UPPER TRINITY RIVER WATERSHED ASSESSMENT REPORT
&
MANAGEMENT AND ACTION PLAN

Prepared by:
Trinity County Resource Conservation District
March, 2006

Grant Funding Provided By:
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SECTION 1

Introduction

Mission Statement

The intent of this watershed assessment is to develop and document a scientifically based understanding between the natural processes and human interactions occurring within the Upper Trinity River watershed. This understanding, which focuses on specific issues, uses, and values, within the watershed, is essential for making sound management decisions. Protecting beneficial uses, such as those identified by the North Coast Region's Water Quality Control Plan (Basin Plan) mandated under the Federal Clean Water Act and the State Porter-Cologne Water Quality Act, is a fundamental motivation for this endeavor.

Purpose of Report

A watershed analysis is not intended to be a decision-making process in and of itself, and should be viewed as an assessment process as opposed to a legally-mandated, NEPA (National Environmental Policy Act) or CEQA (California Environmental Quality Act) driven legal process. The intent is to bring together specific information that has been gathered directly from the watershed to serve as a basis from which land owners, land managers and the public can develop a mutual understanding of the natural processes at work in the watershed and make informed decisions. Management recommendations aimed at restoring the health of the watershed are based upon both existing data and data that were collected for this report, and are presented in the Management & Action Plan section of the document.

Problem Definition

Within the last ten years, the high turbidity levels observed in Trinity Lake and the EPA's adoption of TMDL goals for the Upper Trinity River in December 2001, have generated an increased awareness and concern, as well as unanswered questions amongst local residents, business owners, and various resource agencies, as to the source and cause of sediment that is entering Trinity Lake during major storm events.

In heavy rainfall years, large volumes of fine sediment are eroded from the watershed upstream of Trinity Dam and subsequently trapped and suspended in Trinity Lake many months after these events occur. The degree of the problem has been immediately reflected in the visually high turbidity levels of the water that is subsequently released from the Dam into the Trinity River or exported over the Trinity Divide and into Whiskeytown Lake and ultimately, the Sacramento River and the Bay-Delta system. Turbidity readings in Trinity Lake reached their highest levels in twenty-two years after the storms events of 1997 and remained relatively high through most of 1998. The obvious correlation between these rainfall events and the resulting high turbidity may be indicative of serious erosion and sediment problems that exist within the Watershed. In addition to the water quality reduction caused by high turbidity levels, the buildup of sediment in the lake has the potential to reduce available storage capacity and ultimately threaten the life expectancy of the dam. Photo No. 1-1 was taken during a rainfall event in December of 2005 and is indicative of the sediment plumes that are frequently seen at the north end of the lake.

Photo 1-1 Sediment plume entering Trinity Lake near Trinity River inlet in December 2005.

Need For Assessment

Trinity Lake provides 2.5 million acre-feet of storage for the Central Valley Project and in an average year, diverts nearly 1 million acre-feet of water into the Bay-Delta system. In heavy rainfall years, large volumes of fine sediment that are eroded from the watershed upstream of Trinity Dam are subsequently transported to, and trapped in the lake. By one USDA/NRCS Engineers estimated, approximately 460,160 cubic tons of sediment per year is entering Trinity Lake from the various tributary streams above the dam. In addition to the impairment of water quality, this figure translates into a reduction in storage capacity of 230 acre-feet per year. One acre-foot of water from the Trinity Lake generates 1,100 kilowatt hours of power.

Project Goals

This project addresses and examines the extremely high turbidity levels of Trinity Lake that have existed during, and after, the storms of early 1997 and 1998 by inventorying and quantifying sediment sources within the watershed and recommending solutions to reduce high turbidity levels associated with sediment runoff. This project will bring together stakeholders within the community to develop and implement a comprehensive watershed assessment, and management and action plan. The primary goal of the management and action plan is the identification of projects that will reduce sediment delivery and therefore, improve water quality, minimize loss of storage capacity and improve forest health by addressing fire risk and fuel buildup.

Objectives

The primary objectives of the Watershed Assessment and the Management and Action Plan are to identify problem areas and recommend projects that will help reduce sediment delivery and excessive turbidity levels as well as improve water quality and maintain storage capacity for both the Trinity River Basin and Central Valley Project (CVP).

These projects are not limited, but are expected to include:

- Road inventories
- Road upgrade or decommissioning
- Streambank stabilization.
- Landslide stabilization.
- Revegetation.
- Fuels reduction and thinning.

Primary biological and ecological objectives include:

- Reducing sediment delivery to the lake as this reduces available storage capacity.
- Reducing high turbidity levels, resulting in improved water quality and water supply reliability from Trinity Lake to the Bay-Delta system.
- Improving fisheries habitat upstream of Trinity Dam for non-anadromous fisheries as well as downstream for anadromous fisheries by reducing the erosion of silts and sands that impair the quality of spawning gravels.
- Maintaining beneficial uses within the Watershed.

A sediment source analysis prepared by Graham Matthews and Associates, a hydrology and engineering firm, will help identify the sources of sediment with an initial focus placed on the five main tributaries to Trinity Lake; Stuart Fork, Swift Creek, Coffee Creek, Upper Trinity River, and East Fork Trinity River. A Management and Action Plan will be developed, incorporating the previously mentioned elements and identifying projects for implementation.

Project Tasks

To meet the objectives for the Upper Trinity River Watershed Assessment and the Management and Action Plan, the following tasks have been identified:

- A survey of sediment deltas at each of the five main tributaries to Trinity Lake.
- A watershed sediment source analysis.
- A stakeholder watershed survey.
- A landslide inventory and analysis using aerial photographs.
- Completion of a Watershed Assessment and that address the following topics:
  - Goals and objective of the watershed assessment
  - General watershed profile
  - Demographics, land use and management issues.
  - Limiting factors-Sedimentation, Fuels buildup
  - GIS mapping-roads, soils, vegetation, ownership identification.
- Completion of a Management & Action Plan
  - Strategy for setting priorities
  - Project recommendations based upon results of sediment analysis report and other existing sources.

End Users

This watershed assessment is intended for use by local agencies, conservation groups, land use planners, land managers, stakeholders and others as a resource guide to aid in the decision making process. Information is presented in such a way that existing resources, land uses, and environmental process are identified for future use in problem resolution. The focus of the assessment is centered on the sediment and turbidity issues that are currently affecting water quality within the Watershed and will identify existing conditions and identified causes of current resource degradation. Other issues of concern may be identified but not specifically addressed by this document.

SECTION 2

General Watershed Profile

Study Area

The upper Trinity River Watershed Basin (from hereon referred to as Watershed) is located in Northern California near the California and Oregon border in the northeast section of Trinity County. The area lies within the uppermost section of the Trinity River Sub-Basin, and is the headwaters of the federally designated Wild and Scenic Trinity River which is the largest tributary to the Klamath River Basin. The watershed, which has its lower boundary defined by Trinity Dam which was constructed in 1963, has a total drainage area of 692 square miles and consists of 70 percent publicly owned land that is administered by the Shasta-McCloud Unit and the Trinity Unit of the Shasta-Trinity National Forest. The watershed falls within the Klamath Mountain Range, which lies along the eastern edge of Pacific Coast Ranges. Refer to Plate 2-1 for a map of the Watershed area.

The major tributaries within the Watershed include Stuarts Fork, East Fork of Stuarts Fork, Swift Creek, Coffee Creek, and Scott Mountain Creek on the west side and the East Fork of the Trinity River on the east side. Stuarts Fork, East Fork of Stuarts Fork, and Swift Creek enter directly into Trinity Lake while Coffee Creek and Scott Mountain Creek converge with the Trinity River prior to the Trinity entering the lake. The Watershed can be broken down into seven sub-watersheds: Upper Trinity River, East Fork Trinity River, Coffee Creek, Stuarts Fork, Swift Creek, Eagle Creek and Trinity Lake Tributaries. Refer to Plate 2-2 for sub-watershed locations.

Land Ownership

Ownership of land within the Watershed is divided between public and private lands with a little over seventy percent falling under public domain and the remaining twenty nine percent under private ownership. Figure 2-1 details the allocation and percentage and Plate 2-3 shows the general location of land ownership within the Watershed.

Figure 2-1

LAND OWNERSHIP

Ownership	Acres	Percent of Watershed
U.S. Forest Service	308,559	69.70
Sierra Pacific Industries	92,062	20.80
Timber Products	17,836	4.00
Roseburg Lumber Company	7,216	1.60
Private (other)	15,888	3.60
Non-Private (county or state)	1,034	0.20
Bureau of Land Management	27	0.01

Source: Trinity County RCD

Historically, Forest Service ownership in the area was divided between the Shasta Forest Reserve which was established in 1905 and the Trinity National Forest which was established in 1907 by proclamations of President Theodore Roosevelt. As a cost savings and efficiency measure, the two Forests were later combined into one administrative unit, the Shasta-Trinity National Forest, in 1954. Within the Watershed area, the National Forest lands are managed by three separate management units within the one administrative unit. Plate 2-4 shows the land use allocations for the Forest Service lands within the Watershed and Figure 2-2 provides the acreage breakdown of those uses.

Shasta-McCloud Management Unit manages approximately the upper one-third of the Watershed from about Ramshorn Road north to the top of the Trinity Divide. However, the unit's office is located in the town of McCloud near Mt Shasta and logistics associated with the distance, time and difficulty required to get there, limit the amount of time personnel spend in this area. Land ownership in this section is characterized by a mix between public and private timber company lands in the historic checkerboard pattern that further complicates the management process.

Trinity River Management Unit located in Weaverville manages the public lands within the lower two-thirds of the Watershed, including the 500,000 acres of the Trinity Alps Wilderness, which encompass the western section of the Watershed. This area was congressionally withdrawn from timber management when it was designated a wilderness by Congress through the California Wilderness Act of 1984. Prior to this designation, the area had limited timber harvest due to the rugged and unroaded nature of the terrain. The areas outside of the wilderness within the TRMU jurisdiction is designated mixed uses including timber management and recreation. (USDA Forest Service, 2003).

Whiskeytown-Shasta-Trinity National Recreation Area which encompasses Trinity, Lewiston and Whiskeytown Lakes, provides special management prescriptions for permitted uses on federal lands around the lakes due to a mandate to protect scenic viewsheds and critical wildlife areas. The management office for the NRA is located at the Shasta Lake Ranger Station in Shasta County.

Figure 2-2

U.S. FOREST SERVICE LAND USE ALLOCATION	
Allocation	Acreage
Administratively Withdrawn	7,624
Congressionally Withdrawn	148,442
Late Successional Reserve	66,866
Roaded Recreation	39,797
Timber Management	28,075
Wildlife Habitat Management	19,051
Private	133,194
Source: Trinity County R.C.D.	

The remaining lands within the Watershed are in private ownership and can be divided between rural development and private timber companies such as Roseburg Lumber Co., Sierra Pacific Industries, and Timber Products Co. Rural development is centered around the communities of

Trinity Center and Coffee Creek, several subdivision and isolated parcels. The private parcels are predominantly for residential development and associated retail uses such as general stores and cafes, and for recreational uses such as resorts and marinas. Very little manufacturing or industrial uses exist within the Watershed. Private timber lands are primarily used for timber management and harvesting with little ranching or agriculture remaining. One exception to this is the Alpen Cellars Winery on East Fork Road at the north end of the lake that manages a vineyard and winery.

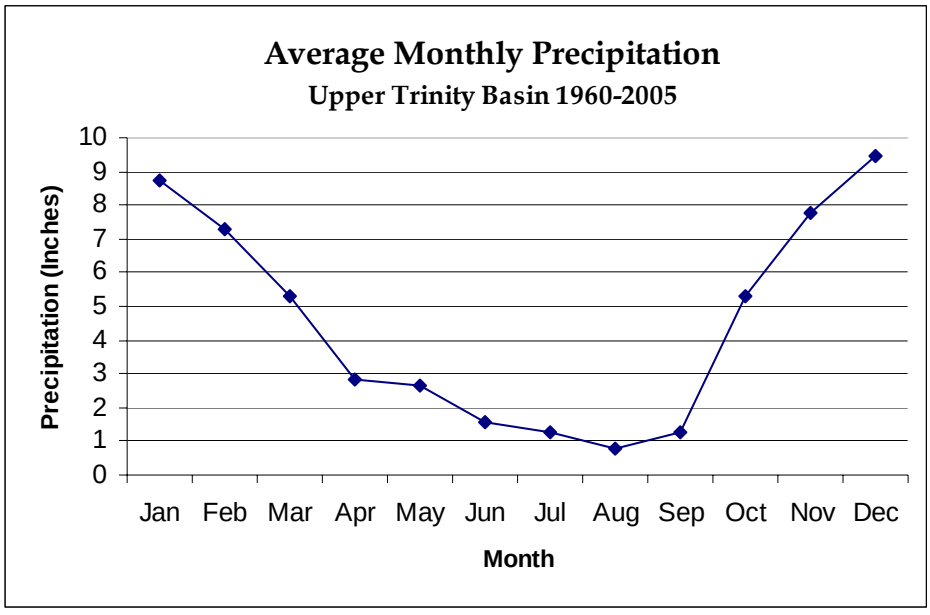
Climate

Northern California lies within an area of the Mediterranean climate zone which in the northern latitudes, is situated between 30 and 50 degrees above of the Equator. The Watershed falls directly within the center of this range along the 41st parallel and as is characteristic of most places within this zone, the summer months remain relatively rain free with the majority of the precipitation occurring during the winter season. Figure 2-3 graphs the monthly precipitation pattern typical for the area.

Throughout the summer, the region is dominated by a subtropical high pressure that moves up from the equator that typically suppresses cloud development and leads to hot, dry summer months where little or no precipitation occurs. Temperatures become more stable and predictable during this period although summer precipitation can result from infrequent thunderstorms. Additionally, the presence of the cold ocean current along the western coast helps to stabilize the air, further reducing the chances of summer rain in this region.

At the start of the winter period, the previously stable jet stream begins to fluctuate and the subtropical high starts to retreat southward allowing the Aleutian Low, or polar front, to move down from the north. The uplift created by the resulting circulation between the retreating subtropical high and the advancing polar low destabilizes the region and begins the rainy season. Precipitation data for the Watershed shows an increase in rain starting in October that typically lasts through the end of March.

Figure 2-3



Source: California Data Exchange Center, Coffee Creek RS, 4400' elevation, operated by USFS

Most of the precipitation during this time comes in the form of moderate intensity storm events that last from two to five days and typically develop over the eastern part of the Pacific Ocean and are brought in by the jet stream flowing in an easterly direction. The amount and distribution of this precipitation and the form it takes upon reaching landfall (rain, snow, hail, etc.) is largely determined by local topographic features and elevation. While snow is not common within the Mediterranean climate zone, within the Watershed area, it occurs in moderate amounts above 2,500 feet, and can accumulate on the ground for significant period of time above the 4,000 or 5,000 foot elevation zone. Refer to Photo 2-1 showing the 2006 snowpack in the Tangle Blue Lake drainage in the northeastern section of the Trinity Alps.

Precipitation

Rain data for the Watershed was collected from the Coffee Creek Remote Automated Weather Station (RAWS) operated by the U.S. Forest Service. This station has been in operation since 1960 and is also located near Ramshorn Summit and is situated mid-slope on the eastern side of the Watershed. Consistent with the Mediterranean Zone described under the climate section, 80 percent of the precipitation within the Watershed falls in the winter season between October and March. The average annual precipitation collected from this site since 1960 was 54.5 inches. Figure 2-4 shows the breakdown of precipitation by month.

Figure 2-4

Average Monthly Precipitation in Inches 1960-2005												
Yearly	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
54.5	8.8	7.3	5.3	2.8	2.7	1.6	1.3	0.8	1.3	5.3	7.8	9.5
Source: California Data Exchange Center, Coffee Creek RS, 4400' elevation, operated by USFS												

The significance of the Mediterranean climate for the Watershed is the infrequent but intense downpours that can develop and cause rapid runoff on previously saturated soils, which in turn can initiate landslides on unstable slopes. If snow has accumulated at the higher elevations and an extended warm front accompanied by heavy precipitation moves in, the resulting rain-on-snow event can lead to heavy flooding as seen recently in the winter of 1997.
In addition to rain, extended periods of fog can persist in the low lying valleys of the Trinity River throughout the winter period between storms.

Temperature

The average daily temperature for the Watershed for the 2005 year was 55° F with a daily average range extending from a low of 42°F to a high of 67°F. Refer to Figure 2-5. The lowest recorded temperature for the year was 23°F and the highest 103° F. The data were collected from the RAWS Weather Station located mid-slope near Ramshorn Summit and should be representative of an average range of the Watershed between the lowest point of 2,390 ft and the highest point of 9,025 ft.

Figure 2-5

Average Daily Temperature 2005 yr			
Month	Minimum Daily Average	Maximum Daily Average	Monthly Average
January	32	49	41
February	35	54	45
March	35	58	46
April	34	56	45
May	44	69	57
June	47	74	61
July	60	93	77
August	59	93	76
September	50	83	66
October	44	71	57
November	36	56	46
December	33	48	41
Average	42	67	55
RAWS Station: Scorpion, 4,400' elev, midslope			

Topography

The Watershed area is characterized by steep, mountainous terrain with narrow ridges and a long narrow valley floor. The east side of the Watershed parallels the Trinity Divided which topographically separates the Trinity and the Sacramento River Basins. Mt. Eddy, the highest point in Trinity County at 9,025 ft, is located along the Divide on the northeastern most corner of the Watershed. Starting from the north, the eastern perimeter continues south along the Divide and has an average elevation ranging between 6,500 and 7,000 ft. The western perimeter is mostly within the Trinity Alps Wilderness area where the elevation ranges between 7,000 and 8,000 ft. The highest point encountered at the north end of the Watershed is Scott Mountain with an elevation of 6,829 ft. Dropping down onto the floor of the Watershed at the northern end of the valley is the base of Scott Mountain at the intersection of Highway 3 and Parks Creek Road (USFS 39N17) with an elevation of 3,300 ft. From here, the valley floor elevation drops nearly 1,000 ft to an elevation of 2,395 ft at Trinity Dam approximately 30 miles south. Elevation bands for the Watershed are shown on Plate 2-5.

Geology

The Watershed falls within the Klamath Mountain Geomorphic Province which covers an area of approximately 12,000 square miles and encompasses the eastern edge of the Pacific Coastal Range and extents from Northwestern California into Southwestern Oregon. Geomorphology of the area is a result of continental drift and plate tectonics of the ocean floor that has resulted in massive uplifting and fracturing of the earths surface over two to three million years ago. Subsequent shaping and alteration of the steep mountainous terrain by glaciers that formed and subsequently retreated at the higher elevations over 10,000 years ago have carved the jagged ridges, broad u-shaped valleys and carved out the alpine lakes characteristic of the Trinity Alps. Mass wasting and fluvial erosion are the main geomorphic processes influencing the formation

of the landscape. The Klamath Province is well known for its complexity of geology and geomorphology that has resulted in non-uniformity of stream drainage and ridge direction. (U.S.F.W., 1998)

The area is a mixture of igneous, sedimentary and metamorphic rocks that range from 330 to 125 million years in age (Devonian and Jurassic). The igneous rock has crystallized from cooling magma high in magnesium and iron minerals and has resulted in the formation of mixed ultramafic and granitic rock. Sedimentary rocks such as sandstone, chert, and slates have developed from the deposition of ocean sediments; while metamorphic rocks have been created from the extreme pressures generated from the upheavals that have created the steep and broken terrain. Much of the western edge of the Watershed within the Trinity Alps Wilderness provides an example of granitic ridges that have been exposed due to loss of soil cover from centuries of erosion processes. Photo 2-2 is a view from the eastern ridge of the Watershed looking towards the western ridge and the granitic peaks of the Trinity Alps Wilderness area. Green Serpentine is an example of a common ultramafic rock found throughout the Watershed that is readily susceptible to mass movement. (DWR, 1980) The general geology of the area is shown on Plate 2-6

Soils

Soils in the Watershed have predominantly been formed from metavolcanic and metasedimentary residuum on upper mountain side slopes and ridges. Soil types vary from the lower elevations with highly fertile soils with few erosion or stability problems to the higher elevations with granitic soils that tend to be highly erodable. A band of highly erodable decomposed granitics crosses the Trinity Basin from Grass Valley Creek north through the upper Trinity River. Soil depth tends to be relatively shallow to moderately deep (0-40 inches) loams and gravely loams and moderately deep (60 inches) at the lower elevations. Erosion levels are moderate to high depending on parent material, slope, aspect and vegetative cover. Soils with erosion levels in the high to very high range may erode faster than the soil formation can occur. Refer to Plate 2-7 for a general location of soils within the Watershed and Plate 2-8 for the erosion hazard rating of the soils.

Vegetation

Vegetation within the watershed consists of mixed conifer and evergreen brush at the lower elevations with true fir and lodgepole pine at the higher elevation. Biological plant diversity is considered to be great, largely due to the ultramafic soils found throughout the area. Nine sensitive plant species are known to occur within the area. (Shasta-Trinity Land and Resource Management Plan).

Vegetation within the Watershed area consists of 76 percent mixed conifer, 10 percent shrub, 6 percent mixed fir, 5 percent non-forested and 3 percent hardwoods. (Upper Trinity River Watershed Analysis, USFS, 2005). Mixed conifer and evergreen shrubs are dominant at lower elevations with true fir and lodgepole, ponderosa and jeffery pine at the higher levels. Areas of the Upper Trinity watershed are noted for the diversity of conifer species.

The predominant natural plant communities, from lower to higher elevations, are White fir series, Red fir series, and Mountain hemlock series. Jeffrey pine series, Foxtail pine series, and Mixed subalpine forest series occur on serpentinized peridotite. Port Orford-cedar series occurs in along some perennial streams and spring areas in the northeast portion of the watershed. Oak woodlands can be found throughout the area in the lower elevations, especially in the inland

valleys and foothills, south facing slopes, and dry rocky ridges. Oak species are comprised of Oregon white oak at the lower elevations and Black oak, Canyon live oak in the lower as well as higher elevations. Dominant conifer species, such as Douglas fir, ponderosa pine, and sugar pine are typical throughout the montane elevations. Photo 2-3 shows a small wetland area with a *Darlingtonia californica* plant community. Plate 2-8 shows the location of general vegetation habitat within the Watershed. Vascular plants are absent where bedrock is exposed, except along joints that are prominent in granitic rocks.

Vegetation communities are comprised of the following dominant species:

Mixed Conifer/Fir

Ponderosa Pine	*Pinus ponderosa*	Red Fir	*Abies magnifica*
Jeffrey Pine	*Pinus jeffreyi*	Sugar Pine	*Pinus lambertiana*
Douglas Fir	*Pseudotsuga menziesii*	Knobcone Pine	*Pinus attenuata*
White Fir	*Abies concolor*	Incense Cedar	*Calocedrus decurren*

Mixed Hardwood:

Black Oak	*Quercus kelloggii*	Canyon Live Oak	*Quercus chysolepsis*
Pacific madrone	*Arbutus menziesii*	Big Leaf Maple	*Acer macrophyllum*
Tan Oak	*Lithocarpus densiflora*	Oregon White Oak	*Quercus garryanna*

Shrubs:

Lemmon's Ceonothus	*Ceonothus lemmonii*	Snowbrush	*Ceonothus velutinus*
Deer Brush	*Ceonothus intergerrimus*	Manzanita	*Arctostaphylos spp.*
Bitter Cherry	*Prunus emarginata*	Whitethorn	*Ceonothus cordulatus*

An "invasive species" is defined as a species that is non-native to the ecosystem under consideration whose introduction causes or is likely to cause economic or environmental harm or harm to human health. The degree of presence of invasive plant species in the upper Trinity area has not been fully investigated yet, but Plate 2-9 shows the location of areas that have been identified to date. Note that the spread of invasive species follows the pattern of the road system, indicating that human behavior is a likely culprit for introducing the unwanted species.

A small population of Port-Orford cedar (*Chamaecyparis lawsoniana*) is found in the Watershed, primarily along the Trinity River and in the upper East Fork Trinity River sub-watersheds. Small populations are also found on some of the tributaries to these rivers. All of the mapped populations are found along or in close proximity to rivers, streams, ponds, lakes, springs, and wet meadows. It has been conjectured that Port-Orford cedar was once a much larger component of the vegetation found in the Watershed. Pollen counts from core samples taken from Deadfall Lake (for a study on fire regimes) contained a high amount of Port-Orford cedar pollen. (Skinner)

The population of Port-Orford cedar is the only one on the west coast that is not infected with the Port-Orford root disease (*Phytophthora lateralis*). There is a concern that this disease will eventually be transported into the Watershed from adjacent areas (see 'Forest Health' section below).

Wildlife

The Watershed area provides habitat for a variety of mammals include Roosevelt elk, black-tailed deer, black bear, mountain lion, coyote, grey fox, weasel, bobcat, ringtail, marten, fisher and river otter. Birds include eagles, hawks, owls, peregrine falcon, osprey and ruffed grouse.

The northern spotted owl, a federally listed Threatened species, is the primary species of concern within the Watershed. Roosevelt Elk, which were extirpated from this area, have been introduced by the Department of Fish and Game in attempts to re-establish the population within its historical range.

Bald Eagles, a federally Threatened and a state listed Endangered species, use the habitat around the lake There are active bald eagle nest territories within the NRA and eagles actively forage the majority of the lake for fish and waterfowl and utilize the perimeter trees for nesting, roosting, and as foraging perches. There are 10 pair of eagles that return to the lake each year in January to nest.

The remaining open areas around the lake provide critical winter forage range for blacktail deer which can be seen swimming across the lake along the old migration trails they used to walk.

Fisheries

Prior to the construction of Trinity Dam in 1963, the main stem of the Trinity River supported large runs of anadromous fishes including Chinook and Coho salmon, Steelhead trout, and Pacific Lamprey. The upper sections of the river above Trinity Dam were primarily utilized by spring Chinook, summer Steelhead, and Coho. The spring Chinook and the summer Steelhead would typically begin their migration from the ocean to the far upper reaches of the river between March and May during the early runoff from snowmelt and over-summer in the deep, cool pools, where they would remain as the river levels dropped, until the beginning of spawning season in October. Migration of the fall Chinook and winter Steelhead would begin in late fall after sufficient rainfall increased river flows enough to allow passage over the numerous falls that are encountered in the lower section of the mainstem.

Once the rains began and the river flows increased, the spring Chinook would move to the uppermost sections of the mainstem of the river as well as the lower reaches of the mainstem tributaries where spawning would occur. While some Steelhead spawning undoubtedly occurred in the mainstem, the majority of the Steelhead run would continue farther up and spawn in the upper reaches of the larger tributaries.

While the Chinook and Steelhead had two distinct runs within a given year, the Coho salmon had only one that began in late October as the flows permitted. Spawning would occur in the wide, gravelly low gradient sections at the lower end of the Watershed which are now inundated by the Trinity Lake.

Though the construction of Trinity Dam in 1963 resulted in the loss of anadromous fish in the upper section of the Trinity River and tributaries, the resulting lake that was formed behind the dam supports a variety of non-native fish that have been introduced to support the popular recreational fishery. The species of sport fish introduced include large and small mouth bass, rainbow and brown trout, as well as kokanee and chinook salmon. Trinity Lake currently holds

the state records for the small mouth bass which was caught in 1973 and the Brown Bullhead catfish which was caught in 1993. The economic benefit of the newly created recreational lake fishery is a boost to the Watershed from the fishermen who support the campgrounds, RV parks, motels, and markets. A list of common fish species found in Trinity Lake, alpine lakes at the higher elevations, tributaries, and the mainstem of the Trinity River above the dam are listed in Figure 2-6.

Figure 2-6

Commonly Found Fish Species of the Upper Trinity Watershed

TRINITY LAKE	Scientific name
Chinook Salmon	*Ochorhynchus tschawytscha*
Kokanee Salmon	*Oncorhynchus nerka*
Brown Trout	*Salmo trutta*
Rainbow trout	*Salmo gairdneri*
Smallmouth Bass	*Micropterus dolomieui*
Largemouth Bass	*Micropterus salmoides*
Brown Bullhead	*Ictalurus nebulosus*
White Catfish	*Ameiurus catus*
Green Sunfish	*Lepomis cyanellus*
Sucker	*Catostomus spp.*
Lamprey	*Lampetra spp.*

ALPINE LAKES	Scientific name
Brown Trout	*Salmo trutta*
Brook Trout	*Salvelinus fontinalis*
Rainbow Trout	*Oncorhynchus mykiss*

UPPER TRINITY RIVER	Scientific name
Brown Trout	*Salmo trutta*
Brook Trout	*Salvelinus fontinalis*
Rainbow Trout	*Oncorhynchus mykiss*
Kokanee Salmon	*Oncorhynchus nerka*
Lamprey	*Lampetra spp.*
Sculpin	*Cottus spp.*

Source: Ca. Dept Fish & Game; U.S. Forest Service, personal communication.

Central Valley Project

The Trinity River Act of 1955 authorized the creation of the Trinity River Division of the Central Valley Project (CVP) as means to provide for the trans-basin diversion of water from the Trinity River to the Sacramento River. Construction of the massive Trinity Dam project by the Bureau of Reclamation began in 1957 which at the time of completion in 1961, was the highest earth-filled embankment dam in the world. By 1963, Trinity Lake was filled and operations of the Trinity River Division had begun. For the first ten years of operation (water years 1964-1973), 88 percent of the Trinity Lake annual inflow was diverted out of the Trinity River and into the Sacramento River Basin and the CVP.

Trinity Lake provides a storage capacity of 2.5 million acre-feet and exports nearly one million acre-feet of water per year from the Watershed to the CVP. The Trinity, in conjunction with the Sacramento and the San Joaquin Rivers, provides water for urban and agricultural uses in the Central Valley of California. Water releases are first regulated at Trinity Dam for power generation or water demand, and then again at Lewiston Dam, which is the regulating reservoir for Trinity Lake. From here, water is either released into the Trinity River or diverted into the Clear Creek tunnel for transfer and storage in Whiskeytown Lake near the city of Redding.

Subsequently, construction of the two dams has resulted in inadvertent but detrimental impacts to the Trinity River and anadromous fish populations when access to an estimated 109 miles of spawning and rearing habitat in the upper reaches of the river and its associated tributaries in the Watershed was cut off from migrating salmon, steelhead and pacific lamprey. Other consequences attributed to the construction of the dams and the diversion of water includes substantial changes in the morphology of the Trinity River from the reduced flows. Intensive flow studies over the last 20 years have shown that the habitat below the dams have been degraded through the elimination of new gravels from above the dams that are necessary for spawning habitat as well as the inability of the current flow releases to adequately flush fine sediments from the existing gravels. In addition, the resulting channelization of the river caused by riparian vegetation encroachment and sediment deposition further degrade available habitat. Information on Trinity Dam and Lake is provided in Figure 2-7. Photo No. 2-4 is an aerial photo of the dam and nearly full lake.

Figure 2-7

Trinity Dam Information									
Dam ID	1311	DWR Number	9000-196	National ID	CA10196	Dam Name	Trinity	Quad Name	TRINITY DAM
County	Trinity	Stream	Trinity	Latitude	40.802	Longitude	122.762	Township	34N
Section	15	Range	8W	Year Complete	1962	Basline Meridian	MD	Parapet Type	N/A
Dam Type	Earth	Material Volume	29410000 cu yds	Storage Capacity	2,447,650 ac-ft	Reservoir Area	16,535 acre	Drainage Area	688 sq mi
Crest Elevation	2,395 ft	Crest Length	2,450 ft	Crest Width	40 ft	Height	458 ft	Parapet Height	N/A
Total Freeboard	25 ft	Operating Freeboard	6.8 ft	Status	FED	Usage	MULTI, IRR, REC, POW	Owner	U S Bureau Of Reclamation

Trinity River Flow Releases

Recent regulations approved by the Department of the Interior have established new criteria for the amount of water released into the Trinity River System that is based upon the amount of precipitation received during the water year (October 1 through September 30). The Record of Decision for the Trinity River EIR defines five specific water year types that allocate varying amounts of water to be released into the river downstream of the dam. Unlike previous water distribution, the new regulations establish a minimal flow that must be maintained in the Trinity River while allocating water in excess of the minimum for exported to the Central Valley for

power generation as well as urban and agricultural uses. Figure 2-8 details the water class year and the projected release of water.

Figure 2-8

Flow Releases to Trinity River by Water Class Year				
Water Year Class	Volume Acre-Ft	Peak Flow (cfs)	Peak Flow Duration (days)	High Flow Period (> 450cfs)
Critically Dry	369,000	1,500	36	Mid-April through June 30th
Dry	453,000	4,500	5	
Normal	647,000	6,000	5	
Wet	701,000	8,500	5	
Extremely Wet	815,000	11,000	5	
Data: U.S. Department of the Interior				

Since the primary purpose of the Trinity and Lewiston lakes is to function as storage reservoirs for the CVP and not to provide recreational resources or opportunities, the effects to the lakes from increased flows in the river were not considered a factor in the flow determination process. Annual flow volumes and projected release schedules for each of the above classes were developed based upon their ability to meet criteria necessary to restore and maintain the fishery resources of the Trinity River. However, the new flow regimes will have an effect on the Upper Trinity Basin by varying the lake level throughout the year as well as determining when and how fast the lake level will drop. The total volume of water released from Trinity Lake into the Trinity River during an "extremely wet year" is almost double that of an "extremely dry year" and can equal 33 percent of the capacity of the lake. The release will also coincide with the beginning of the summer tourist season, effecting recreational uses on the lake as well as the river. Besides the potential economic impacts, the draw down of the lake also contributes to sediment problems by exposing barren soils along the shoreline to the impacts of boat wakes from the recreational users. One of the primary concerns brought up in the Upper Trinity Watershed Survey by residents was the fluctuating lake levels experienced every summer and the effects it has on tourism and recreation. Figure 2-9 outlines the projected releases to the Trinity River starting in late spring and continuing into summer with the peak of the draw-down occurring from mid-May to mid-June, the beginning of the recreational use period of the lake.

Trinity River Hatchery

The construction of the Trinity and Lewiston dams created a permanent upstream migration barrier on the river which has prevented access to an estimated 109 miles of spawning and rearing habitat in the upper mainstem and tributaries as described previously. The subsequent result has been the extirpation of the anadromous fish from the Watershed. In anticipation of the lost habitat and as mitigation for construction of the dams, the Bureau of Reclamation was required to construct the Trinity River Hatchery at the base of Lewiston Dam in 1964. Operations of this mitigation hatchery is funded by the Bureau of reclamation and operated by the California Department of Fish and Game. Three species of anadromous fishes, Coho, fall Chinook and fall Steelhead, are spawned and reared at the facility for release into the Trinity River system below the Watershed. The current goals are to raise and release sufficient juveniles to provide for annual adult returns at the hatchery of 12,000 Chinook, 2,100 Coho, and 10,000 Steelhead. To help differentiate between the wild and hatchery adult fish that return to spawn in

the Trinity River, hatchery personnel mark 100 percent of the steelhead and coho, and place coded wire tags in 25 percent of the Chinook prior to their release. Figure 2-10 lists the species and target numbers of fish released by the hatchery into the Trinity each year.

Figure 2-9

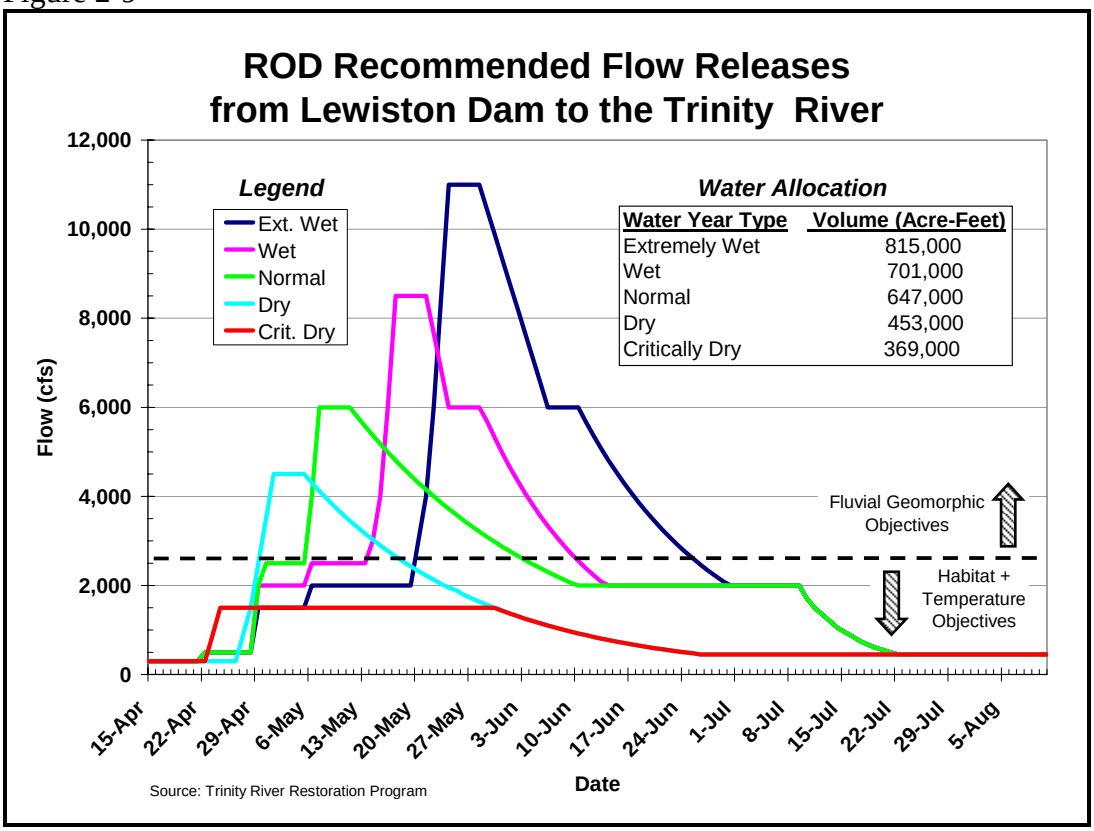


Figure 2-10

Annual Hatchery Release Goals			
Species	Yearlings	Fingerlings	Run
Steelhead	800,000	0	
Coho	500,000	0	
Chinook	400,000	1,000,000	Spring Run
Chinook	900,000	2,000,000	Fall Run
Data: California Department of Fish & Game			

Photo 2-1 View of snowpack in Tangle Blue Lake drainage from Scott Mountain. March 26, 2006

Photo 2-2 Granitic ridge formation of the Trinity Alps. Photo taken from the eastern edge, looking towards the western edge, of the Watershed.

Photo 2-3 Typical wetlands with serpentine soils characterized by Darlingtonia californica

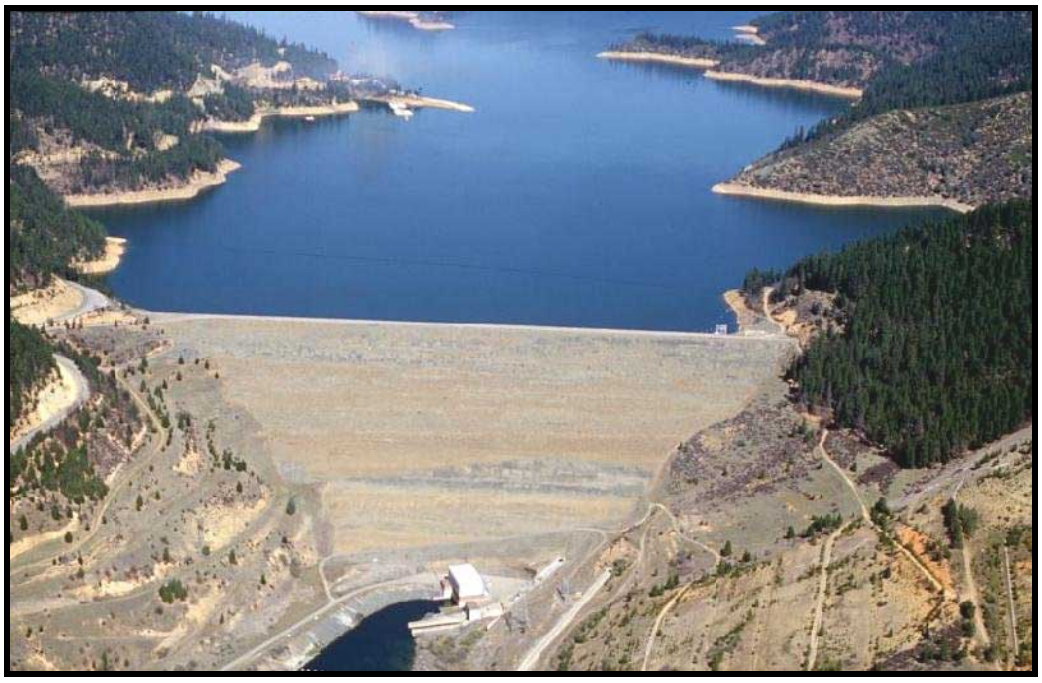
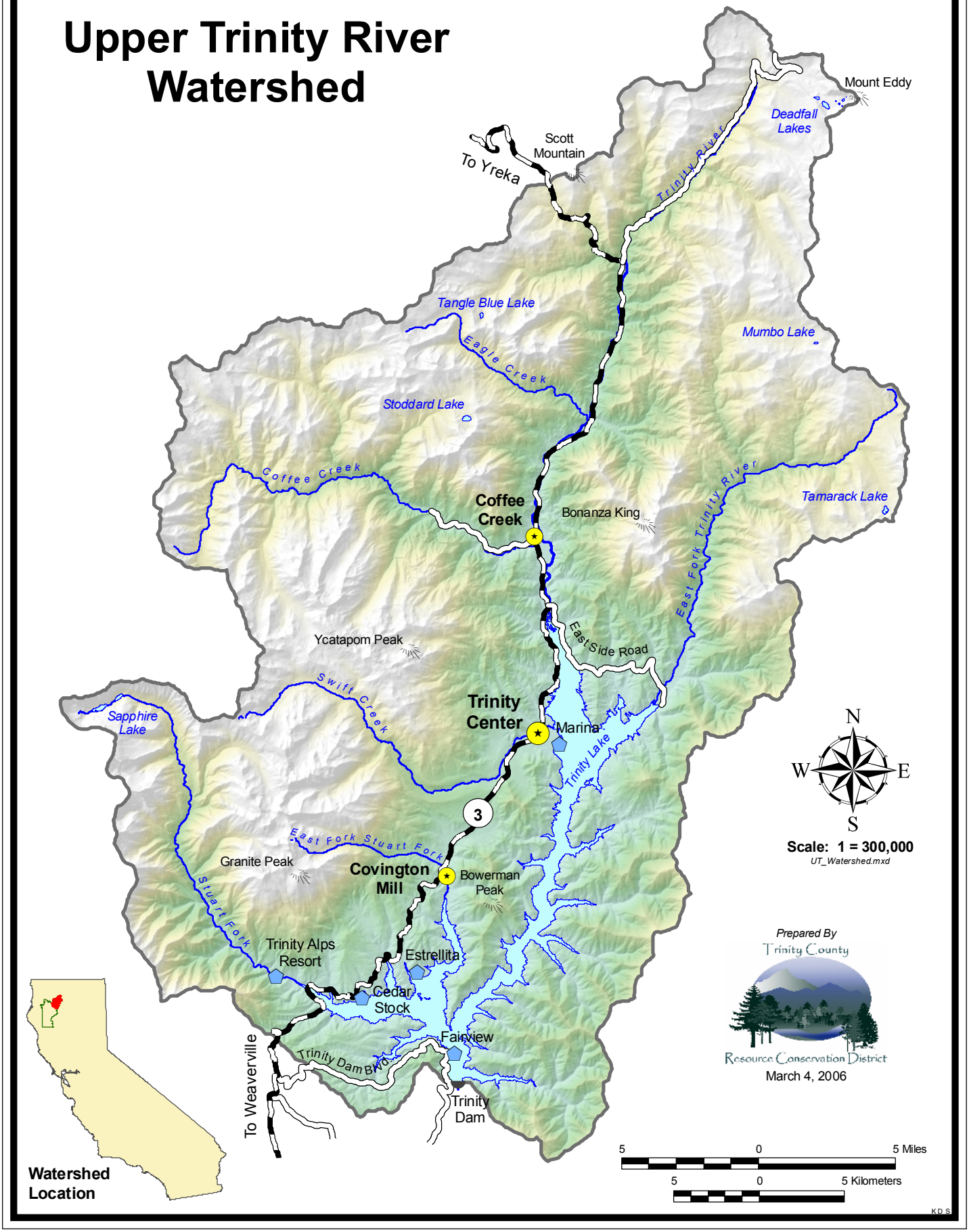


Photo 2-4. Aerial view of Trinity Dam with Trinity Lake near capacity.

Photo 2-5 Typical alpine lake formed in cirque near ridgeline. Note shallow soil formation and sparse tree growth.

Photo 2-6 Typical alpine meadow with deep soils that provides grazing for bear and deer.


Upper Trinity River Watershed
Mount Eddy
Deadfall Lakes
Scott Mountain
To Yreka
Trinity River
Tangle Blue Lake
Eagle Creek
Mumbo Lake
Stoddard Lake
Coffee Creek
Coffee Creek
Bonanza King
Tamarack Lake
East Fork Trinity River
Ycatapom Peak
East Side Road
Swift Creek
Sapphire Lake
Trinity Center
Marina
Trinity Lake
3
East Fork Stuart Fork
Granite Peak
Covington Mill
Bowerman Peak
Stuart Fork
Trinity Alps Resort
Estrellita
Cedar Stock
Fairview
Trinity Dam Blvd
To Weaverville
Trinity Dam
Watershed Location
N
W
E
S
Scale: 1 = 300,000
UT_Watershed.mxd
Prepared By
Trinity County
Resource Conservation District
March 4, 2006
5 0 5 Miles
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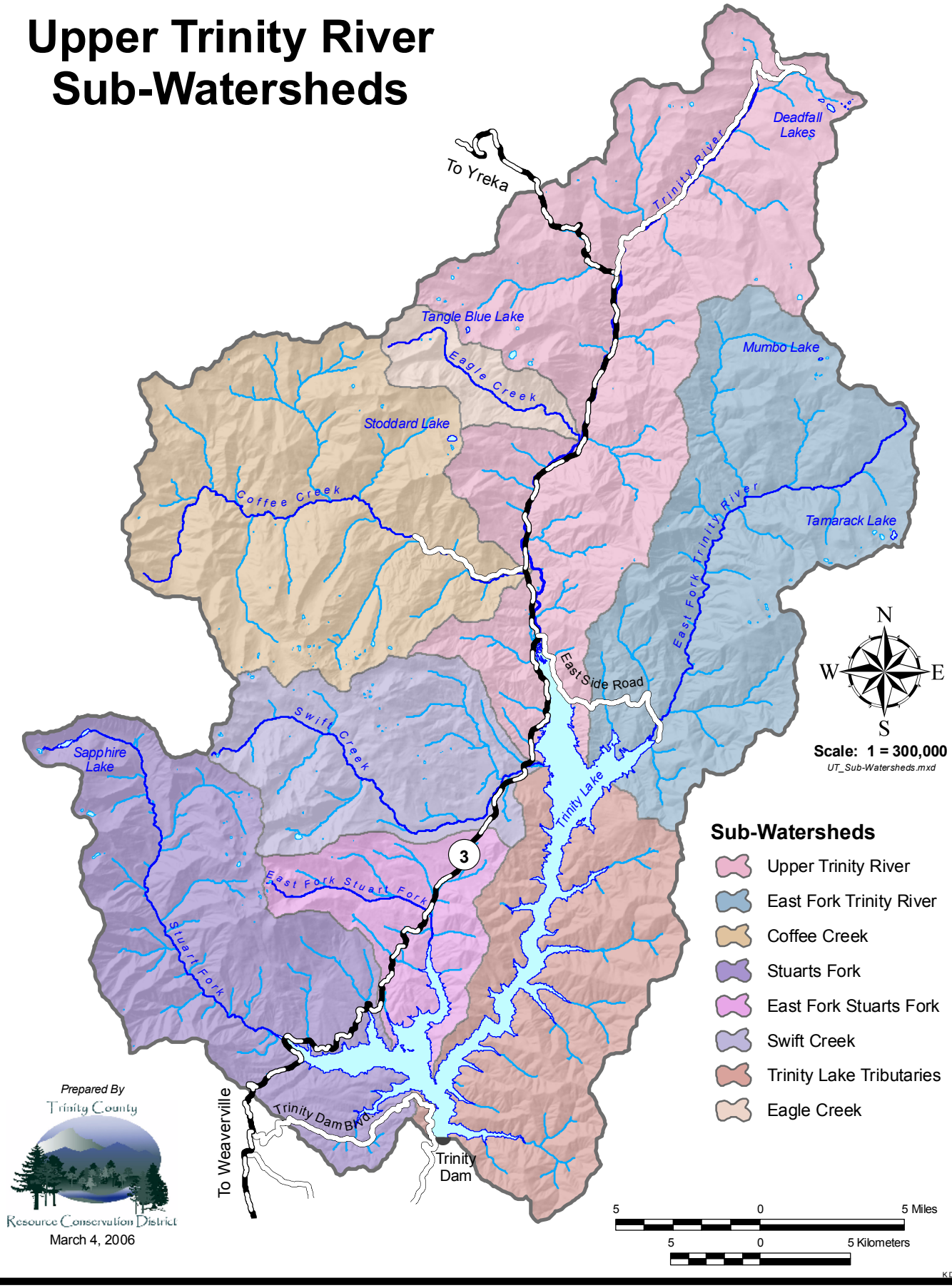
Upper Trinity River Sub-Watersheds



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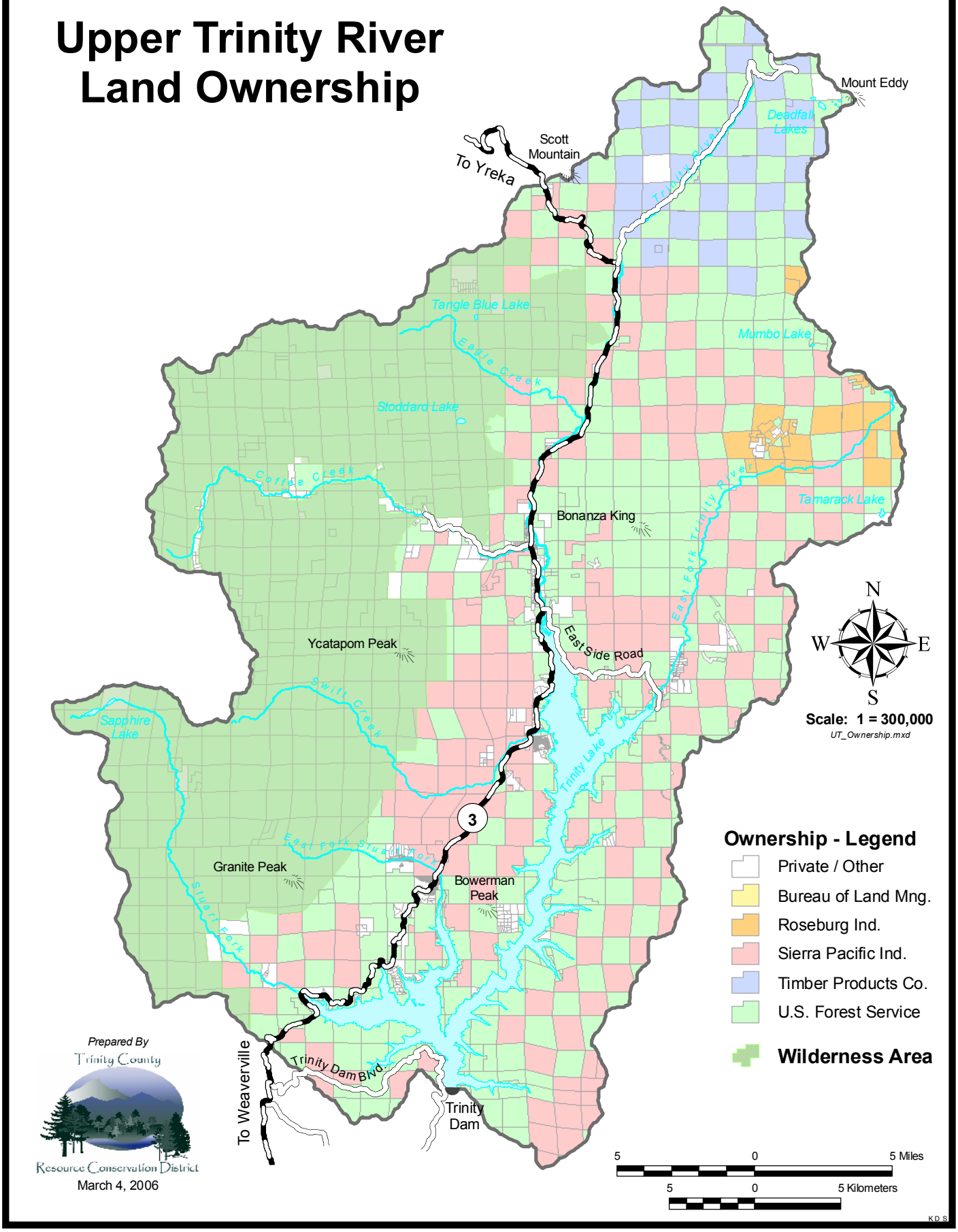
Upper Trinity River Land Ownership



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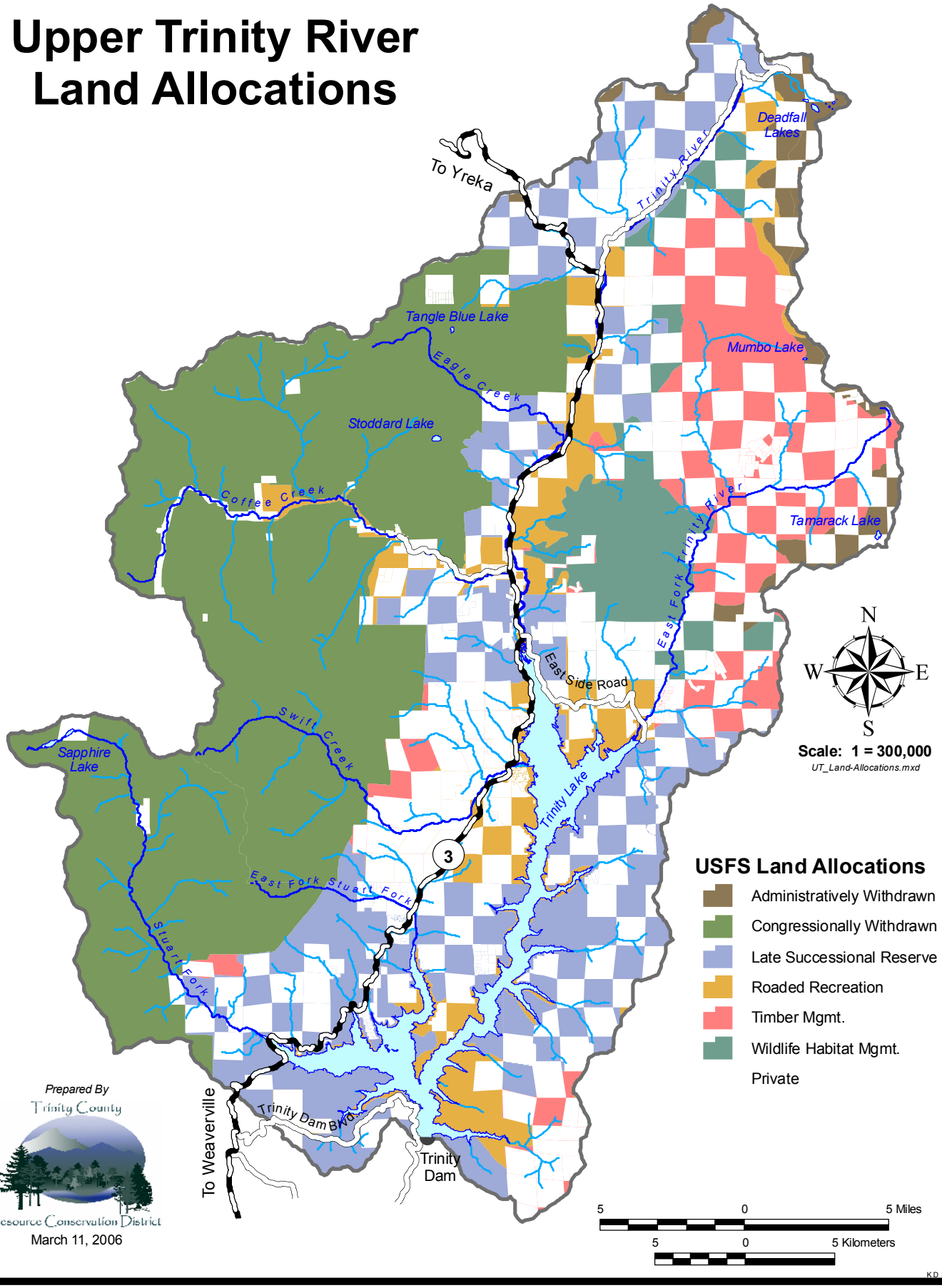
Upper Trinity River Land Allocations



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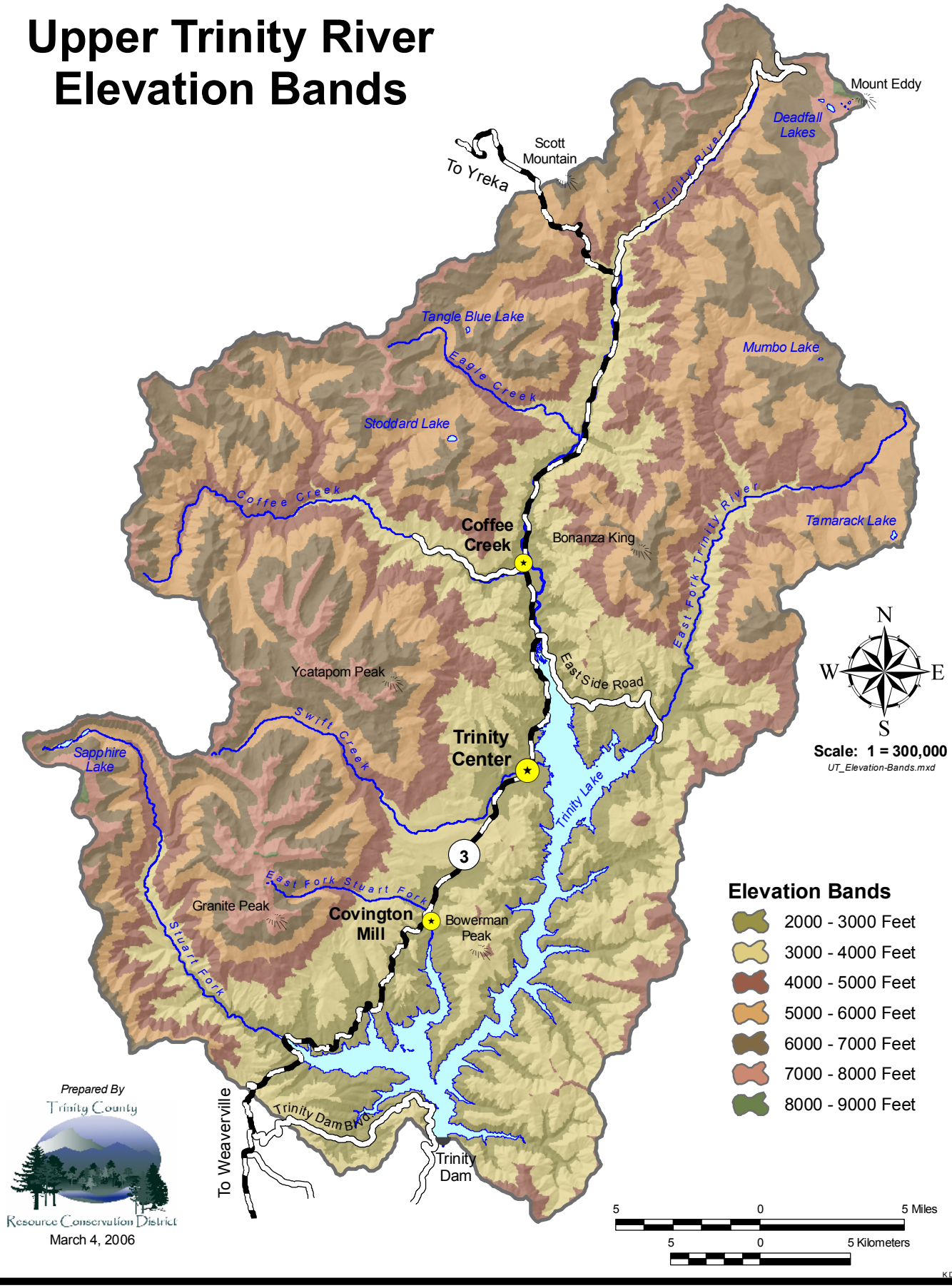
Upper Trinity River Elevation Bands



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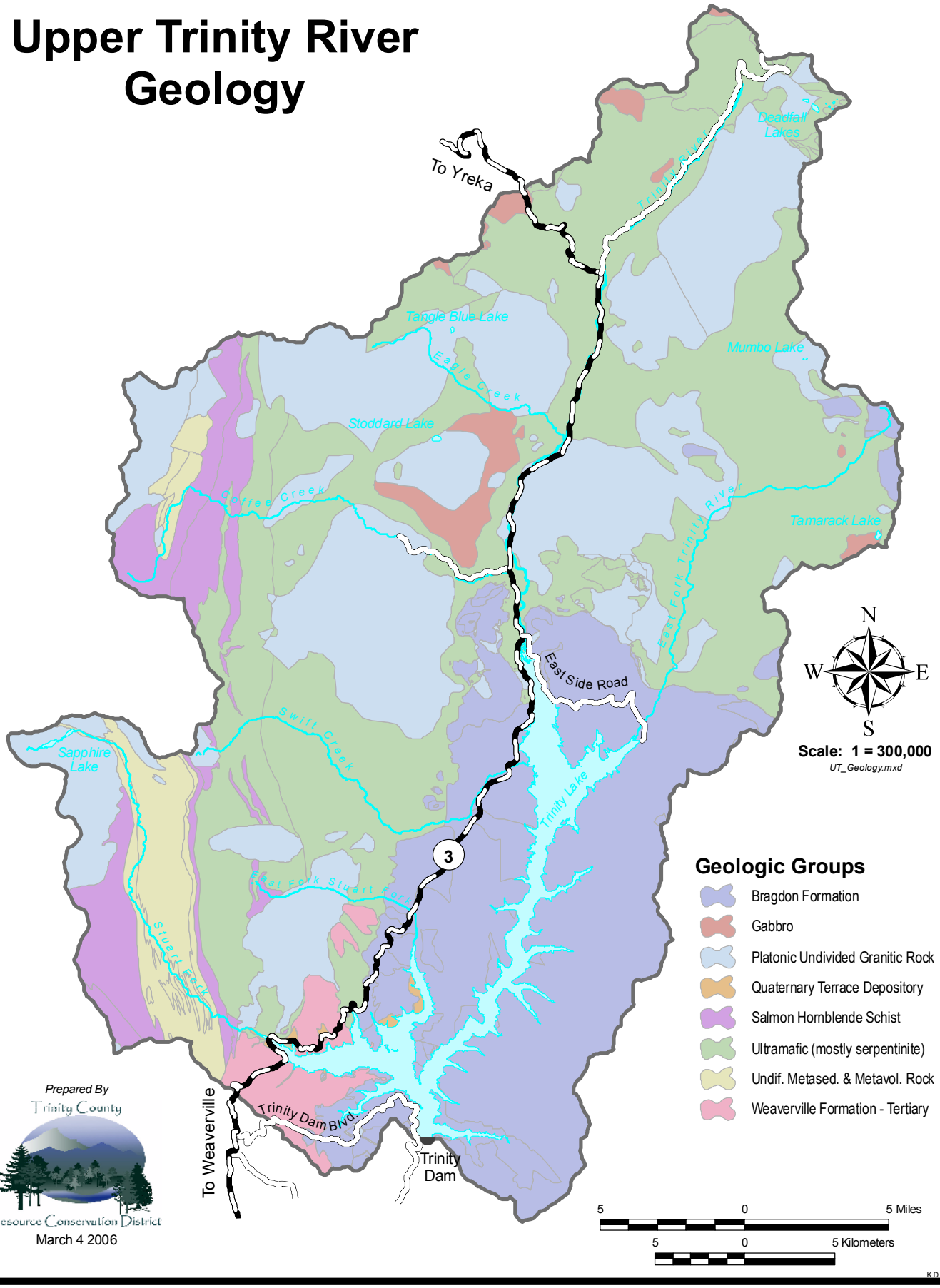
Upper Trinity River Geology



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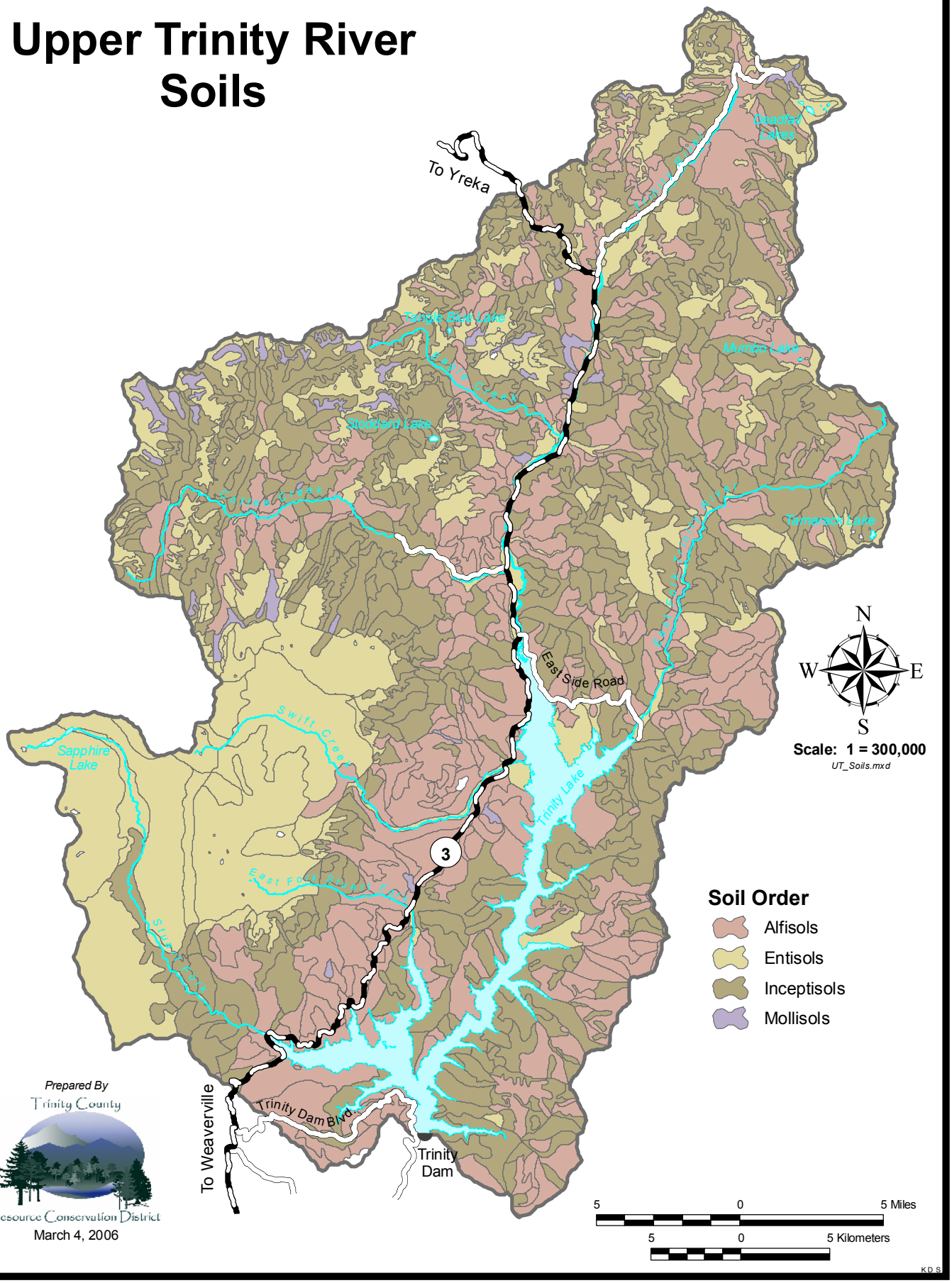
Upper Trinity River Soils



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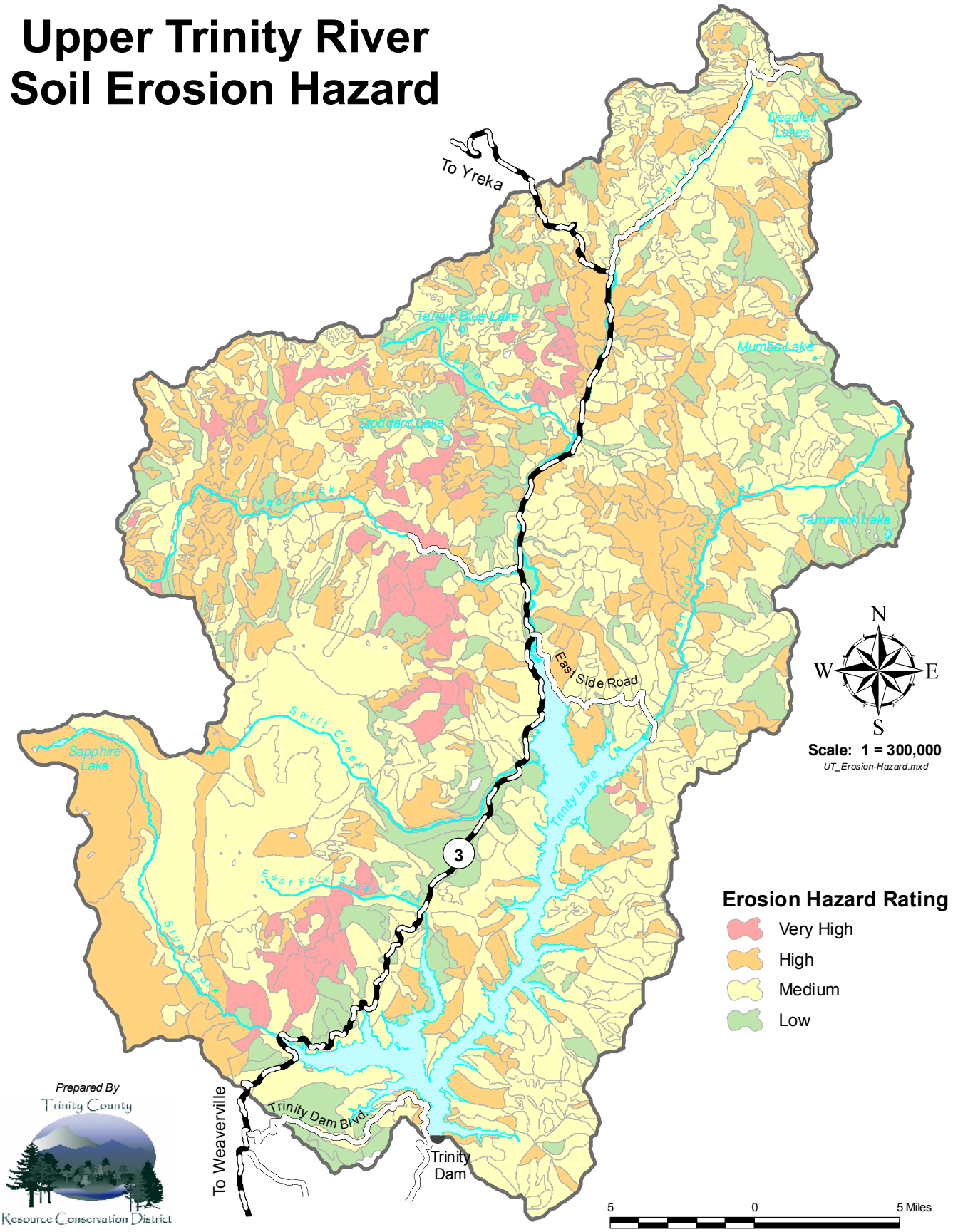
Resource Conservation District

March 4, 2006

Upper Trinity River Soil Erosion Hazard



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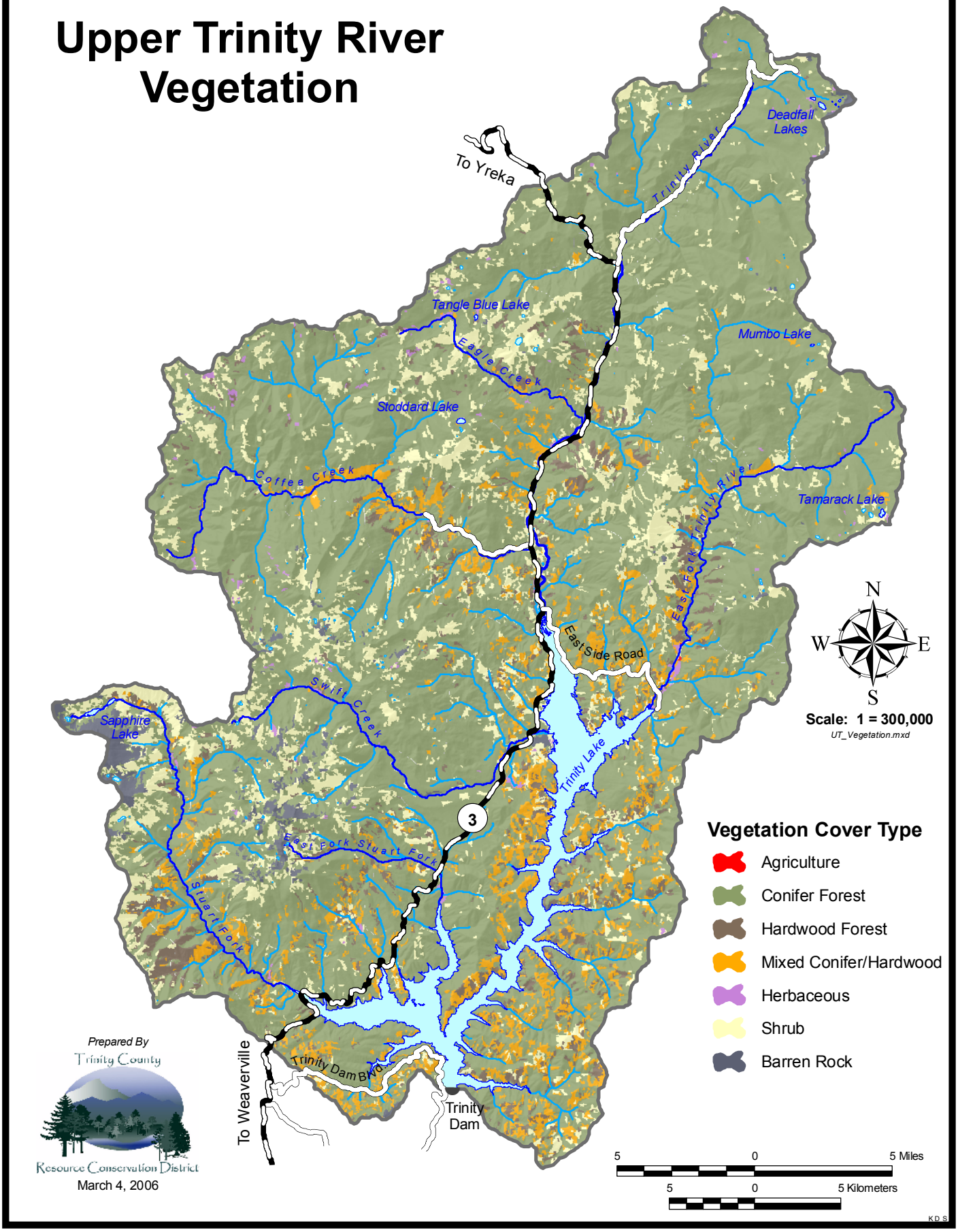
Upper Trinity River Vegetation



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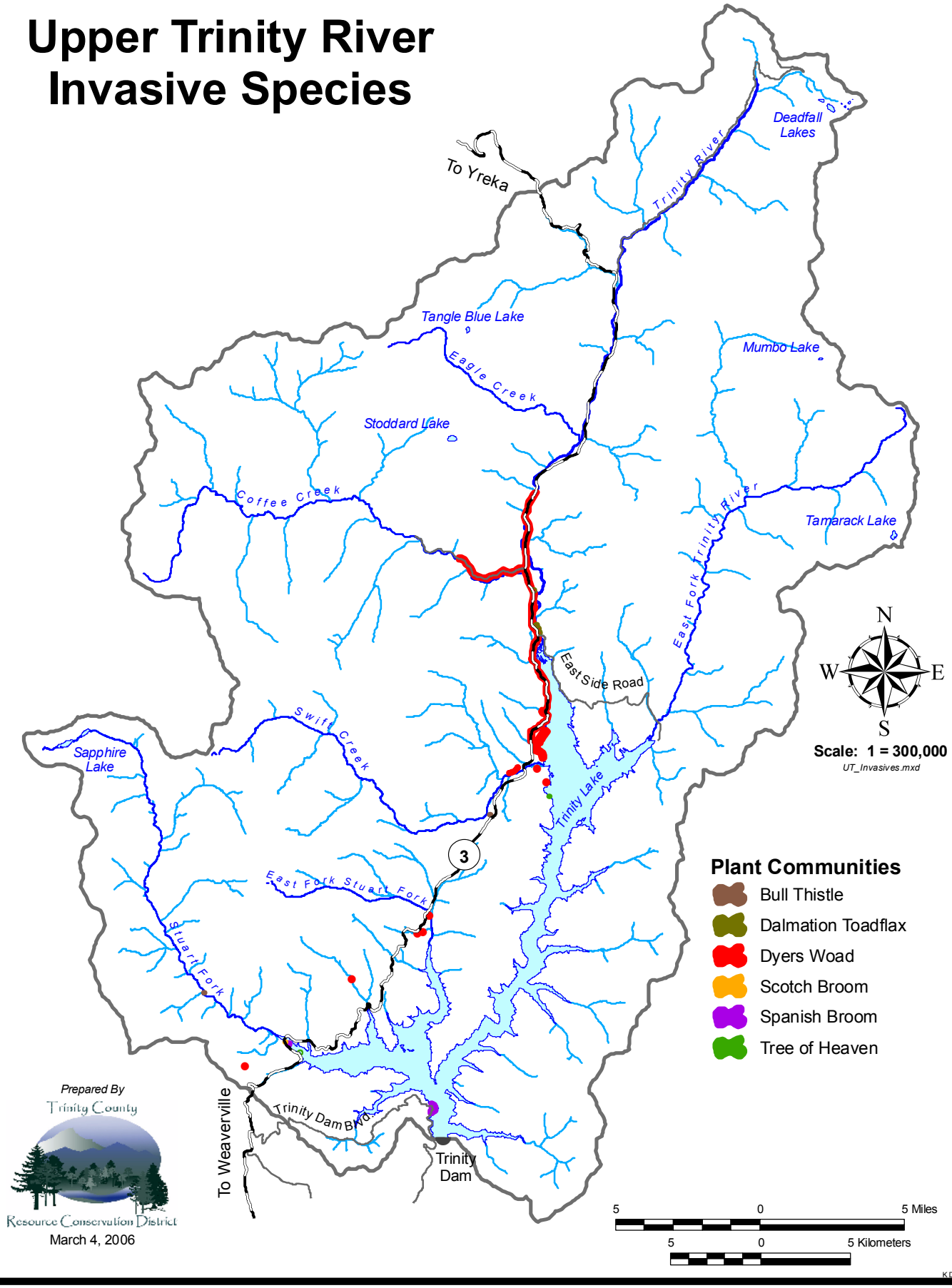
March 4, 2006

Upper Trinity River Invasive Species



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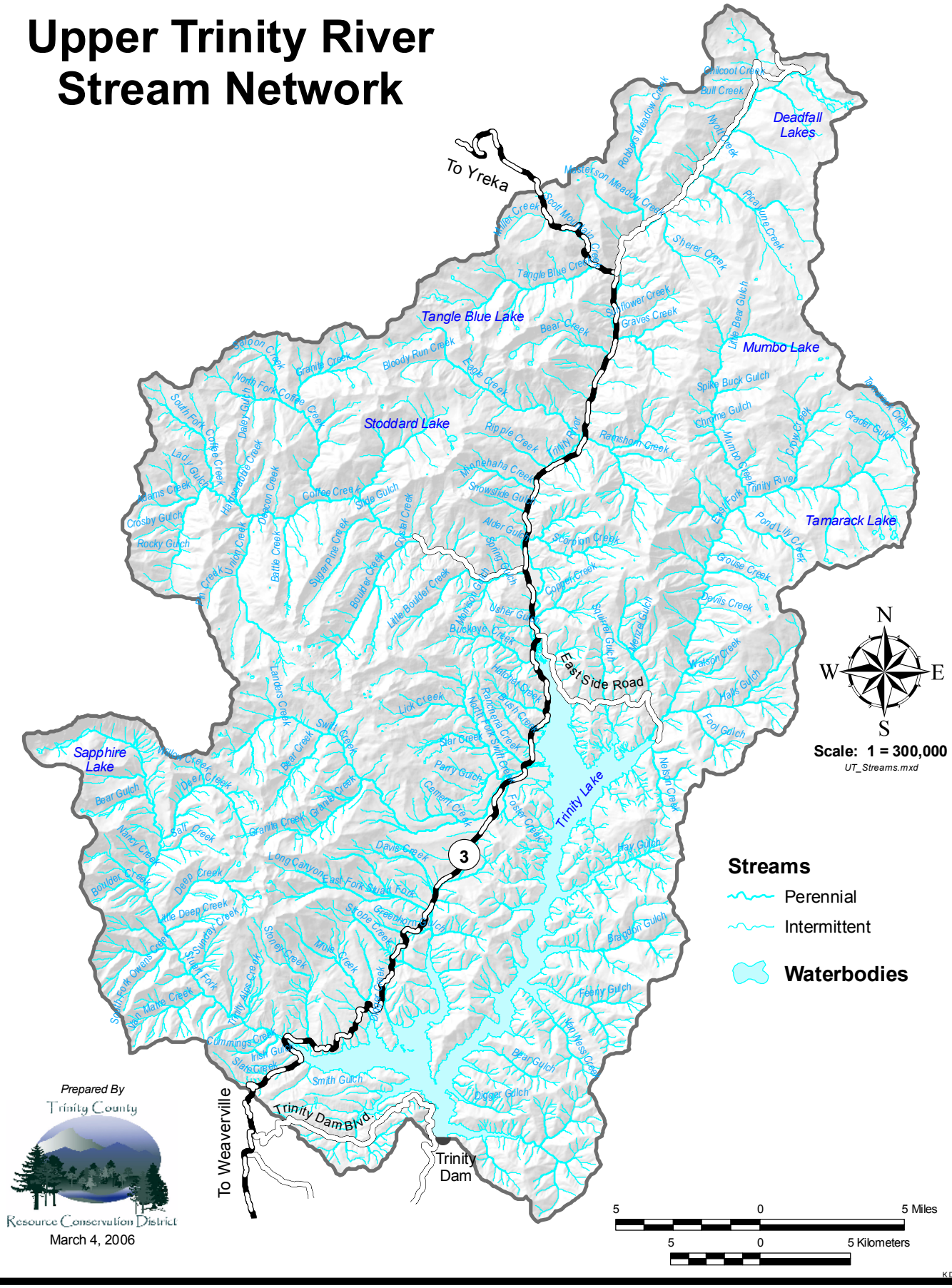
Upper Trinity River Stream Network



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March 4, 2006

SECTION 3

Historical Setting

Wintu People

The Watershed area falls within the tribal territory of the Wintun people that covered a vast area of eastern Trinity County and the Upper Sacramento Valley. The Wintu are the northern most group of the Wintun people with a range extending from the headwaters of the Trinity River southwest to the Big Bar and Hayfork area, east towards Mount Shasta and south as far as the northern part of the San Francisco Bay delta. (T. C. Historic Sites), (Silver, 1978) There were an estimated 500 triblets, or groups of Wintuns living throughout northern California in the early 1800's. The group known as the Wai-ken-mok (people up north) lived in permanent villages located in the broad valley of the upper Trinity watershed that extended as far north as Scott Mountain. The population of the Wintun was estimated to be 12,000 in 1700 however, due to conflicts with white settlers and diseases, these numbers had been reduced to 1,000 by 1910 with a census estimate of only 380 in 1930. In 2000, an estimated 3,200 Wintun remain.

The Wintu were considered sedentary foragers who occupied permanent villages near rivers and streams where they hunted, fished and foraged for plants. Hunting and fishing were the primary responsibility of the men while women gathered wild plant foods and basket making materials While not noted for their expertise in hunting, they were considered to be exceptional fishermen and relied extensively on salmon and steelhead that returned to the valley each year to spawn. (Powers, 1976) While the salmon provided one of the primary food sources for the Wintu in the area, acorns from the black and live oaks were the subsistence staple of Wintu diet. Socially, the Wintu were organized into autonomous tribelets comprised of extended family groups, with the basic social, political and economic unit being the village. (Chase-Dunn, Clewett, and Sundahl).

The following excerpt from the Trinity River Bridges Project 2003 environmental assessment provides a good description of the Wintu people:

> *At the time of Euro-American contact, most of the western side of the Sacramento Valley, north of about Suisun Bay was inhabited by Wintun-speaking people. Early in the anthropological study of the region, Powers (1976) had recognized a linguistic and cultural distinction between the southern membership of this large group (i.e., the Patwin) and the people occupying the northern half of the western valley. Subsequent linguistic analyses resulted in the present division of Wintuan into a southern Patwin group, a Central (Nomlaki) group, and a northern (Wintu) Wintuan stock. Clearly, however, the central and northern Wintus were very closely related and shared numerous cultural traits and attributes.*
> *The Wintu were divided into nine subgroups distributed from Cottonwood Creek in the south, northward through Shasta County and into portions of Trinity and Siskiyou counties, and westward into portions of southern Trinity and northern Tehama counties. Within the project area, the Wintu inhabited all areas east of approximately Junction City, including the area of what is now Trinity Reservoir. Wintu subsistence was based on three main staples: deer, acorns, and salmon. All three were abundant along the Sacramento and Trinity Rivers and their primary tributaries, although acorns and deer were available only seasonally. These staples*

were supplemented with an immense array of less abundant resources, some seasonally available and some procurable year round. The available ethnographic information documents a complex pattern of land use, settlement, and subsistence orientation. The salmon runs, the locations of seasonally available big game (especially deer), and the distribution of acorn-yielding oak trees required major forays from the home base because all three were concentrated in different areas. Moreover, long and arduous trips were often required to collect non-native raw materials, such as obsidian and certain other utilitarian materials.

Trapping

Hunters and trappers from the Hudson Bay Company were the first commonly recognized non-natives to enter the vast wilderness of northern California in the early 1800's. Jedediah Smith, a hunter, trapper, fur trader and explorer who pioneered much of the west, explored the Northern California and Oregon territories in 1828 and blazed trails that opened the region for future expansion by settlers and gold prospectors. By 1833, the Hudson Bay Company was sending scouting parties into the upper Trinity River basin to trap for beaver, otter and other fur bearing mammals and to trade with local Indians. In 1836, trappers from the Hudson Bay Company returned and established the first white outposts in the headwaters of the Trinity River basin.

Mining

Gold was first discovered in Trinity County in 1848 on Readings Creek near Douglas City but it was the discovery of gold in the Sierra ranges in 1850 that started the initial migration of miners to the central California area. In 1852, the discovery of gold in the Klamath Basin brought a wave of miners to the Northern California region and by 1853 exploration for gold had extended into the northern section of the Watershed. In 1897, the discovery of large deposits of placer gold in the Coffee Creek sub-watershed started a small gold rush that has been compared to the infamous Klondike rush in Alaska. Gold mining and prospecting remained the major industry in Trinity County from 1850-1900. (Cooperrider,1998)

Records show that the town of Old Trinity Center was established in 1851 as a small ranch and trading post and by 1853, the population had quickly increased to an estimated 1200 people after word spread of gold being discovered in the upper mainstem of the Trinity River. (T.C.Historical Sites) The town was soon recognized as the most popular and thriving mining camp in the county and boasted of two hotels, two general stores, two blacksmith shops, three saloons and other services. By the end of 1853, the entire valley from the base of Scott Mountain downsteam to Lewiston had been claimed and miners could be found working every available gravel bar in the area. By 1854, Trinity County had issued 6,300 miners licenses within the county.(Trinity Center, Now and Then)

The initial search for gold consisted of placer mining which soon became widespread along every gravel bar of the mainstem Trinity River and many of the tributaries. The original placer miners were able to work the deposited materials along the channel bars and floodplain using gold pans and sluice boxes until the alluvium became too deep or too large to handle. Once the gravel bars had been worked over and shallow placer deposits removed, mining techniques shifted to the use of hydraulic equipment. Water monitors or "cannons" were set in place and using water provided from upstream diversions, stream banks and hillsides were quickly eroded into large sluicing operations that were set up on the lower floodplain. The effects of hydraulic mining operations were very destructive and large quantities of sediment were delivered into the

Trinity River and many tributaries for years. The demand for water to operate the monitors led to the construction of extensive ditch systems that allowed for the inter-basin transfer of water throughout many of the sub-watersheds to the hydraulic mining operations. Remnants of these legacy ditches often intercept and divert surface runoff and contribute to slope instability and can still be found throughout the Watershed. (BLM)

By the early 1900[s], the mining process had shifted once again and the use of bucket line dredges, which were able to dig to greater depths in the alluvium than the placer technique allowed, was introduced. Refer to Photo 3-1 a photo of a typical bucket line dredge used along the Trinity River. The first documented dredge in Trinity County operated on the mainstem of the Trinity River near Poker Bar in 1895. In 1900, the partners of Story and Payne constructed the first wooden hull dredge for use in Trinity Center and for the next 50 years, dredging was the dominant force that altered the economy as well as the environment in the Watershed. It is interesting to note that it was the need for electricity to operate the engines on the dredges that first brought power to the town of Trinity Center (Scott,) At the end of the dredging era in the 1950[s], the mainstem of the Trinity from the headwaters to the North Fork of the Trinity at Helena, and most of the tributaries in between, had been devastated by the huge dredges that left enormous mounds of tailing piles in their wake. Evidence from dredge use including water diversions, channel realignment and altered stream morphology are still readily visible today. Photo 3-2ovides an aerial view of the tailing piles that were left in the wakes of the dredges.

The following information describing the use of the bucket line dredges is provided at a U.S. Forest Service information kiosk at Vista Overlook at the north end of Trinity Lake:

> *The expense of building, maintaining and operating these floating factories was somewhat risky, as was any mining venture. The risk, however, was more than offset by the probabilities of immediate and unheard of profits. For example…in one day of "cleanup" on the Carville dredge, crews retrieved 1900 ounces of gold. In todays market that means about $600,000.*

Dredging for gold along the Trinity River, 1908-1947

> *In 1908 the hunt for gold along the Trinity River took on incredible new dimensions. Conventional placer mining with pans and sluice boxes was productive but labor intensive. With a little American ingenuity, a lot of sweat and toil the idea of floating gold factories hit the big time…the "Bucket Line Dredge" came into its own… machines big enough to move thousands of yards of river bottom gravels each day, sort it, wash it and remove the yellow stuff that came to represent wealth and economic salvation for the Trinity area. The men who built and operated these massive machines were looked upon as local heroes.*

According to early records the first attempt at dredging between Trinity Center and Coffee Creek was a failure. The "Altabert" sank soon after completion. Investors built the "Pacific" to replace the "Altabert" in 1916. In 1918 they built the "Estabrook". She was the Goliath of the Trinity River dredges. Two stories tall, electrically driven, buckets big and numerous enough to move 12,000 cubic yards of gravel each day…she literally chewed her way through the rich bottomlands of the Trinity River, turning farms and ranches into vast fields of piled stone tailings. The profits were incredible.

As the dredges dug deeper towards bedrock, the overlying gravels became larger and heavier and even the Estabrook couldn't handle them. The constant beating literally shook her wooden structure apart. To handle this punishment an investment group planned and built the steel hulled "Carrville" in 1939. It would be the last of the bucket line dredges.

With the onset of World War II, the rising cost of metal and petroleum products, required to keep her running, eventually drove her out of business. She operated sporadically until 1947 but her demise heralded the end to one of the most productive and destructive eras in gold mining this country had ever known.

As the water level in Trinity Lake drops, the view from this point becomes one dominated by the tailing piles left in the wake of these machines. With little commercial value, the have remained unchanged for half a century and will be with us for a long time to come….

To gain an understanding of the power of these dredges, the Estabrook, which was touted as the largest wooden hull gold dredge in the world and constructed using 64 foot wooden beams sawn from a local mill, was capable of dredging through 12,000 yards of gravel per day and work through six and one-half acres of ground to a depth of 50 feet in one month. (T.C. Historical Sites)

Hard rock gold mining was also prevalent throughout the Watershed with mines located in the Trinity Alps and along the Trinity Divide. One mine of significant importance was the Altoona Mine located at the headwaters of the East Fork of the Trinity River north of Trinity Lake. Unlike the majority of the gold mines operated in the area, the Altoona mine yielded cinnabar which is also known as mercury ore, from which "quicksilver" or liquid mercury is derived. To obtain the quicksilver from the ore, it had to be crushed and roasted in large rotary furnaces where the mercury evaporated and was then collected in condensers. The liquid mercury was transferred to iron flasks for storage and shipping. It is estimated that the Altoona Mine yielded over 27,000 flasks of mercury (possibly 76 lbs each) which ranked the mine fifth in output in the state. Of particular concern today are the hazardous piles of toxic slag waste resulting from the extrication process and the potential for contamination of downstream watercourses and Trinity Lake. Mercury was used extensively in the gold mining process were it was used to collect minute bits of gold from crushed ore in sluice boxes. Runoff from this process is known to have contaminated creeks and rivers and the Altoona Mine itself is a suspected source of contamination. Elevated levels of mercury associated with historic gold and mercury mining have been found in numerous reservoirs and streams in northern California. Recent testing of fish in Trinity waters has resulted in a draft fish consumption advisory being issued by the Office

of Environmental and Health Hazards Assessment for selected water bodies in Trinity County in 2005. (Lloyd, Denton, 2005). Refer to Plate 3-1 for the location of some of the prominent mines, cabins, and ranches that are scattered throughout the Watershed.

Timber Harvesting

Timber harvesting was initiated in the Trinity River Watershed in the mid-1850s to supply wood for mining operations. Logs were sawed by numerous small mills that were located adjacent to accessible stands and operated sporadically. The Trinity Journal of February 23, 1856 stated that there were four sawmills in operation in the vicinity of Weaverville that were scarcely able to supply the demand for lumber. (BLM) "The timber companies at that time used very selective harvest techniques, taking only the largest and most easily accessible trees for the supply of a very localized market associated with the settlement of Weaverville and with local mining efforts. Though logging became an important industry by the mid 1940's, significant volumes were not taken until after WWII, when modernization and improved technologies occurred. Production peaked countywide in 1959 at 439 million board feet (mmbf), but was maintained at 200-300 mmbf through the 1980's. Timber markets served during this time were national, and even international. Extensive road building and logging on steep slopes took place over large areas of the watershed, resulting in accelerated erosion and sedimentation." [Upper Trinity River Watershed Analysis (UTRWA), Chapter 4: Reference Conditions]

The following historical harvest volumes for the Watershed are estimates based on GIS data collected by the Act 2 Forest Enterprise Team and interviews with Forest Service personnel (UTRWA):

- 1970's – 40 MMBF
- 1980's – 130 MMBF
- 1990's – 64 MMBF

The initial management direction for the Trinity National Forest, established in 1907, was to ensure a continuing supply of timber and water. There were no long-term timber management objectives and only the largest and most valuable trees were harvested (UTRWA). With passage of the Multiple-Use Sustained-Yield Act of 1960, the Wilderness Act of 1964, and the National Forest Management Act of 1976, the U.S. Forest Service was legally charged with managing for a variety of resources in addition to timber and water. However, timber production, which had increased dramatically following WWII, remained the main management activity in the Watershed until the mid 1990s.

Until about 1980, harvesting on the National Forests in the Watershed was primarily by overstory removal and individual tree selection in late-mature and old growth stands, with some commercial thinning in younger stands. After that, harvesting shifted primarily to clear cutting for the next 15 years and then to a mix of even-aged and uneven-aged prescriptions in the following years. Harvesting was accompanied by extensive construction of roads to access timber sales. Refer to Figure 3-1 for the amount of timber harvested in the last 25 years.

Figure 3-1

Area Harvested By Decade & Disturbance Level

Property Owner	Decade								
	1980				1990			2000	
	Total Acres	Disturbance Level*	Disturbance Acres	Disturbance %	Total Acres	Disturbance Acres	Disturbance %	Total Acres	Disturbance Acres	Disturbance %
Industry	13,132	High	4,531	34.5	28,930	1,422	5.0	12,710	3,834	30.0
		Moderate	8,601	65.5		26,487	91.5		7,390	58.0
		Low	0	0.0		1,021	3.5		1,486	12.0
Private	2,098	High	30	1.5	1,443	60	4.0	193	0	0.0
		Moderate	2,068	98.5		1,363	94.5		181	95.0
		Low	0	0.0		20	1.5		11	5.0
USFS	4,862	High	4,409	90.5	5,531	2,206	40.0	262	55	21.0
		Moderate	422	8.5		2,184	39.5		171	65.0
		Low	31	1.0		1,141	20.5		36	14.0

* A high disturbance level indicates clearcutting. Moderate and low indicate partial cutting or sanitation or salvage cutting.

The California Wilderness Act of 1983 (H.R. 1437) abolished the Salmon-Trinity Alps Primitive Area and reclassified it as the Trinity Alps Wilderness. Management direction was to acquire, through land exchanges, private properties within the boundaries of the new Trinity Alps Wilderness. These exchanges were primarily with Southern Pacific Land Company (SP), for lands near Covington Mill and Trinity Center and in the Papoose Creek area. The exchanges removed a large acreage of high quality timberland from the upper Trinity River portion of the Trinity National Forest. After 1988, further land exchanges were made with Sierra Pacific Industries (SPI), in the Cedar Creek, Menzel Gulch, and Snow Gulch areas.

Management direction for timber production changed significantly in the mid 1990s with the adoption of the Shasta-Trinity National Forest Land and Resource Management Plan (ST LRMP), including provisions of the "Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl [NSO]" commonly known as the Northwest Forest Plan or NW ROD (see Northwest Forest Plan section below). In order to provide protections for the northern spotted owl (NSO), a portion of the lands formerly available for timber production were reallocated to Late Successional Reserves (LSRs). Constraints were placed on timber management in Riparian Reserves (RRs) and timber harvests were not scheduled for either LSRs or RRs. A minimum of 15 percent of the lands available for timber production were retained to provide NSO connectivity and dispersal habitat and mapped nest sites that existed prior to 1994 were protected by 100-acre buffers.

During preparation of the ST LRMP, lands were variously classified as to whether they were capable, available, and/or suitable (CAS) for timber production. CAS lands were then categorized as to growth and yield potential. These classifications affected the Allowable Sale Quantity (ASQ) scheduled from CAS lands.

Taken together, the changes in land allocation, growth and yield potential, and management direction have resulted in a significant reduction in the timber land base, in annual timber production, and in road building on the National Forests in the Watershed.

Timber harvesting before the 1950s was primarily by clear cutting, with some selection cutting, on private lands in Mumbo Basin and around the Altoonia and Integral mines in the upper East Fork Trinity River basin. Selection harvesting and some clear cutting also occurred on scattered private parcels east and west of Trinity Lake and in what is now under Trinity Lake that were patented mines or ranches or were associated with mills, and on National Forest.

The area harvested increased substantially during the 1950s. Harvesting was primarily by selection cutting on both private and National Forest lands, with some clear cutting on private lands. The main areas of harvesting were in the upper East Fork Trinity River Watershed, on the Ramshorn Burn, along Swift Creek in the Trinity Center area, and scattered around Trinity Lake.

The harvest area again increased during the 1960s. Harvesting was almost exclusively by selection cutting on both private and National Forest lands, with only two clear cut areas, both on private lands. Harvesting on the National Forest occurred primarily in various sections from upper Deadfall Creek south to Ramshorn Creek, around Eagle Creek Ranch, in the Scorpion Creek drainage northeast of Coffee Creek, in the Swift Creek drainage, along Bowerman Ridge south of Trinity Center, and in the Van Ness Creek, Feeny Gulch, Bragdon Gulch, and Hay Gulch drainages east of Trinity Lake. Harvesting on private lands occurred primarily in various sections in the upper East Fork Trinity River Watershed, around Eagle Creek Ranch, in the Swift Creek drainage, along Bowerman Ridge south of Trinity Center, in the Stoney Creek area, and in the Feeny Gulch and Bragdon Gulch drainages east of Trinity Lake.

The harvest area increased further, especially on National Forest lands, during the 1970s. Harvesting was almost exclusively by selection cutting on both private and National Forest, with only ten small clear cut areas, all but one on private lands. Harvesting on the National Forest occurred primarily in various sections from the northern end of the Trinity River watershed to the area south of Mumbo Basin, along the Trinity River from Bear Creek to just north of Coffee Creek, in the Eagle Creek Ranch area, from just northwest of Coffee Creek south to Buckeye Ridge and Pettijohn Mountain between Trinity Lake and the Trinity Alps Wilderness boundary, in Feeny and Bragdon Gulch drainages east of Trinity Lake, and in the Halls Gulch drainage, a tributary of the East Fork Trinity River. Harvesting on private lands occurred primarily in various sections in the upper Trinity River Watershed (from Ramshorn Creek north), in various sections from just north of Trinity Center south to Buckeye Ridge and Pettijohn Mountain between Trinity Lake and the Trinity Alps Wilderness boundary, in the upper Papoose Creek drainage, Bragdon and Hay Gulch drainages, and Jackass Peak area east of Trinity Lake, and in the Cedar Creek drainage, a tributary of the lower East Fork Trinity River.

Southern Pacific Land Company (SP) owned by far the largest portion of the private lands in the watershed, until it sold its holdings to Sierra Pacific Industries (SPI) in early 1988. Until the late ‘70s, SP, which did not own a mill, harvested its lands primarily by overstory removal, with some selection and commercial thinning. It increased clear cutting as a prescription in the ‘80s, until the sale of its holdings. In the ‘90s, SPI, which owned a mill in Hayfork (closed in 1996) that purchased most of the timber sales on the Trinity National Forest, almost doubled the area harvested during the ‘80s, mostly using partial cut prescriptions. The level of harvest increased on SPI lands at the same time it was decreasing on the National Forest in the late1990s. Since the

turn of the century, the amount of clear cutting on SPI lands has increased dramatically. Construction of roads to access timber sales also increased dramatically from the ‘70s to the present.

Harvesting has been conducted extensively throughout the tributaries in the Watershed and has significantly modified natural conditions. Most of the forested area outside of the Trinity Alps Wilderness has been harvested (and/or burned) at least once, and many areas have been cut at least twice. As technologies improved after the ’40s, harvesting increased and roads were sometimes constructed in unstable locations, increasing natural erosion rates. Certain logging practices, such as tractor logging on steep or unstable slopes and/or erodible soils, poor road and skid trail location, construction, and/or maintenance, harvesting adjacent to streams, and occasionally skidding logs down or across watercourses have sometimes increased erosion and sedimentation, altered runoff characteristics and/or destroyed aquatic and terrestrial wildlife habitat. Since passage of the Z’Berg-Nejedly Forest Practice Act of 1973 and adoption of the ST LRMP in 1994, protections for watercourses and wildlife and constraints on harvesting operations have increased dramatically. Refer to Plate 3-2 for a map of harvest areas within the Watershed.

The decline in logging in recent years and the closing of one of the last two sawmills in the county have negatively affected the economy of the area, as most of the communities were resource-dependent. Figure 3-2 shows the board feet of timber harvested off of public and private lands in Trinity County from 1993 to 2004 while Figure 3-3 shows the declining trend of timber harvested off of public lands from 1993 to 2004.

Figure 3-2

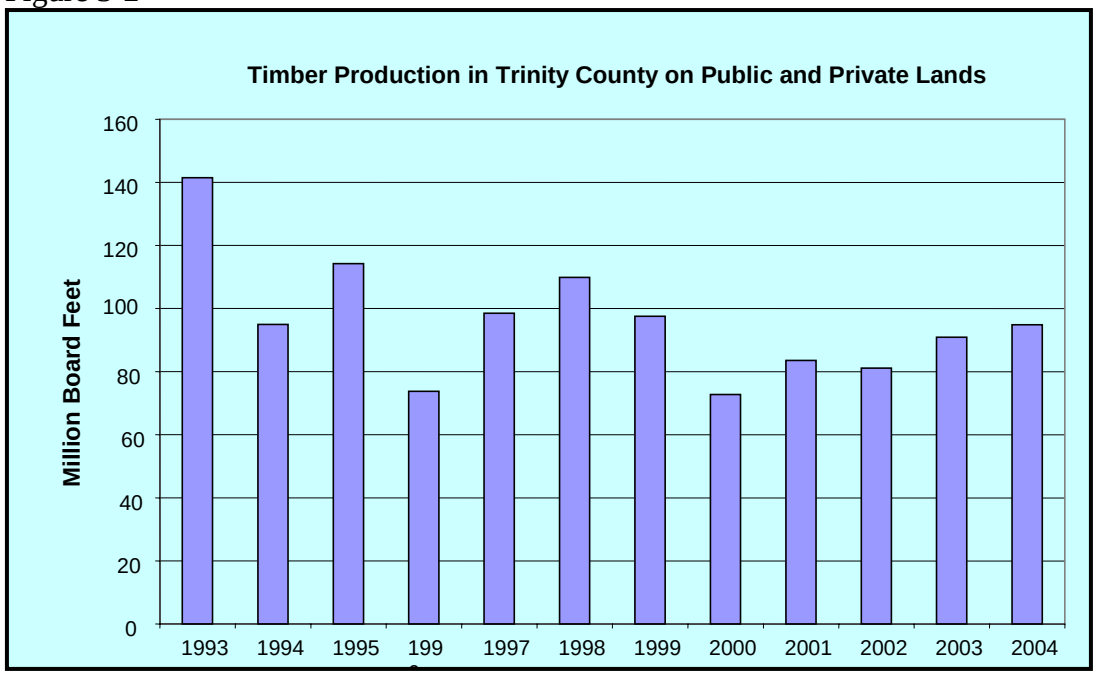
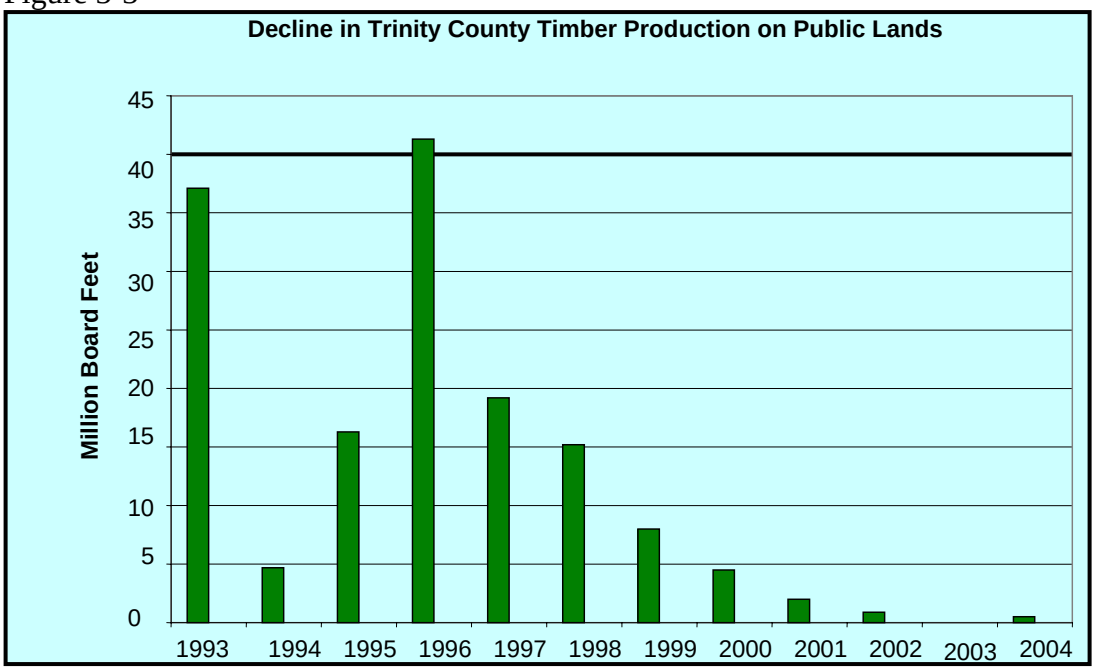


Figure 3-3



Fire History

Fire is the most important natural disturbance agent affecting vegetation in the Watershed. Most of the fires in this Watershed, especially in the mixed conifer forests, were short-interval (median 11 years), low-intensity surface fires that did little damage to larger trees (UTRWA). But there have been at least 25 major fires, ranging from 100 acres to over 6300 acres, since the 1910's, when fires began to be recorded. While some of these fires have threatened communities, most of them were largely stand replacing fires. An unnamed fire in 1922 in the Boulder Creek drainage burned 6348 acres. The Copper Fire, started in 1922, burned 1147 acres just east of Coffee Creek and the Trinity River. In 1959 the Freethy Fire burned 2850 acres just south of Trinity Center and the Pole Gulch Fire burned 203 acres north of Alpine Campground. All of these were human-caused fires. The Ramshorn burn, of unknown origin, on the north side of Bonanza King burned approximately 10,000 acres in 1959. The Hatchet Fire, started in 1961, also from an unknown cause, burned 257 acres just west of Highway 3 and the Vista Point between Trinity Center and the head of Trinity Lake. The Flower Fire, started by human causes in the mid 1980s, burned a large acreage in the Sherer Ridge area east of the confluence of Scott Mountain Creek and the Trinity River. Refer to Plate 3-3 for the fire history of the Watershed area.

Fire suppression was officially initiated by the USFS in the early 1900s but a shortage of personnel and conflicts with local interests, which favored letting fires burn, hampered suppression efforts and successes. Fire suppression forces increased after the 1920s and the policy of suppressing all fires while they were small gradually changed forest conditions. An understory of smaller trees and brush developed and became established in many areas due to the absence of the periodic fires that had previously limited such growth. Fire suppression allowed weaker, damaged, and/or insect killed trees, which otherwise would have been culled by fire, to remain longer in the forest. These changes in forest conditions have made the forests more susceptible to catastrophic fires. (UTRWA)

Lightning during summer thunderstorms continues to be the main source of ignition in the North Lake area, causing 66 percent (1139) of the fire starts since the 1910's (62 percent in roaded areas, 76 percent in the Wilderness), with most of these fires starting on mid to upper slopes. Nearly all of the human caused fires are associated with communities and residential areas, developed and undeveloped campgrounds, and roads and trails. Of 598 total human caused fires, 80 percent were in roaded areas and the rest were in the Wilderness. Refer to Plate 3-4 for the location and cause of starts within the Watershed area.

Ranching and Grazing

The fertile soils in the valley floor of the Watershed encouraged settlement of the area at Old Trinity Center in 1851. With the discovery of gold and the sudden influx of miners and the construction of mines in 1852, as well as the opening of the California and Oregon stage route over Scott Mountain in 1860, the demand for local sources of beef and agricultural products soon led to the establishment of numerous ranches throughout the valley. The ranches also served as layover and supply station for travelers and for pack trains that were packing mining supplies into the Alps and equipment to the lumber mills. Most of these ranches were well established and still in operation until the early 1960's when the valley floor was inundated with water from the filling of Trinity Lake in 1963. The book *Trinity County Historical Sites* provides a list of "Historic Sites Covered by Trinity Lake" that includes fifteen of the large ranches that were forced to be abandoned. Refer to Plate 3-5 to see the location of these sites. Although grazing of cattle throughout most of the Watershed was limited by the steep terrain and harsh weather conditions that prevailed during the winter months, the cattle ranches were able to thrive and expand. The Trinity Farm and Cattle Company raised close to 2,000 head of cattle and eventually became one of the most important cattle operations in northern California supplying beef, agricultural products, and supplies to the mining and lumber operations. During the summer and fall months, grazing activity occurred mainly in the broad valley floor and near the confluences of the larger tributaries, as well as the meadows of the surrounding hills. Grazing in the higher elevation area was limited to several small Forest Service allotments in Swift Creek, East Fork and Main Trinity River. Cattle were driven to winter pastures in Anderson and Cottonwood for the winter months and any excess was cut from the herd and sold to markets in the valley.

Edwin Scott of the pioneering Scott family estimated that 99 percent of the agricultural lands in northern Trinity County were destroyed by the construction of Trinity Dam and the subsequent filling of Trinity Lake. Refer to Photo 3-3 of the Van Matre Ranch at the mouth of Stuarts Fork prior to it being covered by the filling of Trinity Lake.

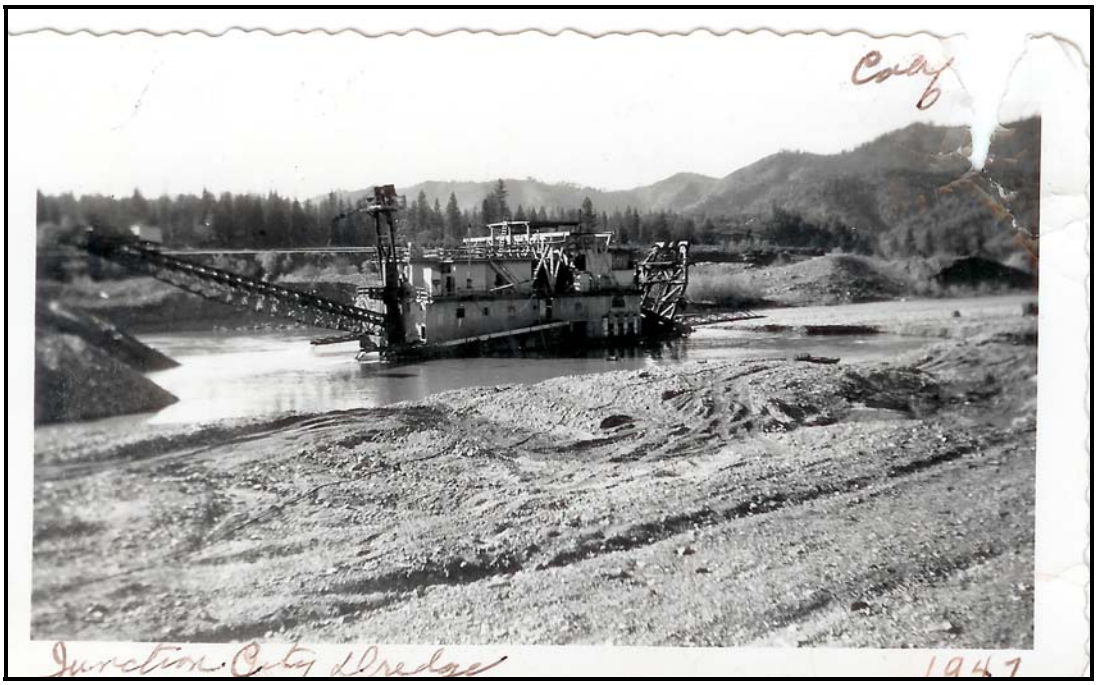
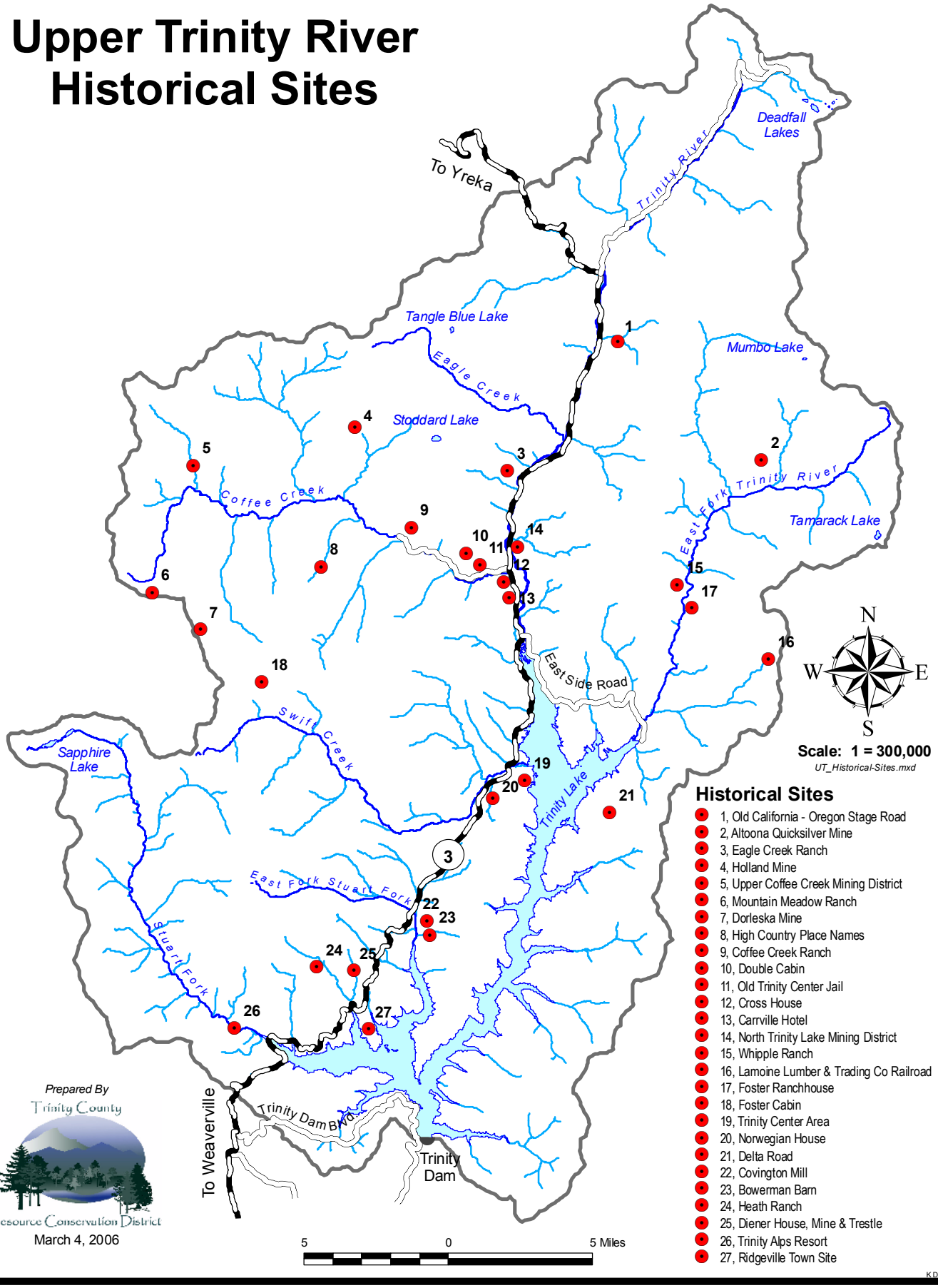


Photo 3-1 Typical bucket line dredge used along the upper Trinity River leaving piles of dredge tailings. This photo was taken in 1947 in Junction City.

Photo 3-2 Example of rock tailings showing amount of alluvium moved by dredgers. Photo taken near Junction City in 1961

Photo 3-3 View near Van Matre Ranch at the confluence of the East Fork of Stuarts Fork and the Trinity River Prior to inundation by the lake. Photo courtesy of Sue Corrigan and family.

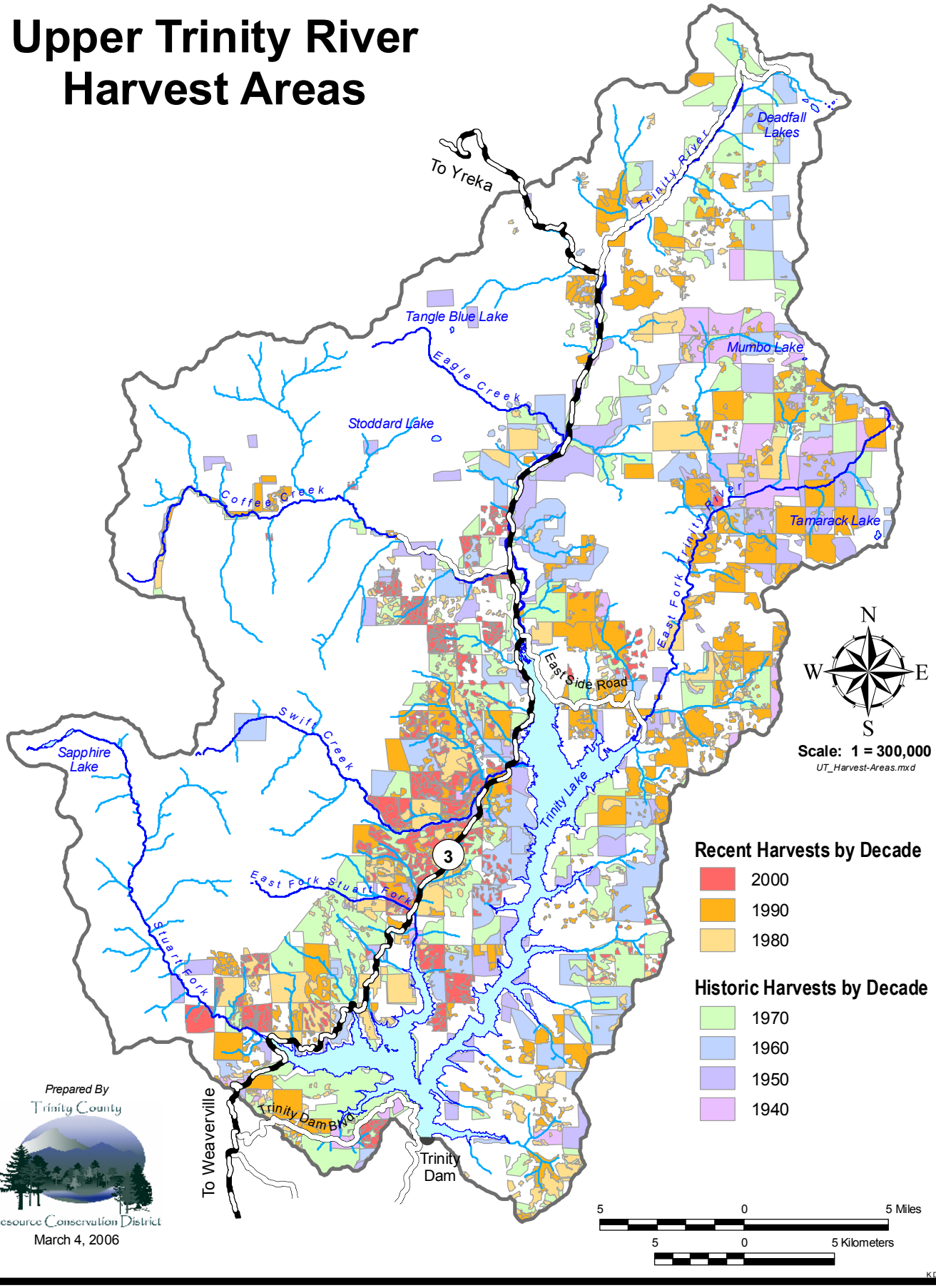
Upper Trinity River Historical Sites



Historical Sites

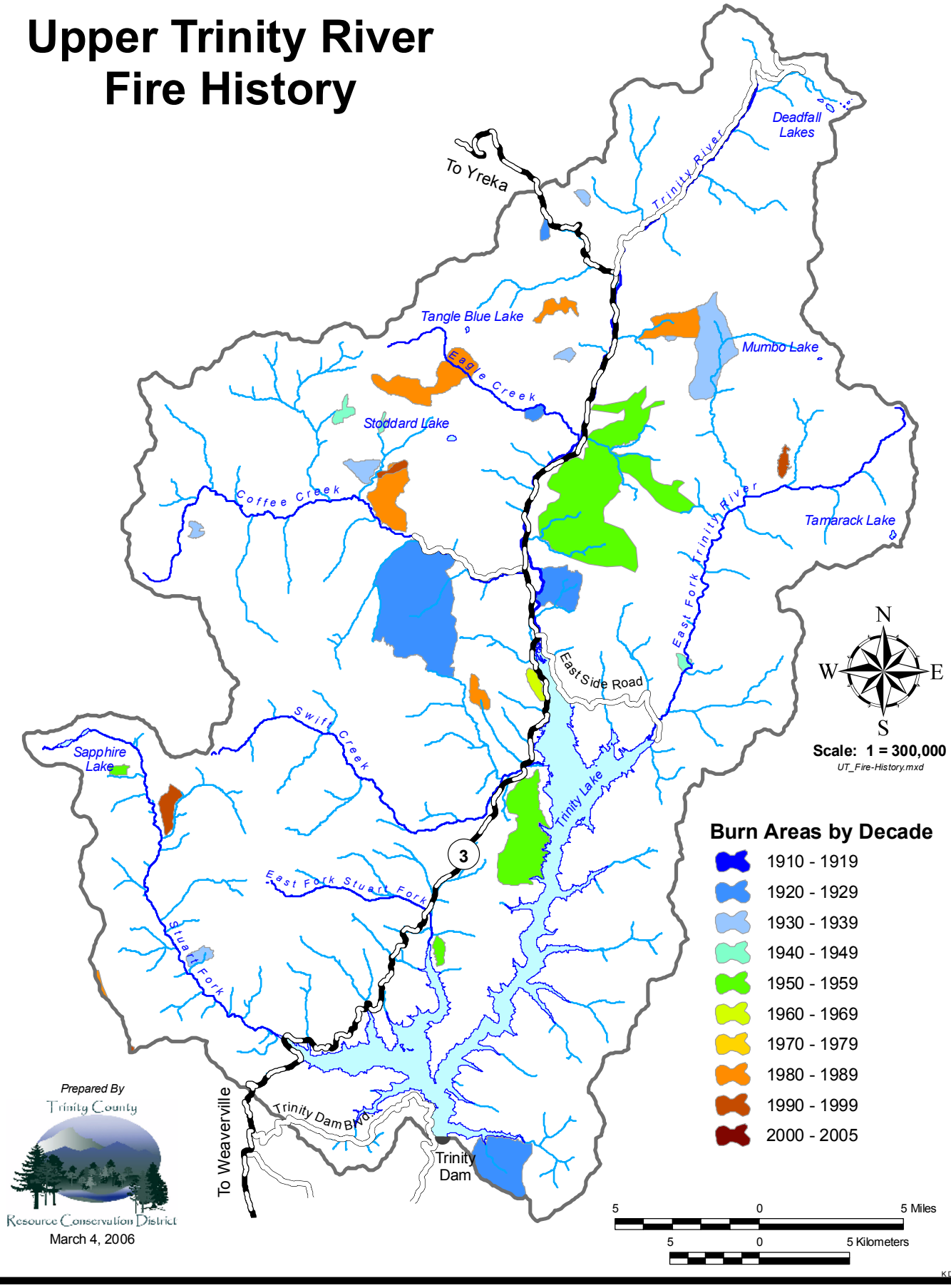
1. Old California - Oregon Stage Road
2. Altoona Quicksilver Mine
3. Eagle Creek Ranch
4. Holland Mine
5. Upper Coffee Creek Mining District
6. Mountain Meadow Ranch
7. Dorleska Mine
8. High Country Place Names
9. Coffee Creek Ranch
10. Double Cabin
11. Old Trinity Center Jail
12. Cross House
13. Carrville Hotel
14. North Trinity Lake Mining District
15. Whipple Ranch
16. Lamoine Lumber & Trading Co Railroad
17. Foster Ranchhouse
18. Foster Cabin
19. Trinity Center Area
20. Norwegian House
21. Delta Road
22. Covington Mill
23. Bowerman Barn
24. Heath Ranch
25. Diener House, Mine & Trestle
26. Trinity Alps Resort
27. Ridgeville Town Site

Upper Trinity River Harvest Areas



Prepared By
Trinity County
Resource Conservation District
March 4, 2006

Upper Trinity River Fire History



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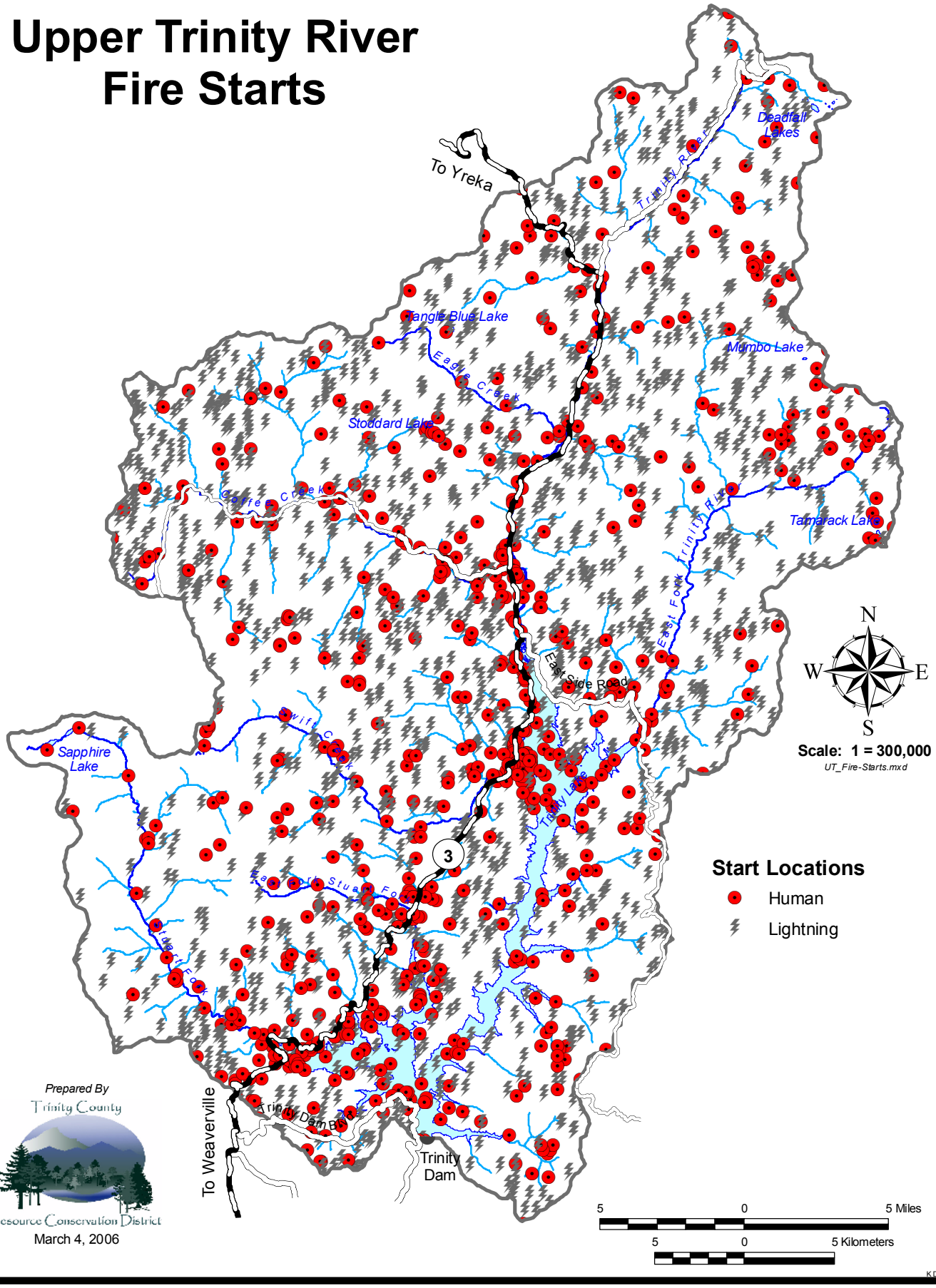
Upper Trinity River Fire Starts

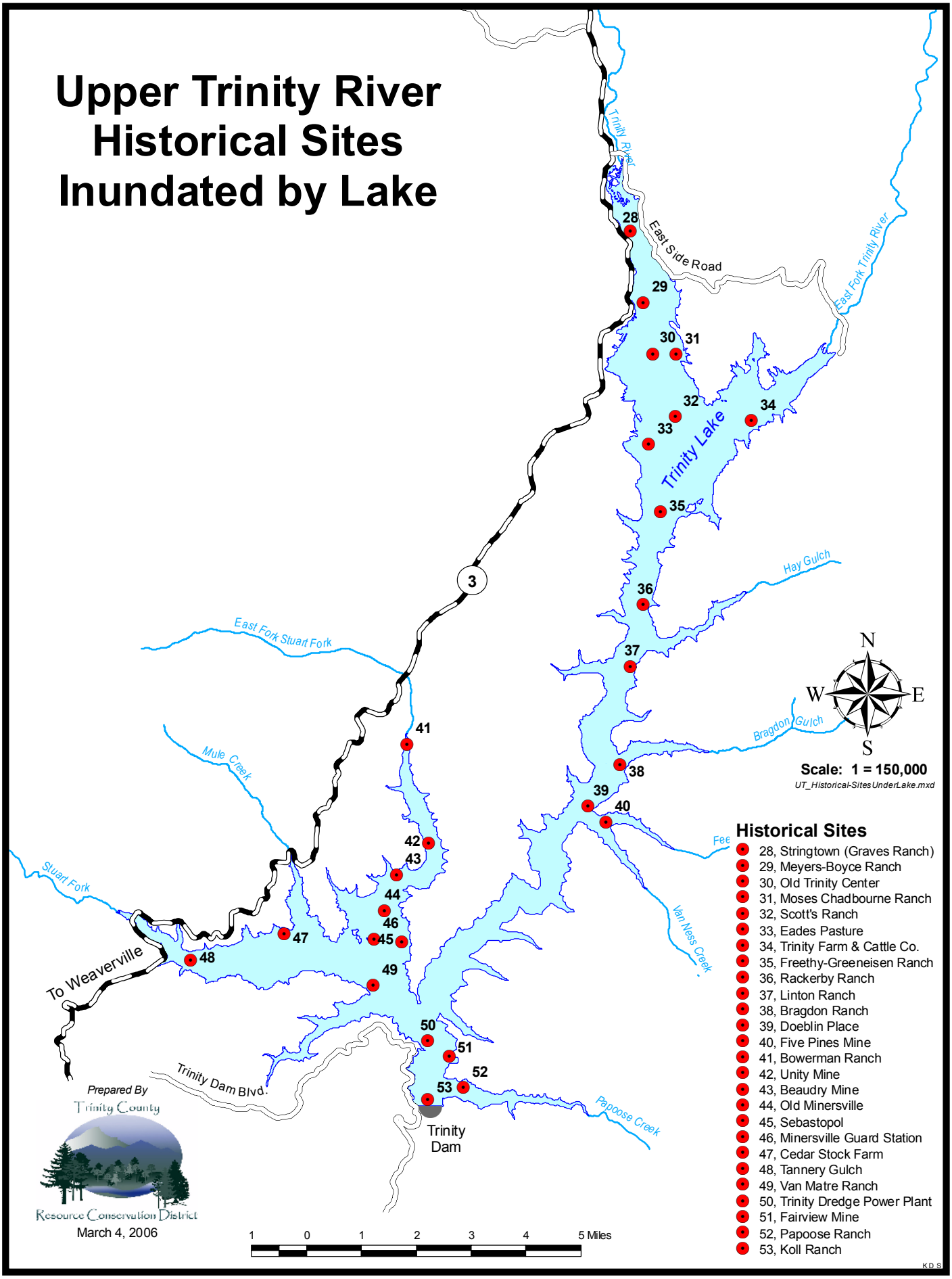


Prepared By

Trinity County Resource Conservation District

March 4, 2006

Upper Trinity River Historical Sites Inundated by Lake



Historical Sites

- 28, Stringtown (Graves Ranch)
- 29, Meyers-Boyce Ranch
- 30, Old Trinity Center
- 31, Moses Chadbourne Ranch
- 32, Scott's Ranch
- 33, Eades Pasture
- 34, Trinity Farm & Cattle Co.
- 35, Freethy-Greeneisen Ranch
- 36, Rackerby Ranch
- 37, Linton Ranch
- 38, Bragdon Ranch
- 39, Doeblin Place
- 40, Five Pines Mine
- 41, Bowerman Ranch
- 42, Unity Mine
- 43, Beaudry Mine
- 44, Old Minersville
- 45, Sebastopol
- 46, Minersville Guard Station
- 47, Cedar Stock Farm
- 48, Tannery Gulch
- 49, Van Matre Ranch
- 50, Trinity Dredge Power Plant
- 51, Fairview Mine
- 52, Papoose Ranch
- 53, Koll Ranch

Prepared By
Trinity County
Resource Conservation District
March 4, 2006

KDS

SECTION 4

Demographics And Land Use

DEMOGRAPHICS

Population

Figures for Trinity County 2000 census show the county with a population of 13,022 people. Using the available information, it was estimated that a total of 784 people reside within the Watershed on a permanent basis though the total population can increase dramatically during the summer months due to the inflow of seasonal residents. To obtain the population of the six specific communities within the Watershed, the location of each census block was identified and the populations within each block were calculated. It should be noted that due to the shapes and configuration of the blocks, there may be slight calculation errors. The resulting information shows that the majority of the population is concentrated near the two largest communities of Trinity Center and Coffee Creek, both of which have a general store, post office and several cafes but few other services or amenities. The remainder of the population is distributed amongst the clustered subdivisions of Lake Forest, Covington Mill, Long Canyon, and East Fork, as well as a few isolated and remote areas. Refer to Figure 4-1 for a breakdown of population and Plate 4-1 for location of the communities within the Watershed.

Figure 4-1

Population Distribution						
Trinity Center	Coffee Creek	Lake Forest	Covington Mill	Long Canyon	East Fork	Other
272	306	58	42	27	28	51
U.S. Census Bureau: 2000 Data						

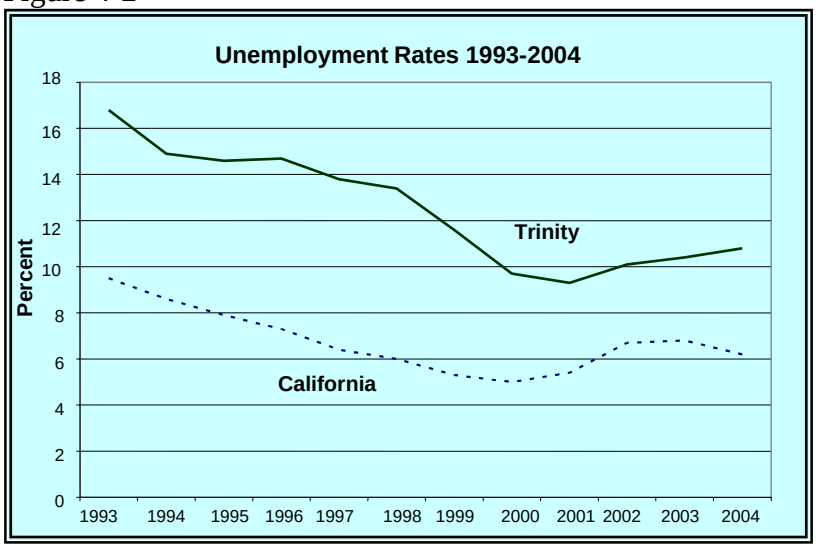
Demographic data indicate that Trinity County has a below average household size at 2.29 persons and a population much older than the statewide norm, with a median age of 37.8. Families living below poverty level within the county is 14.1 percent compared to 9.2 percent statewide. It is interesting to note that the age distribution of the county is not the normal bell shaped curve of a 'normal population'; rather there is a significant decline in the population in ages 18-30. This indicates that many young people leave the county following high school, most likely to find jobs. There is also a bulge in the curve of people that have reached retirement age, suggesting that this is an attractive location in which to retire.

Economic Conditions

Mining and the subsequent demand for support services (lumber mills, agriculture, ranching) that grew with the increasing population provide for the initial economic growth and job demand within the county from the 1850's through the 1950's. By the end of World War II however, mining production began to slow and the increasing demand for housing soon shifted the economy to the timber industry. This sector briefly provided nearly one-third of the direct employment opportunities in the county in the late 1980's, declining by 50 percent by 1994

(EDD 1995). The decline in employment in the timber industry can be attributed to a reduction in standing volume available, automation of the industry, competition from foreign markets and increasing environmental regulations. Only one lumber mill, Trinity River Lumber Company located in Weaverville, remains in operation today and employs around 140 people. A comparison of the unemployment rate in the county compared to the state can be seen in Figure 4-2

Figure 4-2



Some of the general characteristic profiles available for the county are outlined in Figure 4-3. Specific profile data were not available for the scale of the Watershed so county data are provided to reflect the characteristics of the area.

Figure 4-3

SOCIAL, ECONOMIC AND HOUSING CHARACTERISTICS FOR TRINITY COUNTY AND CALIFORNIA

Characteristic	Trinity County	California
Population	13,022	33,871,648
Persons per sq. mi.	4.1	217.2
Households	5,587	11,502,870
Persons per household	2.29	2.87
Median household income	27,711	47,493
Persons below poverty	18.70%	14.20%
Median home value	112,000	211,500
High School grad 25yr+	81%	76.80%
Bachelor degree 25yr+	15.50%	26.60%
Race		
White	88.90%	59.50%
Black	0.40%	6.70%
American Indian	4.80%	1.00%
Asian	0.50%	10.90%
Hispanic	4%	32.40%

U.S. Census Bureau: 1999 and 2000 census data

Typical of many small counties in the Pacific Northwest, employment in the government sector at the local, state, and federal level comprises 40 to 50 percent of employment opportunities (EDD 1995). Much of this employment is provided by the US Forest Service and other federal, state and local agencies, as well as jobs related to education. The Figure 4-4 is a breakdown of jobs by industry in Trinity County for 2000.

Figure 4-4

Employment Occupation, Population 16 Years and Over		
Occupation	**Number**	**Percent**
Management, professional, and related occupations	1,281	28.3
Service occupations	967	21.4
Sales and office occupations	1,032	22.8
Farming, fishing, and forestry occupations	129	2.8
Construction, extraction, and maintenance occupations	490	10.8
Production, transportation, and material moving occupations	630	13.9
Total	4,529	100
U.S. Census Bureau: 2000 census data		

Since 1906, counties with national forest lands have annually received a 25 percent share of receipts from activities on these lands that is designated for distribution between public schools and roads. Rural counties with small economic bases soon became dependant upon this source of income to supplement funding of local school districts and road departments. Since the amount received by the counties is based upon a percentage of the receipts, less timber harvesting on national forests means less revenue to the counties. Referring back to Figure 3-3, timber production from national forest lands have continuously dropped since 1996 until harvesting could be considered non-existent. Because of the devastating consequences this posed to the economies of rural counties, Congress passed the Secure Rural Schools and Community Self-Determination Act of 2000. Through this legislation, counties with national forest lands were given additional money to compensate for the loss of timber revenue. Since 2000, Trinity County has received $7.8 million dollars a year to be distributed by a locally formed Resource Advisory Committee. The Act is currently up for reauthorization in 2006 and if congress fails to reauthorize the bill to extend the Act, the Forest Reserve payments will return the previous level of 25 percent of the timber receipts. This means total payment to the county could be reduced to less then $1 million dollars annually (Trinity Journal). Without the diversification of the economic base, rural counties such as Trinity would be severely impacted and rural areas such as the Watershed would likely loose its schools, jobs and many of its residents.

CURRENT LAND USE

Land use in the Watershed continues to be limited by factors such as climate, mountainous terrain, distance from major metropolitan centers, and mixed ownership between federal and private lands. With an estimated 70 percent of the land in public ownership, management of

those lands remains an important use to most residents. Other uses of the land in the watershed are recreation, tourism, housing, private timber management, agriculture and mining.

Mining

Today, gold mining consists mostly of recreational suction dredging in stream channels though there are over still over 7,000 mining claims remaining in Trinity County (BLM). Suction dredge mining is currently regulated by the Department of Fish and Game and establishing a mining claim falls under the jurisdiction the Bureau of Land Management. Due to environmental constraints, there are numerous restrictions on which streams can be dredged, what time of the year and a limit on the size of the dredge itself. There is one large mining claim that operates sporadically on the gravel bars of the Trinity River several miles up the Parks-Creek Road.

Minerals management inside the Trinity Alps Wilderness area is now subject to Section 4(d) (3) of the Wilderness Act of 1964. This section provides that, subject to valid existing rights, "*the minerals in lands designated by this Act as wilderness areas are withdrawn for all forms of appropriation under all laws pertaining to mineral leasing and all amendments thereto*." This means that no new claims may be located, no ground disturbing exploration or prospecting activities may be conducted, and all existing mining claims must contain a verifiable discovery as of September 28, 1984. Any new discovery made in the wilderness after 1984 cannot be considered and if a discovery is not exposed within the limits of the claim prior to1984, the claim is considered to be void.

The Trinity Unit of the Whiskeytown-Shasta-Trinity National Recreation Area was established by Congress in 1965 (PL 89-336-Nov. 8). Section 6 of the public law states that "*The lands within the recreation area, subject to valid existing rights, are hereby withdrawn from location, entry and patent."* In essence, no new claims or mining operations can be established within the areas designated by the NRA.

Grazing

Due to the loss of most of the prime grazing lands in the valley by the construction of Trinity Lake, cattle ranching has essentially been eliminated. The U.S. Forest Services Shasta-Trinity Land and Resource Management Plan calls for the phase out of grazing in the River Unit of the Trinity River Allotment due to increasing conflicts with traffic and private lands. Personal communications with the Trinity River Unit verified that for all intent and purpose, grazing on Forest Service lands within the watershed has ended. However, several small scale cattle operations are still active on private lands.

Recreation

Recreational opportunities in the Watershed area abound and can range from a scenic drive to simple day excursions or long treks in the rugged mountains of the Alps. For those who enjoy water sports, Trinity Lake supports four marinas, ten boat launches, twenty campgrounds, and two swimming areas. Resorts include Estrellita Marina, Cedar Stock, Trinity Alps Resort, Trinity Lake Resort & Marina, Bonanza King, Coffee Creek Ranch, Enright Gulch Cabins, Mountain Meadow Resort, Ripple Creek Cabins, and Wyntoon Resort.

Recreation use is high in the Trinity Unit of the National Recreational Area and in the Trinity Alps Wilderness consists of recreational trails, including a section of the Pacific Crest Trial, mountain bike riding, horseback riding, vehicle off-roading , snowmobiling, camping, fishing,

hunting, rafting, kayaking, rock climbing, and cross country skiing. Several businesses also offer backcounty packing opportunities into the Wilderness area where visitors can hike or fish in the alpine lacks. Photo 4-1 shows a backcounty skier enjoying the snow on Scott Mountain.

Photo 4-1 Backcountry skier on the slopes of Scott Mountain. March, 2006

Deserving special mention is the Trinity Heritage National Scenic Byway that begins in Weaverville and travels north on Hwy 3 past Trinity Lake, through the center of the Watershed, up Parks-Creek road, and ends on Interstate 5 just north of Weed. This 104 mile drive was designated part of the Federal Highway Administration's National Scenic Byways Program in 1990. The section from Weaverville to the base of Scott Mountain follows the historic Oregon-California Trade Route that served as the primary road between Oregon and California when the pass at Scott Mountain was opened in 1860.

Timber Management

Timber harvesting on the Shasta-Trinity National Forests in the Watershed has been almost non-existent since 2000. There has been one "green" sale, in the Whitney Gulch area south of Trinity Mountain and a number of roadside hazard tree salvage and sanitation sales. A minor amount of understory thinning for fuel reduction has been done within the wildland-urban interface (WUI) and/or adjacent to popular recreational areas. Refer to Photos 4-2 and 4-3 at the end of this section for an example of a fuels reduction project.

There is one green sale planned for FY 2007, but the NEPA for that sale has not yet been funded. This sale is partly located in the Watershed in the Clear Creek Late-Successional Reserve in the area of Pettijohn Mountain and Montgomery, Haylock, and Buckeye Ridges west of Trinity Dam. The sale will basically lower the stocking by removing understory trees to increase the growth rates on the larger trees. Ladder and surface fuels will be treated in order to reduce the likelihood of wildfire damaging the overstory trees.

The allowable sale quantity (ASQ or annual allowable cut) on the Shasta-Trinity National Forests comes from lands capable, available, and suitable (CAS) for timber production. These

lands were allocated to "Matrix" in the ST LRMP and include three management prescriptions, Roaded Recreation (III), Wildlife Habitat Management (VI), and Commercial Wood Products Emphasis (VIII). Matrix lands all contribute to the scheduled timber harvest, but are constrained to varying degrees as to the harvest prescriptions and the level of harvest. There are 62,998 acres of Matrix that have Klamath Mixed Conifer (KMC) or Mixed Fir (MF) forests in the area covered by the U.S. Forest Service "Upper Trinity River Watershed Analysis" (UTRWA) (The UTRWA area is larger than the area in this assessment report as it includes the Lewiston Lake watershed below Trinity Dam). The KMC and MF forests make up over 75 percent of the vegetation in the Watershed and are the vegetation types most suitable for timber management.

The Upper Trinity Management Area includes the lands outside of the Trinity Alps Wilderness north of the Trinity River arm of Trinity Lake. Most of the lands allocated to Matrix are in this area. The ASQ for this area is about 4.9 mmbf/year. The ASQ for the other management area with Matrix lands that contribute to the ASQ was not determined.

There are numerous sections of National Forest allocated to Roaded Recreation around the south Trinity Lake, Trinity Center, and Squirrel Gulch areas and the Coffee Creek Road and Trinity River corridors. There are 23,244 acres of Roaded Recreation in the UTRWA that have KMC or MF forests suitable for timber management. A reduced level of yield is expected from these lands. Uneven-aged harvest prescriptions are permitted under this allocation, but recreation, visual quality, and wildlife objectives are the priority. Fuels reduction and management are also emphasized. It is expected that only incidental harvesting of overstory trees will occur on these lands and that ground disturbance will be minimal.

On lands allocated to Wildlife Habitat Management, treatments to improve habitat, mainly for big game harvest species, are emphasized. There are 13,625 acres of Wildlife Habitat Management in the UTRWA that have KMC or MF forests suitable for timber management. Uneven-aged timber management is permitted, at a reduced level of yield, as is fuels reduction and management. There is a large block of land allocated to Wildlife Habitat Management north of Trinity Lake in the Bonanza King area. This area lies between Highway 3 and the East Fork Trinity River and extends east to the Wildcat Peak and Red Mountain area. There are also scattered sections of this allocation on the east side of the Trinity River north of Ramshorn Creek. It is expected that harvesting will occur on these lands and will remove at least some of the overstory trees, but that ground disturbance will be minimal.

Commercial Wood Products Emphasis lands are allocated for intensive timber management to obtain an optimum yield of wood products. Fuels reduction and management are also emphasized. There are 26,129 acres of Commercial Wood Products Emphasis in the UTRWA that have KMC or MF forests suitable for timber management. The ASQ for this area exceeds 5 mmbf/year, so there will be continuing site disturbance from harvesting and roading. The effects on sedimentation into watercourses should be minimal, given the protections specified for Riparian Reserves (see below).

Most of the Commercial Wood Products Emphasis lands are in the East Fork Trinity River watershed and in the upper Picayune and Sherer Creek watersheds north of that, which were harvested primarily by selection cutting in the '40s, '50s, and '70s and by clear cutting in the '90s. There are also two sections in the Trinity Mountain area northeast of the Papoose arm of Trinity Lake that were partially logged by selection cutting in the '50s and clear cutting in the '80s and '90s, a section north of Trinity Alps Resort on the Stuart Fork of the Trinity that was

logged in the ‘90s, and two sections east and south of Lake Eleanor west of Trinity Center that were selectively logged in the ‘50s and ‘70s, with about six clearcuts created in the ‘90s.

The following are timber management recommendations for the National Forest in the Watershed (UTRWA). These recommendations apply to Matrix (Prescriptions III, VI, and VIII) and Roaded, High Density Recreation.

- “Treat overstocked stands by thinning and uneven-aged management. Maintain optimum stocking and/or provide an output of timber products. Improve stand growth and move more rapidly to an older-mature size class. Decrease the susceptibility of trees to insect and disease.
- Treat mature and poorly stocked stands, including knobcone stands, by regeneration harvest, site clearing and planting. Improve stocking and increase overall percentage of moderate and closed canopy stands.
- Treat young plantations by release, interplanting and precommercial thinning. Optimize tree growth to reach closed canopy conditions.”

Late Successional Reserve (LSR), the largest allocation in the Watershed, emphasizes the protection and enhancement of habitat for the northern spotted owl (NSO) and other species dependent on late-mature and old-growth forests. There are 68,681 acres of LSR in the UTRWA that have KMC or MF forests suitable for management. Harvests from the LSR are not part of the scheduled timber sale program and are not charged to the ASQ. Silvicultural treatments that will accelerate the development of late-successional conditions and/or reduce the risk of catastrophic insect, disease, or fire damage are permitted, but should not degrade suitable NSO habitat or other late-successional conditions.

Limited harvesting within the LSR is recommended to develop old-growth forest characteristics and to prevent large-scale disturbances by fire, drought, insects, and other agents. (UTRWA)

- “Thin and conduct understory burning or other fuel treatment in older stands in the LSR to accelerate creation of late successional forest conditions.
- Monitor vegetation management in LSR to assess changes in late successional species.
- Design vegetation treatments that will accelerate the development of LS/OG conditions and reduce fragmentation.
- Develop bald eagle nest trees as necessary on the slopes overlooking Trinity Lake.”

Riparian Reserves (RRs) are overlaid over all of the above allocations and their management prescriptions take precedence. These reserves are designed to achieve Aquatic Conservation Strategy objectives, such as maintaining and restoring aquatic habitat for water dependent species, providing connectivity within and between watersheds, and maintaining and restoring water quality necessary for the support of riparian, aquatic, and wetland ecosystems. The widths of Riparian Reserves, as shown in the S-T N.F. LRMP, apply to all watersheds until site-specific watershed analyses are completed (which has been done for the Watershed) and the scientific rationale for any change is presented during the NEPA decision-making process. The widths are as follow:

- Fish-bearing streams – The protected width includes the watercourse and the adjacent areas, extending from the “edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest.”

- Perennial, nonfish-bearing streams – The protected width has the same requirements as for fish-bearing streams, except the distance is one site-potential tree or 150 feet slope distance (300 feet total).
- Intermittent or seasonal (ephemeral) streams - The protected width includes the channel, the extent of unstable and potentially unstable areas, or to the top of the inner gorge, or to the outer edge of the riparian vegetation, or from the edges of the channel to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest. A site-potential tree height is the average maximum height of the tallest dominant trees (200 years or older) for a given site class.
- Constructed ponds & reservoirs, and wetlands >1 acre – The protected width includes the water body or wetland, the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the wetland >1 acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greater.
- Lakes & natural ponds - The protected width has the same requirements as for constructed ponds and reservoirs except the distance is two site-potential trees or 300 feet slope distance, whichever is greater.

Riparian Reserves were not included in the calculation of the ASQ. Harvesting in RRs is prohibited unless it will either help attain or maintain Aquatic Conservation Strategy objectives. Permitted management activities are salvage and fuelwood cutting following catastrophic events and silvicultural treatments to control stocking, reestablish and manage stands, and acquire desired vegetation. Road standards are prescribed, including the installation of stream crossings that will accommodate 100-year floods, at a minimum.

The U.S. Forest Service recommends the following for vegetation management treatments in and adjacent to the Riparian Reserves (UTRWA):

- "Allow vegetation management activities to occur within and adjacent to the buffers of Riparian Reserves when they are compatible with Aquatic Conservation Strategy Objectives and management guidelines for Riparian Reserves (USDA Forest Service, 1994).
- Design all fuels management projects so that the activities will maintain and/or enhance water quality, soil stability, fertility and productivity.
- When planning vegetation management activities in or adjacent to Riparian Reserves determine the Desired Future Condition (DFC) for vegetation and riparian/aquatic habitats. Design vegetation management projects to achieve the DFCs tailored for each Riparian Reserve according to its unique characteristics (i.e. aspect, elevation, soils, geology, natural fire behavior, etc.).
- Conduct all vegetation management activities in accordance with Best Management Practices as described in Water Quality Management for National Forest System Lands in California – Best Management Practices, 2000."

Since 2000, neither Timber Products nor Roseburg Resources Co. have harvested in the Watershed. Sierra Pacific Industries has harvested on about 12,700 acres, primarily on the west side of Trinity Lake, from just north of Coffee Creek to just west of Trinity Dam. It has also harvested, by clear cutting, in the Cedar Creek drainage west of the lower East Fork Trinity River and in the Bragdon Gulch drainage east of Trinity Lake. Approximately 30 percent of the total acreage harvested has been by clear cutting, which is considered a high disturbance harvest.

Another harvest is currently being conducted in the Scott Mountain Creek area, much of it by helicopter.

Only 200 acres have been harvested on non-industrial private lands since 2000. These harvests (21 percent clear cut, 79 percent partial cut) have been mainly in the Coffee Creek and Stuart Fork of the Trinity River areas.

Harvesting on industry and private lands is expected to be ongoing and will continue to cause disturbances to soil and vegetation. The degree of sedimentation into watercourses from these disturbances is unknown. What is known is that there will be sedimentation, despite protections required by the California Forest Practice Rules (see below). Studies in the watershed have shown that sedimentation is usually higher in sub-watersheds with greater amounts of harvesting and higher road densities (see below).

Since passage of the Z'Berg-Nejedly Forest Practice Act of 1973 (see "Land Use Practices" below) and adoption of the ST LRMP in 1994, protections for soil, water, and wildlife and constraints on silvicultural practices, stocking levels, harvesting operations, and road building have increased dramatically on both private and public lands. But the requirements for long-term maintenance of erosion control structures on skid trails and landings and for maintenance of logging roads are minimal, and consequent failures occur. As Forest Service budgets continue to be cut, road maintenance becomes less of a priority for scarce dollars. As the commercial component of timber stands becomes depleted on industry and non-industrial private lands, spur roads into logging units have historically been neglected. This can happen with mainline roads as well. Erosion from the extensive network of logging roads in areas that have been harvested could eventually increase through lack of maintenance.

It should be noted that Roseburg Resources Co. (RRC) is certified by SmartWood, a forest certification program of the Rainforest Alliance, which in turn is accredited by the Forest Stewardship Council, the international organization that accredits forest certification programs. In its voluntary compliance with the standards of this certification, RRC has maintained an outstanding record of resource protections, including upgrading its road system and maintaining it on at least an annual, and generally more frequent basis. Annual audits by SmartWood over the past six years have never found any but minor erosion problems from RRC's roads.

LAND USE REGULATIONS

County General Plan and Zoning Ordinances

In California, the County General Plan is the official document used by planners and decision makers to guide land development and the use of natural resources within each county. The Plan is required by law to contain at the minimum land use maps, policies and information necessary to make consistent and informed decisions pertaining to current and long range development. Trinity County's General Plan was last adopted in 1973 and is considered both antiquated and outdated by today's standards and provides only the minimal guidelines deemed necessary. The General Plan is required to address seven elements which are: land use, circulation, housing, public safety, conservation, open space and noise.

Land Use Element

This element which addresses the Watershed area in the chapter titled *North Lake Area* was last updated by the county in 1988. During the review process, the quality of development within this area was rated as one of the primary concerns that should be addressed in all future planning processes. Specifically, the goals that were established focused on:

- Protecting the recreation and tourism value of Trinity Lake.
- Encouraging the development of recreational activities, services and businesses.
- Encouraging land ownership that supports resource production.
- Encouraging existing agricultural uses to continue.
- Limiting new services within the area to the existing communities of Trinity Center and Coffee Creek.
- Limiting the subdivision of residential lots to a minimum of ½ acre size.

Community Plans for the communities of Trinity Center and Coffee Creek have never been developed and both have been given a designation of "Village" which has historically been used for small developing communities in rural areas. This designation provides guidelines and regulations that allow for less restrictive zoning ordinances that would otherwise be applied as a means to encourage "community" oriented development while a town is trying to find its character. Development such as single family homes, schools, and general stores is encouraged while uses such as heavy industrial and multifamily units are discouraged.

Open Space Element

This element is used to identify natural areas that the planning process should set aside for the protection of scenic values, fish and wildlife habitat, watershed protection, and resource rehabilitation. Using a zoning overlay process, it also identifies areas and recommends against development or the construction of permanent structures where natural processes such as geologic instability, floodplains, and other natural hazards may pose a threat to lives. Areas that meet the requirements for open space can be zoned as such in the subdivision or development process and can be set aside to remain in a natural and undeveloped state.

Conservation Element

The conservation element provides general guidelines that promote the conservation, development and utilization of natural resources such as water, forests, soils, rivers, fisheries and wildlife. This element also addresses the conservation of native plants, natural landform features, scenic viewsheds and archaeological and historic sites that may be adversely affected through development. Areas that are given a conservation zoning overlay on top of the primary zoning are required to address guidelines established in this element when development of the property is proposed.

All three of the above elements to the General Plan are applicable to all private lands within the Watershed but not to state or federal lands. In addition, there are several additional county zoning designations that can affect land use and development as well.

R-D-1 Zoning Designation

The Trinity Unit of the Shasta-Trinity National Forest manages an area around Trinity Lake that is designated part of the Whiskeytown-Shasta-Trinity National Recreation Area that has separate guidelines for goals, objectives, and management prescriptions for permitted uses on federal lands around the lake. To reduce regulatory conflicts and maintain compatibility with the federal

guidelines, the county has developed a zoning designation of R-D-1 that establishes county development standards that are complementary with those of the National Recreation Area. This zoning overlay follows the perimeter of the lake and regulates the type of uses allowed so that the viewshed from the lake is not degenerated or lost.

Some of the restrictions that apply to lands within this zone are:

- Uses must be compatible with public and private recreation and enjoyment and the conservation of scientific, historic, scenic and other values.
- Uses permitted are single family units and accessory buildings, utilities, timber management and tree harvesting.
- Restrictions are placed on minimum lot size, building height, architectural design, building materials and earthwork.
- Commercial uses are limited and require issuance of a use permit.

Agricultural Preserve and Timberland Production District are two zoning designations within the County that are used to encourage the conservation of open space and natural resources. Each designation provides benefits of significantly lower property taxes for the landowner in exchange for entering into long term agreements that limit the use of the property.

Agricultural Preserve (AP)

Agricultural Preserve zoning was created by the California Land Conservation Act and requires a minimum parcel size of 100 acres. The intent of the zoning is to discourage development and to encourage continued utilization of lands for agricultural production purposes. While AP zoning is not used extensively within the Watershed due to the steep terrain and dominance of timber production lands, it is an available tool that the county and landowners can use to aid in land conservation.

Timberland Production Zone (TPZ)

The Timberland Production Zone (authorized by the Timberland Productivity Act of 1982) applies to actively managed timberland with a minimum of 160 acres and requires a minimum time commitment of 10 years to receive the benefits of taxing the property on the basis of growing and harvesting timber and its compatible uses. This zoning is an incentive for landowners to keep productive timber lands from being developed and defaulting on the agreement prior to expiration of the contract term carries substantial monetary penalties. Most of the large sections of private timberlands within the Watershed are zoned for TPZ

Mining Ordinance No. 315-230 and 315-596

To ensure compliance with Chapter 9 of the Public Resource Code that deals with the California Surface Mining Act of 1975, Trinity County has adopted two ordinances that regulate mining on private lands. The intent of the regulations is to minimize adverse affects on the environment by requiring either the reclamation or the restoration of areas that are disturbed by mining activities and to protect public health and safety. All mining activities require the obtainment of an approved use permit as well as a reclamation or restoration plan. Mining operations on public lands must meet the established federal guidelines.

California Forest Practice Rules

Since passage of the Z'Berg-Nejedly Forest Practice Act of 1973, forest practices on private lands in California have been governed by the Forest Practice Rules (FPRs), administered by the California Department of Forestry and Fire Protection. The purpose of the FPRs "is to implement the provisions of the Z'berg-Nejedly Forest Practice Act of 1973 in a manner consistent with other laws, including but not limited to, the Timberland Productivity Act of 1982, the California Environmental Quality Act (CEQA) of 1970, the Porter Cologne Water Quality Act, and the California Endangered Species Act. The provisions of these rules shall be followed by Registered Professional Foresters (RPFs) in preparing Timber Harvesting Plans, and by the Director in reviewing such plans to achieve the policies described in Sections 4512, 4513, of the Act, 21000, 21001, and 21002 of the Public Resources Code (PRC), and Sections 51101, 51102 and 51115.1 of the Government Code. It is the Board's intent that no THP shall be approved which fails to adopt feasible mitigation measures or alternatives from the range of measures set out or provided for in these rules which would substantially lessen or avoid significant adverse impacts which the activity may have on the environment. The THP process substitutes for the EIR process under CEQA because the timber harvesting regulatory program has been certified pursuant to PRC Section 21080.5." (2005 California Forest Practice Rules)

In order to implement the intent of the Z'Berg-Nejedly Forest Practice Act of 1973,

"(a) RPFs who prepare plans shall consider the range of feasible silvicultural systems, operating methods and procedures provided in these rules in seeking to avoid or substantially lessen significant adverse effects on the environment from timber harvesting. RPFs shall use these rules for guidance as to which are the most appropriate feasible silvicultural systems, operating methods and procedures which will carry out the intent of the Act.

While giving consideration to measures proposed to reduce or avoid significant adverse impacts of THPs on lands zoned TPZ, the RPF and Director shall include the following legal consideration regarding feasibility:

(b) In determining whether a THP conforms to the intent of the Act, the Director shall be guided by the following principles:

(1) The goal of forest management on a specific ownership shall be the production or maintenance of forests which are healthy and naturally diverse, with a mixture of trees and under-story plants, in which trees are grown primarily for the production of high quality timber products and which meet the following objectives:

(A) Achieve a balance between growth and harvest over time consistent with the harvesting methods within the rules of the Board.

(B) Maintain functional wildlife habitat in sufficient condition for continued use by the existing wildlife community within the planning watershed.

(C) Retain or recruit late and diverse seral stage habitat components for wildlife concentrated in the watercourse and lake zones and as appropriate to provide for functional connectivity between habitats.

(D) Maintain growing stock, genetic diversity, and soil productivity.

(2) Individual THPs shall be considered in the context of the larger forest and planning watershed in which they are located, so that biological diversity and watershed integrity are maintained within larger planning units and adverse cumulative impacts, including impacts on the quality and beneficial uses of water are reduced." (2005 California Forest Practice Rules)

Northwest Forest Plan

The "Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl [NSO]" commonly known as the Northwest Forest Plan or NW ROD, amended the "Regional Guide for the Pacific Southwest Region" (August 1984). The NW ROD significantly constrained management activities on the Shasta-Trinity National Forests, including the Watershed, as outlined in the "Record of Decision for the Final Environmental Impact Statement for the Shasta-Trinity National Forests" (ST ROD), signed April 28, 1995 by G. Lynn Sprague, Regional Forester. Some of the key provisions of the NW ROD (as per the ST ROD) that apply to the Watershed are as follow:

A. Old-growth Forests and Biological Diversity:

Scheduled timber harvests are not permitted in Late Successional Reserves (LSRs) or in Riparian Reserves (RRs). "The primary emphasis of these reserves is protection and enhancement of late seral stage (old-growth forest) and riparian habitat."
"Additionally, within land allocations where timber harvest is planned [Matrix & AMA], a minimum of 15 percent of the Forests will be retained to provide further connectivity and dispersal. Snags will be retained within regeneration harvest units at levels sufficient to support species of cavity nesting birds. An adequate supply of down logs and coarse woody debris are maintained to meet the needs of wildlife species and ecological functions."

Additionally, the Forest Plan provides for diversity of age classes across the forest by requiring retention of at least 5 percent of each seral stage."

B. Threatened, Endangered, and Sensitive (TES) Species:

1. Protection buffers will be provided for the rare and locally endemic species.
2. Protection for [TES] species is provided for outside of withdrawn and reserved areas by Forest-wide Standards and Guidelines.
3. NSO viability is provided for by the system of [LSRs], [RRs], and retention standards within the Matrix and AMA. Also, NSO nesting sites mapped prior to January 1994 will be protected by a 100 acre area around the nesting site.
4. The Shasta-Trinity Forest Plan provides for viability of goshawks through land allocations and standards and guidelines for late successional dependent species.

C. Aquatic Conservation Strategy (" . . to restore and maintain the ecological health of watersheds and aquatic ecosystems")

1. "Riparian Reserves – [are] lands along streams, lakes, and watersheds and unstable and potentially unstable areas." "Primary objectives on these lands are to maintain and enhance riparian structures and functions of streams, confer benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for terrestrial animals and plants, and provide for connectivity of LSRs.
2. Watershed analysis – procedures for conducting analyses that evaluates geomorphic and ecologic processes operating in specific watersheds.
3. Watershed restoration – a comprehensive, long-term program of watershed restoration to restore watershed health and aquatic ecosystems, including the habitats supporting fish and other aquatic and riparian-dependent organisms." (ST ROD)

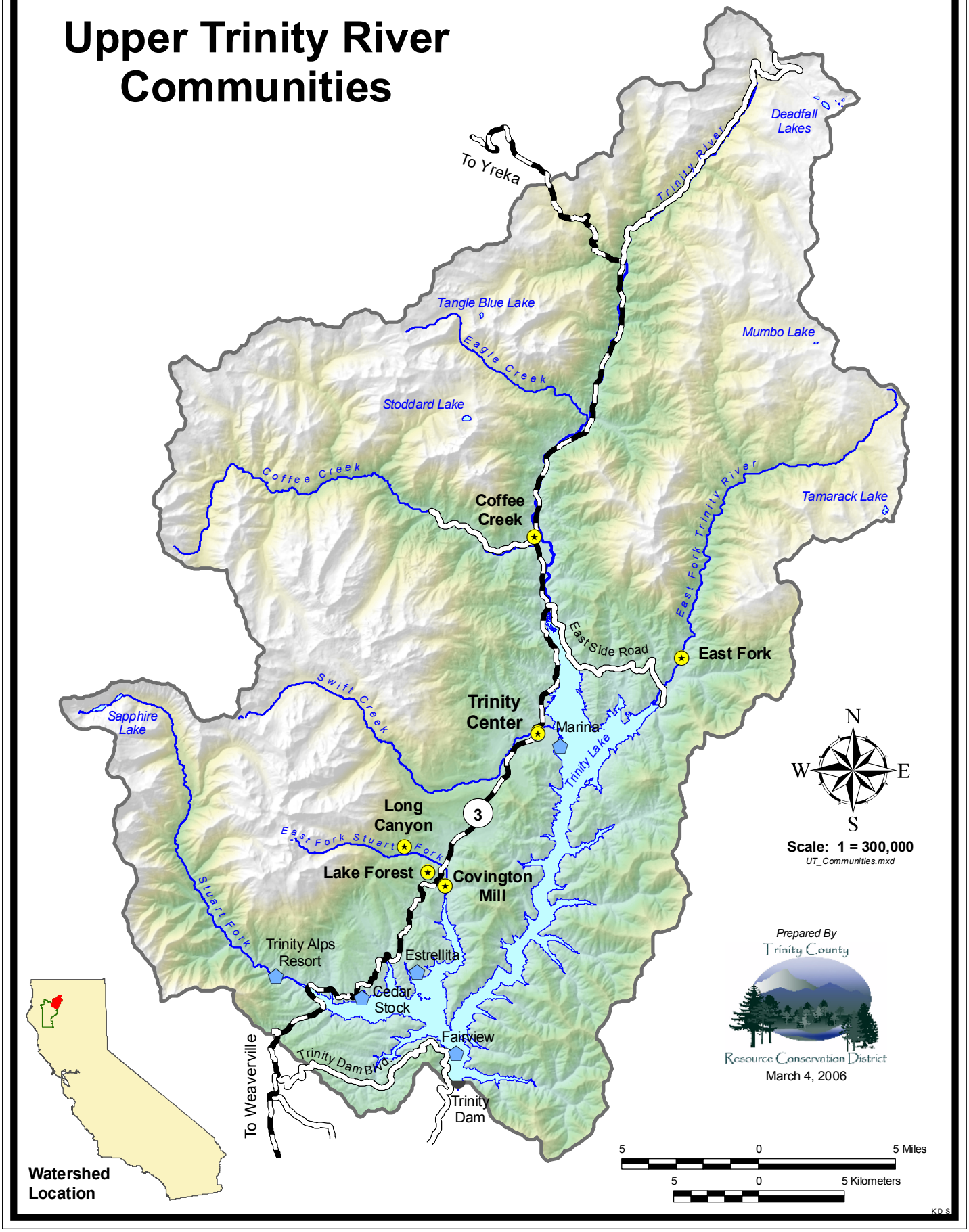
Photo 4-2 Area before treatment.

Before and after photos showing fuels reduction work near the Trinity Center Ball Park adjacent to Wyntoon Resort. Work consists of removing the "ladder fuels", or the brush and thick under growth that quickly moves the fire from the ground to the trees. This fuels project was completed by the Trinity County RCD in 2004.

Photo 4-3 Area after treatment

The intent of the fuels reduction projects is to reduce the chance of fire starts in the Wildland Urban Interface areas located next to residential communities. The reduction in fuels also give firefighters a chance to control wildfires and reduces the intensity of fire, thereby limiting the damage to soils which could lead to increased soil erosion and delivery of sediment to streams.

Upper Trinity River Communities



SECTION 5

Management Issues

Fire And Fuels Management

Large fires have occurred in the Watershed in the past and, despite all efforts, will probably occur again. The mix of residential development, forest and brush lands, hot summer weather and high fire ignition risk make fire and fuel management an important concern of residents of the area. (East Fork Fire Management Plan)

The wildfire threat (an index of both the expected fire frequency and the physical ability of a fire to cause impacts) in the Watershed, outside of the Trinity Alps Wilderness, is rated high to very high and the fire hazard severity (combination of hazard, risk, and values at risk) is rated very high by CDF's Fire & Resource Assessment Program (FRAP) because:

- Flammable structures in the Wildland-Urban Interface areas are interspersed throughout the forest
- Some of the residential areas are on, or bordered by steep slopes with flammable fuels
- Roads into some homes are not adequate to accommodate 2-way traffic
- Some of the roads, especially Highway 3, Stuart Fork Road, Long Canyon Road, Swift Creek Road, Coffee Creek Road, Parks Creek Road, and County Line Road (USFS 106) are heavily traveled during the fire season
- Fire start records indicate that human caused fires tend to be located along roads and trails and in camping areas and residential developments
- Fire season conditions include hot, dry, and sometimes windy weather
- Wildland vegetation is often dense, with areas of continuous fuels, including dead fuel on the ground
- Fire ladders exist in many areas

The communities of Coffee Creek, Trinity Center, and Covington Mills are federally designated as communities at risk due to their proximity to highly hazardous fuels.

In order to describe and compare wildfire-related risks to ecosystems, a rating system has been developed to relate expected wildfires to their historic frequency and ecosystem effects. Most of the Watershed area is rated as condition class 3. This is the highest ranking possible and indicates a high risk of losing key ecosystem components that define the ecosystem. In this area the departure from natural fire regimes is high and fuels are significantly different from those that existed historically. This often results in highly uncharacteristic fire behavior, severity, and patterns that cause changes in the composition and structure of vegetation that are significantly different than what existed historically. Disturbance agents, native species, and hydrologic functions are also substantially outside of the historical range of variation and smoke production is high during wildfires (The Changing California, Forest & Range 2003 Assessment).

Changes to the structure of the vegetation in the analysis area can be attributed to two main factors, timber harvesting and fire. The suppression of wildland fires over the past 90 years and the elimination of regular low intensity fires over the past 70 years have generally resulted in denser forests, with greater amounts of live and dead fuels than previously existed.

These denser fuel conditions have been reduced on some industry and public lands where harvesting was followed by slash disposal, shrub control, and pre-commercial thinning. Where slash was inadequately treated following partial cutting, where shrubs invaded harvest units, or where the density of brush and/or small trees was not controlled following clear cutting, hazardous fuel conditions remain.

In recent years there has been an increase in projects on both public and private lands to decrease understory fuels by thinning from below. Fuels have been reduced on some residential properties by clearing surface and ladder fuels around home sites. In general, these projects cause only minor soil disturbance and do not increase sedimentation into watercourses. The U.S. Forest Service expects to focus its fuels management efforts over the next 10 years around the WUI areas of Covington Mill, Trinity Center, and Coffee Creek. The following are some of the projects and priorities recommended by the Forest Service (UTRWA):

- Priorities for fuels management are:
  - 1st the WUIs,
  - 2nd developed recreation facilities along the Hwy 3 corridor and Trinity Lake,
  - 3rd treat the area of blowdown in the East Fork Coffee Creek,
  - 4th protection of timber resources, especially the plantations east of Trinity Reservoir,
  - 5th protection of the area of potential future development in the Estrellita area.
- Conduct Fireshed Analyses for the areas affecting the WUIs.
- Concentrate on reducing fuel ladders and providing defensible fire zones for the WUIs and recreational facilities.
- Coordinate fuels reduction efforts with other resource management opportunities, including timber and recreation.
- Participate with other agencies in the Trinity County Fire Safe Council to implement the Trinity County Fire Management Plan (TCRCD, 2003) and the East Fork Fire Management Plan (TCRCD, 2000).

Most of the private forest land in the Watershed, and all of the industrial forest land in the WUI areas of Coffee Creek, Trinity Center, and Covington Mills, is owned by Sierra Pacific Industries. The primary goal of SPI foresters and land managers is intensive timber management, using primarily even-aged silviculture and limited uneven-aged silviculture, while maintaining forest and watershed resources and a limited harvest buffer along Highway 3. An additional goal is to create a fire-safe forest. On-going timber management and harvesting, control of conifer spacing and density, and planting of under-stocked timberlands are meeting these goals.

Residential development is now mainly located within a few miles of Highway 3, and is concentrated in the Covington Mill, Trinity Center, and Coffee Creek areas. However, SPI has recently announced that it intends to change the zoning from TPZ to open space on 3260 acres of its holdings, with the ultimate goal of rezoning to rural residential, with minimum parcel sizes of 1-20 acres. Acreage rezoned in the Watershed would be in Eagle Creek Loop, the East Fork of the Trinity River, west of Trinity Center in the Swift Creek area, Long Canyon, lower Covington Mill, Hayward Flat, and Fairview Marina. If this rezoning is approved, it will be at least ten years before it will go into effect. At that time parcels will begin to be sold and developed, which will increase the population, the fire risk, and the values at risk.

Fire Risk (Chance of Ignition)

The USFS map for fire risk potential in the Clear Creek LSR shows a moderate risk for most USFS lands in the Watershed, except for areas of high risk along Highway 3 and in selected areas near the lake, and high risk for all private lands. The combination of moderate to high fuel hazards, high risk, and the physical and aesthetic values of the residents gives the overall area a high fire hazard severity rating.

Summer lightning storms, which are the primary source of fire ignitions during dry, hot periods in late summer when fuels are most flammable, are the main cause of catastrophic fire starts. Lightning from summer thunderstorms is the main source of ignition in the Watershed, causing 66 percent (1139) of the fire starts since the 1910's (62 percent in roaded areas, 76 percent in the Wilderness), with most of these fires starting on mid to upper slopes.

Studies in the Sierra (Weatherspoon C.P. and C.N. Skinner. 1996) indicate that the fire-suppression organization has been ineffective in reducing the number or size of large lightning fires because lightning fires tend to occur as simultaneous, multiple ignitions which, in unusually dry years, can quickly exceed the suppression capacity of the regional fire organization. Reductions in suppression forces on the Shasta-Trinity National Forest in recent years are likely to hamper suppression effectiveness in similar situations and may well lead to an increase in catastrophic fires. Fire suppression is further hampered in the Watershed, especially in the Trinity Alps Wilderness, by the steep, rugged topography and limited access.

Nearly all of the human caused fires are associated with communities and residential areas, developed and undeveloped campgrounds, and roads and trails. Of 598 total human caused fires, 80 percent were in roaded areas and the rest were in the Wilderness. As might be expected, and as verified from fire starts data, the most traveled roads and the areas with the highest density of ungated roads have the highest risk of human caused ignitions. Many areas in the Watershed have a high road density, with heavy recreation use during the summer. Trinity Lake, the Trinity River, and the Trinity Alps Wilderness are big recreational draws, and as would be expected, the campgrounds and resorts along the lake and river are heavily used, as are the access roads to trailheads into the Wilderness. The most heavily used roads are Highway 3, the main two-lane, paved road that bisects the area from north to south, USFS Road 112 up the Stuart Fork to the trailhead, the paved roads to the campgrounds and resorts on the west side of Trinity Lake, the road to the Granite Peak trailhead, USFS Road 115 up the East Fork of Stuart Fork to the Long Canyon trailhead, USFS Road 123 from Trinity Center to the Swift Creek trailhead, County Line Road (USFS Road 106) to French Gulch and to roads accessing the east side of Trinity Lake, USFS Road 37N52 from Coffee Creek to the Boulder Lake trailhead, Coffee Creek Road to the Caribou Lakes trailhead, the Eagle Creek loop (USFS Road 140) to the Stoddard Lake trailhead, the Ramshorn Road (USFS Road 25) to Interstate 5, the road to the Bear Lakes trailhead, and Parks Creek Road (USFS Road 17) to Deadfall Meadows, the Pacific Crest trail, and Weed. Refer to Plate 3-4 for the location and cause of Fire Starts.

During the fall hunting season, logging roads and undeveloped campgrounds in the area to the east and north of Trinity Lake are heavily used. The campgrounds along the east shore of Trinity Lake are also used by hunters and boaters during the summer season. The risk of fires starting and spreading in these areas is greater since the USFS fire station at Trinity Mountain and the CDF station at French Gulch were closed, requiring up to three hours for ground-based suppression forces to respond to fires.

But the Helitack crew is still based at Pettijohn Mountain and could be on a fire within 10-15 minutes of detection. This helicopter can deploy 2-5 fire fighters on scene in one flight (10-15 total) and begin water bucket drops almost immediately. The retardant bombers, lead plane, air attack and smoke jumper planes stationed at Redding Airport could be on scene within 20-25 minutes of dispatch.

Fire Hazard (Fuel Situation)

Before fire suppression was initiated in the Watershed, it is likely that there were more fires and that they were generally low severity surface fires. It was a common practice for cattle and sheep herders to light fires at the end of the grazing season as they left an area, for miners to burn an area to increase the visibility of the ground for prospecting and to remove organic matter to ease mining, and for Native Americans to burn periodically for cultural purposes. These fires burned out the dead and down fuels and ladder fuels (shrubs and small trees) from the understory, encouraged the growth of grass and shrub sprouts, and created stands of large trees with a relatively sparse understory.

For approximately 70 years, wildland fire suppression strategies and tactics on the Shasta-Trinity National Forests have been focused on controlling all fires at the smallest size and with the least possible resource damage. This has had the effect of increasing snags, dead and down surface fuels, and ladder fuels composed of shrubs and shade-tolerant understory trees. Although there are no formal fuel inventories to substantiate the magnitude of these increases, observations of unharvested and unburned stands since the early ‘70’s confirm the increase. These conditions are most prevalent in the moderately dense to dense Klamath Mixed Conifer forests that predominate in the Watershed and are less prevalent in the open Jeffrey pine and incense cedar dominated stands found on ultramafic soils in higher elevations.

The nine-year drought between 1986 and 1994 resulted in an increase in conifer mortality from bark beetles and other agents, with a consequent increase of snags and dead and down woody fuels. This has increased the volume of flammable fuels in the forest by an unknown amount.

Extensive partial cutting by overstory removal, selection, sanitation, and/or salvage has occurred since the mid 1950’s in what are now Matrix and LSR allocations on National Forest and TPZ on SPI, Timber Products, Roseburg Resources Co., and other private lands. This harvesting left a forest which is now generally composed of a relatively sparse overstory of trees larger than 36 inches in diameter over an understory mosaic of relatively dense clumps, patches, and scattered individual seedlings, saplings, poles, and small sawtimber interspersed with shrubs and bare openings. Openings created along roads have in many places filled in with shrubs and seedling, sapling, and pole size conifers.

Partial cutting has had the effect of removing many of the large, fire resistant trees, leaving groups and patches of smaller trees, which with their thinner bark and crowns close to the ground are susceptible to fire damage. It has also increased the quantity and depth of surface fuels on cable units (very few) and on tractor units where slash was not piled and burned and where shrubs and small trees have occupied the understory. Partial cutting, by opening the canopy, created a warmer, drier, and windier environment near the forest floor during times of significant fire danger. All of these factors increase the likelihood that fires will be more severe, will cause more damage to the forest, and will increase sedimentation.

Clear cut harvesting was eventually done in many stands that did not regenerate or grow satisfactorily following partial cutting, as well as in unentered stands. Formal or informal fuel inventories were done by USFS, SPI (and SP Land Co. before them), Timber Products, and Roseburg Resource Co. personnel on harvest units following clear cutting to determine site preparation needs for reforestation. Site preparation by broadcast burning and tractor piling and burning has been the main fuel treatment (80-90 percent of prescribed burning on the National Forest has been to prepare harvest units and brushfields for reforestation). This treatment effectively reduced dead and down fuels on the plantations, at least temporarily, but did nothing to reduce fuels in the surrounding forest. Many of the plantations on the east side of the watershed need to be protected from wildfire by treating the fuels around them.

On the National Forests, grass and shrub layers have developed in many stands following harvesting as a result of 1) political, legal, and/or budgetary obstacles to controlling unwanted vegetation in plantations with herbicides or by manual release, 2) budgetary constraints on pre-commercial thinning, and 3) natural successional processes. These fuels, in combination with the generally well-stocked trees, are in some cases creating a volatile fuel hazard. Trees in these plantations, due to their small size, are especially vulnerable to fire damage, as was demonstrated during the 1987 fires on the Hayfork Ranger District. This has been less of a problem on SPI and Roseburg Resources Co. plantations due to their use of herbicides and pre-commercial thinning, but there is still a problem with volatile grasses in some of their plantations.

Where both partial cutting and clear cutting occurred, stream buffers were left mostly undisturbed to provide shade, retain the structural integrity of the stream channels, and provide a filter strip. The highest density of large, fire resistant trees tends to be found in these zones. These zones also tend to have a moderate to dense midstory of conifers and hardwoods and a moderately dense understory of trees and shrubs.

Shaded fuel breaks were constructed along strategic roads and ridges and fuel hazard reduction was done along some roads to slow fires ignited along the roads, to act as a barrier to the progress of fires moving through the fuelbreaks, and to act as an anchor point for back burning. In some cases these fuelbreaks are in need of maintenance to insure their effectiveness.

Over the years there has been an increasing buildup of fuels along the shoreline of Trinity Lake, where woody debris is stranded as the water level recedes during the summer. Since boating activity is high during the summer, with houseboats parking in the coves and other types of boats stopping at such popular areas as Squirrel Flat near the mouth of the East Fork Trinity River, the chance of fires starting is high. In high use areas, fuels on the shoreline and in the adjacent forest should be treated.

Fuel loading in the Watershed ranges from low to high, with many of the residential, resort, and campground areas having moderate to high fuel loads. An indication of fuel loading, as well as vegetation type, is indicated by the “Flame Length” data layer in the USFS GIS 90 data. Higher flame lengths generally indicate denser, taller, and/or more flammable fuels. Flame lengths along the most heavily used roads and in the campground and resort areas are about equally in the 0-4 foot and 4-8 foot flame length fuel classes, with some areas >8 feet. Trinity Center and Coffee Creek are mostly in an area of >8 foot flame length fuels, with some areas of 4-8 foot lengths. The residential areas in the Covington Mill area are primarily surrounded by 0-4 foot and 4-8 foot flame length fuels, with some >8 foot flame length fuels.

The U.S. Forest Service UTRWA lists seven fuel profiles found in the Watershed that uniquely affect fire behavior. These are:

- Mature Mixed Conifer at lower elevations (fuel loads 15-25 tons/acre) – This fuel profile is on drier sites where past fire exclusion has created conditions that will promote high intensity fire behavior, including catastrophic fire.
- Mature Mixed Conifer from midslopes to mountaintops (fuel loads 20-30 tons/acre) – This fuel profile is in higher elevations with a colder, moister climate and longer fire return intervals, so fuels are heavier.
- Small Timber/Mixed Conifer (fuel loads 10-15 tons/acre) – Fuels are less than in mature forests and brush is more common. This profile can include plantations over 20 years old. Fire is carried in the litter layer.
- Shrub Fields (fuel loads 0-10 tons/acre) – This profile is common on south slopes and has low levels of residual woody surface fuels and dense vertical and horizontal fuels. It includes plantations from 11-20 years old. Fire is carried from the litter layer into the shrub canopy.
- Knobcone (fuel loads 15-25 tons/acre) – This profile is associated with high intensity fires at long intervals, such as the Ramshorn Burn, that result in a buildup of dense fuels as the trees mature.
- Grasses (fuel loads 0-10 tons/acre) – This fuel is found in new plantations and in some mature forests on south facing slopes at low elevations.
- Heavy Insect Mortality/Blow Down (fuel loads 25-45+ tons/acre) – This profile is generally intermixed with other fuel profiles, sometimes in large amounts. It can include harvests that were not followed by hazardous fuel reduction. The heavy residual fuels can result in high intensity fires.

Values at Risk

The critical and unique resources that are at risk in the North Lake watershed are the:

- communities of Trinity Center and Coffee Creek
- residential areas along Highway 3, Long Canyon Road, Coffee Creek Road, and the East Fork of the Trinity
- resorts bordering Trinity Lake, Stuart Fork, Coffee Creek, and the Trinity River
- a vineyard in the lower East Fork Trinity River watershed
- USFS and private campgrounds
- USFS fire guard stations
- LSR, Riparian Reserves and Spotted Owl Activity Centers in the Matrix
- plantations in Matrix and LSR and on SPI, Timber Products, and Roseburg Resources Co. lands
- Whiskeytown-Shasta-Trinity National Recreation Area
- historical sites (ex. Bowerman Barn, Carraville Hotel)
- high value focal (refugia) sub-watersheds that are important within the analysis area and within the entire Trinity River watershed
- populations of Port-Orford cedar
- the forests and brushfields that protect the watershed from erosion.

The LSR is primarily a mosaic of sections of USFS lands (about 66,900 acres) interspersed with alternating sections of SPI and Timber Products lands that are managed intensively for timber production. The primary forest types found in the LSR are mid- to late-successional Klamath Mixed Conifer and Mixed Fir (white and red fir) at higher elevations. Most of the LSR is within four miles of Trinity Lake, the Trinity River, and/or Highway 3. Some of the National Forest within the LSR has been logged by partial cutting, with some clear cutting since 1980. Much of the forest on the alternating SPI sections has been harvested by clear cutting since 1980 and by a combination of prescriptions on Timber Products Co. lands. The LSR is therefore critical for the survival and health of wildlife dependent on late successional forests.

Riparian Reserve is an expanded concept of what were once termed stream buffers. These buffers (about 37,000 acres) in Matrix are unique in that they are areas where contiguous stringers of moderately dense late successional trees are found in what is otherwise a fragmented forest sometimes sparsely stocked with large trees. These buffers were designated and left uncut in previous timber sales and are critical for preserving the health and integrity of watercourses and for providing travel corridors for dispersal of wildlife dependent on late successional forests. Experience has shown that dense riparian vegetation, including large trees, can burn intensely during catastrophic fires. The aftermath of severe burns can increase sedimentation and runoff of ash into streams and destabilize stream banks.

Matrix lands on National Forest comprise about 86,900 acres of the Watershed. There are numerous plantations on Matrix (and some on LSR) and on SPI, Timber products, and Roseburg Resources Co. lands. These plantations range in age from 1-25 years (mostly 1-20 years) and are generally well stocked, with trees varying from 2-35 feet tall. These plantations represent a substantial investment in time and resources by management, administrative, technical, and field personnel and contract labor as well as an investment in access roads, nursery and storage facilities, and fire infrastructure. Future timber outputs depend upon the continued production of these plantations. They are vulnerable to fire and are a critical resource in the Watershed. Given the fire regime in this area, many of these plantations will likely experience wildfire before they reach rotation age.

Forest Health

The forests within the Watershed are surprisingly healthy. This is likely due in part to the relative isolation of the area due to the high mountains that surround the watershed on three sides and the scarcity of residential property and jobs, which all inhibit the spread of disease spores and insects by wind, water, and humans and other living organisms. In part it is due to the abundance of mixed conifer forests of varying ages, which increases the resistance to widespread disturbance by any single organism. And in part it is due to forest management practices, such as stocking control by thinning and removal of diseased or infested trees by sanitation harvesting, which have maintained stand conditions that promote tree vigor.

A survey by the U.S. Forest Service on California National Forests and adjacent lands identified localized forest stands west of Trinity Lake and along the Trinity River corridor that were at high risk of tree mortality (>25 percent mortality) from insects and diseases, through 2015. This assessment was based upon high stocking levels and current (2002) management regimes and fire suppression tactics (Forest & Range 2003 Assessment). If in fact such mortality occurs, and if the dead trees are not salvaged, fuel levels will increase dramatically and subsequent wildfires

will spread more rapidly and burn with more intensity. This will increase the exposure of soils to erosional forces and likely result in increased sedimentation into watercourses.

In the early '80s ('83-'85) there was an outbreak of spruce budworm that was particularly heavy in the Bowerman Ridge and upper Papoose Creek areas. This proved to be a short-lived outbreak that in general only temporarily defoliated the tops of many Douglas-firs, many of which refoliated from buds that had not been killed. The Forest Service logged trees that were most severely defoliated. Due to the concern of some SP foresters that this outbreak would spread, *Bacillus thuringiensis*, a biotic agent, was sprayed aerially over the infected areas. In the Papoose area, SP clear cut a large area of infested trees, removing almost every Douglas-fir and causing a nearly complete species change. There is still disagreement as to whether this, or the spraying, were necessary, or were the cause of the ultimate decline of the budworm population. There was a lot of site disturbance in the Papoose area at the time of logging, but the logged area has not been entered for 20 years and has recovered.

There is an endemic population of bark beetles that kills isolated pockets of pines and Douglas-firs on a continual basis. Mortality is salvaged when practical. Stand tending by stocking control, which is being done on both industrial and public lands, is the best defense against widespread infestations. Commercial thinning and selection, sanitation, and salvage harvesting, which are generally used for stocking control and to remove mortality, are less site disturbing than clear cutting.

The only disease of note is black stain root fungus (*Leptographium wageneri*), which primarily infects Douglas-fir, ponderosa pine, and Jeffrey pine in areas close to some campgrounds in the Watershed. Insect vectors are believed to spread the fungal spores over long distances, although some foresters believe that spores can be picked up and spread by vehicle tires and human footwear. The best way to prevent infections is to maintain vigorous trees through stocking control and logging practices that do not compact the soil. Treating the stumps of harvested trees with Sporax® immediately after harvesting also helps control the spread of this disease. Another control method is to treat infected stands by sanitation harvesting of dying trees and salvaging of dead trees, and then planting with white fir and other species that are not susceptible to the fungus.

Port-Orford root disease (*Phytophthora lateralis*) is not present in the watershed, the only watershed on the west coast where the disease is not found. It is found to the east in the upper Sacramento River canyon and it is likely that eventually spores will be transported to the watershed in mud attached to vehicles, human footwear, or wildlife. Roads occur in, adjacent to, or above every mapped Port-Orford cedar stand, all of which are confined to streams and stream corridors. If the disease is introduced into the watershed, it is likely that the disease will first show up along the Trinity River in areas that are in or adjacent to wet areas or are periodically inundated by water, as the disease is transmitted by water and is primarily water borne.

The populations at highest risk for infection are in low-lying wet areas directly below roads, trails, and other likely areas for the introduction of the disease. Populations at lower risk are those in areas that are not directly influenced by wet conditions or periodic water flows.

The 1997 flood caused considerable damage to Port-Orford cedar along the Trinity River and its tributaries. In some places, trees that survived the flood had their roots exposed and scarred and in other places had the lower part of their trunks buried. As a result, some stands are still in

decline and are experiencing mortality. The overall condition of stands affected by the flood is considered fair to poor.

The U.S. Forest Service recommends that protection measures for Port-Orford-Cedar be incorporated into the design of all management activities, as follow (UTRWA):

- "Prevent/reduce the import of disease into uninfested areas (offsite spores picked-up and carried into an uninfested project area)
- Prevent/reduce the export of disease to uninfested areas (onsite spores moved to offsite, uninfested area)
- Minimize increases in the level of inoculums or minimize the rate of spread in areas where the disease is localized or infection is intermittent."

Road Density

Most of the roads in the Watershed were built to access timber sales and many sub-watersheds are densely roaded. The average road density in the Watershed, outside of the Trinity Alps Wilderness and Trinity Lake, is 4.9 miles/square mile. The density of roads in the immediate Trinity Lake sub-watershed is 6.1 miles/square mile. The cumulative risk rating of disturbance from sub-watersheds generally increases as road density increases, and is generally high for the sub-watersheds with significant harvested areas. Refer to Plate 5-1 for a map of the road density within the Watershed.

Roads in the Upper Trinity River impact hydrology and water quality by intercepting runoff from hillslopes and increasing sediment inputs to streams from ditches and segments with poor drainage. Roads in some locations also have affected slope stability. Large sediment pulses into the Trinity River from roads are particularly noticeable after the first fall or winter storms. Approximately 9 percent of the total sediment load in the upper Trinity River Assessment Area can be attributed to roads (US EPA, 2001). Sediment delivery from roads and road related failures is dramatically increased when road maintenance and related hardware is neglected. Photos 5-1 and 5-2 show the degree of sediment that can be collected by road drainage systems and delivered to watercourses after heavy rainfall events. The sediment shown here is delivered directly into Trinity Lake. Photo 5-3 shows a culvert with a sediment filled inlet basin that has water diverting over the road and downcutting the road fill. Annual maintenance of road related structures would greatly reduce the erosion processes that often lead to road and stream crossing failures.

Photo 5-1 Inlet of culvert at mile marker 62.13 and 61.81

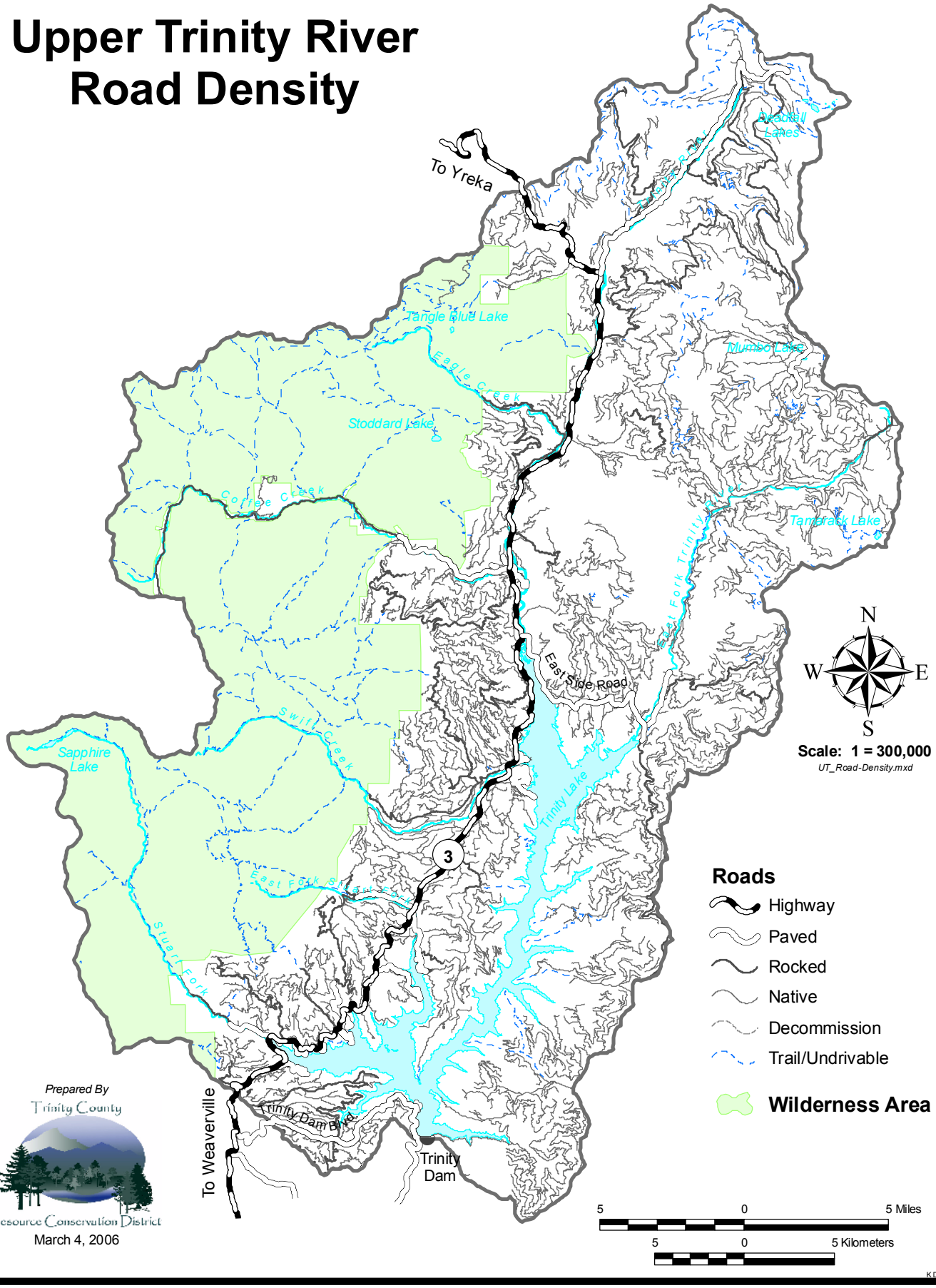
The turbidity of the water at the inlet and outlet of these two creeks vary remarkably even though they are only 563 yards apart. In cases like these, investigations should be conducted to see if the cause of sedimentation is natural or activity related and remedial actions should be initiated to reduce or prevent further occurrences. The creek on the left is at mile marker 62.13 and the one on the right is at mile marker 61.81 on Highway 3 North, and both outlets discharge directly into Trinity Lake.

Photo 5-2 Outlets of culvert at mile marker 62.13 and 61.81 showing difference in turbidity levels.

Photo 5-3. View of culvert with sediment filled inlet basin. Water has been flowing across road and downcutting road fill. Lack of minor maintenance could lead to crossing failure.

Photo 5-4 Measuring fill slope at culvert outlet. Riprap in foreground was placed to re-enforce road after landslide (mid-photo) event.

Upper Trinity River Road Density



Prepared By

Trinity County

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SECTION 6

Management and Action Plan

The Upper Trinity River watershed is such a large and diverse resource area that management opportunities and actions can vary greatly based upon factors such as land ownership, landowner needs, type of resource issues identified, location within the watershed, accessibility and availability of funding. The following section will attempt to address concerns raised through a variety of sources including; landowner contacts (initial notification, landowner survey, personal communications and site visits, and public meetings), the Upper Trinity River Watershed Analysis (USFS 2005), the Trinity River TMDL (EPA 2001), Trinity County DIRT road analysis (2001), East Fork Fire Management Plan (Baldwin, 2000) and analyses conducted during the 18 months of this project. The objective of the Management and Action Plan is to identify and propose potential actions to address these concerns as well as propose a strategy for setting planning priorities and priority projects that have been identified thus far.

This section is organized by overall resource issues; General Watershed Projects, Projects Identified by Landowners, Projects Identified by U.S.F.S., Forest Health, and Recreation, because these are the areas that were identified as areas of concern. Setting out a plan of action is iterative and needs to maintain the flexibility to adapt to changing conditions, funding availability, new information and ability to work in partnership with other resource or county agencies.

Strategy for Setting Priorities

While establishing priorities for management action, a number of factors should be considered or given weight by resource managers to help organize project proposals. Some of these factors include:

- Sub-watersheds with higher risk of delivering controllable sediment to watercourses.
- Protection of communities and their infrastructure, including community water systems.
- The protection of beneficial uses.
- The reduction of lake turbidity issues
- The protection or restoration of unique or sensitive resources.
- Landowner participation and/or approval.
- Cost-benefits and effectiveness.
- Ability to monitor effectiveness of project.
- Time frame required to complete project.
- Limitations on ability to complete projects as planned

General Watershed Projects

The East Fork Trinity River Watershed has the greatest amount of human caused erosion when it is expressed as a percentage over natural background erosion (US EPA, 2001). The Stuart Fork and Coffee Creek watersheds are the most predisposed to surface erosion from management activities. Based on the sediment source inventory prepared for the Trinity River TMDL the Main Trinity River watershed contributes the most sediment per unit area from both natural and land-use activities. Management recommendations include:

1) Complete road analyses/inventories of USFS road network and "shared use" roads beginning in the watersheds that have been identified with the highest risk of not meeting sediment TMDL hillslope targets. An objective should be completing a minimum of one (1) inventory per year until inventories are completed for all of the sub-watersheds in the Upper Trinity River Watershed. Focus should be placed on:

    a) roads and culverts damaged by floods, landslides, and debris flows that should be identified for repair and upgraded to meet current road standards.

    b) roads that have been abandoned, or are identified as obsolete, so decommissioning provisions can be made for erosion and drainage control.

2) Complete specific watershed analyses for all sub-watersheds with a focus on identifying site-specific information on opportunities for improving water quality. This can include reducing erosion from roads and legacy sediment sources (e.g. timber harvest areas, mines, legacy roads), especially in areas where management activities are proposed or resource conditions warrant future restoration funding for reduction of road sediment sources. (On lands managed by the USFS this refers to conduct Watershed Improvement Needs (WIN) inventories). An objective should be completing the watershed analysis in the year following the completion of the road inventory.

3) Implement Trinity County's High Priority projects identified in the 2001 DIRT Analysis completed by the Planning Department's Natural Resources Division.

4) Encourage the adoption of a countywide grading ordinance as recommended by the Five Counties Salmonid Restoration Plan, Summary of Specific Conclusions and Recommendations: Recommendation 5B: The counties should explore mechanisms to curtail winter grading, such as grading ordinances, or standardized mitigations on grading imposed through the CEQA process

5) Encourage the adoption of county maintenance policies as recommended by the Five Counties Salmonid Restoration Plan, Summary of Specific Conclusions and Recommendations: Recommendation 7B: Road and bridge maintenance policies should be institutionalized so that they become standard organizational practice, rather than the result of individual initiative.

6) Conduct an inventory of all current activities that occur within the Watershed and identify all potential impacts associated with the activity so that standardized, comprehensive mitigation measures can be developed and implemented.

7) Develop and implement a comprehensive aquatic monitoring plan for the Watershed that monitors habitat, fish populations, and current management effectiveness.

8) Provide for protection of soil and water resources when planning and implementing all projects in the Upper Trinity River (e.g. Region 5, Soil Quality Standards for land management (USDA Forest Service, 1995) and California Forest Practices Act, especially Section 936.9 Protection and Restoration in Watersheds with Threatened or Impaired Values.

9) Stream condition inventories should be undertaken in areas where future projects are planned. Additional stream conditions inventories, habitat-typing surveys, and channel stability evaluation should be completed in areas without any existing information.

10) Because the Stuart Fork Watershed has the most productive soils for timber regeneration (USFS 2005) special care should be provided to protect the soil resource of this watershed during implementation of management activities.

11) Mercury Contamination: The USGS received funding to investigate Mercury contamination in the Upper Trinity River Watershed. The initial field work was completed, but funding has not been provided to publish a report. There are specific, known sites of concerns, including a popular recreation site; the Carrville ponds and a potential source of contamination, the Altoona Quicksilver Mine. This is a critical public health issue and completion of the USGS study is imperative for sound decisions to be made on behalf of the residents and visitors to the Upper Trinity River watershed. A funding source should be found to complete this report. The abstract for the project is titled "Mercury Bioaccumulation From Historical Mining in the Trinity River Watershed"

12) Trinity County, through the Five County Salmonid Restoration Program, conducted a survey (DIRT) of all of the county-maintained roads in the watershed in 2000 -2001. The following roads represent the highest priorities for treatment in the Upper Trinity River Watershed:

Eastside Road	Rainier Road West
North Derrick Flat Road	Delta Road
Trinity Alps Road	Ramshorn Road
Coffee Creek Road	Eagle Creek Road
Van Ness Road	Eagle Creek Loop
Swift Creek Road	Slate Mountain Road
Long Canyon Road	

Projects Identified by Landowners

1) Upper Coffee Creek Stream Restoration: A legacy of mining activities in the Upper Coffee Creek drainage has resulted in the loss of about 0.5 miles of stream and riparian habitat and created a fish passage barrier resulting in the isolation of previous fisheries habitat above the mine tailings. Proposed remediation would include:

    a) Phase I would be a feasibility study leading to preliminary design of an appropriate stream restoration project.

    b) Phase II would be implementation of the project.

2) East Fork of Stuart's Fork debris management: The 1997 winter storm event resulted in a torrential debris flow upstream of Highway 3 that caused considerable damage to the stream channel and stream crossings. Blown out road crossings were restored, but significant amounts of debris remain in the stream channel. Homeowners adjacent to the stream are concerned that this debris will be remobilized in the next "big storm". A stream condition inventory and hazard evaluation should be conducted of the East Fork of Stuart's Fork to determine the appropriate course of action to reduce potential hazards.

3) In April 2005, the Office of Environmental Health Hazard Assessment issued fish consumption advisories based on mercury contamination for fish caught from Trinity Lake. This has raised serious concerns among the local residents in regards to public health as well as economic impacts to recreation dependant jobs. As with Priority No.

11 listed under General Watershed Projects, the source of contamination should be identified and any potential remediation funded if feasible.

4) In the Upper Trinity River Watershed Survey, of the 100 landowners who indicated that they have had erosion problems related to flooding, 43 percent indicated they had experienced moderate to extensive damage to their property. Further investigation is warranted in this area to determine if there is a need to provide remedial or preventive measures to reduce erosion and subsequent sediment delivery to the water courses.

Projects Identified by U.S. Forest Service

The following recommendations apply to U.S. Forest Service lands that fall within Prescriptions 3, 6, 8 and Roaded, High Density Recreation within the Watershed:

1) Treat overstocked stands by thinning and uneven-aged management. Maintain optimum stocking and/or provide an output of timber products. Improve stand growth and move more rapidly to an older-mature size class. Decrease the susceptibility of trees to insect and disease.

2) Treat mature and poorly stocked stands, including knobcone stands, by regeneration harvest, site clearing and planting. Improve stocking and increase overall percentage of moderate and closed canopy stands.

3) Treat young plantations by release, interplanting and precommercial thinning. Optimize tree growth to reach closed canopy conditions.

Limited harvesting within the LSR is recommended to develop old-growth forest characteristics and to prevent large-scale disturbances by fire, drought, insects, and other agents.

4) Thin and conduct understory burning or other fuel treatment in older stands in the LSR to accelerate creation of late successional forest conditions.

5) Monitor vegetation management in LSR to assess changes in late successional species.

6) Design vegetation treatments that will accelerate the development of Late Seral and Old Growth conditions and reduce fragmentation.

7) Develop bald eagle nest trees as necessary on the slopes overlooking Trinity Lake.

The following are some of the projects recommended by the Forest Service Upper Trinity River Watershed Assessment:

8) Priorities for fuels management are:
    a) Wildland Urban Interfaces (WUI) around communities.
    b) Developed recreation facilities along the Hwy 3 corridor and Trinity Lake,
    c) Treat the area of blowdown in the East Fork Coffee Creek,
    d) Protection of timber resources, especially plantations east of Trinity Lake,
    e) Protection of the area of potential future development in the Estrellita area.

9) Conduct Fireshed Analyses for the areas affecting the WUIs.

10) Concentrate on reducing fuel ladders and providing defensible fire zones for the WUIs and recreational facilities.

11) Coordinate fuels reduction efforts with other resource management opportunities, including timber and recreation.

12) Participate with other agencies in the Trinity County Fire Safe Council to implement the Trinity County Fire Management Plan (TCRCD, 2003) and the East Fork Fire Management Plan (TCRCD, 2000).

13) Over the years there has been an increasing buildup of fuels along the shoreline of Trinity Lake, where it is stranded as the water level recedes during the summer. Since boating activity is high during the summer, with houseboats parking in the coves and other types of boats stopping at such popular areas as Squirrel Flat near the mouth of the East Fork Trinity River, the chance of recreationists starting fires is high. Response time by suppression crews to fires in this area is slow. In high use areas, fuels on the shoreline and in the adjacent forest should be treated.

14) Shaded fuel breaks were constructed along strategic roads and ridges and fuel hazard reduction was done along some roads to slow fires ignited along the roads, to act as a barrier to the progress of fires moving through the fuelbreaks, and to act as an anchor point for back burning. In some cases these fuelbreaks are in need of maintenance to insure their effectiveness.

Forest Health

In general the low to mid-elevation forested areas of the watershed are at an increased hazard of stand-replacing fire due to high fuel loading. Effective fire prevention and suppression programs and the lack of timber management on federal forestlands have altered the character of the forests, resulting in extremely high fuel loads and combustibility. High fuel loads could produce catastrophic wildfires with the potential to destroy wildlife habitat and private property, including community water systems, houses and timber stocks, and to increase soil loss and sedimentation. The areas of greatest risk within the watershed are the Wildland Urban Interface (WUI) areas and the developed recreation areas in the vicinity of Trinity Lake. The Upper Trinity River Watershed Analysis (USFS 2005) identified three WUI's – Coffee Creek, Trinity Center and Covington Mill. Future development in these areas will increase the number of structures and expand the extent of WUI's. The following recommendations address this critical issue of forest health and fuels reduction as identified in the Trinity County Community Wildfire Protection Plan.

1) Conduct Fireshed Analysis for the areas affecting the Coffee Creek, Trinity Center and Covington Mill Wildland Urban Interface areas. This modeling tool allows planners to estimate fire behavior and changes in fire behavior/patterns with various fuels reduction treatments.

2) Develop a 10-year plan to implement the projects identified in Fireshed Analyses for the Coffee Creek, Trinity Center and Covington Mill WUI's. Concentrate on reducing fuel ladders and providing defensible fire zones for the WUI's (including community water systems) and recreational facilities.

3) Treat the area of blow-down in the East Fork Coffee Creek

4) Complete the implementation of the East Fork Fire Management Plan (TCRCD 2001) to assist in reducing fire risk for the Covington Mill WUI area.

5) Treat identified areas of invasive weed species, which tend to be highly flammable and are detrimental to forest health.

6) Port Orford Cedar is a special resource that occurs within the Upper Trinity River Watershed (USFS 2005). One of the most important drivers for water quality protection in the Mainstem Trinity River and East Fork Trinity River Watersheds is the occurrence of Port Orford Cedar. These two watersheds contain the only populations of Port Orford Cedar on the west coast that have not been infected by *Phytophthora lateralis.* This root disease is primarily a water borne and transmitted disease. The disease can also be transported by humans and other vectors in mud from wet area to wet area. The disease requires running or standing water for introduction into uninfected areas. Port Orford cedar risk analyses categorize areas in high or low risk classes. High-risk areas are described as low-lying wet areas that are located down slope from already infested areas or below likely sites for future introductions, especially roads. Low-risk areas include areas that are not influenced by wet conditions or periodic later flow. Most of the greatest impacts to POC stands from the disease, and the most habitat loss will likely occur in the high risk stands located in floodplains adjacent to streams and in areas of high road or trail density. The transportation system in the Upper Trinity River and East Fork Trinity River has also directly impacted stands. Roads located in close proximity to streams, springs, wet meadows and other hydrologic features have been located within Port Orford populations in some areas resulting in the direct loss of Port Orford Cedar habitat. In addition to direct habitat loss, roads located in and in close proximity represent potential disease vectors. The following measures for the protection of Port Orford Cedar are recomemded (USFS 2005):

    a) Incorporate measures to protect Port-Orford-Cedar for all management activities. All management practices should be designed to:

        i) Prevent/reduce the import of disease into uninfected areas (offsite spores picked-up and carried into an uninfected project area)

        ii) Prevent/reduce the export of disease to uninfected areas (onsite spores moved to offsite, uninfected area);

        iii) Minimize increases in the level of inoculums or minimize the rate of spread in areas where the disease is localized or infection is intermittent.

    b) Perform a restoration needs inventory focusing on reducing the risk of POC infection by *Phytophthora lateralis* in the Main Trinity River and East Fork Trinity River Watersheds. Identify and implement projects that will minimize the risk of introduction of *Phytophthora lateralis*.

    c) Perform a risk analysis for any planned management activities in areas with Port-Orford cedar.

    d) Implement the appropriate mitigation measures to prevent the introduction for *Phytophthora lateralis*, the cause of Port-Orford cedar root disease (LMP 4-105). For an example of potential risk-reduction techniques refer to - A Range-Wide Assessment for Port-Orford-Cedar (*Chamaecyparus lawsoniana*) on Federal Lands, pgs. 135-179 (USDA-USDI, 2003).

Recreation

Maintenance of the recreational qualities of Trinity Lake is important to users and for viewshed. The most frequent issues raised are:

1) Lake Levels: No specific projects were identified that address lake levels. Lake level management is solely a function of the Bureau of Reclamation for the Central Valley Project and Trinity River flow releases.

2) Lake clarity: Lake clarity could be addressed directly by projects identified in General Watershed Projects and would benefit from improved forest management that reduces the risks of catastrophic wildfires. Another identified project is to assist resort owners deal with grey water issues from houseboating activities.

3) Lake free of post-storm debris. Develop a storm debris removal plan that addresses the hazard problem of large woody debris floating in the lake after large storm events.

4) Mercury contamination levels: Identify the source(s) of mercury contamination in the upper Trinity River and Trinity Lake and conduct a feasibility study of removing mercury contamination from mine tailings and preventing runoff from the Altoona Mine area if it is determined to be a source of contamination. Monitor mercury levels in fish on a periodic basis to advise on safe consumption limits.

5) Forest Service Road Access: Access to USFS road network was raised in community meetings. The USFS has seen a pattern of reduced funding for maintenance of roads in the recent past. Systematically completing road inventories/analyses and subsequent watershed analyses are critical first steps for the USFS to develop a plan for its road network, and; therefore, providing access to roads while protecting water resources of the watershed.

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APPENDIX A

Upper Trinity River Sediment Source Analysis

Landslide Inventory for the Upper Trinity River Watershed

Upper Trinity River Watershed Sediment Delivery Risk Assessment for Landslide, Surface, and Fluvial Erosion

APPENDIX B

Upper Trinity River Watershed Survey

UPPER TRINITY RIVER WATERSHED SURVEY

An Element Of The

Upper Trinity River Watershed Management and Action Plan

November, 2005

Prepared By:
Trinity County Resource Conservation District

With Grant Funding Provided By:
California State Water Resources Control Board

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APPENDICES

Acknowledgements

The Upper Trinity River Watershed Survey was made possible through a grant provided by the State Water Resources Control Board. Contract Manager for the project was Michele Fortner, North Coast Regional Water Quality Board.

Administrative assistance was provided by the Natural Resource Conservation Service through a cost sharing agreement.

Native wildflower seeds sent to landowners who completed and returned the survey were selected and purchased through Pacific Coast Seed, Inc. 533 Hawthorne Place, Livermore CA 94550

The Resource Conservation District would like to thank the landowners in the Upper Trinity River Watershed who took the time to complete and returned their surveys and have chosen to take an active role in the management of the area they live in.

Questions regarding this survey may be directed to:

Trinity County Resource Conservation District
No.1 Horseshoe Lane
P.O. Box 1450
Weaverville, CA 96093

Phone: 530-623-6004
FAX: 530-623-6006
E-MAIL: info@tcrcd.net

ABSTRACT:

A natural resources survey was mailed to landowners of the Upper Trinity River Watershed in January of 2005 as an element of the Upper Trinity River Watershed Management and Action Plan being completed by the Trinity County Resource Conservation District through a grant provided by the State Water Resources Control Board. The intent of the survey was to identify areas of concern that landowners may have with an emphasis on identifying water quality and sediment related issues. A total of 945 surveys were sent to landowners and businesses and 341 were returned by the end of February. As an incentive, native wildflower seeds were mailed to landowners who completed and returned the survey by the designated deadline.

INTRODUCTION:

The Trinity County Resource Conservation District (TCRCD) received a grant from the State Water Resources Control Board in June of 2004 to develop a comprehensive Watershed Plan for the Upper Trinity River Watershed located in the northern most part of Trinity County. The primary purpose of the project is to identify the source of diminished water quality from an increase in sediment and turbidity levels in the Upper Trinity River and Trinity Lake that have been noted in recent years. The goals of project are to establish an Upper Trinity River Watershed Coalition, conduct a sediment source inventory, prepare a strategic fuels reduction/thinning plan and demonstration project, and develop a comprehensive Watershed Action Plan with prioritized restoration projects utilizing adaptive management techniques.

The strategic fuels reduction/thinning plan and demonstration project will be developed for the watershed, with participation from the Watershed Research and Training Center, input from the US Forest Service (the primary landowner in the watershed), and the California Department of Forestry and Fire Protection for private lands input. An Upper Trinity River Watershed Action Plan will be developed, incorporating the previously mentioned elements of the project outlining prioritization of projects for implementation. This project will contribute to ongoing local watershed stewardship that can achieve significant environmental results with benefits for the Trinity River Watershed below Trinity and Lewiston Dams. This project was initially spearheaded by local residents concerned about the continuing high levels of turbidity in Trinity Lake and the resultant negative economic impacts on the communities and the fishery resource.

The landowner survey conducted by TCRCD will help identify issues of concerns that the landowners of the Upper Trinity River Watershed have with an emphasis being placed on water quality and sediment problems that they may be aware of, or are experiencing on their property. The twenty-question survey was designed to gather empirical data related to what the landowner can physically quantify as well as identify more subjective information such as attitudes and commonly held beliefs as to why certain problems may exist.

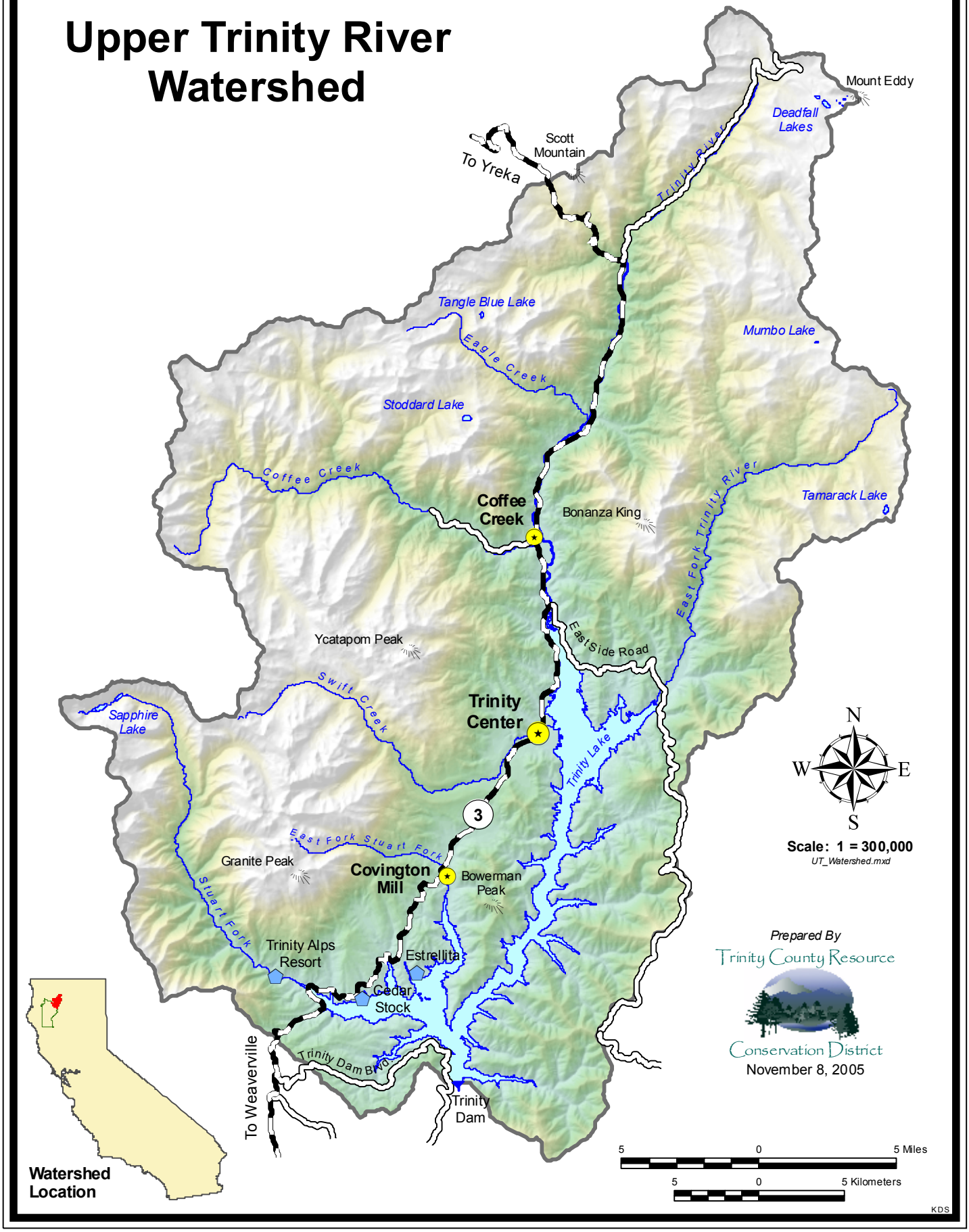
The Upper Trinity River Watershed is a rural area with sparse population density. Residential development is focused within three main categories with approximately one-third of the population living in the two small towns of Coffee Creek and Trinity Center, one-third of the population living in more isolated areas and the remainder in small clusters of residential development. Some landowners do not have permanent structures on their property. Trinity Center, the largest developed community, serves as a base to a number of residents who fly in and out of the county throughout the year.

Methodology:

To obtain the names and addresses of landowners within the Upper Trinity River Watershed, ARCVIEW GIS was used to first delineate the boundaries of the watershed and then create a database of property owners who fell within the boundaries using the program's functions. This database was then converted to an EXCEL file format and verified with the most current property ownership data available from the county assessor's office. The data was then sorted, checked for errors, incomplete entries were deleted, and then names were cross referenced for landowners with multiple properties to reduce the frequency of duplicate copies of the survey being sent to the same individuals. A final list of 945 landowners was generated through this process.

The survey was then drawn up and questions formed using the goals outlined in the grant proposal for developing the watershed plan for the Upper Trinity River Watershed. The questions were designed to collect general information such as population, demographics, and desirable attributes of the area as well as significant factors needed to identify problems landowners may be having with flooding, erosion and landslides. Surveys were sent out January 15, 2005, and as an incentive to encourage responders to return the surveys before they were set aside and forgotten, a packet of wildflower seeds was promised to those who returned the survey by the first week of February. Of the 945 surveys sent out, 22 were undeliverable and a final total of 341 (36%) were completed and returned. 250 of these were returned within the first two weeks, an additional 47 came in during the following two weeks, and 44 after that. The wildflower seeds and an informational brochure were sent out to the 297 respondents who promptly returned the survey.

All surveys that were received were entered into an ACCESS database program and then sorted and transferred to an EXCEL spreadsheet for additional analysis.


Upper Trinity River Watershed
Mount Eddy
Deadfall Lakes
Scott Mountain
To Yreka
Trinity River
Tangle Blue Lake
Eagle Creek
Mumbo Lake
Stoddard Lake
Coffee Creek
Coffee Creek
Bonanza King
Tamarack Lake
East Fork Trinity River
Ycatapom Peak
EastSide Road
Swift Creek
Sapphire Lake
Trinity Center
Trinity Lake
3
East Fork Stuart Fork
Granite Peak
Covington Mill
Bowerman Peak
Stuart Fork
Trinity Alps Resort
Estrellita
Cedar Stock
Trinity Dam Blvd
To Weaverville
Trinity Dam
Watershed Location
N
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Scale: 1 = 300,000
UT_Watershed.mxd
Prepared By
Trinity County Resource Conservation District
November 8, 2005
5 0 5 Miles
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KDS

Summary of Upper Trinity River Watershed Survey

Question # 1: Residency Period

Landowners were asked which part of the watershed they reside in and the number of months spent there on an average year. Choices available included five regions within the watershed, another part of the county, another county, or out of state.

Dividing those who responded into the five regions, one hundred and twenty eight (38%) live in Trinity Center, seventy-five (22%) live in Coffee Creek, forty-eight (14%) live in Covington Mill, twenty-nine (9%) live in Long Canyon and twelve (4%) live in East Fork. Residency within the Upper Trinity watershed can also be divided between permanent residents, and those who use the area on a part time basis. The analysis showed a clear delineation between those who live within the watershed six months or less out of the year and those who reside in the watershed on a permanent basis. The number of respondents who live within the watershed for a period of six months or less within the five regions was twenty-three (79%) for Long Canyon, nine (75%) for East Fork, eighty-eight (69%) for Trinity Center, forty-five (60%) for Coffee Creek and twenty-six (54%) for Covington Mill. Respondents who could be considered permanent residents with residency rates of twelve months out of the year ranged between 17% and 29% between the five locations. Few respondents reported living in the watershed in the seven to eleven month range.

Seventeen respondents did not answer this question; several did not answer where they resided when not within the watershed, and five resided in several regions of the watershed at different times of the year.

Question # 2: Location Of Residence

Landowners were asked to classify the location of their residence or business into one of four categories represented within the watershed.

The Upper Trinity watershed is a rural area that consists of five small communities, several clustered subdivisions and isolated residences scattered throughout the watershed. One hundred and nineteen (36%) of the respondents stated they live within a developed community, One hundred and fourteen (35%) in an isolated area, Seventy two (22%) in a residential subdivision outside of a developed community and twenty-four (7%) chose other type of location.

Twelve respondents did not answer this question.

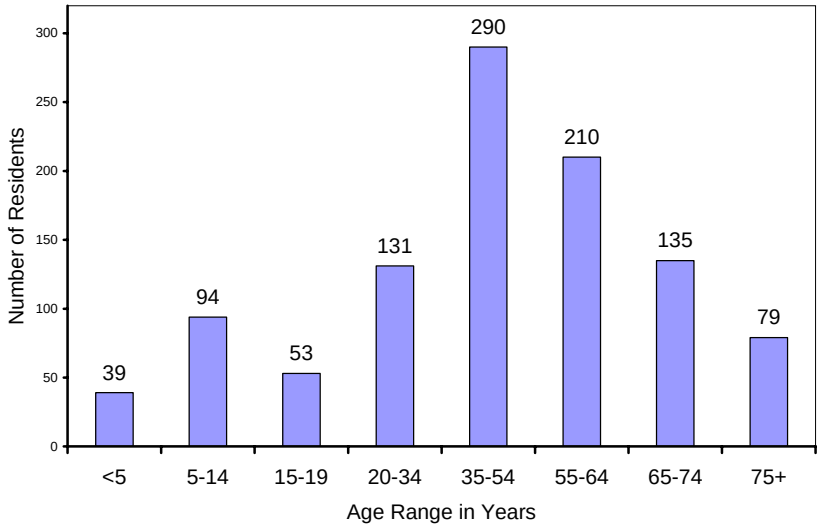
Question # 3 Household Demographics

Landowners were asked to document the number of people living in their household and place them into one of eight age group categories.

To determine the age distribution of landowners in this watershed, respondents were asked to provide the age of occupants living within their household. A total of 1,031 individuals were reported with one hundred and eighty-six (18 %) being under the age of 20, four hundred and twenty-one (41%) between the ages of 20 and 55 and four hundred and twenty-four (41%) at or over the age of 55. Interestingly, the main communities and outlying areas within the Upper Trinity watershed have been perceived by county residents as having an above average number of older retirees, which has not been corroborated by this survey. Further analysis of the results may indicate the majority of full time residents may belong to the older age groups and that absentee owners and part time residents may make up the majority of the younger age groups.

Twelve respondents did not answer this question.

Age of Residents



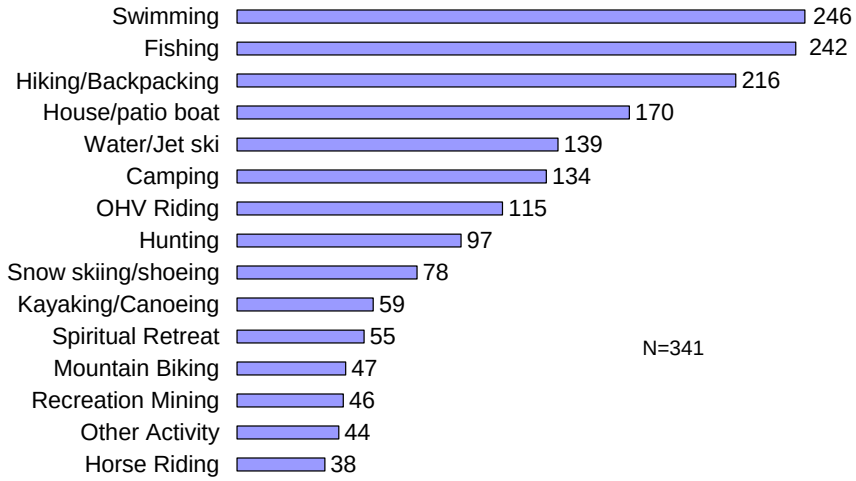
Question # 4: Recreational Activities

To determine the extent and preferences for types of recreational use, landowners were asked to identify the recreational activities they or their families participate in while in the watershed. Respondents were encouraged to choose all categories that applied.

Recreational opportunities have been recognized as a priority and desirable amenity among Trinity County residents and visitors. The choice of activities was limited to those with outdoor and recreational parameters since this was one focus of the survey. The Upper Trinity watershed is bordered by the Trinity Alps Wilderness to the west, US Forest Service and private timber lands to the north and east, and Trinity Lake in the center. Not surprisingly, the majority of the highest ranking activities focused on water-based recreation due to the proximity to Trinity Lake, Trinity River, or one of its tributaries.

Twelve respondents did not answer this question

Recreational Activities



Question #5: Employment

To help determine what employment opportunities exist within the watershed, landowners were asked if they derived any income from the watershed and to categorize their occupation.

Historically, employment within the watershed consisted of logging, sawmill operations, gold mining, ranching (before the dam), recreation and their related support services. With the decline in both gold mining in the 1930's and the shift in timber management and reduction in corresponding logging operations on both private and public lands in the 70's and again in 90's, many of the traditional occupations that existed have been greatly reduced or eliminated. However, forest-related jobs such as timber management and firewood cutting still provide significant employment opportunities with 29% of the respondents reporting receiving income from these occupations. The service sector consisting of retail and food sales such as general stores and cafés account for 32%, government had 5%, recreation with 4%, agriculture with 5% and the remaining miscellaneous 25%. Only fifty-two (15%) of the respondents reported receiving any income from working in the watershed which may be the result of landowners not wanting to disclose personal information, a high percentage of retirees who don't work or the high number of part time residents that work elsewhere. Due to the low number of responses received, this may not provide an adequate representation of employment conditions in the watershed and caution should be used when assessing this information.

Two hundred and eighty-eight respondents did not answer this question and some reported receiving income from more than one category.

Question #6: Flooding

Landowners were asked to rate the type and extent of property damage and soil erosion they may have experienced due to flooding from the Trinity River or one of its tributaries. The four specific parts of this question referred to general damage, the alteration of a stream or creek channel, the erosion of stream or creek banks, and the risk of future flooding.

The Upper Trinity watershed is a mountainous area that can experience localized flash flooding and torrential debris flow during the winter or summer thunderstorm events. The area is prone to mass wasting processes which are prevalent throughout the watershed (Upper Trinity River Watershed Analysis, U.S. Forest Service, March 2005). While flooding is a natural event, alterations to the landscape through development, catastrophic fire, or timber harvesting can alter the severity and frequency of the problem. The Trinity River is listed as impaired by the State of California and this adversely affects water quality of the lake and the river below Trinity Dam (U.S. EPA, 2001). One concern is the degree to which flooding is contributing to erosion and the increase in sediment being delivered to tributaries and, eventually, Trinity Lake and Trinity River.

Since not everyone lives next to a stream or creek, a large proportion of respondents answered that flooding has had no effect on their property. Two hundred and thirty-seven (70%) of the respondents reported there was no damage to their property, two hundred and fifty-three (77%) said there was no alteration of stream channels, one hundred and forty-one (43%) said there was no bank erosion and two hundred and eight (62%) said there was no increased risk due to past flooding. However, it is important to note that of the 100 people who reported having experienced property damage caused by flooding, forty-three (43%) stated they have experienced moderate or extensive damage. Fifty-seven (57%) had minimal to minor damage from flooding.

Thirty-five (46%) reported having moderate or extensive stream or creek channel alteration and forty-one (54%) have had minimal or minor channel alterations. Seventy-six (41%) have had moderate or extensive channel bank erosion and one hundred and eleven (59%) have experienced minor to moderate bank erosion. Finally, forty-two (34%) reported they have a moderate or extensive increased risk of future flooding and eighty three (66%) cited minimal or minor increase in future flooding risk.

Four respondents did not provide any answers to this question.

Question # 7: Forest Practices

Landowners were asked six questions to get their opinions about current forest management practices in the Upper Trinity River watershed. The questions asked if they felt forest management: 1) benefits and improves the health of the forest, 2) increases the fuel load and therefore the risk of fire, 3) increases the risk of erosion from road construction, 4) adequately addresses water quality and environmental issues, 5) should do more to address the threat of fire, and 6) should increase the "no logging" zones around water courses to reduce erosion.

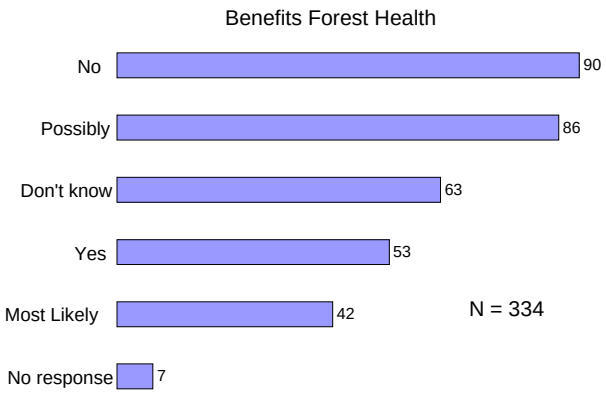
Most of the Upper Trinity watershed has been associated with current or historical timber management practices to some extent, with the exception maybe of some of the designated wilderness areas. Timber harvesting and forestry management deal with a variety of issues including timber production, fire management, wildlife management, erosion and water quality. The amount and type of forest management practices varies over time. For example, the USFS completed the Upper Trinity River Watershed Analysis in March 2005, and this document indicates that the USF has conducted very little management of the forest lands under their jurisdiction in recent years. On the other hand, a review of California Department of Forestry and Fire Protection (CDF) timber harvest plans shows active forest management on private lands. The survey's authors did not develop questions that define "management practices" in a way that distinguishes types of management (or lack thereof) or management by types of ownership. Therefore responses are silent to these issues, also.

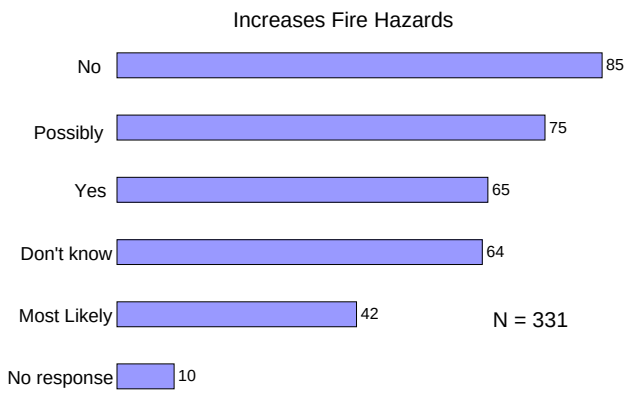
The responses can be grouped to look for general patterns. The first four questions speak to current practices. Grouping positive responses for each of these questions (responses of "yes" and "most likely") shows that roughly one-third or 31% to 32% answered positively responding yes or most likely when asked about timber management practices benefiting and improving forest health; increasing fuel load, and therefore, fire hazards; increasing erosion to streams; and adequately addressing environmental concerns. The negative response to these same four questions was about 27%. Forty-one to 44% percent of the responses were less certain, answering "possibly" or "don't know".

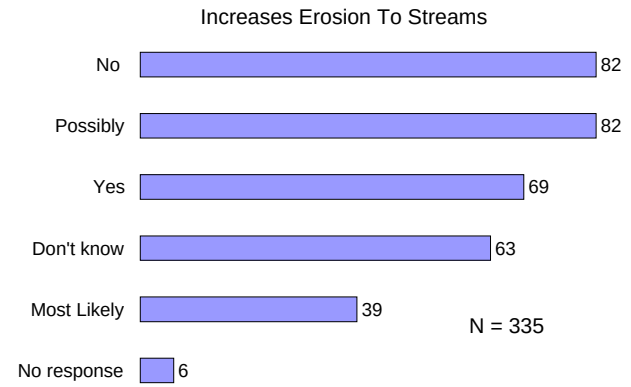
The final two questions in this section asked about future actions – should more be done to reduce fire risk and should "no logging zones" be increased next to creeks and waterbodies to help reduce erosion. Grouping responses together ("yes" and "most likely") indicates that most respondents believe that additional action should be taken, 79% and 71% respectively. It is interesting to note that only about one third of respondents believe that current management practices increase fire risks, but nearly three-quarters of them believe that more should be done to reduce fire risk. Similarly, about one-third see current practices increasing the risk of erosion and delivery of sediment to streams, but 71% indicate that wider buffers along waterbodies would help reduce erosion.

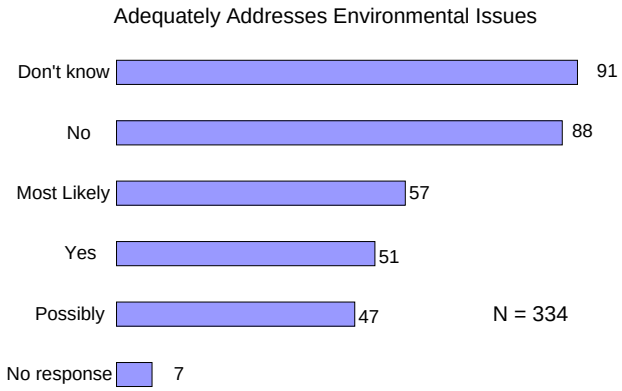
Five respondents did not answer to these questions.

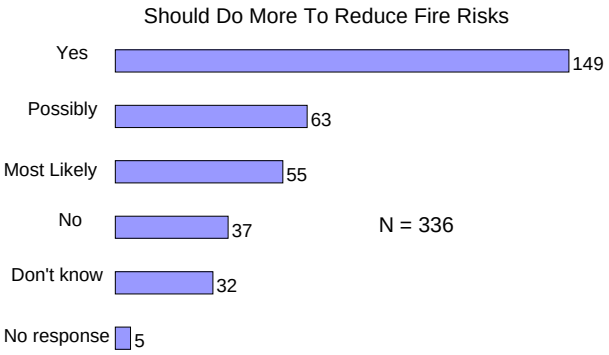
The following graphs show the respondents opinion of current forest management practice.

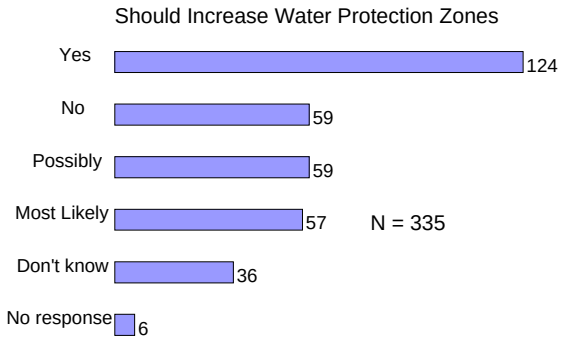












N = total number of responses received for that question.

Question # 8: Development

Landowners were asked their opinions regarding residential and commercial development within the watershed. The four questions asked were; do county zoning ordinances adequately address environmental impacts from development, should environmental impacts be a priority in future development, do residential septic systems threaten water quality, and does a lack of a county grading ordinance lead to erosion problems due to poor construction practices.

Residential and commercial development can lead to increased erosion and sediment delivery to streams from poor design and maintenance as well as other environmental issues. Trinity County is one of the few remaining counties in the state that does not have a grading ordinance to control or monitor development or road construction. While fifty-nine (18%) of the respondents say lack of a grading ordinance does or most likely causes problems. One hundred and forty-one (43%) say they don't know and seventy-one (21%) say it does not. On-site sewage disposal systems (septic tanks) are the predominant method of sewage disposal in the watershed. Only thirty-five (11%) of the respondents view septic systems as an environmental concern and one hundred sixty-four (50%) do not. The largest group of respondents, one hundred and seventeen (35%), aren't sure if zoning ordinances adequately address environmental concerns, yet one hundred and forty-three (43%) feel that environmental concerns should be a priority for future development.

Three respondents did not answer this question.

Question # 9: Environmental Problems

Landowners were asked if they have experienced any problems with landslides, excessive erosion, poor air quality, invasive plants or forest fuel loads on or near their property.

One hundred and nine (33%) of respondents stated that they have experienced landslides to some degree, while two hundred and twenty-one (67%) stated that they never have. Although the term "excessive erosion" was not defined in the survey, one hundred and eighty-three (56%) of the respondents stated they have experienced excessive erosion compared to one hundred and forty-six (44%) who have not. Wood stoves are a primary source of heat for many residences in the watershed, and every winter timber managers burn slash piles left over from logging operations and fuels reduction projects. Both of these sources can impact air quality within the watershed and one hundred and sixty-five (52%) of the respondents say that they have experienced poor air quality at some time. However, only eleven (3%) state that air quality affects them often or regularly, and one hundred and fifty-three (48%) state that they have never experienced poor air quality. Invasive plants species have proliferated and become an area of concern for resource managers. In an attempt to determine the extent that invasive plant species have spread throughout the watershed, landowners were asked if they have a problem on, or near, their property. A surprisingly high number of respondents, one hundred and ninety-seven (59%) state they do not have a problem with invasive plants and only thirty-six (11%) state that they do. Although there are documented areas of invasive plants in the watershed, they are either not a landowner concern or are not recognized as being invasive species by the general public. Consistent with previous answers pertaining to fuel loads in the forest, one hundred and sixty-seven (50%) of the respondents feel they have a problem with fuel load or excessive woody debris in the area around them (yes or most likely) and ninety-four (28%) feel that they do not.

Seven respondents did not answer this question.

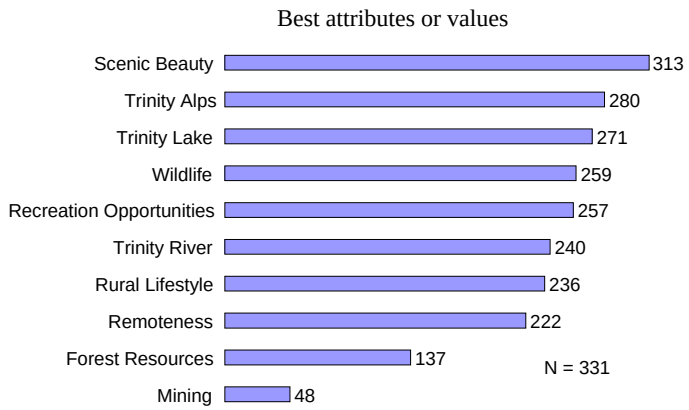
Environmental Problems

Response	landslides	excessive erosion	poor air quality	invasive plants	forest fuel loads
Regularly	4	12	5	-	-
Often	10	14	6	-	-
Occasionally	35	52	34	-	-
Infrequently	60	105	120	-	-
Never	221	146	153	-	-
Yes	-	-	-	36	117
Most Likely	-	-	-	11	50
Possibly	-	-	-	17	53
Don't Know	-	-	-	71	17
No	-	-	-	197	94
No Response	10	12	23	9	10

Question # 10: Best Attributes

Landowners were asked to select the best attribute or value of the watershed and were able to select as many categories as they liked.

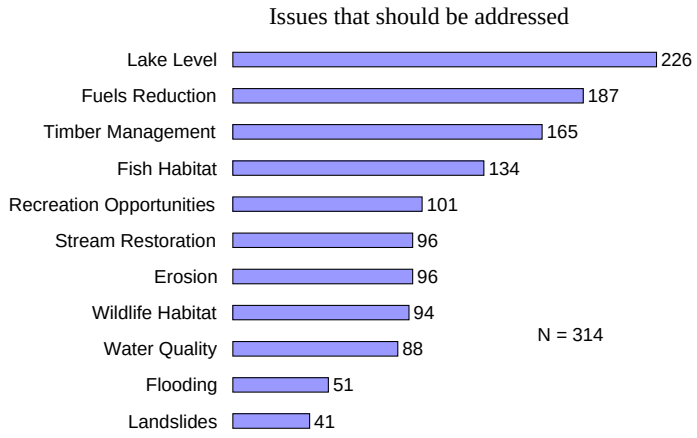
This question received a high response by most landowners and defines the reasons why respondents choose to live and/or own property in the Upper Trinity watershed. Ten respondents did not answer this question.



The next three questions are interrelated. Landowners were asked, if there were any issues within the watershed that needed to be addressed; to what they would attribute the problem, and which types of restoration they would emphasize. They were able to select as many categories as they felt appropriate.

Question # 11: Issues To Address

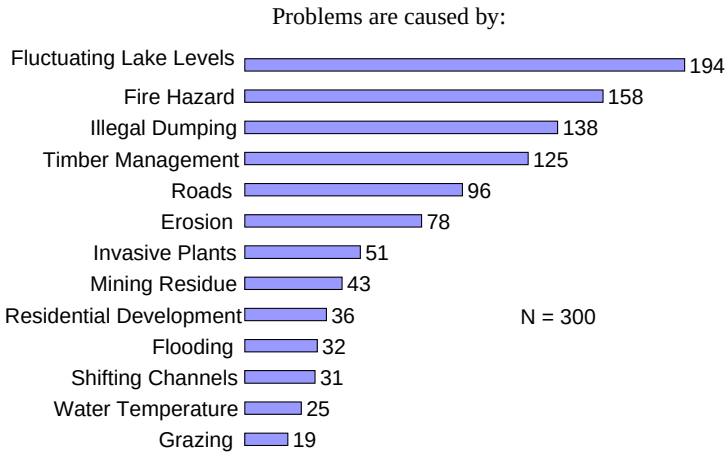
The highest response received pertained to the recreational levels of the lake based on concerns over the amount of fluctuation and low water levels during drought years. Trinity Lake was constructed in the mid-1960's as a water storage reservoir for the Central Valley Project. Lake levels are controlled for this purpose and not maintained for recreational uses. The fluctuating levels have a negative impact on water sports, lake camping, resorts as well as water quality, so this is understandably a top issue of concern for the residents. The second and third ranked selections have to do with fuels reduction and timber management issues. Twenty-seven respondents did not answer this question.



Question # 12: Causes of Watershed Problems

The number one category of causes of watershed problems was reported to be fluctuating lake levels, followed closely by fire hazard, which reinforces respondents concerns over the need for fuels reduction. Roads and erosion are a concern for one-third of the landowners responding.

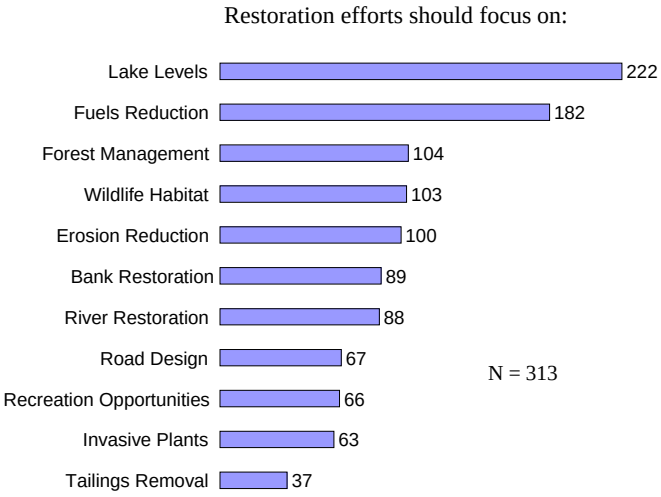
Forty-one respondents did not answer this question.



Question # 13: Restoration Emphasis

The most common responses regarding where restoration efforts should be focused, were on Lake Levels and Fuels Reduction and Forest Management.

Twenty-seven respondents did not answer this question.



Question 14: Government Oversight

Landowners were asked if they felt local, state and federal governments were doing an adequate job protecting the watershed. The majority of the respondents either were not sure or felt that government agencies are not doing an adequate job with one hundred and eighteen (37%) responding that they were not sure and one hundred and twenty-one (38%) saying no. Eighty-two (26%) of the respondents answered yes. Twenty respondents did not answer this question.

Question 15: Water Quality Issues

Landowners were asked if the water quality of Trinity Lake, Trinity River or its tributaries is impaired and if something should be done about it. Eighty-two (25%) of respondents felt there was a problem, one hundred and fourteen (35%) were not sure, and one hundred and twenty-seven (39%) did not believe there was a problem. Eighteen respondents did not answer this question.

Question 16: Habitat Restoration

Landowners were asked if they feel there is a need for wildlife habitat restoration within the watershed. One hundred and twelve (34%) replied yes, eighty-five (26%) were not sure and one hundred and twenty-nine (40%) felt there was no need. Fifteen did not answer this question.

Question 17: Money For Habitat Restoration

Landowners were asked if the government should spend money on wildlife habitat restoration within the watershed. Respondents were consistent with the answers given for the need for habitat restoration with one hundred and thirteen (35%) saying there was a need, eighty-two (26%) were not sure, and one hundred and twenty-six (39%) saying there was no need. Twenty did not answer this question.

Question # 18 Environmental Issues

Landowners were asked to list three environmental issues about the watershed that they think need to be addressed. Respondents were allowed to write-in their own issues and were not restricted to selecting from a predetermined category as in previous questions. Categories were created based upon the responses received and the issues were placed into the appropriate category. Of the surveys returned, 29% did not provide a first issue, 44% did not provide a second issue and 60% did not provide a third issue. As with answers to previous questions, the primary issues of concern listed by the respondents were; forestry practices, water levels of Trinity Lake, and the need for fuels reduction.

Environmental Issues of Concern

SUMMARY BY CATEGORY **Number of Respondents**

Issues of Concern	Issue 1	Issue 2	Issue 3	Total
Forestry Issues	54	35	15	104
Lake Issues	50	34	14	98
Fuels Reduction	48	27	23	98
Forest Management	16	17	17	50
Erosion	11	11	2	24
Roads	9	13	11	33
Fish Habitat	7	4	9	20
Restoration	7	6	2	15
Trinity River	5	4	0	9
Water Quality	5	7	1	13
Wildlife	5	10	9	24
Grazing	4	0	0	4
Illegal Dumping	4	7	9	20
Air Quality	3	1	0	4
Development	3	2	4	9
Invasive Plants	3	4	7	14
Mining Concerns	3	4	7	14
Flooding	1	3	0	4
Noise	1	0	0	1
Recreation	1	1	5	7
Illegal Camping	0	1	0	1
Trails	0	0	2	2
No Response	99	149	203	451
Total Response	**240**	**191**	**137**	**568**

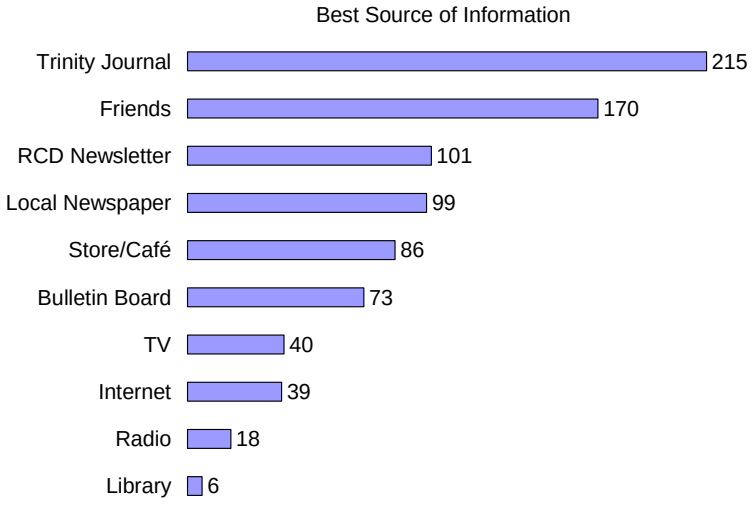
Question # 19: Learning Topics

To give landowners a chance to provide personal input, they were asked what types of watershed topics they would be interested in learning more about, Eighty-three respondents provided one to several topics in response the questions that were divided into sixteen categories.

Question # 20 Sources of information.

To determine the most effective method to disseminate information or news throughout the watershed, landowners were queried as to the best sources available to them.

As can be expected in a small rural community consisting of both full and part time residents, news travels best by the weekly newspaper and through word of mouth. The Trinity Journal, which can be mailed to local landowners as well as those outside of the county, is reported to be the best source of information by 72 percent of respondents. This is closely followed by friends at 57 percent, the Resource Conservation District's Quarterly Newsletter, which is mailed to all addresses in Trinity County, at 34 percent and other local newspapers at 33 percent. Other local sources of information are local store and cafés at twenty 29 percent and bulletin boards at 25 percent. Less frequently other sources of information reported by residents included the television, internet, radio, and library.



Conclusion

The Upper Trinity Watershed survey has provided interesting insights into the natural resource issues that concern landowners in the watershed and more importantly, it has placed quantitative figures on issues that have been discussed in the past.

The fluctuating water level of Trinity Lake or "lake level" has always been an issue in the county. Although this is based mostly on the negative impact on water sports, lake camping, resorts, and other recreational opportunities, it is also a concern due to the water quality issues caused by the exposure of the dirt banks at low water levels which are susceptible to erosion. Seventy-one percent of the respondents feel that the lake should be the main emphasis for restoration efforts and eighty-two percent feel it is one of the best attributes of the watershed. Understandably this is a top issue of concern for the residents.

As previously stated, the Upper Trinity watershed is a mountainous area that can experience localized flash flooding and torrential debris flow during the winter or summer thunderstorm events and is prone to mass wasting processes, which are prevalent throughout the watershed. It is important to note that roughly forty to fifty percent of those reporting damage from flooding on their property have experienced moderate to extensive damage by their estimation. Further investigation is warranted in this area to determine if anything can, or should be, done to reduce the amount of damage from flooding and therefore, the amount of erosion and deliverable sediment that is being generated.

Although the term excessive erosion was not defined in the survey, 56% of the respondents stated they have experienced excessive erosion compared to 44% who have not. This is a relatively high number and if the assumption is made that most of the serious erosion occurs outside of the developed communities where 36% of the population resides, then this may indicate that erosion is a serious issue that should be looked at further. Geology within the Upper Trinity watershed is composed mainly of mixed ultramafic and granitic rock so soils within the watershed are mostly granitic in origin and therefore, easily erodeable during heavy storm events. Most of the soils and roadbeds have a moderate soil erodability rating (Soil Survey of Shasta-Trinity Forest Area, USDA, 1980).

Issues pertaining to forest management were closely split between those who felt that an adequate job was being done and those who did not. There was almost a 50/50 spilt between responses pertaining to timber management benefiting forest health, increasing the risk of fire, and increasing the risk of erosion. There was a more uniform belief that more should be done to reduce the threat of fire and that water courses should be protected more than they are to reduce the chance of creating erosion and deliverable sediment to streams.

Fire hazards and fuels reduction were consistently one of the top concerns documented throughout the survey, most likely due to the increase in catastrophic fires that have been occurring in the west and the increasing amount of residential development within the wildand/urban interface. Forest management practices have focused on suppression of wildfires as quickly as possible, which has contributed to an increase in the amount of fuels that have built up in the forests. Management of federal forest lands has been very limited for at least a decade, also contributing to the current volumes of biomass in the forests. Besides being a threat to residences and personal property, catastrophic fire also can increase damage to the environment by destroying the vegetation and ground cover that prevent erosion during major storm events. The loss of ground cover combined with super-heated soils that have lost their structure are highly susceptible to soil erosion which eventually becomes deliverable sediment to the creeks and streams. The removal of dead woody debris, dense understory and excessive brush will reduce the threat of catastrophic fire by reducing the amount of fuel load in the forest. The 2005 Upper Trinity River Analysis (USFS) identifies these issues.

Timber management, fuels reduction and Trinity Lake water levels are the top issues that respondents have expressed interest in learning more about. These issues, along with several others, can become complicated and there are links between many of them. The "don't know" and "not sure" responses along with the comments received from respondents show the need for, and desire the landowners have to learn more about forest management and the environmental processes that occur in the watershed. This, coupled with the overwhelming belief that government agencies are not addressing watershed issues, should highlight the need to place more of a focus on this region of Trinity County.

References

Soil Survey of Shasta-Trinity Forest Area, USDA, 1980

Upper Trinity River Watershed Analysis, U.S. Forest Service, March 2005

U.S. Environmental Protection Agency, Region IX, 2001 Trinity River Total Maximum Daily Load for Sediment

APPENDIX C

Trinity County Planning Department:

Direct Inventory of Roads and their Treatments (DIRT) high priority projects

The DIRT data in this area was collected in 2000 and 2001, the onset of the 5C program. At the start of the program we were still refining the methodology. Therefore, some valuable data, such as "chronic cutbank and road" erosion was not collected and it would have been too costly to re-inventory. So needless to say, you will note low erosion volumes and lack of data as compared to current DIRT databases. Also please note, U.S.F.S. roads have contributed to some of our erosion problems on the road listed below.

Road Name	Comment	Total Yield (yd^3) over 10yrs
Eastside Road	Within mile mark 0.14 to 12.48 are where the sites with high, high-moderate treatment immediacy are located. The road is chipseal to ~ 8 mile mark, then it's native. Highly erodable area. Cutbank slides, road fill failures, gulling at outlets, gullies from road runoff or excessive ditch lengths and outboard berms. Undersized, plugged, rusted through, damaged DRCs that sometimes act as Emergency Over Flow culverts. Undersized stream crossing culverts that are also rusted through, plugged and damaged with diversion potential. Potential road fill failure from undermining and/or shot gunned culverts. Poor placement of pipes. Misaligned pipes, too flat or too steep or they exhaust onto an erodable slope/area. Culverts that are plugged from road runoff or sidecasting. Areas that need large rock armor. Cutbank slides that plug the ditch or are sidecasted directly into the stream. Ditches that need to be stopped at their DRCs with headwalls or deeper installation.	52275 cyds plus the five sites below.
	Mile mark 5.27. Site #346. High treatment immediacy/high erosion potential. Squirrel Creek,class II. 54" x 120' rusted through culvert. Channel erosion at inlet and outlet due to undersize. Undermining road fill. Left ditch is 750' at 7%. Highly erodable area.	11692
	Mile mark 6.43. Site #356. High treatment immediacy/high erosion potential. Cedar Creek, class I. Two 108" x 90' oval culverts. Damaged inlets, rusted bottoms and rusted through at the outlet. Inlet has been overwhelmed.	4485
	Mile mark 11.59. Site #390. High treatment immediacy/high erosion potential. Class II stream. Lots of woody debris above inlet. Undersized, rusted through culvert that's falling apart and washing out on the bottom right side. In a huge fill. Large outboard berm and a plugged DRC up ditch. Check watershed for culvert size. Big job!	24834
	Mile mark 4.46. Site #339. High-moderate treatment immediacy/high-moderate erosion potential. Squirrel Gulch, class I. 84" x 80' rusted through culvert that's misaligned. Saw fish. Check watershed area for pipe sizing. 1255' of left ditch.	1040
	Mile mark 7.66. Site #368. High-moderate treatment immediacy/moderate-low erosion potential. Two class II streams to an 18" culvert, (undersized). Could be water supply for homes on the left bank. This site is near the East Fork of the Trinity River.	62
North Derrick Flat Road	The road is chip sealed to mile mark 0.21 then it's rocked. The high, high-moderate treatment immediacy area is between mile mark 0.26 to 0.45. Mostly undersized DRCs and stream crossing culverts. Diversion potentials.	335 cyds plus Site #2110.
	Mile mark 0.45. Site #2110. High treatment immediacy. Potential cutbank slide and road fill failure with direct delivery to Upper Trinity river. The cutbank slide is very rocky, convergent for 180' x 140' x 2' = 1867 cyds with 50% delivery and the outboard is convergent for 180' x 50' x 2' = 667cyds with 100% delivery. Also there's road runoff.	17631

Road Name	Comment	Total Yield (yd^3) over 10yrs
Trinity Alps Road	Mile mark 0.45 to 0.98. After we completed our inventory of this road there was a massive landslide that took a section of road out. It has been repaired. High to high-moderate treatment immediacy with high to high-moderate erosion potential. One of these site have a moderate erosion potential. Chip sealed road. This area gets lots of rain on decomposed granite. Slides, undersized, plugged culverts.	5688
Coffee Creek Road	High to high-moderate immediacy area from 2.8 to 13.3. Within this road segment there are landslides, damaged, plugged and undersized DRCs that carry to much ditch that includes diverted class II or III stream. Too much water collection and concentration. Undersized and poorly installed stream crossing culverts. Within a lot of this area, the road could be outsloped with rolling dips.	3220
	A poorly installed, short, undersized culvert at mile mark 15.9, that is plug. High immediacy.	34
	Another poorly placed, undersized culvert at mile mark 17.9. High immediacy.	91
Van Ness Road	Mile mark 0.66 to 3.34. High to high-moderate treatment immediacy with high to moderate-low erosion potential. Native. The biggest problem on this road is the undersized, rusted out culverts. Next would be the diversion potential. Several of these site have diverted in the past and have caused roadbed erosion. The rusted out culverts are causing road fill failure. Some of the culverts are falling apart, damaged, plugged and shotgunned. There's a lot of sidecasting and ditches bypassing their DRCs.	2111
Swift Creek Road	Mile mark 0.40 to 1.20. High to moderate treatment immediacy with high to moderate erosion potential. Native. Un-culvert-ed stream crossings, undersized culvert at a class III. Sidecasting causing outboard landslides with delivery. Way too much ditch delivery to the bridge/North Fork of Swift creek. Damaged and plugged DRCs.	2085
Long Canyon Road	Mile mark 1.57. Site #2152. Sheep Corral Creek, class I. 14' x 9' x 70' arched culvert with steel plank liner and cement and rock armor at the inlet and outlet. Local residents say the pipe has been overwhelmed. High treatment immediacy.	1182
	Mile mark 2.16. Site #2155. High-moderate treatment immediacy. Could be a class I. Local residents said this crossing blew out and diverted down left, plugging the DRCs. Appeared to be a new install in 2001. 7' x 5' x 60' arched culvert that may be undersized. Rock armor at the inlet and outlet. Fairly large fill. Buried cable. Could install EOF on the left hinge.	586
	Mile mark 1.05. Site #2143. Moderate treatment immediacy with high-moderate erosion potential. DRC with delivery to East Fork Stuart Fork. Local resident says this is a problem site. The water undermines the culvert and dirt bubbles up under the road surface, causing road fill failure. The inlet appears to need regular clearing during the rainy season. This culvert was installed too steep, which is causing the outlet to plug. Even though this site has problems it is not likely there is a lot of sediment delivery to the stream, which gives this a lower immediacy.	4

Road Name	Comment	Total Yield (yd^3) over 10yrs
	Long Canyon Rd: Mile mark 1.33. Site #2147. Moderate treatment immediacy with high-moderate erosion potential. Class III with a DI/sediment basin that is full. There is a diversion potential down the left but this site receives left ditch and road runoff from a private driveway and there's right ditch from the county road and from a private drive. The erosion potential is HM due to the full DI and all the ditch delivery.	270
Rainier Road West	Mile mark 0.27 to 1.74. High to moderate treatment immediacy with High to moderate-low erosion potential. Paved. Erodable area. Undersized DRCs and stream crossing culverts with diversion potential. Class three streams without culverts. Cutbank slides with ditches undercutting.	618
Delta Road	There's two are high immediacy sites. At mile mark 0.26 and 1.9. Both are undersized, damaged culverts and is rusted through, on class III streams. Both have road/ditch drainage issues.	392
Ramshorn Road	Mile mark 0.82 to 6.25. High-moderate to moderate treatment immediacy with High to moderate erosion potential. Rocked/native. North end of the County. Sierra Pacific Industries uses for logging. Connects with Interstate 5. Some sections of this road are graded down to the bedrock. This road is very steep in some spots, so outslopeing, rolling dips and berm removal may not be safe and suitable in all of the road treatment. There are crushed, plugged, flat, shot gunned, misaligned and undersized culverts. There are un-culvert-ed streams. Streams with diversion potential. Road runoff and outboard berms that have created gullies that need armor. Road fill failure. A wet crossing that needs a pipe. Too much ditch. Road switchback drainage problem and an undersized culvert on private logging road that causes problem on county road.	3604
Eagle Creek Road	Three class III stream crossing with undersized culverts or no culvert at all. At mile mark 0.08, 0.22 and 0.31. All high-moderate immediacy.	260
	Mile mark 1.28. This area is wet all around at the end of the county road, causing the outboard road to slip out with direct delivery to the Trinity River. It would be best to decommission this end of the road but it is access to U.S.F.S. road 38N13Y. High-moderate immediacy.	120
Eagle Creek Loop	Three high-moderate sites on this road. Bridge crossing Minnehaha Creek at mile mark 0.46 has channel erosion on the upstream left bank. Needs rip-rap. At mile mark 0.96 a class II stream crossing with an undersized culvert that has been overwhelmed in the past. At mile mark 1.43 is a Bridge over Ripple Creek with a high/moderate plug potential. The bridge is made of rail road ties. This bridge has overtopped in the past.	145
Slate Mtn. Road	Mile mark 1.28. Site #420, the only site on this road. High-moderate treatment immediacy and high-moderate erosion potential. Huge hillslope landslide that has completely blocked the road. The landslide was followed down the hill until it turns into a class three stream. The sediment is still thick and traveling. There is no way for us to tell if this is road related or not due to the size of it.	222 cyds, at least

APPENDIX D

Summary of Reports on the Upper Trinity River Watershed

Summary of Reports on the Upper Trinity River Watershed

Sediment Source Analysis for the Mainstem Trinity River, Trinity County CA.
U.S. Environmental Protection Agency, October 2001

The Trinity River watershed in Trinity County has been listed as a sediment impaired water body in California's 1995 CWA 303(d) list, adopted by the State of California North Coast Regional Water Quality Control Board. This sediment impairment has resulted in non-attainment of designated beneficial uses. This study developed estimates of sediment production and delivery by process for the entire Trinity River watershed (including the Upper Trinity River) using a combination of field measurements and indirect techniques, involving aerial photo and GIS-based analyses. Sources were stratified by time period, land use type, and dominant process, in order to assess management and non-management related sediment sources and their relative contributions. The purpose of this report was to compile, summarize, and analyze sediment production data for the Trinity River Watershed that could be used for TMDL development. The sediment production data is then integrated with other geomorphic information to develop a preliminary sediment budget for portions of the Trinity River watershed. This study combines office-based analyses of aerial photographs and GIS coverages with extensive field data collection and inventories, including considerable streamflow and sediment transport data collection. The report concluded that significant construction of new roads has led to increasing sediment yields from road surface erosion, despite improved practices.

Current Fire & Fuel Conditions In The North Lake Area
Kenneth Baldwin, Sept 2001

Fire is the most important natural disturbance agent affecting vegetation in the North Lake area. Most of the fires in this area, especially in the higher elevations, were probably low intensity ground fires that did little damage to larger trees. But there have been at least 25 major fires ranging from 100 acres to over 6300 acres since the 1910's, some of which have threatened communities. The critical and unique resources which are at risk in the North Lake watershed are the communities of Trinity Center and Coffee Creek, the residential areas along Highway 3, Long Canyon Road, Coffee Creek Road, and the East Fork of the Trinity, the resort areas bordering Trinity Lake, Stuart Fork, Coffee Creek, and the Trinity River, various USFS and private campgrounds, USFS fire guard stations, LSR, Riparian Reserves and Spotted Owl Activity Centers in the Matrix, plantations in Matrix and LSR and on SPI lands, the NRA, high value focal (refugia) sub-watersheds that are important within the analysis area and within the entire Trinity River watershed, and the forests and brush fields which protect the watershed from erosion. Lightning from summer thunderstorms continues to be the main source of ignition in the North Lake area, causing 66% (1139) of the fire starts since the 1910's (62% in roaded areas, 76% in the Wilderness), with most of these fires starting on mid to upper slopes. Nearly all of the human caused fires are associated with communities and residential areas, developed and undeveloped campgrounds, and roads and trails.

Draft Recommendations on Trinity County Values at Risk from Fire and Pre-Fire Fuels Treatment Opportunities drawn from Community Meetings.
Trinity County Fire Safe Council, 1999/2000

The Trinity County Fire Safe Council (FSC) seeks to improve cooperation and coordination in all aspects of wildfire management in Trinity County. Members include representatives from local, state and federal land management agencies, non-governmental organizations including the local Volunteer Fire Departments (VFDs) and citizens. The FSC has identified a need for a spatially explicit countywide fire management plan to assist in prioritizing and coordinating at a landscape level activities such as pre-fire fuels reduction treatments. County or regional scale wildfire management planning efforts often fail to involve or even to acknowledge local residents' knowledge and expertise. FSC members feel very strongly that community input should drive the Trinity County Fire Management Plan development process with advice from local and regional expertise in fire management. In 1999 with funding support from the USFS Pacific Southwest Research Station and the State Department of Water Resources, a team from the FSC began a process to capture community recommendations for this planning effort.

In a series of community meetings and public workshops held at Volunteer Fire Department Halls and community centers across Trinity County, residents were asked to help identify and map features relevant to emergency response. Data noted included *e.g.* locked gates, bridges too weak to carry a fire truck, and water sources. Community members also worked with the team to locate and specify values at risk from fire in and around their communities. They made recommendations about pre-fire treatments, such as clearing defensible space around residences and constructing shaded fuel breaks along roadsides that could help to protect these values. Finally, they jointly developed a ranking system and a prioritized list of recommended projects. Data from these meetings were captured and entered into a Geographic Information System (GIS). The methods used to capture community input and the recommendations from these meetings are presented in this report.

The California Watershed Assessment Guide.
Dept. of Environmental Science & Policy, UC Davis for the Bay Delta Authority June 2004

This manual provides information and guidance to assist watershed assessors. It summarizes key ideas and processes for conducting a watershed assessment. Topics include planning, watershed basics, collecting and organizing data, analyzing and presenting data, information integration, the assessment product, and decision-making.

Soil Survey of Shasta-Trinity Area, California
U.S. Dept. of Agriculture, Forest Service and Soil Conservation Service, 1983

Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age. Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were

approved in 1983. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service, US Forest Service, and the University of California Department of Soils and Plant Nutrition. It is part of the technical assistance furnished to the land managers of the Forest Service and private land owners.

Trinity County Fire Management Plan
Trinity County Fire Safe Council, Feb. 2003

Major elements addressed in the plan include: Reducing the Current Level of Fire Risk and Hazard in the Landscape through Pre-Fire and Post-Fire Treatment and Managing for Fire, Support for Local Fire Suppression Forces,Coordination among all Actors, Building Local Pre-Fire Treatment and Fire Suppression Capacity Public Education and Involvement, Funding Fire Management Activities, Identifying Regulatory Conflicts that affect Fire Management, Cooperating with Trinity County Planning Department on Safety Element of General Plan. Monitoring of Plan Implementation and Effectiveness

Upper Trinity River Road Inventory
Trinity County Resource Conservation District, August 2005

The Upper Trinity River Watershed Road Inventory Project was a Cooperative Agreement between the U.S. Fish and Wildlife Service and Trinity County Resource Conservation District in partnership with the Natural Resource Conservation Service and Timber Products Inc. to conduct an inventory of the road network in the Upper Trinity River Watershed. Funding for the inventory was provided by the U.S. Department of Interior, Fish & Wildlife Service through the Jobs In The Woods Watershed Restoration Program, Cooperative Agreement # 11330-1-J087. The objective was to inventory 100-plus miles of private timber land roads to identify sources of deliverable sediment, collect data to evaluate adequacy of stream crossing culverts, locate all stream crossings with diversion potential, map locations of roads and drainage structures and identify road drainage and culvert maintenance needs. Data collected will provide resource managers with information needed to implement restoration work that will reduce the amount of deliverable sediment to tributaries of the upper Trinity River.

East Fork Fire Management Plan
Kenneth Baldwin, June 2002

This report provides a description of the East Fork of the Trinity River watershed including location, ownership, topography, climate and fire weather, transportation system, present fire threats, community risk and values, and firefighting resources. The report covers natural resources, and recommends rural residential treatments as well as recommended community-wide wildfire defense projects.

Shasta-Trinity N.F. Land and Resource Management Plan"
U.S. Department of Agriculture, 1995

This National Forest Land and Resource Management Plan has been prepared to guide the management of the Shasta and Trinity National Forests. The primary goals of this Plan are to integrate a mix of management activities that allow use and protection of forest resources, meet the needs of guiding legislation, and address local, regional, and national issues.

Trinity River Total Maximum Daily Load for Sediment
U.S. Environmental Protection Agency, December 2001

The Trinity River Total Maximum Daily Load (TMDL) for Sediment is being established in accordance with Section 303(d) of the Clean Water Act, because the State of California has determined that the water quality standards for the Trinity River are exceeded due to excessive sediment. In accordance with Section 303(d), the State of California periodically identifies "those waters within its boundaries for which the effluent limitations . . . are not stringent enough to implement any water quality standard applicable to such waters." In 1992, EPA added the Trinity River to California's 303(d) impaired water list due to elevated sedimentation. The North Coast Regional Water Quality Control Board (Regional Water Board) has continued to identify the Trinity River as impaired in subsequent listing cycles, the latest in 1998.

The purpose of the Trinity River TMDL is to identify the total load of sediment that can be delivered to the Trinity River and its tributaries without causing exceedence of water quality standards, and to allocate the total load among the sources of sediment in the watershed. Although factors other than excessive sediment in the watershed may be affecting salmonid populations (e.g., ocean rearing conditions), this TMDL focuses on sediment, the pollutant for which the Trinity River is listed under Section 303(d). EPA expects the Regional Water Board to develop implementation measures which will result in implementation of the TMDL in accordance with the requirements of 40 CFR 130.6. The allocations, when implemented, are expected to result in the attainment of the applicable water quality standards for sediment for the Trinity River and its tributaries.

Erosion and Deposition Produced by the Flood of December 1964 On Coffee Creek Trinity County, California
Stewart, J and LaMarche, V., Geological Survey Professional Paper 422-K, 1967

The catastrophic flood of 1964 on Coffee Creek largely determined valley morphology, channel pattern and location, and the character of alluvial deposition. Only in extreme events can the coarse material that makes up these features be transported. The total amount of sediment transported during the 1964 flood cannot be determined from information available, but extreme events clearly are more important than lesser ones in the formation of the landscape features on Coffee Creek. The effect of the flood of December 1964 on the valley of Coffee Creek was catastrophic. Erosion destroyed large areas of forest and meadowland, as well as many buildings and structures. The destruction was unprecedented in the history of the area and has drastically changed the character of the valley.

Mercury Bioaccumulation from Historical Mining in the Trinity River Watershed
Trinity River Mercury Study, USGS

The USGS received funding to investigate Mercury contamination in the Upper Trinity River Watershed. The initial field work was completed, but funding has not been provided to publish a report. Write up to this point is limited to an abstract. There are specific, known sites of concerns, including a popular recreation site; the Carrville ponds and a potential source of contamination, the Altoona Quicksilver Mine.

Draft Health Advisory : Fish Consumption Guidelines For Trinity Lake and Selected Water Bodies in the Trinity River Watershed.
Lloyd, A., Denton, J. California Environmental Protection Agency, April 2005

This report provides guidelines for consumption of various fish species taken from Trinity Lake (also known as Clair Engle Lake) and the Trinity River watershed region in Trinity County, including the Trinity River (upstream and downstream from Trinity Lake), Lewiston Lake, Coffee Creek, Canyon Creek, Eastman Creek, Eastman Dredge Ponds, Carrville Pond, Crow Creek, Tamarack Creek, the New River, and the East Fork Trinity River and its tributaries. These guidelines were developed as a result of findings of high mercury levels in fish tested from this region and are provided to protect against possible adverse health effects from methylmercury as consumed from mercury-contaminated fish. This report provides background information and a description of the data and criteria used to develop the guidelines.

U.S. Fish and Wildlife Service Water Temperature Data

The U.S. Fish and Wildlife Service Arcata Field Office has deployed automated temperature sensors throughout the Klamath and Trinity River watersheds, including the Upper Trinity in 2003. Data from the Upper Trinity are for three tributaries, Stuarts Fork, Swift Creek and Coffee Creek, that were once anadromous fish habitat. U.S. Fish and Wildlife Service has published numerous reports which utilize the water temperature data they collect (Guillien, 2003; Zedonis, 2003).

Sediment Source Analysis for the Mainstem Trinity River, Trinity County, CA
Graham Matthews and Associates, 2001

The purpose of this report is to compile, summarize, and analyze sediment production data for the Trinity River watershed that could be used for TMDL development. The sediment production data is then integrated with other geomorphic information to develop a preliminary sediment budget for portions of the Trinity River watershed. This study combines office-based analyses of aerial photographs and GIS coverages with extensive field data collection and inventories, including considerable streamflow and sediment transport data collection. Data may include wild fire, timber harvest, roads, landslides and sediment transport rates.

Upper Trinity Basin Climate Data

Rainfall and snowfall data for the Upper Trinity Basin was downloaded for use from the California Data Exchange Center (CDEC) web site as text files and converted into Dbase IV for use in KRIS. Relative location maps are also downloaded and can be viewed as Pictures associated with climate Topics. Snowfall data are displayed for April to allow inter-annual comparisons. Data collection in other months is too sporadic to allow for substantial comparison.

KRIS Map Project Integrated into Version 3.0 Database

All KRIS database projects have companion ArcView projects for the geographic area covered and most themes are now included in KRIS Version 3.0, which has a new built in

KRIS Map Viewer. Nearly all map layers have a readily-accessible companion metadata file that describes the map layer and provides contact information for the source of that layer. If KRIS is installed on your computer's hard drive and you are viewing maps using the KRIS Map Viewer (the map tab), you can view metadata for a layer by clicking on a layer in the map legend to make it the active layer and then clicking the "M" (metadata) button on the toolbar. If you are browsing KRIS on the www.krisweb.com Internet site, or viewing the web pages included on the KRIS CD-ROMs, you can view map metadata by clicking on a metadata link at the link at the bottom of a map page.

The Upper Trinity KRIS Map project relies heavily on content from the Trinity Resource Conservation District (TCRCD), the U.S. Forest Service, Graham Matthews and Associates and other contributors. Data are acquired from various sources and re-projected, easily understood legends crafted and metadata compiled by Dr. Paul Trichilo of the KRIS project. Data are arranged for ease of use in subsequent watershed studies. Vegetation data from Landsat also comes from HSU and the Spatial Analysis Lab and was derived under the supervision of Dr. Larry Fox. To learn more about vegetation and timber types, see the Vegetation Type Background page.

Mainstem Trinity River Watershed Analysis, Section VI, 1995
U.S. Department of the Interior, Bureau of Land Management

This section briefly describes the contents of detailed reports, focused on ecosystem components, that were prepared as part of this watershed analysis. The technical reports which contain data and the findings of various investigations and studies were prepared as the basis for the discussions and recommendations presented in the previous sections. Copies of the reports are available from Steve Borchard, 355 Hemstead Dr., Redding, CA, 96002, (916) 224-2100.