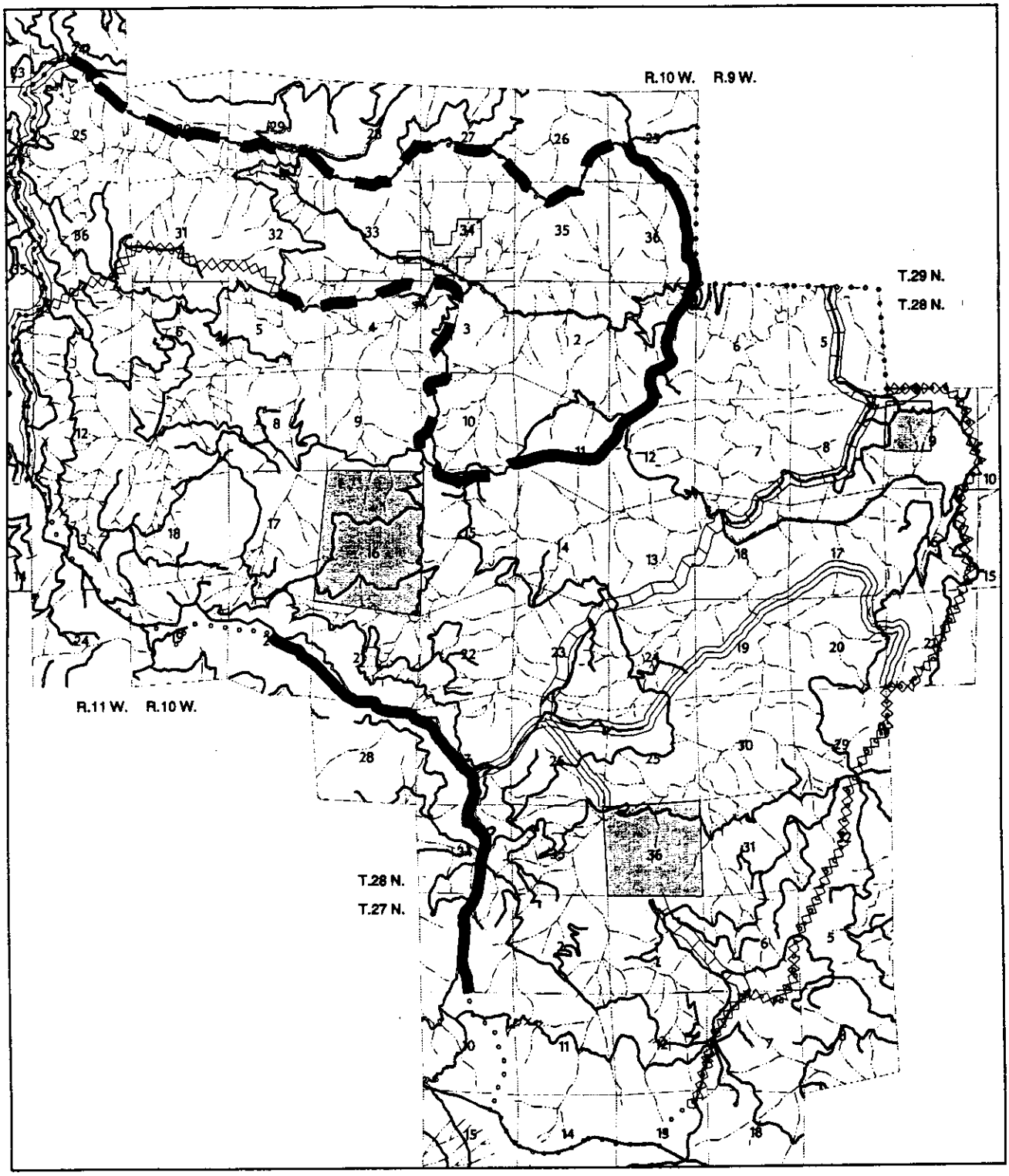
Map File: ww_chap4x11.gis February 21, 1997

Proposed Burning

Beegum Creek Watershed Analysis

U.S.D.A Forest Service
Shasta-Trinity National Forests





Fuelbreak Priorities

Legend

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Prepared by Hayfork Ranger District
Projection: UTM Zone 10
1927 North American Datum

February 20, 1997 Map File: f_b_pri_17.ora

Scale 1:63,360

0 1 2 3 Miles