

Rec B.C.F.
10/9/96

P.O. Box 60
Petrolia, CA 95558

Mr. Dean Cromwell, Executive Secretary
California Board of Forestry
1416 9th Street
P.O. Box 944246
Sacramento, CA 94244-9460

Dear Mr. Cromwell:

Enclosed is our nomination of the Mattole River Basin as a "Sensitive Watershed" under 14 CCR 916.8, 936.8, 956.8 of the California Forest Practices Act. Our intent in designating the Mattole as a "Sensitive Watershed" is to bring people together, to work together, to prevent the further decline of salmon and steelhead through our choices in land use practices from ridgetop to stream channel. The Mattole Watershed is a perfect example of a watershed which meets listed criteria for designation and appropriate response as a "Sensitive Watershed".

Coho and chinook salmon and steelhead, and their aquatic habitats are threatened by further timber operations, impacts from past operations, and the natural and management-induced conditions present in the watershed. The attached Nomination document describes these threats and conditions. The main areas of concern are actually quite simple and correspond to the needs of salmon, steelhead, sensitive amphibians, and other aquatic species for clean, cool water, good spawning gravel, deep pools, and stable/high quality riparian and stream cover. The simple overall prescription is to:

- reduce erosion and sedimentation
- reduce water temperatures
- improve the extent and quality of instream and riparian habitat.

In discussions about the nomination and designation of the Mattole Valley as a "Sensitive Watershed", some have argued that the above issues have not reached a critical point in the Mattole. We do not believe this argument is backed by substantial evidence. The preponderance of evidence, as presented in the nomination document, clearly qualifies the Mattole Watershed as "Sensitive". Some prefer the term "Damaged Forestland Watershed", but regardless of terms, it is obvious that a concerted effort is warranted in the Mattole to assure productive fisheries and forests in the near and distant future.

The California Forest Practice Rules provide a framework for addressing and responding to the areas of concern outlined above, through the Timber Harvest Planning process. Unfortunately, lack of personnel and inadequate implementation, have generally prevented realization of the mandated "restoration, maintenance, and enhancement" of the beneficial uses of water. The challenge we collectively face is how to assure adequate implementation of the

current rules with the involvement of qualified, preferably local, personnel. This implementation should actually improve local economic and social conditions while the watershed heals and the salmon and steelhead populations recover.

Please provide us with confirmation of your receipt of this package. We look forward to your communications as to the status of our nomination, and a timetable describing your response to this proposal. We have suggestions for appointees to the "Nomination Committee". Please address all correspondence to our contact person, Ms. Ellen Taylor at the above address.

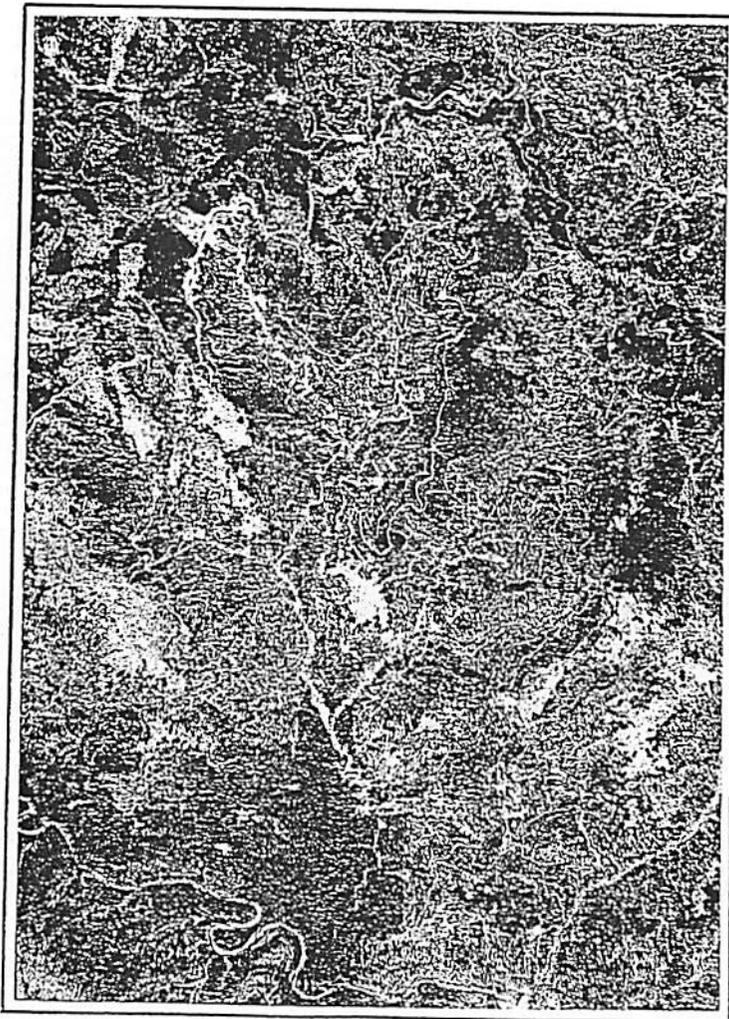
Sincerely,

The Mattole Sensitive Watershed Group

A NOMINATION FROM CONCERNED CITIZENS OF THE
MATTOLE RIVER WATERSHED OF THE STATE OF CALIFORNIA

PROPOSING THE MATTOLE RIVER
AS A SENSITIVE WATERSHED

Under 14 CCR 916.8, 936.8, and 956.8



7 October 1996

SENSITIVE WATERSHED NOMINATION COVER SHEET

I. NOMINATOR

Name (Individual or Organization and Contact Person): **Mattole Sensitive Watershed Group, Ellen Taylor (contact)**

Address: **P.O. Box 60
Petrolia, CA 95558**

Phone: **(707)-629-3500**

Fax: **NA**

II. IDENTIFICATION OF NOMINATED WATERSHED

Name of the watershed or major stream(s): **Mattole River**

Planning Watershed Identification Number(s): **112.30010, 112.30011, 112.30012, 112.30013, 112.30020, 112.30021, 112.30030, 112.30031, 112.30032, 112.30033, 112.30034, 112.30040, 112.30041, 112.30042, 112.30050, 112.30051, 112.30052, 112.30053, 112.30060, 112.30061, 112.30062, 112.30063, 112.30070, 112.30071, 112.30072.**

Name of higher order stream, if any, to which the watershed is tributary: **NA**

Quadrangle names of USGS topographic map(s) on which the watershed is located: **The Mattole River is located on the following USGS 7.5 min quadrangles - Bear Harbor, Briceland, Buckeye Mountain, Bull Creek, Capetown, Cooskie Creek, Ettersburg, Honeydew, Petrolia, Shelter Cove, Shubrick Peak, Taylor Peak, and Weott.**

County: **Humboldt and Mendocino**

Township and Range: **The Mattole Watershed extends from Township 1 South to Township 5 South, and from Range 2 East to Range 3 West, Humboldt Baseline Meridian and part of Township 24 North, and Range 19 West, Mt. Diablo Baseline and Meridian.**

Approximate size of the nominated area (acres): **Approximately 194,560 acres (304 square miles)**

III. SUMMARY OF RESOURCES THAT ARE SIGNIFICANTLY THREATENED BY FURTHER TIMBER OPERATIONS IN THE NOMINATED AREA:

The nomination contains detailed information on the fish, wildlife, and vegetation that has been impacted by extensive timber harvesting and related road-building in the Mattole Basin. Some examples are: chinook and coho salmon, old-growth

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associated birds, mammals, amphibians, and late-seral habitats themselves. It also details the unique geology and seismic activity of the Mattole watershed that contribute to the sensitivity of the watershed, its soil, and geomorphology.

The following critical issues are identified for BOF action:

- (1) high water temperatures in the Mattole River and its tributaries that are seasonally lethal to elements of the native biota must be ameliorated;
- (2) excessive fine sediments that have adversely impacted these same watercourses must also be ameliorated;
- (3) late-seral forests, which are substantially reduced beyond the ecologically functional minimum of 15% (California Dept. Fish and Game 1995), and no longer well-distributed throughout the watershed, must not be further reduced;
- (4) performance standards or definitive thresholds ("action thresholds", whereby the offending management activity is stopped or other mitigation is initiated) to address cumulative effects of 1-3 above must be established, adopted, and enforced;
- (5) a comprehensive road removal or maintenance program for abandoned logging roads and an incentive-based program for the upkeep of rural homestead and ranch roads must be designed and offered;
- (6) CDF's lead agency responsibility for the public trust resources of fish, wildlife, and water quality in the Mattole should be revoked based on their performance to date (see Section 7, Legal Challenges) and questions of legal propriety (e.g., letter from Bion Gregory, Legislative Counsel for California to the chair of the Senate Natural Resources Committee, dated 6 May 1996).

IV. SUMMARY OF MITIGATION MEASURES PROPOSED TO PROVIDE PROTECTION FOR RESOURCES IDENTIFIED IN ITEM III, ABOVE.

Recommendations for ecologically-sustainable timber harvesting are provided, with special attention to riparian/stream protection and reduction of sediment impacts due to poor road maintenance. Monitoring of water temperature and sediment input is recommended, to examine the affects of any new forestry practices adopted as a result of this nomination. Detailed information is provided on other conservation options for private landowners, such as conservation easements. A mechanism to provide voluntary assistance to landowners wishing to harvest timber in an ecologically sensitive and sustainable manner is also described.

NOTICE FOR NEWSPAPER PUBLICATION

Nomination for Sensitive Watersheds must be accompanied by a draft notice for newspaper publication. Please prepare the notice according to the following format:

NOMINATION OF PROPOSED SENSITIVE WATERSHED

A nomination for designating a Sensitive Watershed has been submitted to the California State Board of Forestry for the watershed(s) of the Mattole River located in Humboldt and Mendocino counties. The nominated area includes Planning Watershed numbers 112.30010, 112.30011, 112.30012, 112.30013, 112.30020, 112.30021, 112.30030, 112.30031, 112.30032, 112.30033, 112.30034, 112.30040, 112.30041, 112.30042, 112.30050, 112.30051, 112.30052, 112.30053, 112.30060, 112.30061, 112.30062, 112.30063, 112.30070, 112.30071, and 112.30072. The Mattole Watershed extends from Township 1 South to Township 5 South, and from Range 2 East to Range 3 West, Humboldt Baseline Meridian and part of Township 24 North, and Range 19 West, Mt. Diablo Baseline and Meridian. The Mattole is not a tributary. The Mattole River is located on the following USGS 7.5 min quadrangles - Bear Harbor, Briceland, Buckeye Mountain, Bull Creek, Capetown, Cooskie Creek, Ettersburg, Honeydew, Petrolia, Shelter Cove, Shubrick Peak, Taylor Peak, and Weott. The nominated watershed covers an area of approximately 194,560 acres.

Based on criteria in Title 14 of the California Code of Regulations, Sections 916.8, 936.8, and 956.8, and the Forest Practice Rules, the Board must determine whether nominated watersheds are "sensitive" to further timber operations on non-federal timberlands. For watersheds classified as "sensitive", the Board must identify specific resources that are sensitive to further timber operations, and specific mitigation measures that will provide the necessary protection of those resources. The nomination contains detailed information on the fish, wildlife, and vegetation that has been impacted by extensive non-federal timber harvesting and related road-building in the Mattole Basin. Some examples are: chinook and coho salmon, old-growth associated birds, mammals, amphibians, and late-seral habitats themselves. It also details the unique geology and seismic activity of the Mattole watershed that contribute to the sensitivity of the watershed, its soil, and geomorphology. Publication of this notice is part of the notification process. A public hearing will be conducted by the Board within 60 days of receipt of the Committee's recommendation.

Further information can be obtained from the California Department of Forestry and Fire Protection located at 118 Fortuna Blvd., Fortuna, California. (707)-725-4413.

**A NOMINATION FROM CONCERNED CITIZENS OF THE
MATTOLE RIVER WATERSHED OF THE STATE OF CALIFORNIA**

**PROPOSING THE MATTOLE RIVER
AS A SENSITIVE WATERSHED**

Under 14 CCR 916.8, 936.8, and 956.8

EXECUTIVE SUMMARY

This nomination from concerned citizens of the Mattole River watershed to designate the Mattole River as a sensitive watershed is being submitted under 14 CCR 916.8, 936.8, 956.8 to the California Board of Forestry.

The Mattole watershed encompasses 304 square miles of the northern California Coast Range mountains along the western edge of the North American continent. The Mattole River starts as a small stream in northern Mendocino County, flows almost due east for a few miles, then passes into Humboldt County where it turns north, then west, to complete its sixty-two mile run to the sea. The river flows into the Pacific Ocean ten miles south of Cape Mendocino, the westernmost point of land in California.

The nomination contains detailed information on the fish, wildlife, and vegetation that has been impacted by extensive timber harvesting and related road-building in the Mattole Basin. Some examples are: chinook and coho salmon, old-growth associated birds, mammals, amphibians, and late-seral habitats themselves. It also details the unique geology and seismic activity of the Mattole watershed that contribute to the sensitivity of the watershed, its soil, and geomorphology. The following critical issues are identified for BOF action:

- (1) high water temperatures in the Mattole River and its tributaries that are seasonally lethal to elements of the native biota must be ameliorated;
- (2) excessive fine sediments that have adversely impacted these same watercourses must also be ameliorated;
- (3) late-seral forests, which are substantially reduced beyond the ecologically functional minimum of 15% (California Dept. Fish and Game 1995), and no longer well-distributed throughout the watershed, must not be further reduced;
- (4) performance standards or definitive thresholds ("action thresholds", whereby the offending management activity is stopped or other mitigation is initiated) to address cumulative effects of 1-3 above must be established, adopted, and enforced;
- (5) a comprehensive road removal or maintenance program for abandoned logging roads and an incentive-based program for the upkeep of rural homestead and ranch roads must be designed and offered;
- (6) CDF's lead agency responsibility for the public trust resources of fish, wildlife, and water quality in the Mattole should be revoked based on their performance to date (see Section 7, Legal Challenges) and questions of legal propriety (e.g., letter from Bion Gregory, Legislative Counsel for California to the chair of the Senate Natural Resources Committee, dated 6 May 1996).

Recommendations for ecologically-sustainable timber harvesting are provided, with special attention to riparian/stream protection and reduction of sediment impacts due to poor road maintenance. Monitoring of water temperature and sediment input is recommended, to examine the affects of any new forestry practices adopted as a result of this nomination. Detailed information is provided on other conservation options for private landowners, such as

conservation easements. A mechanism to provide voluntary assistance to landowners wishing to harvest timber in an ecologically sensitive and sustainable manner is also described.

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Cover Photo - This photo is a reproduction of an aerial photograph shot in 1964 over the Dry Creek subwatershed. The photo shows an extensive road and skid trail network and numerous types of landslides and hillslope failures. Highly aggraded stream channels are evident down slope of some of the largest hillslope failures. This was the condition of the landscape when the 1964 flood hit.

Appendices

- I. New regulations for Sensitive Watersheds (R. Wilson, CDF director)
- II. Review of THP 1-93-537, letter from A. Gonzales, CDFG
- III. CDFG Concerns Over Cumulative Adverse Impacts (B. Curtis, CDFG)
- IV. North Coast Historic Earthquakes > MMI VI (Dengler et. al. 1992)
- V. Best Management Practices for Forest Ecosystem Health and Sustainability
- VI. TPZ Landowners within the Mattole Basin

INTRODUCTION

We, concerned citizens of the Mattole River watershed, believe that the practices of the responsible state entities (California Department of Forestry and Fire Protection [CDF]) and its respective governing body, the Board of Forestry (BOF) have failed to restore, enhance, and maintain the precious natural resources of the Mattole Basin as mandated by law (Forest Practices Act, Water Quality Act, California Endangered Species Act, and California Environmental Quality Act). Such failures by CDF and the BOF call into question both the wisdom and legality of having CDF act as "lead agency" in the public trust areas of water quality and fish and wildlife resources. The issue of legality was also raised in a letter from Bion Gregory, Legislative Counsel for California to the chair of the Senate Natural Resources Committee, dated 6 May 1996 that states that the authority for evaluating THP effects (both positive and negative) on salmon and steelhead resources lies with CDFG. Water quality, and fish and wildlife resources are best monitored by the State Water Quality Control Board (WQCB) and the California Department of Fish and Game (CDFG) and its governing body, the Fish and Game Commission, respectively. By allowing CDF to continue as lead agency, CDFG and WQCB are knowingly contributing to the degradation of these public trust resources.

Current forestry practice rules are clearly not sufficient in and of themselves, nor are they sufficiently enforced even where adequate, to protect the public trust fish and wildlife resources in the Mattole watershed. This failure has been a major contributor to the nearly complete loss of valuable fish stocks such as the coho and chinook salmon, and the near extirpation of late seral forest habitats and associated wildlife. In an urgent effort to save these natural resources and thereby re-establish our long-term ecological and economic stability, we petition the California

Board of Forestry to return control of these resources to more responsible agencies, or to us, the local people most affected by these losses. This nomination, to declare the Mattole River drainage a Sensitive Watershed, details the unique characteristics of this watershed and provides suggestions whereby local control and management of these resources can be enacted in partnership with the responsible State agencies in order to save these resources for future generations. We urge the Board of Forestry to act swiftly and resolutely in accepting and promoting this nomination under the authority described in the letter dated 22 February 1994 from Richard A. Wilson, CDF Director (see Appendix I).

The Mattole River is classified by the Federal government as a Tier 1 Key Watershed, essential to the survival of coho and chinook stocks (FEMAT 1993, PACFISH 1994). In a letter from the CDF director to the Regional Chiefs of CDF, dated 26 February 1992, the Mattole is identified as a sensitive watershed by CDF, the Regional Water Quality Control Board, and CDFG based on water quality and fisheries concerns. The Mattole is a complex and diverse watershed sensitive to both natural disturbances and human impacts. If we are to succeed in reversing the declines described above, we must act together, now, and with an understanding of the functional dynamics of the whole system.

We recommend an ecosystem or whole system view be considered for management of the Mattole watershed. This ecosystem includes terrestrial, semi-aquatic (land-water interface), and aquatic components and habitats. "To manage ecosystems, it is crucial to analyze the whole system by pulling individual system components together and then evaluating all important interactions (Naiman et al. 1993)" (SAT 1993). Riparian areas of the Mattole are especially in need of attention. A recent Pacific Northwest Federal Scientific Analysis Team Report provides

the basis for sound river and riparian management: "Riparian and aquatic ecosystems are physical-biological systems in or near surface waters that have primary values associated with water and the proximity of land and water" (Gregory et al. 1991).

This comprehensive landscape-scale approach to natural resources management is consistent with recent recommendations to the California Board of Forestry for assessing cumulative wildlife effects (Pendleton et al. 1994). We whole-heartedly endorse and encourage this approach and this forms the basis for the recommendations that follow in this document.

SUPPORTING INFORMATION FOR SENSITIVE WATERSHED PROPOSAL

1. Name, approximate size and location of the watershed(s) identified by county, township and range, and names of USGS topographic map(s) on which the planning watershed is found.

The Mattole watershed encompasses 304 square miles of the northern California Coast Range mountains along the western edge of the North American continent. The Mattole River starts as a small stream in northern Mendocino County, flows almost due east for a few miles, then passes into Humboldt County where it turns north, then west, to complete its sixty-two mile run to the sea. The river flows into the Pacific Ocean ten miles south of Cape Mendocino, the westernmost point of land in California.

The Mattole watershed extends from Township 1 South to Township 5 South, and from Range 2 East to Range 3 West, Humboldt Baseline & Meridian; and part of Township 24 North, and Range 19 West, Mt Diablo Baseline and Meridian. The Mattole watershed is found on the following thirteen USGS 7.5 minute topographic maps: Bear Harbor, Briceland, Buckeye Mountain, Bull Creek, Capetown, Cooskie Creek, Ettersburg, Honeydew, Petrolia, Shelter Cove, Shubrick Peak, Taylor Peak, and Weott.

2. The name of the higher order stream, if any, to which the watershed is a tributary.

The Mattole River is not a tributary. There are 74 "blue line" tributaries within the Mattole Basin, 6 of which are considered major (Noble and Jackman 1978).

3. *Specific resources that are significantly threatened by further timber operations on non-federal timberland in the nominated watershed, including, as appropriate, but not limited to:*

3 A. *Fish, aquatic organisms, aquatic habitat, and riparian habitat.*

The Mattole River provides habitat for a diverse aquatic community, including several endemic stocks of salmon and many unique and highly specialized amphibians. Past timber harvesting and other land use practices (e.g., road-building and grazing), combined with the steep slopes and unstable geology of this watershed, have had many negative impacts on the river itself and the flora and fauna it supports (Ramsdell 1973). The primary impacts have been from increased siltation and warming of waters throughout the drainage, and past logging debris blockages of fish spawning habitat in numerous tributaries (Hinton et al. 1965). Ecosystem function of the entire Mattole River is severely impaired and there have been significant reductions in anadromous fish runs (Hinton et al. 1965). Continued clear-cut logging and road building in headwater swales and other areas of the Mattole Basin is likely to cause a significant increase in sedimentation of Class II and III streams and further damage to aquatic resources of the river.

Fall run chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*O. kisutch*) in the Mattole River have been characterized as being at high risk of extinction (Nehlsen et al. 1991; Higgins et al. 1992). Increased erosion resulting from further timber harvesting will have downstream effects on endemic stocks of coho salmon, chinook salmon and steelhead and resident rainbow trout (*O. mykiss*). Other fish species known from the Mattole Basin are the brook lamprey (*Lampetra pacifica*) and green sturgeon (*Acipenser medirostris*) (Moyle et al. 1989). Welsh (1990a&b) has characterized the southern torrent salamander (*Rhyacotriton*

variegatus) and the tailed frog (Ascaphus truei) in the Mattole River basin as at high risk of extinction and further timber harvesting is likely to have direct negative impacts on remnant populations of these species (Welsh 1990b).

The California Department of Fish and Game questioned the effectiveness of the current watercourse and lake protection zone (WLPZ) rules to protect fish, other aquatic organisms, and aquatic and riparian habitat in a letter to the BOF dated 6 July 1995. CDFG evaluated all aspects of the WLPZ rules including: adequacy of information presented in THP's, stream classification, WLPZ widths, shade canopy retention, maintenance of cool water temperatures, use of heavy equipment, maintenance of drainage facilities, operations in Class III watercourses, upslope inputs to Class I and II watercourses, large woody debris retention and recruitment, treatment of exposed soil, retention of vegetative structure for fish and wildlife habitat, operations near meadows and wet areas, winter operations, and water quality problems.

Endemic Mattole River Coho Salmon and Chinook Salmon Stocks

The Mattole was previously one of the best chinook and coho salmon and steelhead rivers on the entire California coast (Hinton et al. 1965). These fish are recognized as unique "stocks" because of the homing ability of salmon which isolates breeding populations and promotes genetic differentiation. Each stock of anadromous salmonids has evolved particular adaptations that optimize survival in its home stream (Ricker 1972). These isolated breeding units qualify as species under the Endangered Species Act (National Marine Fisheries Service [NMFS] 1980). Bjornn and Horner (1980) state that any stock showing persistent population declines could qualify as Endangered. Mattole River fall chinook salmon were determined to be a genetically distinct strain in studies conducted at U.C. Davis (Bartley and Gall 1990).

Mattole River chinook and coho salmon stocks have both shown persistent population declines (MRC 1995). The U.S. Fish and Wildlife Service (1960) found 6,000 chinook salmon redds on the Mattole River in 1959, which would indicate a spawning population of about twice that number. In the 1965 California Fish and Wildlife Plan, the California Department of Fish and Game estimated that 5,000 chinook salmon spawned in the Mattole River basin (CDFG 1965). Recent spawning returns have averaged less than 500 adults, with the population dropping as low as 150 in 1989 (Mattole Salmon Support Group, pers. comm., Preston 1990; MRC 1995). Reports from the American Fisheries Society have categorized Mattole River fall chinook salmon as at high risk of extinction (Nehlsen et al. 1991; Higgins et al. 1992).

Coho salmon of the Mattole Basin are not as well studied as chinook salmon, but seem to be showing similar rapid population declines (Preston 1990). As of 1965, annual coho salmon spawning escapement was estimated at about 2000 (CDFG 1965). While runs a decade ago averaged about 500 spawners annually (Preston 1990), recent Mattole Salmon Group escapement estimates were between 50 and 150 for 1989-90 through 1994-95 (MRC 1995).

Both chinook and coho salmon populations in the Mattole River are on the brink of extinction (Frisell 1993) and qualify for listing under the Endangered Species Act. The population collapse of both stocks in the Mattole River basin is ascribed to catastrophic changes in stream habitat due to excessive sedimentation (Preston 1990).

Amphibian Species At Risk of Extinction in the Mattole Watershed

The southern torrent salamander and the tailed frog are associated with streams in old growth or late seral stage forests and may be declining towards extinction in our region (Welsh 1990a). The southern torrent salamander is a State species of special concern and is presently being

considered for Federal listing under the Endangered Species Act. Recent surveys have found that these species are present at very low levels in the Mattole watershed (USDA Forest Service, Pacific Southwest Research Station, unpublished data). This situation appears to be the result of a gradual decline due to cumulative effects. These species were probably quite widespread in the Mattole River valley in association with the previously dominant old-growth Douglas-fir and redwood habitats (MRC 1988) but have become extinct within most drainages as habitat alterations associated with timber harvesting have raised stream temperatures and eliminated their required microhabitats. Ongoing research in the watershed illustrates the vital importance of improving riparian protection for this species. Figure 1 shows summer 12-hour mean temperatures for two streams in the Mattole Basin, one that crosses harvested land and one within an old-growth redwood/douglas-fir stand. Both streams are Class II and data were recorded over the same time period in 1995. The temperature at which thermal stress has been documented for this headwater salamander is shown on the graph to illustrate the impacts of increased stream temperatures in managed watersheds of the Mattole. The managed watershed, in the vicinity of Ettersburg, has historical records for the southern torrent salamander (Museum of Vertebrate Zoology, University of California, Berkeley), yet none have been found there during extensive targeted sampling by highly qualified individuals over the last two years (1994-95) (USDA Forest Service, Pacific Southwest Research Station, unpublished data). Southern torrent salamanders now appear to be on the brink of extinction throughout the Mattole River watershed. Given the fragile nature of the populations and the strong likelihood of extinction in the Mattole Basin, we would suggest that areas with confirmed populations be afforded maximum protection.

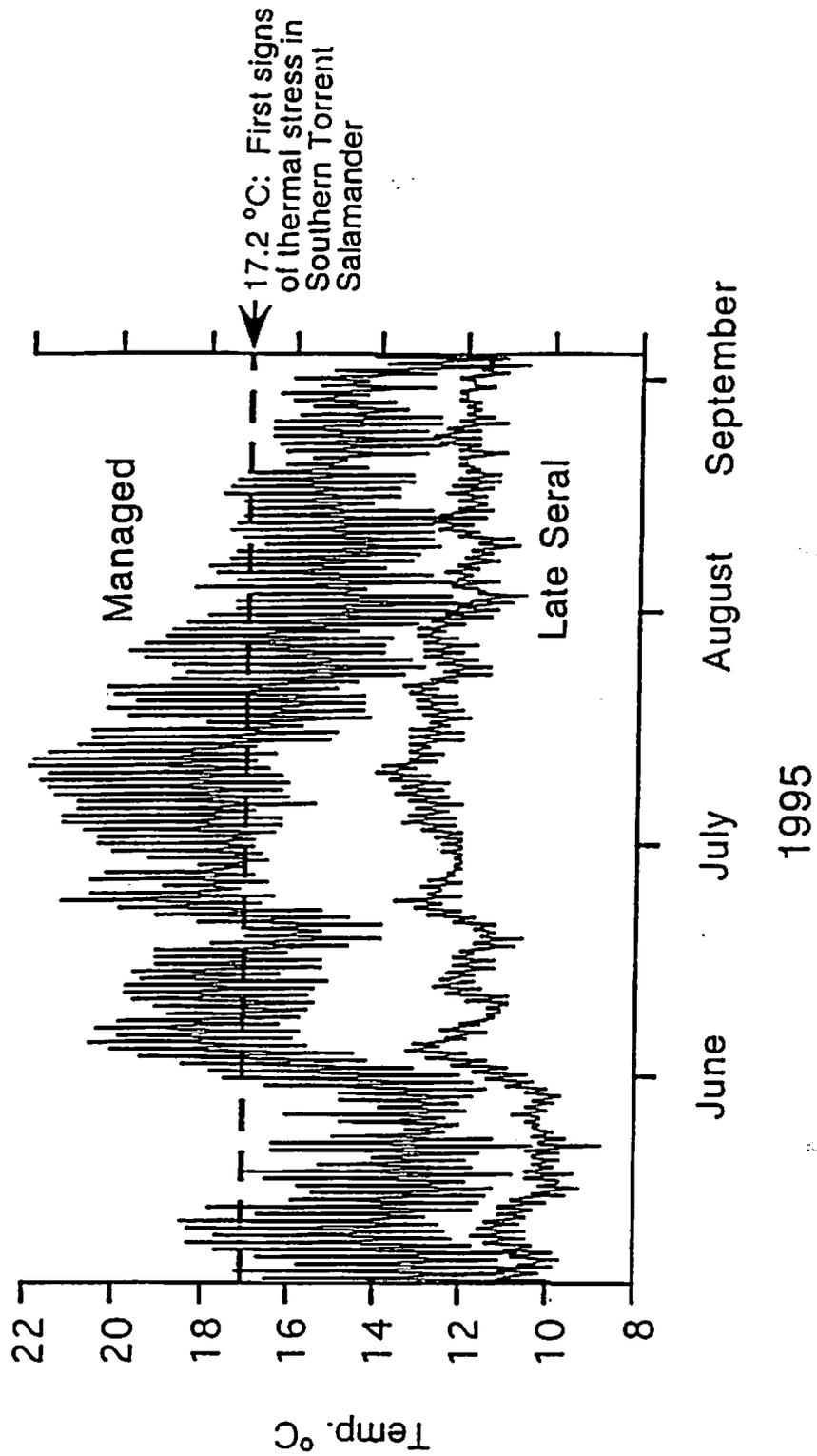


Figure 1. Comparison of summer water temperatures for two representative streams in the Mattole River watershed (USFS, Redwood Sciences Lab, unpublished data).

Old-growth associated amphibians, such as the southern torrent salamander and tailed frog, breathe through their skin (cutaneous respiration) which requires that high humidity and cool air temperatures must prevail in stream side zones. Fritschen et al. (1970) found that maintenance of air stability within a forest requires a buffer distance of at least two tree heights from the forest edge. Additional research by Chen et. al. (1993) on interior forest microclimates indicates that even a two tree height buffer may not be sufficient to assure the stability of other critical climatic variables such as temperature and humidity (Fig. 2a). A recent study of riparian buffer zone widths in the Mad River Basin demonstrated that overstream air temperature and relative humidity were substantially affected by clearcut edges when buffers were less than 30m (100 ft) wide (Ledwith 1996). In order to buffer riparian as well as instream habitats, riparian buffer zones would thus need to be wider than 30m. The removal of 75% of the coniferous overstory of Class II streams and a buffer of only 50 feet (as allowed under current Forest Practice Rules) is likely to have a significant negative impact on microclimatic conditions affecting these amphibians. Over 90% of old-growth forests have been harvested in the Mattole River watershed (MRC 1988) which is a principal reason that these amphibians are at risk of extinction. To alter any of the few remaining viable habitats before other headwater streams have recovered and been recolonized is imprudent. We suggest improved riparian protection via wider buffer strips along all streams, springs or seeps within which there would be no harvesting of trees or movement of heavy equipment. In all areas where these species are still found, the protection detailed in the President's Forest Plan (i.e., Half-SAT and Full-SAT; FEMAT 1993) should be implemented based on site-specific situations.

Riparian Buffer Effects on Microclimate

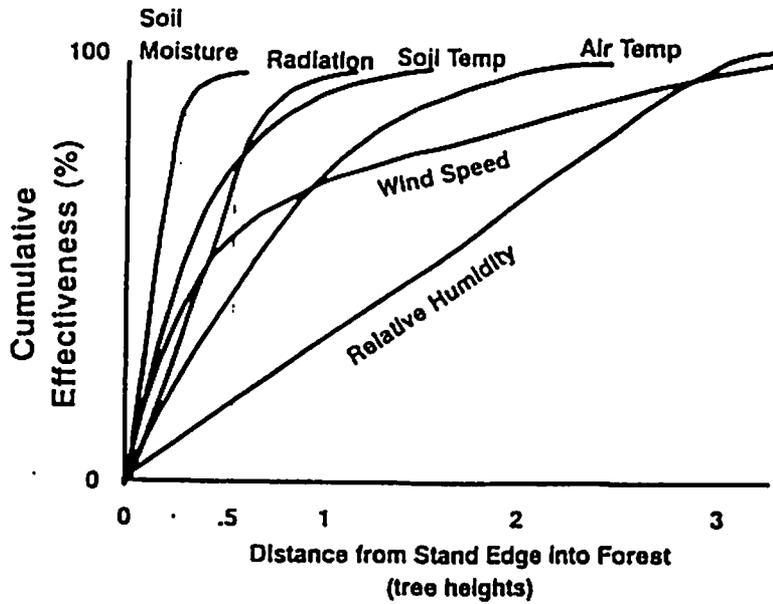


Figure 2a. Generalized curves indicating percent of microclimatic attributes occurring within varying distances of the edge of a riparian forest stand (after Chen 1991). From FEMAT 1993.

Riparian Forest Effect on Streams as Function of Buffer Width

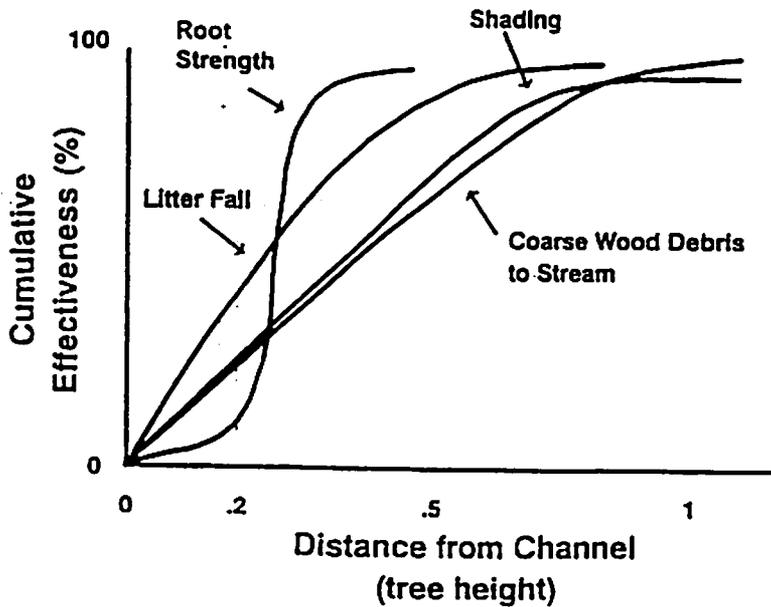


Figure 2b. Generalized curves indicating percent of riparian ecological functions and processes occurring within varying distances from the edge of a forest stand. From FEMAT 1993.

Riparian and Aquatic Habitat Concerns

The amount of fine sediment and quality of spawning gravel of the Mattole River Basin are not well studied in all tributaries, but streams that have filled in (aggraded) often show increases in fine sediment and a decrease in gravel stability that can negatively impact spawning success of salmon and steelhead (Frissell and Liss 1986). It is likely that steelhead in most tributaries in the basin are now spawning in marginal quality gravels, and that additional sediment from further timber harvesting would prolong recovery time back to healthy conditions. If head-wall failures route large quantities of sediment down streams, then channel widening processes in larger order streams will continue, and this is one principal mechanism for stream warming. Lack of estuarine rearing capacity has been cited as a potential limiting factor for production of chinook salmon juveniles in the Mattole River basin (Busby 1991). Further addition of sediment will contribute to further filling of the estuary as well as decreasing pool depth in the few remaining pools in the Mattole River (Mattole Restoration Council [MRC] 1995).

Tributaries of the Mattole River suffer from high stream temperatures as a result of widespread removal of forest cover (e.g., Ramsdell 1973, Welsh 1990b) and widening of the stream channel due to sediment deposition. Stream temperatures recorded at the USGS Petrolia gaging station from 1965 to 1973 indicated that the average summer temperature (70 °F) is near the maximum tolerance for juvenile salmonids (Ramsdell 1973). Contributions of cold water from springs and seeps in tributaries may still provide habitat islands critical to resident rainbow trout in the basin (Preston 1993).

Stream temperatures in the lower Mattole River currently exceed lethal limits for salmonids during periods of summer low flow (Preston 1990). No removal of trees from the riparian

overstory should be allowed anywhere in the basin until stream temperatures in index reaches such as the lower North Fork and lower mainstem Mattole River have dropped below lethal or stressful levels for salmonids. Further logging will increase tributary temperatures incrementally even if additional erosion does not occur. Hicks et al. (1991) found long term decreases in summer streamflow following logging of relatively small basins in western Oregon (150-300 acres). Operation of heavy equipment in headwater swales and a short distance from Class III streams has the potential to decrease water storage capacity of soils due to compaction and can possibly lead to decreased cold water flows during summer. A comprehensive temperature model is needed for the entire Mattole River drainage so that the incremental impacts of land use activities can be better judged.

Downed logs in streams provide cover for juveniles salmonids, trap spawning gravels, and create scour pools (Sedell et al. 1988, Gregory and Ashkenas 1990). Large coniferous trees such as redwoods and Douglas-fir that fall into streams may remain intact for over 100 years (Sedell et al. 1988). Timber harvests and floods have depleted large woody materials in all Mattole River tributaries. Further harvesting of large, old-growth Douglas-fir and redwood trees in the riparian zone will further deplete available large wood for recruitment in the river and its tributaries (Fig. 2b).

Recent guidelines developed for riparian and aquatic area management on Federal lands provide a good model for all forest lands in California (SAT 1993). Harvesting would be permitted only if it improves the quality of the riparian and aquatic habitat in accordance with the following guidelines:

- "Maintain and restore water quality to a degree that provides for stable and productive riparian and aquatic ecosystems. Water quality parameters that apply to these ecosystems include timing and character of temperature, sediment and nutrients."
- "Maintain or restore the stream channel integrity, channel processes, and sediment regime under which the riparian and aquatic ecosystems developed. Elements of the sediment regime include the timing, volume, and character of sediment input and transport."
- "Maintain or restore instream flows to support desired riparian and aquatic habitats, the stability and effective function of stream channels, and the ability to route flood discharges."
- "Maintain or restore the natural timing and variability of the water table elevation in meadows and wetlands."
- "Maintain or restore the diversity and productivity of native and desired non-native plant communities in riparian zones."
- "Maintain or restore riparian vegetation to provide an amount and distribution of large woody debris characteristic of natural aquatic and riparian ecosystems."
- "Maintain or restore habitat to support populations of well-distributed native and desired non-native plant, vertebrate, and invertebrate populations that contribute to the viability of riparian-dependent communities."

- "Maintain or restore riparian vegetation to provide adequate summer and winter thermal regulation within the riparian and aquatic zones."
- "Maintain or restore riparian vegetation to help achieve rates of surface erosion, bank erosion, and channel migration characteristic of those under which the desired communities developed."
- "Maintain and restore riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within each specific geo-climatic ecoregion."

3 B. Domestic and other water supplies, water quality, other beneficial uses of water existing at the time of nomination or factors related to stream system and channel morphology.

The name "Mattole" means "clear water" in Athapascan, the language of the Native Americans who inhabited this watershed until this century. Indeed, the Mattole River used to be famous for its brilliance and clarity, and oldtimers from the Humboldt Bay area remember driving out to the valley on Sundays to swim in its transparent pools which reached 18 feet or more in depth. Its fisheries were equally renowned, and sportsmen came from far away to enjoy the fall chinook and coho salmon, and winter steelhead runs, less than two decades ago.

The recreational values afforded by the Mattole River have been devastated by timber harvesting and other poor land use practices, so that now the fame of the Mattole resides in the amount of sediment it transports (second only to the Eel River, in proportion to its size). Removal of shade canopy has caused accelerated rates of evaporation from the river and its drainage basin. Raindrops strike the earth with greater force, causing more erosion. The earth's moisture-retentive organic layer is washed away. The soil has become less permeable. The result

is destructively rapid run-off in the winter and a low water table in the dry months, which causes low flow rates. In the winter of 1994-95, the flow rate in January reached 62,000 cubic feet per second (cfs) at a USGS gauging station located six miles above the mouth. By February, it had dropped to 600 cfs. By September it was down to 27 cfs. The combined factors of low flow and consequent poor oxygenation together with lethal temperatures (over 68° F and sometimes as high as 80° F) during the summer seem to have impacted even young-of-the-year steelhead, generally thought to be more hardy than juvenile salmon. The high temperatures appear to have even caused die-offs of algae in the estuary, which further depletes dissolved oxygen. Such a scenario is all too common now in the lower Mattole, even when winter rains are not abnormally low. As our natural resources are destroyed, the human activities dependent upon them, such as commercial and sports fishing, and the businesses which support them, are destroyed as well.

The consequences of rapid winter run-off and low water tables in the summer have damaged our living conditions in other ways. Winter flooding obliterates springs, muddies wells, and buries streams. Valuable land is swept away. Acres of fertile river flats, which supported dairies and orchards, have been washed out to sea by floods. Homes and roads continue to be destroyed, at enormous costs to individuals and to taxpayers. On the other hand, in the summer, springs dry up, fires are an increased hazard, and less water is available to the valley's agriculture and ranching industries.

In March of 1994, the Environmental Protection Agency added the Mattole to its list of impaired watersheds (303d list). The Mattole is designated as impaired with regard to temperature, turbidity, and sedimentation. California is therefore required to establish total daily maximum loads of pollutants, according to the Porter Cologne Clean Water Act. This

designation alone, as well as the Key Watershed designation by the FEMAT report (1993), should be sufficient to qualify the Mattole as a Sensitive Watershed.

3 C. Downstream reservoirs, navigable channels, water diversion and transport facilities, estuaries, and harbors.

There are no downstream reservoirs or harbors in the lower Mattole River. The lower 2/3rd of the river, downstream of Eubanks Creek, is seasonably navigable by canoe, kayak, and raft and is frequently used for recreational purposes. There are no known authorized or permitted inter-basin water diversion projects from the Mattole basin, but there are numerous intra-basin diversions (appropriations- see section 9b). The estuary at the mouth of the Mattole is important rearing habitat for young chinook salmon (MRC 1995).

3 D./E. Wildlife species or the habitat of species, listed under state or federal law as rare, threatened or endangered, candidate, or sensitive, including discussion of the habitat features threatened by timber harvest operations. Wildlife species with narrow geographic range, low density, low reproductive rates, and highly dependent on localized habitat features threatened by timber operations and a discussion of why protective measures are required to prevent a loss of population viability.

The Mattole River watershed is situated geologically within the Franciscan Formation of the coast ranges of northwestern California (Alt and Hyndman 1975), and is the westernmost river system in the North Coast Bioregion (Welsh 1994). This unique geographic location has resulted in an unusually high diversity of plant and animal communities (i.e. high biological diversity). Biogeographically its position near the south end of the Oregonian Province and the northern end of the Californian Province (Udvardy 1975) places it in a broad ecotonal region. This unique

biogeography, in conjunction with high topographic variability resulting from frequent and pronounced tectonic activity, manifests in this unusually high biodiversity. Douglas-fir/mixed hardwood and redwood forests interdigitate with chaparral and coastal prairie-scrub vegetation formations producing a complex array of plant communities and resulting in equally species-rich animal communities. Most of the states' wealth of forest, woodland, and grassland life forms are represented in the Mattole Basin. This high biodiversity is evident in the high number of closely related species-pairs found in the Mattole watershed. Each member of a species-pair is closely associated with a different habitat or plant community, but the two species often co-occur in ecotonal areas. Some examples include the northern goshawk and the Cooper's hawk, the California quail and the mountain quail, the Steller's jay and the scrub jay, the deer mouse and the pinyon mouse, the western gray squirrel and the Douglas squirrel, the northern and southern alligator lizards, the western fence lizard and the sagebrush lizard, the rough-skinned newt and the red-bellied newt, the yellow-legged frog and the red-legged frog, and the arboreal salamander and the clouded salamander.

Historical accounts indicate that wildlife species in the Mattole have been gradually declining since European settlement. The Mattole watershed probably supported grizzly bears and timber wolves. However, these top carnivores, while co-existing with the native peoples (although not necessarily harmoniously), were a greater threat to European settlers and were probably extirpated in the watershed by the turn of the century. Many carnivores, including mountain lion, black bear, coyote, bobcat, and gray fox, still occur in the Mattole but data on the current status of their populations are lacking. A lesser known but once common carnivore species, the fisher (a bobcat-size member of the weasel family), appears to have gone the way of the wolf and grizzly

bear. Historical records indicate that in the early 1900's, fisher pelts were traded for groceries at the Petrolia store; however the last confirmed record from the Mattole occurred in about 1912. A recent observation (April 9, 1990) places the fisher as close as the South Fork Eel River drainage near Phillipsville (R. Sutherland, pers. comm.). Another heavily trapped member of the weasel family, the marten, was found recently to still occur in the South Fork Eel River drainage (Schempf and White 1977), and may still exist in the Mattole. Robert Sutherland reported a recent sighting (February 7, 1984) in the Blue Slide Creek drainage (pers. comm.). There is strong evidence that both the fisher and marten, like the northern spotted owl and the marbled murrelet, are old-growth or late-seral (see Franklin and Spies 1991 for a description) forest-associated species (SAT 1993).

A serious and relatively recent anthropogenic threat to native wildlife species has been underway throughout the Pacific Northwest since the 1950's with the extensive harvesting of late-seral Douglas-fir forests (Thomas et al. 1988, Johnson et al. 1991). The Mattole watershed is no exception to this trend with resulting declines in both fisheries stocks (e.g., Nehlsen et al. 1991; Higgins et al. 1992) and wildlife species (e.g., Welsh 1990a, 1990b). Of the late-seral forest present in the Mattole in 1947, a paltry 9% was left by 1988 (MRC 1988), and the harvesting of this scarce habitat has continued unabated. (For an analysis of the cumulative impacts of this trend on the native biota by the California Department of Fish and Game, see Appendix II). The little remaining late-seral forest habitat in the Mattole is scattered widely within the basin, with 2135 acres in the Bear Creek watershed (USDI BLM 1995), about 3000 acres in the lower north Fork Mattole, 1670 acres in Honeydew Creek, 1480 acres at Gilham Butte, 275 acres near Squaw Creek, (all on BLM lands), 614 acres in the headwaters region

(Sanctuary Forest), and 280 acres in Mill Creek (land trust). A few lesser stands also occur in headwaters areas of several other tributaries of the Mattole. In order to reverse this trend and preserve the unique level of biodiversity in the watershed, habitats that are sensitive to anthropogenic perturbations and those that are rare and limited in area, require protection.

Ecologically insensitive timber harvesting is now the greatest threat to the health and well-being of many native vertebrate populations. The few remaining remnants of late seral forest in the Mattole should be preserved as intact communities (to the extent still possible) to serve as "seed sources" for declining species such as the marbled murrelet, northern spotted owl, southern torrent salamander, and the tailed frog. For example, in an on-going study by the USDA Forest Service, Pacific Southwest Research Station, small populations of torrent salamanders and tailed frogs (State Species of Special Concern and Federal candidates) have been located only in areas with remnant late seral forest in scattered locations such as along Dream Stream, Yew Creek and Ancestor Creek in the headwaters area, and along upper Bear Creek and upper Honeydew Creek in the north King Range (USDA Forest Service, Pacific Southwest Research Station, unpublished data). Marbled Murrelets, another late seral forest associate (and a State-listed species), are known from Shadowbrook (administrative headquarters for Sinkyone Wilderness State Park) as well as from numerous sightings in off-shore areas near the mouth of the Mattole. If remnant late-seral habitats are preserved, along with the gradual rehabilitation of damaged habitats throughout the watershed, there will be sources and opportunities for currently missing or impacted species to re-populate once habitat conditions improve.

Late seral attributes of hardwood forests are also critical to many wildlife species. Important habitat attributes such as large old trees with cavities, snags, and downed logs, should be

protected and managed in those areas that were high-graded for conifers during the 1950's and are now being re-entered for hardwood harvesting. Some large old trees, snags, and downed logs (of all species) should be retained, and suitable green trees left to perpetuate these critical habitat attributes (Maser and Trappe 1984; Harmon et al. 1986; Maser et al. 1988). Sensitive riparian areas also need protection in order to reverse the declines of salmonid stocks, sensitive amphibians, and other aquatic life that constitute a healthy stream community. To this end the stream continuum concept (Vannote et al. 1980) should be embraced and applied so that entire channels are protected to include the headwaters and intermittent channels. Anything short of this approach means that ten or twenty year large storm events will wash sediments from unprotected Class III watercourses down into Class I and II channels and counteract any short-term gains that may result from the riparian protections in the current forest practices rules. A whole systems or landscape scale approach (Turner 1989, Pendleton et al. 1994) is imperative to address cumulative effects and preserve the integrity and health of the Mattole watershed and its complex and highly diverse plant and animal communities.

A moratorium on further cutting of remaining late seral habitats in the Mattole watershed should be enacted immediately to preserve the few remaining "islands" of this critical habitat such that these islands can serve as sources for late-seral dependent species. The California Dept. of Fish and Game (1995) estimated that the absolute minimum for ecologically functional late-seral habitat in a watershed is 15% of the original forest cover. Late seral habitats in the Mattole now comprise less than 8% of the original forest cover. The appropriate State agency should initiate negotiations with willing land owners for conservation easements for these late seral areas using State funds set aside by the voters for the procurement of critical wildlife habitats. Ideally, a

moratorium on late-seral harvesting in the Mattole would remain in effect until early seral habitats begin to grow back into a well-distributed mosaic of mature and late-seral habitats. Such an approach is advocated in a recent article on reconciling resource extraction needs with healthy forests (Zuckerman 1992, 1996). A watershed-wide plan for sustained harvesting could then be established that would allow harvesting of late-seral in a manner consistent with maintaining well-distributed populations of late-seral species and habitats throughout the watershed. This approach would serve to protect those species most likely to vanish from the watershed now before they go extinct. In the meanwhile, it would allow time for the development of a comprehensive landscape-scale resource management plan that will balance private property rights with the needs of the full range of species, processes and resource needs that exist in the watershed (e.g., Swanson et al. 1993, Frissell et al. 1993, Pendleton et al. 1994).

3F. Biologically active industrial chemicals (e.g., herbicides, pesticides, etc.)

A comprehensive survey of recent research on the effects of biologically active industrial chemicals (e.g., herbicides, pesticides, etc.) (Colburn et al. 1996) has documented that many of these substances have a strong effect on the reproductive biology of fish, wildlife, and humans at very low doses, by mimicking and blocking natural hormones. Furthermore, the presence of these hormone mimicking and blocking effects are not tested for by industry or the regulatory agencies responsible for the public health, such as the Environmental Protection Agency (EPA). Consequently, we are being poisoned and our reproductive health compromised by the widespread and careless use of these substances (for example, Barnum Timber Company's use of herbicides in the headwaters of the Mattole). Until such time as the manufacturers, users, and

regulators meet their moral obligation to test and exonerate each and every one of these chemicals for hormone mimicking and blocking effects, we request they be banned from use in the Mattole (and everywhere else in the world).

4. *Natural or management-induced conditions present in the watershed which pose a significant threat to the resources identified in 14 CCR 916.8(a) (3) [936.8(a) (3) and 956.8(a) (3)], above, including, as appropriate, but not limited to:*
 - A. *steep slopes and easily destabilized soils;*
 - B. *continuing landslide or soil erosion problems related to past or ongoing land-use activities;*
 - C. *extensive ground disturbance, particularly associated with roads, skid trails, landings, and watercourse crossings;*
 - D. *accelerated aggradation, streambank erosion, and channel scouring;*
 - E. *changes in the habitat or condition of wildlife species identified in 14 CCR 916.8(a) (3) [936.8(a) (3) and 956.8(a) (3)], above.*
 - F. *accelerated rates of proposed road construction or timber harvesting within a watershed or near streams or springs.*

The Mattole River watershed merits recognition as a Sensitive Watershed due to its unique geologic and climatic setting, combined with a recent history of intensive land-use that has resulted in widespread adverse cumulative impacts to aquatic and terrestrial resources.

The proximity of the Mattole watershed to the Mendocino Triple Junction (MTJ) fault system results in geologically unstable slopes and varied geologic terranes bounded by regional fault systems and localized shear zones. In addition, the active fault systems surrounding the MTJ generate frequent and damaging earthquakes (Fig. 3). The high relief of the King Range produces extremely steep slopes, and strongly influences weather patterns, producing some of the highest annual rainfall accumulations in the Pacific Northwest (Fig. 4 and Fig. 5). This combination of geologic instability, frequent seismic activity and high-intensity storm patterns places the Mattole

Annual rainfall varies with topography in the Mattole watershed

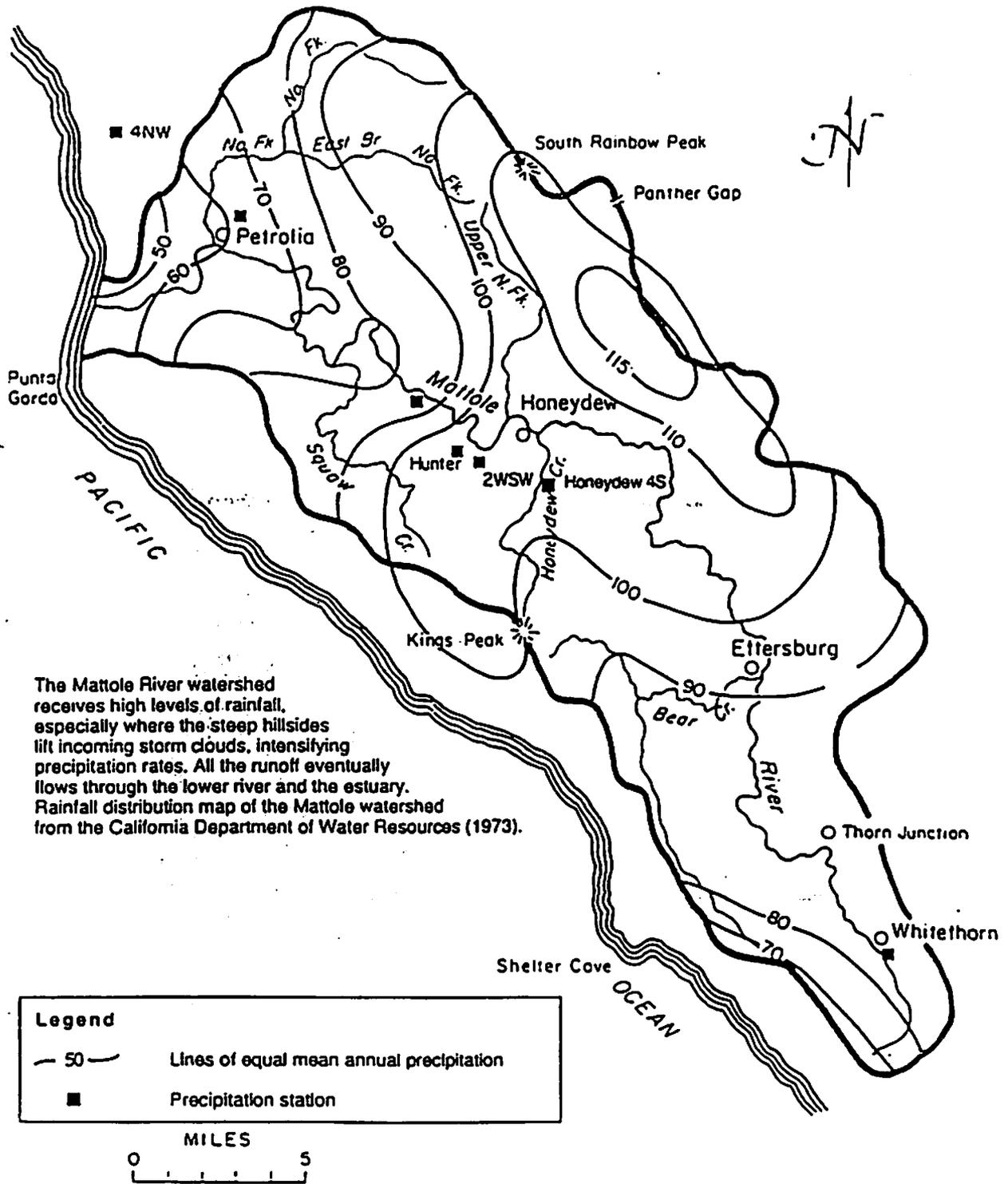
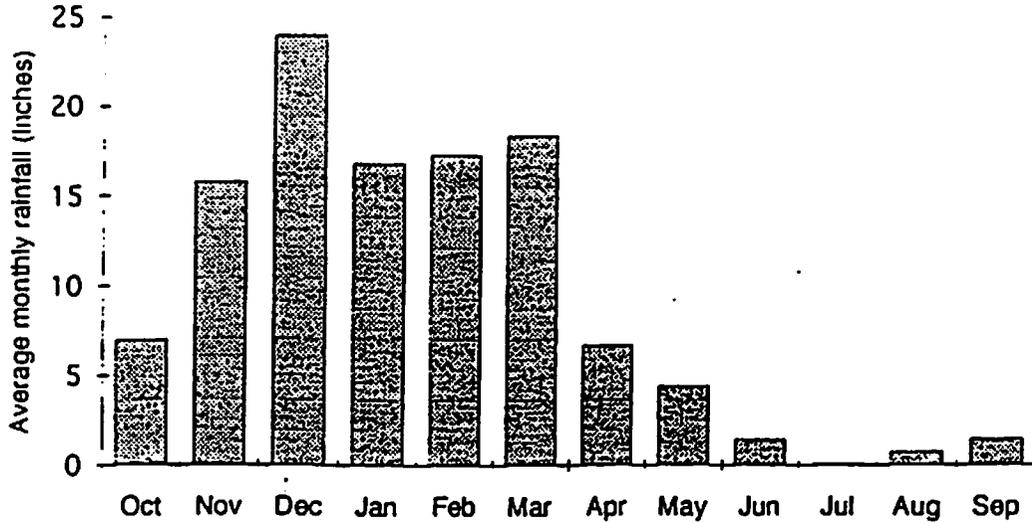


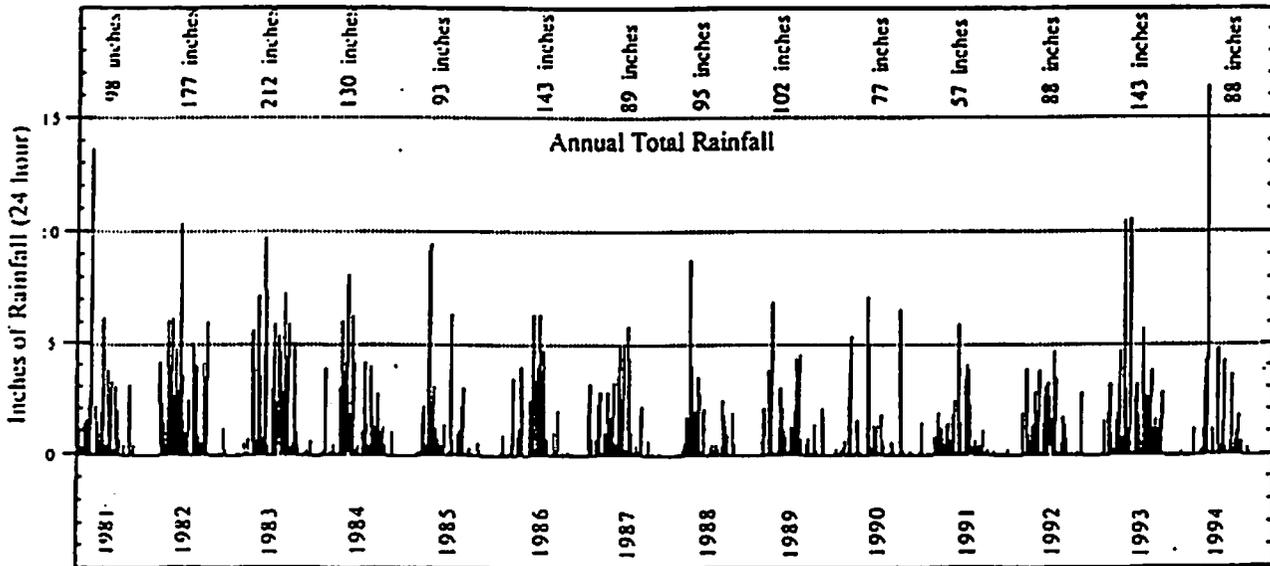
Figure 4. Annual rainfall distribution over the Mattole River watershed (MRC 1995).

Most of the year's rain occurs from November through March



This figure depicts the monthly distribution of rainfall throughout the year. It is based on the records from Wilder Ridge (Honeydew 4S), averaged from 1981 through 1993. The Wilder Ridge station (elevation 1,500 feet) is located on the first major ridge inland of the King Range and lies close to the center of the Mattole watershed. This station receives some of the highest accumulations of rainfall in California.

Daily rainfall of ten inches is not uncommon on Wilder Ridge



This figure is a summary of daily rainfall amounts on Wilder Ridge from 1981 through 1994. The data show the nature of peak events, such as fourteen and sixteen-inch daily totals. Daily precipitation of ten inches are not unusual. These are the events that bring about dramatic changes in the hillslopes and stream channels. Annual rainfall totals at the top of the figure display a range from 212 inches in 1983, to 57 inches in 1991.

Figure 5. Annual and daily rainfall patterns in the Mattole River watershed (MRC 1995).

River watershed in a context that would be characterized as sensitive, even without any land-management activities. Unfortunately, historic land-use patterns have already produced adverse cumulative impacts. Hillslope stability has been greatly reduced as a result of widespread road building and logging during the unregulated Douglas-fir logging boom of the 1950s to early 1970s. Ground disturbance during this era was extensive, and impacts are still felt today as Humboldt crossings, road fills and hillslopes continue to fail, introducing large volumes of sediment into the tributaries and mainstem reaches of the Mattole. The legacy of past land-use activities continues to produce adverse cumulative watershed effects, which are exacerbated by present day management activities. The California Department of Fish and Game recognized the problematic nature of this condition and recommended a policy of "Zero Net Discharge" (ZND) of sediment be implemented for all future timber harvest operations (Appendix III).

Geologic Setting of the Mattole River Watershed

The geologic instability of the Mattole River watershed cannot be overemphasized. The rocks into which the Mattole river incises are the jumbled remains of an active tectonic past. Three phases of deformation have folded, fractured and faulted these rocks, rifting them from, then reaccrting them to the North American continent over the last 55 million years (Beutner et al. 1981; McLaughlin et al. 1994). We are left today with highly fractured and deeply weathered sandstones and shales, with boundaries between rock units defined by broad regional and smaller localized shear zones. Shear zones are portions of relative weakness in the crust, or crustal boundaries where most of the plate motions are accommodated (McLaughlin et al. 1994). In many cases, shear zones can be considered the surface expression of deeper crustal fault systems. They are clearly recognized on aerial photographs by their hummocky terrain, lack of forest

vegetation and high frequency of large landslides or earthflows. On the ground, shear zones often contain unique rock specimens such as limestone, chert and blueschist in a matrix of scaly argillite (mudstone, or shale). These rocks are often "tectonically rounded" as they are slowly transported in the sheared remains of old marine deposits.

The larger northwest trending shear zones run parallel to each other, and are related to the San Andreas fault system. Recent thinking has reconsidered the traditional placement of the San Andreas fault running offshore at Point Delgada (Shelter Cove); geologic and topographic evidence indicate a major shear zone running up the Whale Gulch watershed (known as the Whale Gulch Fault Zone), extending through the Bear Creek and Honeydew Creek watersheds, and then joining the parallel-trending shear zone that follows the mainstem of the Mattole (McLaughlin et al. 1994). As these shear zones approach the coast, their direction shifts from NW-SE to almost purely east-west, reflecting the influences of the MTJ, and a major transition from translational to convergent tectonics (Fig. 6). The Mendocino Fault intersects the North American continent at the mouth of the Mattole, and the Cascadia Subduction Zone (CSZ) intersects the landmass only about 10 miles to the north (Clarke and Carver 1992). "Geologically active" is an understatement for this area.

Geologic Site Conditions within the Mattole River Watershed

Geologic maps distinguish three general rock formations within the Mattole River watershed (Clarke 1992; Fig. 7). These three formations are considered subterranees of the Franciscan Formation, and are distinguished based on their age, lithologic characteristics and degree of tectonic deformation. From west to east, the subterranees are known as: the Coastal belt, the Yager terrane, and the Central belt. Most of the Mattole basin is underlain by Coastal belt rocks,

The Mattole River watershed lies in one of the most geologically and seismically active areas in North America. Yellow dots denote earthquake epicenters; green lines denote mapped fault systems. The orange zone depicts the zone of maximum uplift resulting from the 1992 CMES.

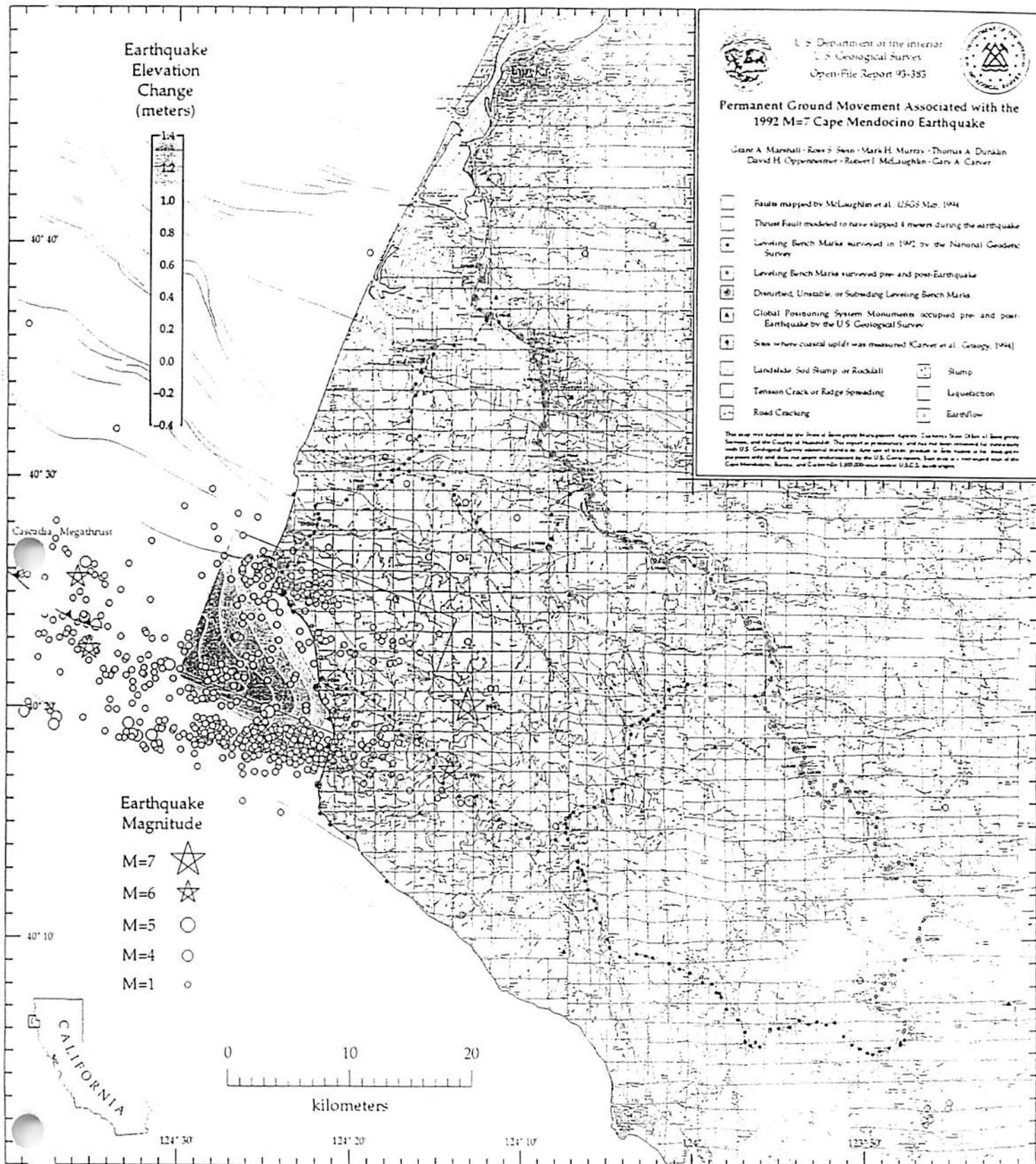


Figure 6. Permanent ground movement associated with the 1992 Cape Mendocino Earthquake Sequence (Marshall et al. 1993).

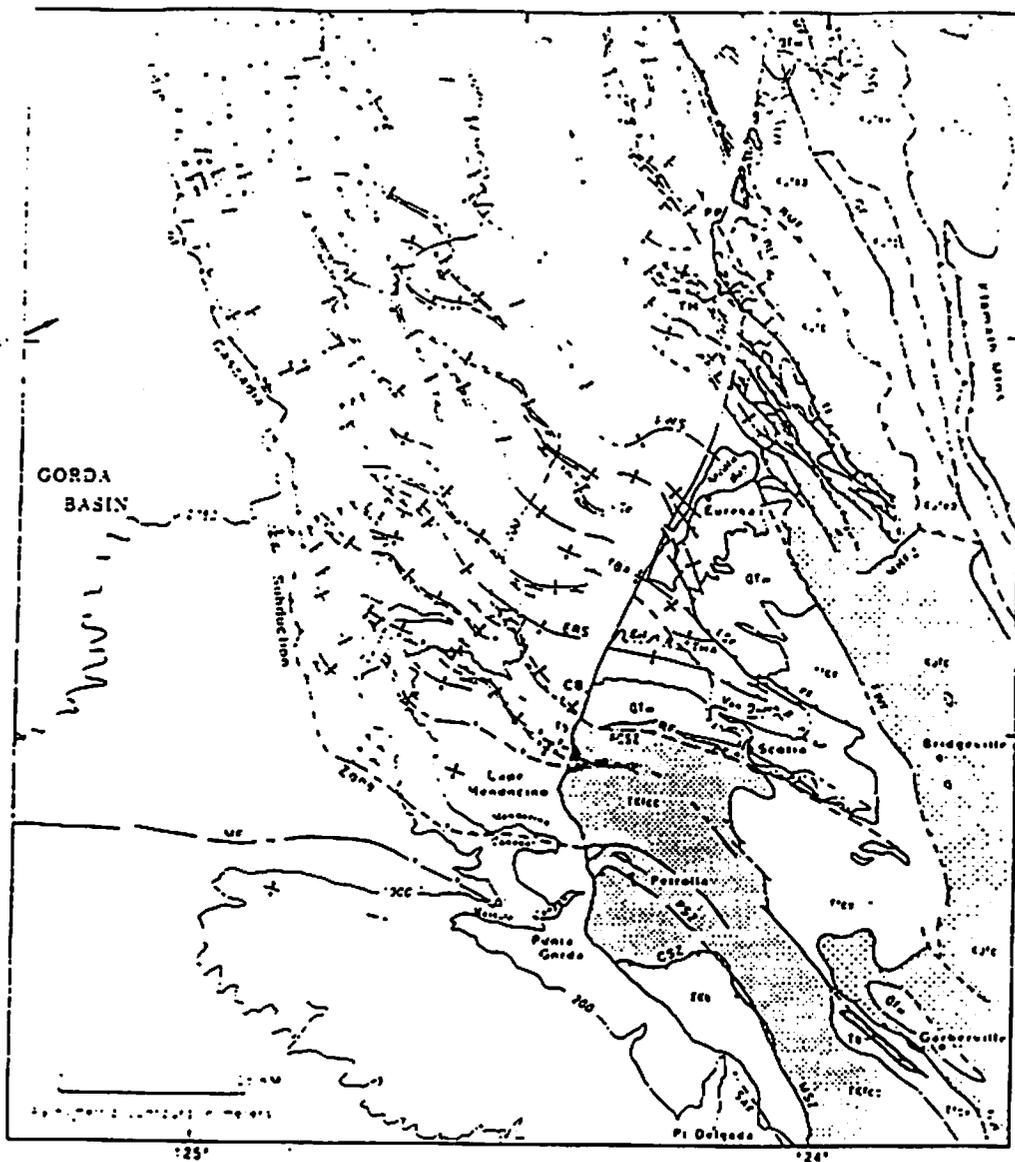


Figure 7. Geologic and structural map of the southern Cascadia fold and thrust belt (Clarke 1992). This map depicts the various geologic units and major fault systems and shear zones cutting through the Mattole River watershed. PSZ=Petrolia Shear Zone, CSZ=Cooskie Shear Zone, and MSZ=Mattole Shear Zone.

but portions of the eastern half of the basin are underlain by the Yager terrane, and the Central belt. The Central belt is the most diverse terrane from a lithologic standpoint. It is composed primarily of broken formation units and melange units. The broken formation units consist of highly fractured and tectonized sandstone and shale packages, and the melange units contain a diverse assemblage of rock types, including: blocks of conglomerate, graywacke, chert, limestone, blueshist, greenstone, and plutonic rocks floating in a matrix of scaly argillite (Aalto 1981). The Yager (the youngest of the three) is composed primarily of poorly indurated sandstones and mudstones that, in general, are much softer than the rocks of the Coastal or Central belt terranes. The Coastal belt is relatively homogeneous from a lithologic standpoint. It is composed primarily of broken formation sandstone units and highly folded and fractured turbidites (Buetner et al. 1981; McLaughlin et al. 1994). Regional shear zones such as the Petrolia Shear Zone (PSZ), the Mattole Shear Zone (MSZ) and the Cooskie Shear Zone (CSZ) cut through the Coastal belt, in places marking subterranean boundaries (Clarke 1992). Smaller, localized shear zones are too numerous to mention, and in many locations have not even been recognized on geologic or geomorphic maps.

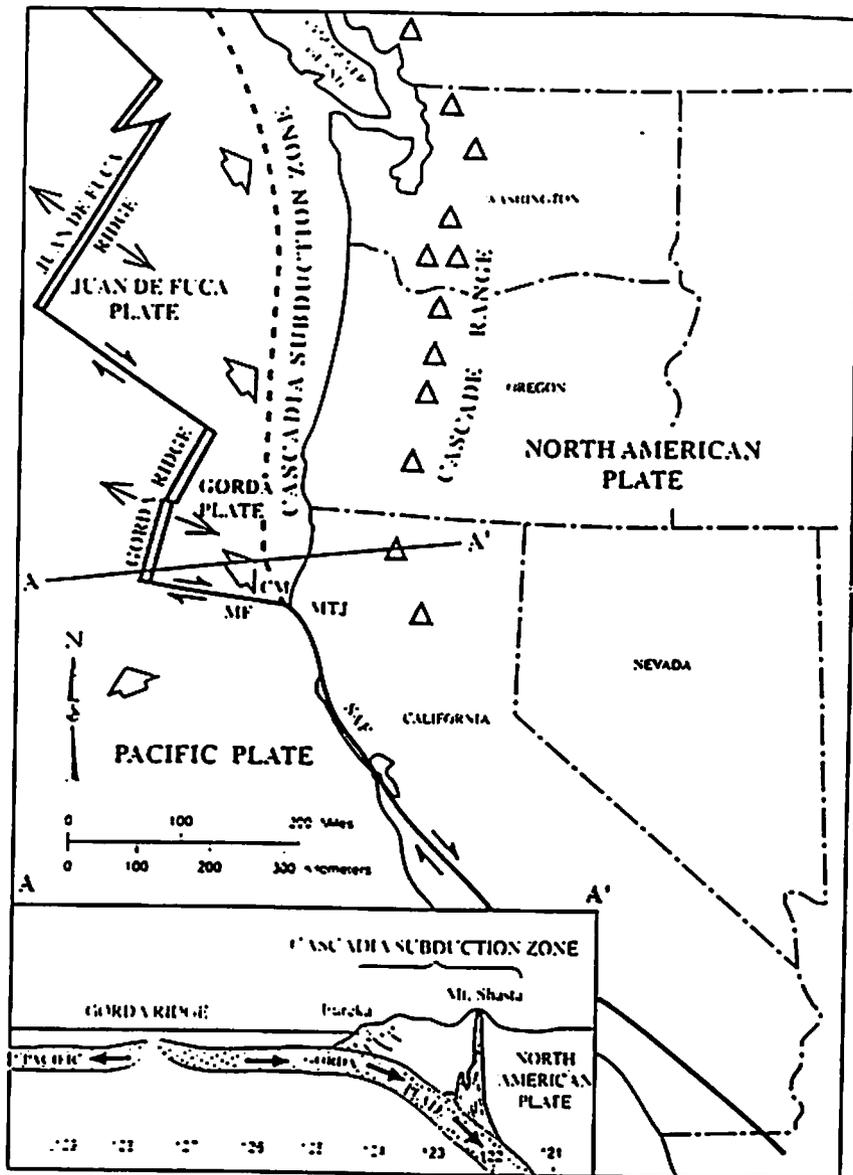
The unique characteristics of each terrane should be carefully evaluated during planning and implementation of activities such as logging and road construction. For example, road maintenance in the Yager terrane is often quite difficult since gravel applied to the road bed is often absorbed by the soft material during the winter months. This feature leads to dramatically increased costs associated with maintaining roads for all-season travel. Surface erosion hazards are higher in the Yager, due to the generally softer nature of the rocks, the depth of weathering, and the tendency of the rocks to undergo "slaking" (crumbling) when the clay-rich portions

undergo wetting and drying cycles. The number and extent of regional and local shear zones within the Mattole River watershed dictate the need for increased caution when conducting management activities in these unstable areas. The large number of localized shear zones merit special attention, since these features are often not mapped, and are only recognizable based on field and/or aerial photo evaluations.

Frequent Seismic Activity--The Mattole River enters the Pacific Ocean near the MTJ, one of the most geologically active structures in western North America (Fig. 8). The MTJ is a broad zone of geologic "mixing" resulting from the intersection of three tectonic plates. Each plate is bounded by large, regional fault systems: the MTJ lies at the southern end of the Cascadia Subduction Zone, the northern end of the San Andreas Fault System, and the eastern end of the Mendocino Fault (Fig. 9). Active plate motions in this area are responsible for frequent earthquakes along each of these fault systems. Historic records of active seismicity date to the late 1800's (Topozada et al. 1981; Dengler et al. 1992), and reflect recurrent damaging earthquakes in the Cape Mendocino area. Dengler et al. (1992) describe the different sources of seismicity, both in terms of frequency of occurrence, source areas, and estimated intensity. Historic data have provided a regional picture of the areas most frequently impacted by strong earthquakes (Fig. 10). The Mattole River watershed lies in the middle of this zone.

Uplift and Denudation Rates

The long-term (geologic) history of regularly occurring earthquakes has had both direct and indirect influences on the evolution of the Mattole River watershed. The MTJ has migrated northward at the same rate of motion as the Pacific Plate (1 inch/year). Complex plate interactions and localized faulting are responsible for the rapid rates of tectonic uplift in the Cape



Simplified map of northwestern California regional tectonics. To the south of the Mendocino triple junction (MTJ), the San Andreas fault system (SAF) is the transform (strike-slip) boundary between the Pacific and North American plates. North of Cape Mendocino (CM), the Juan de Fuca and Gorda plates are converging with the North American plate along the Cascadia subduction zone. West of Cape Mendocino, the Mendocino fault (MF) is the transform boundary between the Pacific plate and the Gorda plate. White arrows denote plate motion relative to North America; black arrows denote relative plate motion at plate boundaries. The inset is a simplified cross section of the southern Gorda plate being subducted beneath the North American plate in northern California.

Figure 8. Regional plate tectonic setting of the Mendocino Triple Junction (Dengler et al. 1992). The Mattole River watershed is located on or near the Mendocino Triple Junction, the intersection of three tectonic plates.

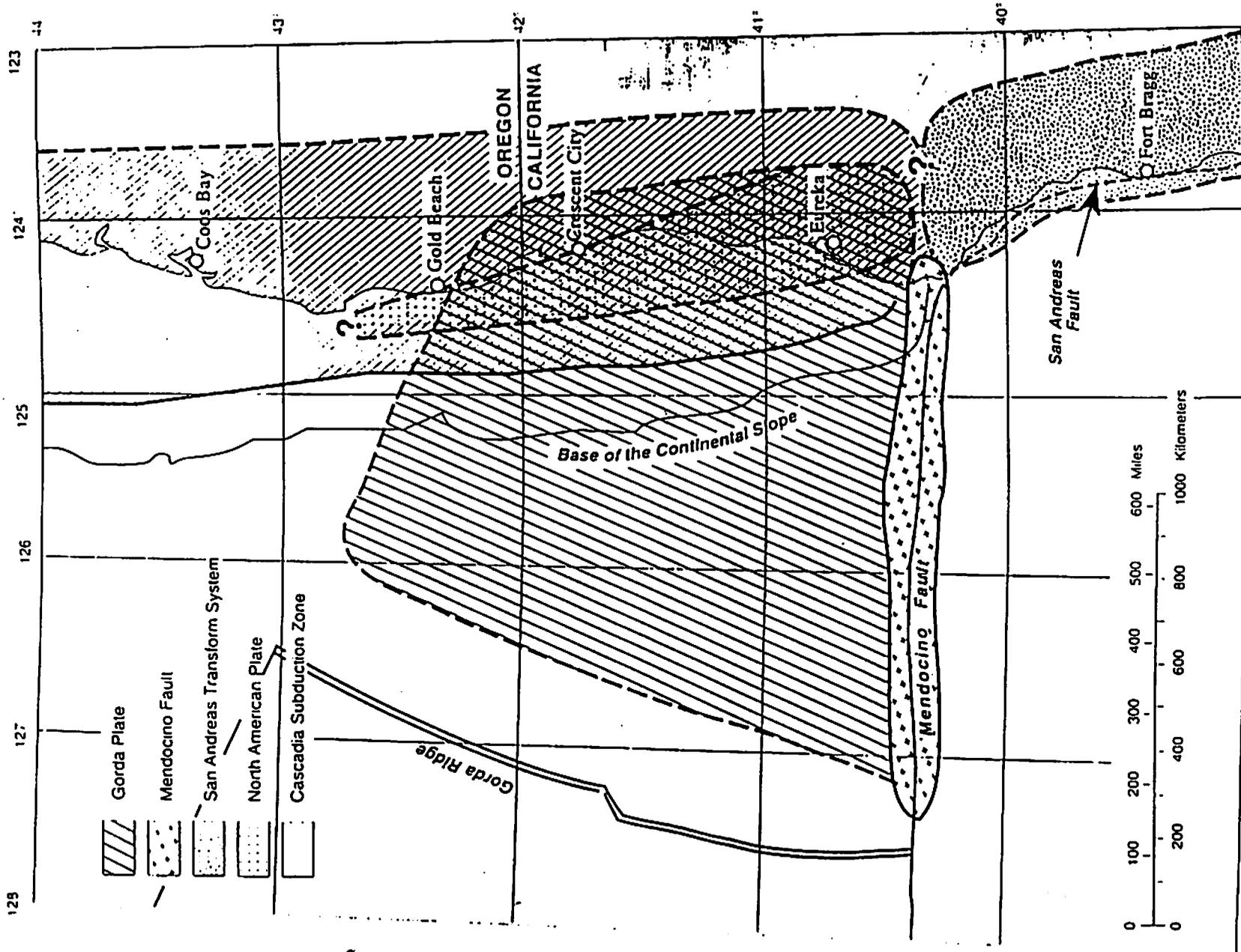


Figure 9. Summary of regional earthquake source zones (Dengler et al 1992). The Mendocino Triple Junction produces earthquakes from a variety of mechanisms and source zones. The Mattole River watershed is directly affected by each of them.

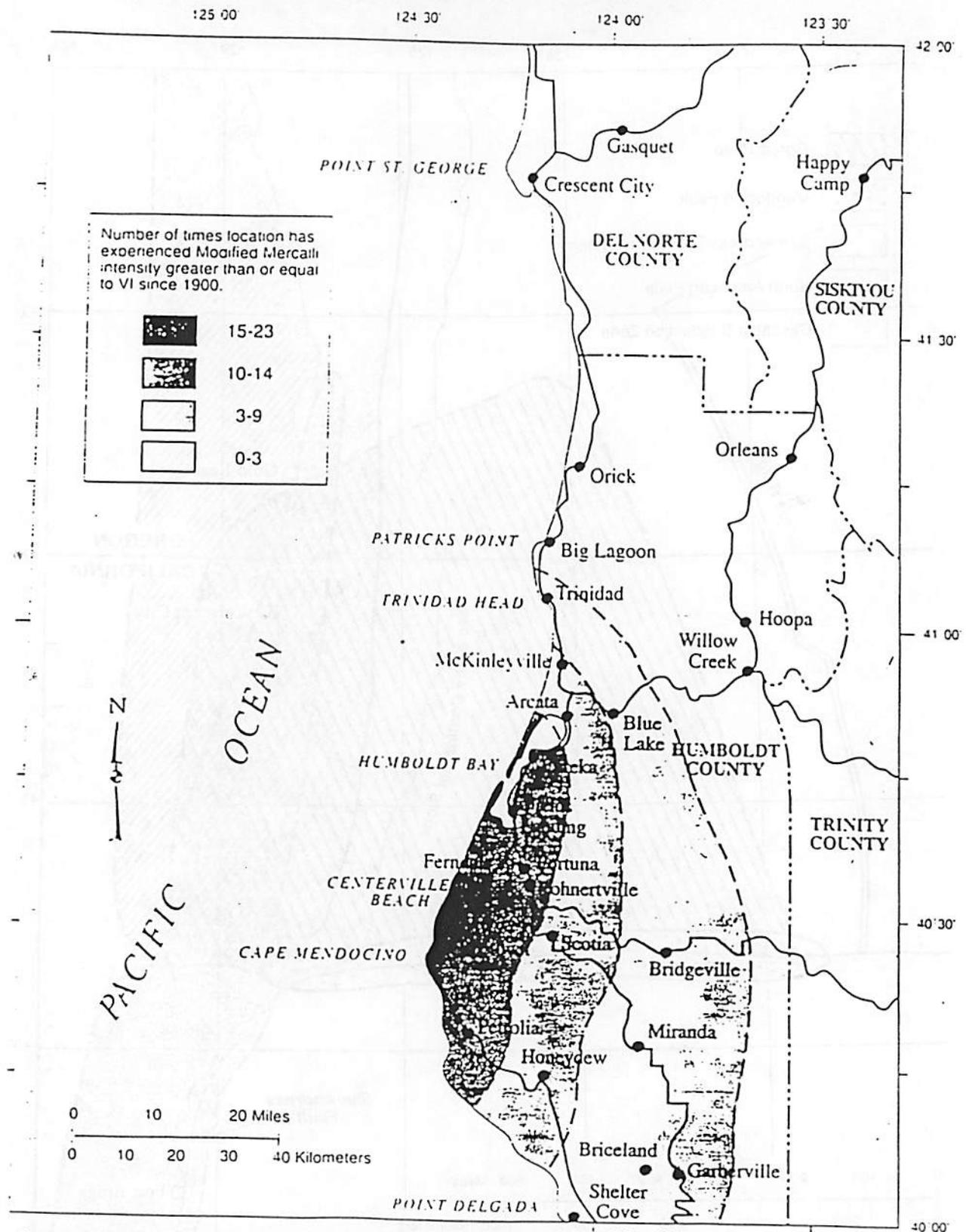


Figure 10. Cumulative frequency of ground shaking on the North Coast (Dengler et al. 1992). Strong shaking is always greatest the closer one gets to the earthquake epicenter. Due to the proximity to major source zones, the Mattole River watershed is often severely impacted by large earthquakes.

Mendocino area. Uplift rates in this area are significantly higher than in other regions of the coast of Northern California, where the influences of the MTJ are less direct. Studies of marine terraces (McLaughlin et al. 1984; Merritts and Vincent 1989; Merritts and Bull 1989) found geologic evidence that the portion of the coastline in the vicinity of the MTJ is uplifting at approximately 12 feet per thousand years, while areas to the north (Trinidad) and to the South (Fort Bragg) are uplifting at rates of less than a quarter of that rate. Kings Peak, located near the center of the Mattole River watershed, on its western edge, rises to an elevation of just over 4000 feet, making it the highest mountain in the lower 48 states located such a short distance from the ocean.

Regional tectonic uplift patterns produce a series of conditions that increase the sensitivity of the landscape to management activities. The high relief and steep slopes of the King Range and other areas of the Mattole watershed are a direct response to an uplifting land mass. As the coastline uplifts, streams incise in response to a generally lowering base level. This situation has produced steep inner gorges in most tributaries to the Mattole, and generally steep topography throughout the rest of the watershed.

Geomorphic Impacts of Strong Shaking

The mechanisms that cause tectonic uplift are still active today. In the April 1992 Cape Mendocino Earthquake Sequence (CMES), a 9 mile (15 km) long section of coastline was uplifted as much as 4.5 feet (1.4 m) as a result of thrust faulting along the Cascadia Subduction Zone (Fig. 6; Oppenheimer et al. 1993; Carver et al. 1994). Seismological data from this earthquake have provided the scientific community with clear evidence that the "megathrust" boundary along the Cascadia Subduction Zone (CSZ) is a significant seismogenic source, and that

it is capable of producing severe ground motions that have significant impacts on man-made structures and hillslope stability.

Strong motion recorders located near Cape Mendocino recorded some of the highest ground accelerations ever documented during an earthquake. Horizontal accelerations recorded at Station #89005 (Cape Mendocino) during the main shock of the April 25, 1992 CMES were 1.20 and >1.80 times the force of gravity. Vertical ground acceleration at the same station was >1.85 times the force of gravity (Shakal et al. 1992). Variations in the gravitational force strongly influence conditions governing hillslope stability. Slope stability models generally assume that there is only one component for the gravitational force (the acceleration due to gravity, which is 9.8 m/s^2 in the downward direction). When this condition is not met, slope stability models are no longer valid, and hillslopes and constructed fills can instantaneously become unstable.

Strong shaking during the CMES caused widespread landsliding in the lower Mattole Valley on steep hillslopes, and along inner gorges of many tributaries to the Mattole. Many of the most notable seismically-induced landslides and failures were directly or indirectly associated with road systems (Dunklin 1992). Types of earthquake-induced failures included fill failures, tensional cracking and settling in fillslopes, and rockfalls and debris avalanches in areas where road systems undercut the existing steep topography. Seismically induced damages to roads can be divided into two general types: (1) those that block roadways due to material falling onto the road surface, or (2) those that disrupt the road surface as a result of fill failure or settling, tensional cracking, or slumping. Both of these types of impacts serve to block vehicle access, and delay road maintenance activities until heavy equipment is available. In addition, cutbank failures and rockfalls delivering material to the road surface often clog inboard ditch systems and culverts,

thereby leading to additional problems resulting from non-functional drainage structures. When drainage structures are no longer functional, concentrated runoff is often directed toward unstable areas resulting in gullies, erosion of fill material, and in the worst case, debris flows.

Detailed studies of seismically-triggered landslides have found that earthquakes rated on the Modified Mercalli Intensity (MMI) scale at VII or greater can cause widespread landsliding in mountainous areas (Keefer 1984). In areas of especially steep topography, or high instability, landsliding and slope failures can occur with ground shaking intensity as low as MMI V (Dengler and McPherson 1993). The area in the vicinity of the MTJ has experienced 54 damaging earthquakes (MMI>VI) over the past 140 years (see Appendix IV). Thirteen of these have exceeded MMI VII, and thus can be considered earthquakes that have a geomorphic impact (Keefer 1984). Prior to the 1940s, the road network was far less extensive, and therefore did not pose a significant threat to aquatic resources. Today, disruption of such a dense and complex road network will have severe impacts when combined with high magnitude storms such as those experienced in 1955, 1964, 1974, and 1995.

CDMG Earthquake Scenario

As a result of the widespread impacts of the 1992 CMES, the California Division of Mines and Geology (CDMG) produced a "Planning Scenario" (Toppozada et al. 1995) for the area that will be impacted by a subduction zone earthquake. The scenario chooses an earthquake of a magnitude and duration that seems reasonable to experts in the field of paleoseismology.

Earthquake Planning Scenarios are produced by the CDMG to assist in planning emergency response and in reducing hazards before earthquakes occur. The scenario is intended to provide planners with a regional pattern of the types of problems that may occur. The extensive efforts

undertaken by CDMG in preparing a Planning Scenario reflect a general consensus in the scientific community regarding the seismic hazards associated with the Cascadia Subduction Zone.

Seven planning scenarios have been produced for the metropolitan areas surrounding the San Francisco Bay Area, and southern California. The planning scenario for Humboldt and Del Norte Counties is unique because of the relatively lower population density of the North Coast. It is also unique in terms of the high-magnitude event hypothesized, and the recognition of the widespread effects likely to occur with such an event. The fact that a planning scenario was even undertaken for such a sparsely populated region indicates the recognition that seismic hazards in northwestern California merit increased attention from local and regional planners.

Conclusions of the Scenario—One of the most striking findings of the Planning Scenario is that a very broad area will experience intensities of VIII to IX on the MMI Scale. (Intensity is a measure of the effects of an earthquake at a particular place, and is dependent on earthquake magnitude, distance from the epicenter, and site geology.) The entire Mattole watershed is expected to experience MMI VIII+ to MMI VIII- with the alluvial portions of the lower Mattole (Honeydew to the mouth of the river) experiencing MMI IX. This conclusion is especially significant, since research has shown that seismically-induced landslides become common above a threshold of MMI VII (Keefer 1984). More recent analysis of the effects of the 1991 Honeydew earthquake (located within the Mattole River watershed) concludes that seismically-induced landslides can occur at an Intensity threshold as low as MMI V to MMI VI (Dengler and McPherson 1993). As a result, a large proportion of the Mattole watershed is characterized in the

planning scenario as "areas susceptible to coherent landslides"(Map S-3 in Topozada et al. 1995).

The Planning Scenario evaluates only the major transportation routes which serve as "lifelines" during emergency situations. Highway 101 is predicted to be unusable in many parts of Humboldt and Del Norte Counties for up to a month, and connecting roads between major highways are likely to experience widespread damages. Roads through mountainous terrain are expected to be blocked by landslides and other damages. Repair of these routes will largely be determined by regional prioritization, depending on amount of use of the route, the extent of damages and availability of equipment, repair materials, and access.

Relation to Forest Management and Road Maintenance Considerations--Forest managers and planners working with forest and wildland roads must recognize that road maintenance and repair will be extremely difficult following a large magnitude earthquake. Damages will be widespread, and maintenance of forest roads will become a low priority with respect to maintenance and repair of "lifeline" transportation routes.

With this knowledge, prudent management dictates that the landscape must be left in a condition that will not be impacted by strong shaking and subsequent winter storms. This requires that various techniques of erosion prevention be applied on a far more widespread basis. Some of these techniques are described in the recently published Handbook for Forest and Ranch Roads (Weaver and Hagans 1994).

Earthquakes are a way of life in the Mattole River watershed. County planners, road and bridge engineers, and local residents have included earthquake planning into their daily routines. It is time that the California Department of Forestry does the same. It is unrealistic to continue to

treat these frequent and potentially damaging events as "acts of God" or as "unforseeable events."

Climatic Setting--Extreme Precipitation Patterns

The high relief of the King Range is largely responsible for the unique precipitation patterns found in the Mattole River watershed. High annual rainfall rates are directly related to topographic influences: air masses coming off of the Pacific Ocean have the moisture "squeezed" out of them as they pass over the King Crest in a process known as orographic lifting. As a result, the rainfall levels on the east side of the King Range and near the headwaters of the Mattole are some of the highest daily and annual accumulations recorded in the state of California.

Daily rainfall accumulations frequently exceed 5 inches, and have reached up to 16 inches in recent years (Fig. 5). For example, in December of 1993, 20 inches of rain was measured in a period of 36 hours on Wilder Ridge (NWS Observer station Honeydew 4S). The highest rainfall accumulations occur in the middle and upper part of the watershed, resulting in basin-wide impacts from peak storm events. The Mattole River demonstrates a rapid response to rainfall because of the relatively low soil permeability in the middle and lower sections of the drainage. When rainfall is heavy, more than 70 percent of the rain may appear as runoff within a day of the end of a storm (Kennedy and Malcolm 1977). Even though the average depth of soil in the basin is from 3 to 10 feet (1-3 m), the bedrock is highly compacted due to extensive folding and faulting. The result is that there is no large groundwater reservoir and so fluctuations from winter storms to summer low-flow runoff are extreme; from 90,000 cfs (1955) to 20 cfs (Kennedy and Malcolm 1977). Run-off amounts vary considerably depending on rainfall patterns; run-off is

much greater in years with intense but brief storms than in years with moderate prolonged rains (Zettlemyer 1981).

The relationship between hillslope failures and peak storm events is well established. Peak storm events have even greater effects on past and present timber harvest plans, where ground disturbance and channel diversions are more likely to cause road hillslope failures. Recognitions of the extreme precipitation patterns in this region should provide further incentive for including erosion control measures in the design and construction of all forest roads. In recent years, these techniques have been referred to as "storm proofing" roads (Weaver and Hagans 1994).

Management-Induced Conditions

The period of intensive timber extraction and road construction in the Mattole River watershed is confined to a relatively brief segment of history. During the post-World War II period, crawler tractors arrived to extract most of the merchantable timber, and road densities dramatically increased. By the mid-1960s road networks were extensive and stream channels were beginning to show clear signs of aggradation (Plate 1). Nearly all of the sub-watersheds of the Mattole were impacted because of the new ability to cut roads across hillslopes provided by this new piece of technology (Fig. 11). Prior to the post-war boom, roads were mostly confined to ridge tops or valley bottoms where road construction was less formidable. But crawler tractors allowed timber operators to go nearly anywhere; stream channels frequently served as transportation and haul routes in the rainy season when roads were impassable.

Sediment Delivery Processes in the Mattole

Various efforts have been made to characterize the nature of sediment delivery processes in the Mattole. These efforts range from regional estimates of sediment discharge based on analysis

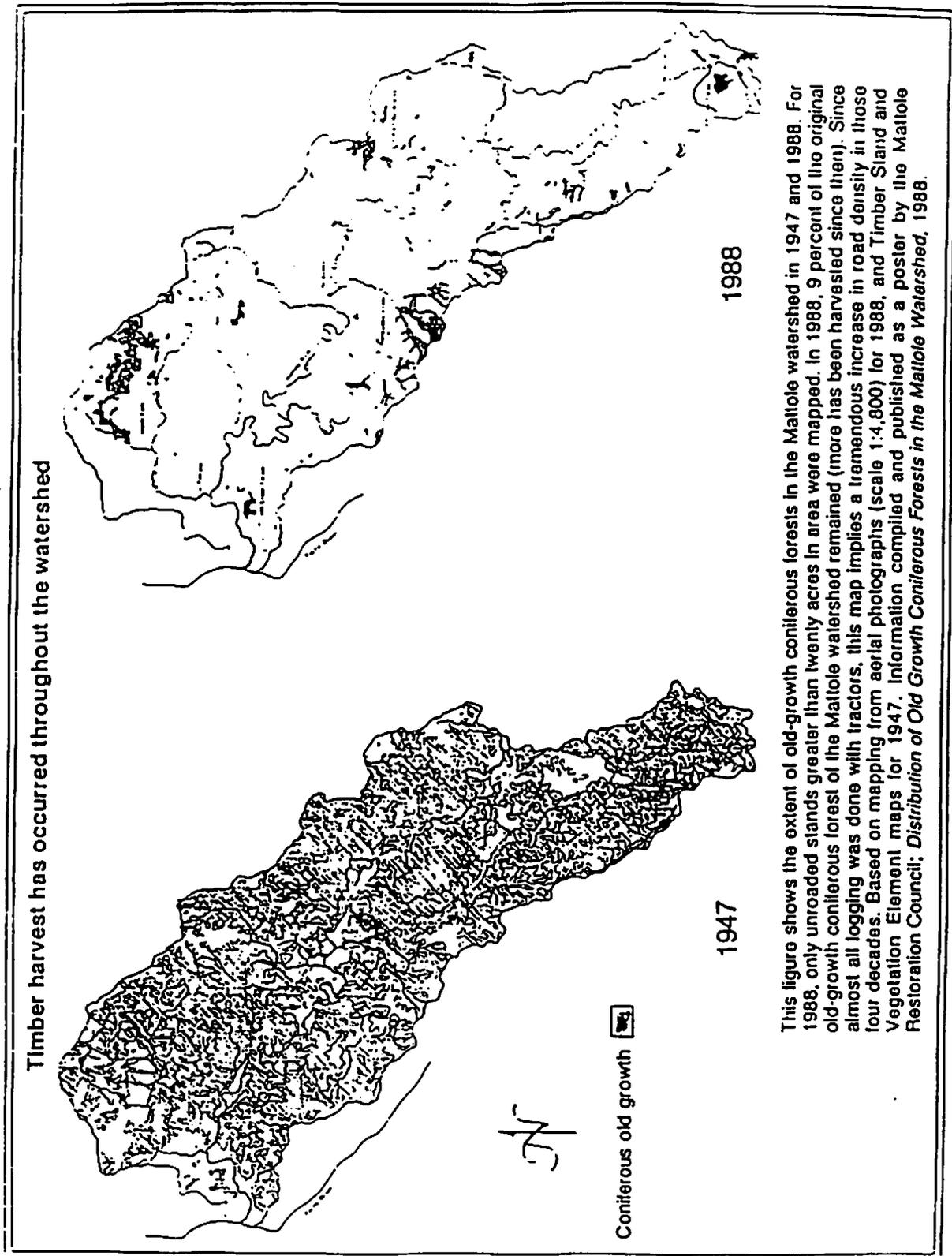


Figure 11. Distribution of old-growth coniferous forest, 1947 and 1988 (MRC 1988).

of Landsat imagery (Fig. 12 and Fig. 13) to on-the-ground mapping of individual erosion features in a basin-wide inventory of sediment sources (MRC 1989). The studies have all recognized the Mattole River watershed as a prolific sediment producer, and have noted recent land-use activities as a key element contributing to accelerated erosion (Ramsdell 1973; Kennedy and Malcolm 1977; Griggs and Hein 1980; MRC 1989).

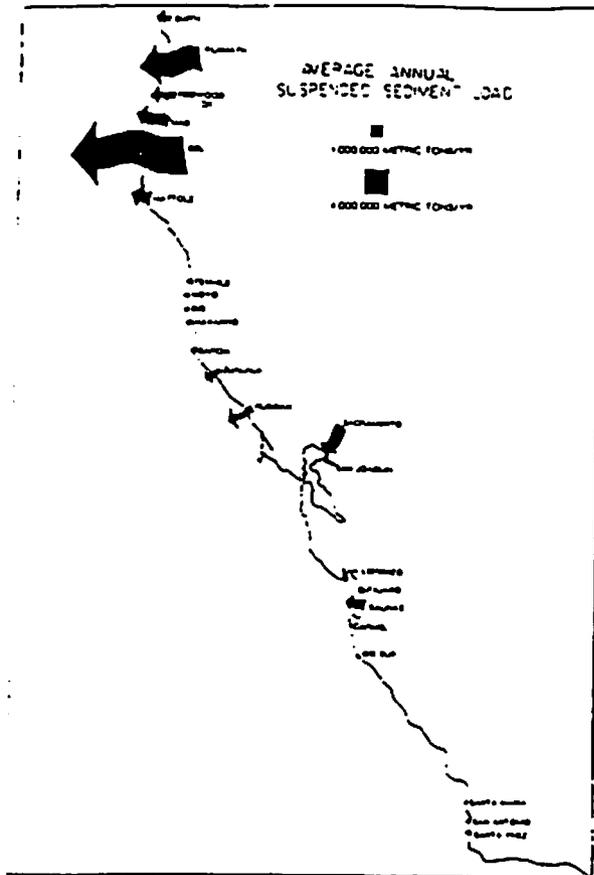
In the early 1970s, the California Department of Water Resources conducted a survey of erosion sources in the Mattole basin, published in the Memorandum Report, Character and Use of Rivers: Mattole River (Ramsdell 1973). They cite USDA Soil Conservation Service estimates of sediment production from the following areas:

<u>Source Area (Type)</u>	<u>Ac-ft/yr</u>	<u>Expected Increase If Not Treated</u>	<u>% of Total</u>
Landslides	400	500	30
Streambank Erosion	550	550	41
Sheet and Gully	<u>380</u>	<u>700</u>	<u>29</u>
Combined Total	1130	1750	100

While it is interesting to note the relative impacts of these three types of erosion, the report does not quantify the percentage of erosion due to intensive land use activities. Other studies (e.g., Milliman and Syvitski 1992; Saunders and Young 1983) estimate that intensive land-use can increase sediment loads by an order of magnitude (i.e. a factor of 10). Griggs and Hein (1980) cite studies that document 2.5 to 1000-fold increases in erosion rates due to human impacts. Only a few tributaries of the Eel River basin have comparable sediment yields.

Of the dominant erosional processes cited in Ramsdell (1973), stream channel and bank erosion are indirectly impacted by human land use. In contrast, landsliding, sheet erosion and

The Mattole makes a measurable contribution of sediment to the Pacific



Using LANDSAT photos, geologists estimated the average amount of suspended sediment flushed into the Pacific Ocean each year by various rivers in northern and central California (map, left). The Mattole's contribution, although small in comparison to larger basins such as the Eel and Klamath, is large in relation to its size. Taken as a proportion of the watershed's area, the suspended sediment load places it close behind the Eel River in its rapid rate of erosion (Figure 4.9, below). Data from the mid-1970s; map from Griggs and Hein (1980).

Figure 12. Landsat estimates of sediment production, North Coast (Griggs and Hein 1980).

Erosion rates in the Mattole watershed are second only to the Eel

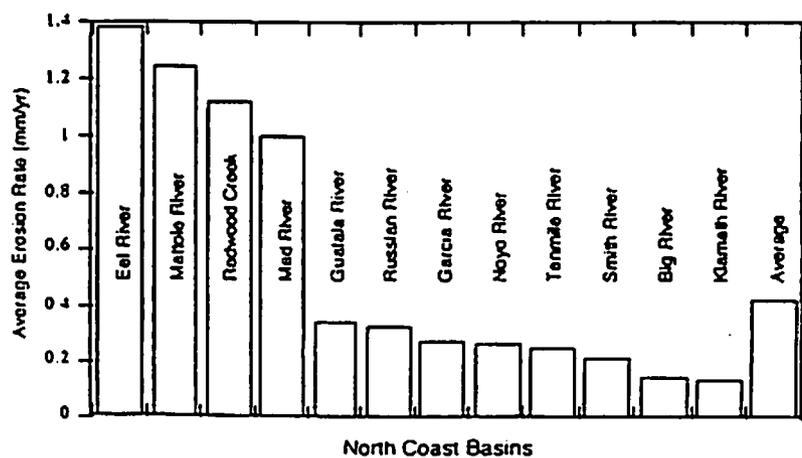


Figure 13. Comparative erosion rates in North Coast basins (Griggs and Hein 1980).

gully erosion are all directly impacted by land-use practices such as road construction, logging and grazing. Roads introduce a whole new suite of erosional processes that simply do not exist in unroaded areas--their impacts cannot be overemphasized. The anomalous nature of road-related erosion is reflected in the watershed restorationist's saying: "There is nothing in nature that mimics a road." (Hagans, pers. comm.).

The number of road-related erosion features is too great to describe in detail in this report. Instead, a list is provided of road-related sources of fine sediment in decreasing order of severity, based on the work of Reid (1981):

- landslides
 - heavy use road surface erosion
 - secondary erosion (landslide scars exposed to rainsplash)
 - backcut erosion (road cutbanks)
 - temporary non-use road surface erosion
 - moderate use road surface erosion
 - debris flows
 - sidecast erosion
 - light-use road surface erosion
 - non-use road surface erosion
 - gullies
- (note: other features not quantified in Reid's analysis include stream crossing failures and culvert blowouts.)

Road Impacts

Roads are a major contributor of sediment, and are without question the principal human-induced cause of sediment mobilization in most north coastal California watersheds. Roads actively contribute sediment to the fluvial system through surface runoff, and more importantly, from failures directly related to road construction such as cut and fill failures, gullies, and landslides. Most of these failures result from water diverted from its natural channel as a result of culvert blockage, or damage to engineered drainage structures.

Various authors have made estimates of the percentage of road-related sedimentation as compared with natural background rates of sedimentation. The estimates vary, stating that from 35-70 percent of all erosion in a watershed stems from roads and road-induced failures, such as those listed above (McCashion et al. 1983). Other authors estimate the increase in rates of sedimentation following road construction. These estimates range from a 3 to 7-fold increase over the long term, to a 750-fold increase in the immediate years following road construction (Reid 1981; Megahan and Kidd 1972). Dramatic increases in sedimentation rates were recognized for at least a 20-year period following road construction by McCashion et al. (1983). Recent research has indicated that the relative amount of roaded area within 300 feet of streams is associated with depressed aquatic macroinvertebrate diversity (McGurk and Fong 1995).

There are an estimated 3,350 miles of active and abandoned road in the Mattole basin (Perala et al. 1993). Only 115 or so miles are maintained by the county, with an estimated 25 miles maintained by the BLM. This leaves nearly 425 miles of active and 2,800 miles of abandoned roads that are not managed or maintained in any systematic manner.

<u>Road Type</u>	<u>Miles</u>
Paved (county)	115
High-use unpaved (county, residential)	105
Low-use unpaved (logging, residential, ranch)	300
Abandoned (estimated)	<u>2,800</u>
Estimated Total Road Miles -	3,350

Taken alone, a single road reach has a minimal impact relative to the total sediment load of the Mattole, but if viewed as a cumulative effect, the combined length of all active and abandoned roads may be the single largest source of fine sediment delivered to the Mattole. Abatement of

road related drainage and erosion hazards is the top priority in terms of reducing upslope sources of sediment. This is due in large part to the recognition that all man-made drainage structures are temporary, and that they have a higher likelihood of failure if not properly designed or maintained.

Conclusions

Adverse cumulative watershed effects are controlled by the interrelationships between the physical (geologic) and climatic settings, and the nature and intensity of disturbance mechanisms active in the watershed. In the Mattole River watershed, each of these three factors can be characterized as "extreme." Recognitions of these extremes and incorporation of special rules in planning processes is critical in order to conduct responsible land-use practices that minimizes further degradation of aquatic and terrestrial habitats.

Since forest road systems are generally the greatest cause of increased sediment production to watercourses, the minimization of chronic and catastrophic road-related sediment production should be considered a primary goal of any special rules.

5. Approved Habitat Conservation Plans or other documents approved or under review by public agencies within the nominated watershed which provide for maintenance or improvement over time of management induced conditions within or adjacent to the planning watershed or forest district.

Though much research has been conducted and information gathered on the resources of the Mattole Basin, there is no comprehensive management plan for this watershed. Below is a list of existing management information for the Mattole Basin.

Barnhart, R.A., and M.S. Busby. 1986. Chinook salmon populations and related biological parameters, Mattole River lagoon, June 1986-October 1986. Summary report to Bureau of Land Management, Arcata Resource Area Arcata, CA. California Cooperative Fishery Unit, Humboldt State University, Arcata, CA. 35 pp.

- Barnhart, R.A., and K.L. Day. 1992. Investigations into the life history of the Mattole River steelhead, December 1990 to October 1991. Summary report to Bureau of Land Management, Arcata Resource Area, Arcata, CA. California Cooperative Fishery Unit, Humboldt State University, Arcata, CA. 27 pp.
- Barnhart, R.A., and K.L. Day. 1993. Investigations into the life history of the Mattole River steelhead, December 1991 to October 1992. Summary report to Bureau of Land Management, Arcata Resource Area, Arcata, CA. 26 pp.
- Barnhart, R.A., and D.A. Young. 1985. An investigation of the Mattole River estuary, May 1984 to March 1985. Final report to Bureau of Land Management, Arcata Resource Area, Arcata, CA. 26 pp.
- California Department of Fish and Game (DFG). 1995. California Hunting Regulations for Mammals and Furbearers. Effective July 1, 1995 through June 30, 1996. California Department of Fish and Game, Sacramento, CA.
- California Department of Fish and Game (DFG). 1990 Net Zero Sediment Discharge recommendation proposed by Banky E. Curtis, Regional Manager of DFG on June 13, 1990 and subsequently adopted in practice by the California Department of Forestry and Fire Protection for all timber harvest operations in the Mattole watershed. California Department of Fish and Game Memorandum, Sacramento, California. The DFG recommended that in the timber harvest plan review process, there be an overall objective by agency reviewers to achieve, "...at the very least a net zero discharge of sediment to watercourses, retention of existing large woody debris (including potential sources for recruitment) and no further increases in summer water temperatures within the Mattole system. The DFG believes these extraordinary measures are now necessary because it appears the anadromous fishery resource dependent on the Mattole River watershed is very sensitive to further degradation. The legislature has directed us by specific mandate (SB2261) to double existing anadromous fishery resources within this State by the year 2000. Maintaining and ultimately restoring the Mattole River watershed for that purpose is crucial for achieving that goal. This approach must be a cooperative effort among all of the various federal, state and local agencies, private landowners and public interest groups, all of which stand to benefit from the protection and restoration of the Mattole watershed."
- California Department of Fish and Game. 1965. California Fish and Wildlife Plan, Vol. III, Part B. Sacramento, California. 679 pp.
- California Department of Fish and Game. 1972. Fish and wildlife resource relationships and water quality requirements, Basin 1B-North Coastal. Unpublished report dated August 1972, water quality planning project, Task DF&G-3, prepared for the State Water Resources Control Board, Sacramento, CA. 39 pp. + 11 figures.
- California Department of Water Resources. 1973. Character and use of rivers: Mattole River (a pilot study). Memorandum Report, Division of Resources Development, Sacramento, California. 145 pages + 3 appendices.
- E.P.A. (U.S. Environmental Protection Agency). 1994. Designation of the Mattole River on the 303d list of impaired water bodies by E.P.A. under the Clean Water Act (section 303d).

- FEMAT (Forest Ecosystem Management Assessment Team). 1993. Forest ecosystem management: An ecological, economic, and social assessment. USDA Forest Service, USDI Fish and Wildlife Service, USDC/NOAA National Marine Fisheries Service, USDI National Park Service, USDI Bureau of Land Management, (BLM) and Environmental Protection Agency, Portland, Oregon. ca. 1000 pp. This document designates the entire Mattole River basin as a Tier 1 Key Watershed. It includes very specific guidelines for the management of BLM lands within the Mattole watershed. Subsequently, the BLM is conducting watershed analyses on two tributaries which are critical salmonid habitat, Honeydew Creek and Bear Creek. Watershed restoration work has begun on Honeydew Creek with the removal by heavy equipment of 3.5 miles of unused road in the upper basin. A road and sediment source inventory has recently been completed on Bear Creek.
- Flosi, G. and F.L. Reynolds. 1994. California salmonid stream habitat restoration manual. Second edition. California Department of Fish and Game, Inland Fisheries Division, Sacramento, California. This document provides guidelines for stream restoration actions intended to improve salmonid habitat.
- Mattole Restoration Council. 1989. Elements of Recovery: An inventory of upslope sources of sedimentation in the Mattole River watershed, with rehabilitation prescriptions and additional information for erosion control prioritization. Report prepared by the Mattole Restoration Council, Petrolia, California, for the California Department of Fish and Game, Sacramento, California. 47 pp.
- Mattole Restoration Council. 1995. Dynamics of Recovery: A plan to enhance the Mattole River estuary/lagoon with recommendations for improvement of salmonid habitat in the estuary and watershed-wide. Report prepared by the Mattole Restoration Council, Petrolia, California, for the California State Coastal Conservancy, Oakland, California. 165 pp.
- Mattole Salmon Group (MSG). 1995. Five-Year Management Plan for Salmon Stock Rescue Operations, 1995-96 through 1999-2000 Seasons. Report prepared by the MSG for the California Department of Fish and Game, Sacramento, California. 52pp. + 2 appendices.
- PACFISH. 1994. Environmental assessment for implementation of interim strategies for managing anadromous fish-producing watersheds in eastern Oregon and Washington, Idaho, and portions of California. USDA Forest Service and USDI Bureau of Land Management, Washington, D.C.
- Stein, R.S., G.A. Marshall, M.H. Murray, E. Balazs, G.A. Carver, T.B. Dunklin, R.J. McLaughlin, K. Cyr, and A. Jayco. 1994. Permanent ground movement associated with the 1992 M=7 Cape Mendocino, California, earthquake: Implications for damage to infrastructure and hazards to navigation. U.S. Geological Survey, Open-File Report 93-383. 36 pp. plus oversize map in pocket.
- Topozada, T.R., G. Borchardt, W. Haydon, and M. Peterson. 1995. Planning scenario in Humboldt and Del Norte Counties, California for a Great Earthquake on the Cascadia Subduction Zone. California Division of Mines and Geology Special Publication 115:1-159.
- U.S.D.I. Bureau of Land Management. 1995. Arcata Planning Area Proposed Resource Management Plan Amendment and Environmental Assessment. USDI Bureau of Land Management, Arcata Resource Area, Arcata, CA.

- U.S.D.I. Bureau of Land Management. 1995. Bear Creek Watershed Analysis. USDI Bureau of Land Management, Arcata Resource Area, Arcata, CA.
- U.S.D.I. Bureau of Land Management. 1985. Mattole Estuary Habitat Management Plan. USDI Bureau of Land Management, Arcata Resource Area, Arcata, CA.
- U.S.D.I. Bureau of Land Management. 1982. Nooning Creek Habitat Management Plan. USDI Bureau of Land Management, Arcata Resource Area, Arcata, CA.
- U.S.D.I. Bureau of Land Management. 1985. South Fork Bear Creek Habitat Management Plan. BLM, Arcata Resource Area, Arcata, CA.
- U.S.D.I. Bureau of Land Management. 1992. Visitor Service Plan, BLM, Arcata Resource area.

6. Suggested feasible mitigation measures needed in addition to current forest practice rules to provide adequate protection for resources identified in 14CCR 916.8(a)(3)[936.8(a)(3) and 956.9(a)(3)], above, to mitigate or avoid new or continuing significant cumulative effects related to timber operations, including, but not limited to, restoration or rehabilitation of degraded resources within any portion of the proposed sensitive watershed.

Current California Forest Practices rules have been in effect since the Z'berg-Nejedly Forest Practice Act of 1973 (with a few more recent changes). It is clear from the findings presented above (Sections 3-4) these rules are not sufficient to maintain suitable habitat conditions for public trust resources in the Mattole Watershed as many of these resources have continued to decline. The above findings describe numerous concerns relative to impacts of timber harvesting and related road-building on fish and wildlife species and their habitats, and present information on the geology which details the high erodibility of the soils and extreme tectonic activity in the Mattole watershed. The following critical issues detailed in these findings must be addressed by the Board of Forestry in order that their actions be deemed credible in the matter of this nomination:

(1) high water temperatures in the Mattole River and its tributaries that are seasonally lethal to elements of the native biota must be ameliorated;

- (2) excessive fine sediments that have adversely impacted these same watercourses must also be ameliorated;
- (3) late-seral forests, which are substantially reduced beyond the ecologically functional minimum of 15% (California Dept. Fish and Game 1995), and no longer well-distributed throughout the watershed, must not be further reduced;
- (4) performance standards or definitive thresholds ("action thresholds", whereby the offending management activity is stopped or other mitigation is initiated) to address cumulative effects of 1-3 above must be established, adopted, and enforced;
- (5) a comprehensive road removal or maintenance program for abandoned logging roads and an incentive-based program for the upkeep of rural homestead and ranch roads must be designed and offered;
- (6) CDF's lead agency responsibility for the public trust resources of fish, wildlife, and water quality in the Mattole should be revoked based on their performance to date (see Section 7, Legal Challenges) and questions of legal propriety (e.g., letter from Bion Gregory, Legislative Counsel for California to the chair of the Senate Natural Resources Committee, dated 6 May 1996).

In order to address these concerns and provide appropriately sensitive land management techniques that address the inherent instability of Mattole lands, we provide the following recommendations. These suggestions are minimum guidelines for returning the Mattole watershed to that of a healthy, functioning ecosystem from which timber can be harvested sustainably. A complete description of best management practices for forestry in the Mattole is provided in Appendix V.

Enforce the Existing Rules

The first step toward addressing the above concerns is for the appropriate State agencies to enforce the existing Forest Practices Rules. This means that timber harvest plan filers or Registered Professional Foresters (RPF's) must be consistently held accountable for making sure that timber operators follow the rules and implement any mitigation for each THP. Some other possible strategies to ensure this are:

- (1) Require RPF's to be on site during operations in WLPZ's and unstable areas;
- (2) Require a written list of the pre-harvest inspection mitigation to be signed by the RPF, attached to the THP, and given to the Licensed Timber Operators (LTO);
- (3) Upgrade the requirements for the quality, scale and content of THP maps. Forest Practice Rules Section 1034(x), the mapping subsection, needs to be implemented so that the information required is actually "clearly shown" at an appropriate scale. For instance, the mapping of known slides and unstable areas should be done at a minimum scale of 1 in.= 500 ft. from large scale aerial photos. Critical stream crossings should be mapped at a 1 in.=20 ft. scale to assure adequate review and facilitate correct implementation by the LTO.

One specific rule that is currently not being fully implemented is "Cumulative Impacts" (896, 898, 898.2, 912.9 and BOF Technical Rule Addendum No. 2 and Cumulative Impacts Assessment). This rule calls for the identification and the giving of location of "known, continuing significant environmental problems by past projects" for the Watershed Assessment Area. This is not being done and must be done in an adequate manner if fisheries and watersheds are to be protected and restored. The consideration of the factors in the Appendix of Technical Rule Addendum No. 2 need to be reflected with adequate documentation and response,

particularly riparian and instream conditions and areas of instability and mass wasting. Compliance with the applicable Water Quality Control Plan must be assured.

Management of Riparian and Aquatic Areas

Two key issues need to be addressed in riparian zone management. There are inconsistencies in designation of Class II and Class III streams which results in inadequate or no protections for many forms of aquatic life. Secondly, the adequacy of current requirements for WLPZ widths is questionable based on the needs of many aquatic and riparian species (see Ledwith 1996). The mis-classification of streams combined with minimal protection of aquatic and riparian habitats under existing WLPZ rules, reduces or prevents the healthy functioning of the aquatic and riparian continuum (Vannote et al. 1980). Specifically, there are limited sources of large woody debris, excessive amounts of sediment in the system, and increased water temperatures due to low or absent canopy cover and changes in channel morphology. Previous sections of this petition contain evidence for the need to strengthen riparian protections over those currently in existence. Below are three possible approaches for addressing these problems.

I. Forest Riparian Management under the President's Forest Plan -- The SAT report (1993) provides specific guidelines for establishing Riparian Habitat Conservation Areas (i.e. Watershed and Lake Protection Zones). Riparian Habitat Conservation Areas are excluded from timber harvest. These areas consist of a stream or lake and the area on either side of the stream or lake defined as follows for each category below:

- fish-bearing streams - "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 a distance equal to the height of

two site-potential trees, or 300 feet horizontal distance (600 feet, including both sides of the stream channel), whichever is greatest.”

- permanently flowing non- fish-bearing streams - “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 a distance equal to the height of one site-potential tree, or 150 feet horizontal distance (300 feet, including both sides of the stream channel), whichever is greatest.”
- lakes - “to the outer edges of riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of moderately or highly unstable areas, or to a distance equal to the height of two site potential trees, or 300 feet horizontal distance, whichever is greatest.”
- ponds, reservoirs or wetlands greater than one acre - “to the outer edges of riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of moderately or highly unstable areas, or to a distance equal to the height of one site potential tree, or 150 feet horizontal distance, whichever is greatest.”
- seasonally flowing or intermittent streams, wetlands less than one acre, landslides, and landslide-prone areas - “to the top of the inner gorge, or to the outer edges of riparian vegetation, or to the extent of landslides or landslide-prone areas, or to a distance equal to the height of one site-potential tree, or 100 feet horizontal distance (200 feet, including both sides of the stream channel), whichever is greatest.”

II. Watershed Management Under Ecologically Sustainable Forest Practices --The guidelines in Part I above, provide stringent riparian protection for areas where standard forestry approaches are applied under current forest practice rules. An alternative approach is possible if landowners adhere to the measures contained in Appendix V, guidelines that were adapted from the Institute

of Sustainable Forestry, or some comparable, ecologically sustainable approach. In order to be successful, the following riparian management guidelines must be executed within the context of other ecologically sustainable forestry practices.

Watercourse and Lake Protection Zones (WLPZ) will be established along each streambank for brooks, streams, springs, and seeps, and completely encircling lakes and ponds. WLPZ widths (see Table below) will be defined from the potential or actual wetted channel, and include the entire inner gorge and headwall of headwater tributaries. This WLPZ will be divided into two equal portions: (1) an inner portion immediately adjacent to the wetted channel or basin; and (2) an outer portion extending an equivalent distance beyond the inner portion. No felling of live trees or removal of downed logs for harvesting is permitted within the inner portion of any WLPZ. Within the outer portion of class I and II WLPZ's, 80% of the overstory shade canopy shall remain immediately after harvesting. This 80% cover value does not mean 80% of pre-harvest values, but is an overall standard not to be reduced by any additional harvesting. Class III streams are divided into two types (IIIa and IIIb), where IIIa is defined by the presence of riparian or aquatic plant, aquatic invertebrate, or aquatic vertebrate life forms, and IIIb is defined by evidence of annual scour only. The outer portion of WLPZ's for Class IIIb streams must maintain a minimum of 50% overstory (tree) shade canopy after harvest; the outer portion of Class IIIa streams must maintain a minimum of 80% overstory canopy after harvest.

WLPZ WIDTHS (in feet on each side of the stream channel)

Watercourse Class

Slope Class / Portion	Class I	Class II	Class III (+landslides)		Class IV
			a	b	(manmade)
≤ 50% / inner	90	50	50*	25*	25
outer	90	50	50*	25*	25
> 50% / inner	100	65	65*	40*	40
outer	100	65	65*	40*	40

* or to the extent of the landslide or landslide prone areas

III. Voluntary Watershed Management -- The recently adopted "California Rangeland Water Quality Management Plan ([CRWQMP] 1995)" could be examined as a voluntary approach for forest lands though it would need to be expanded to ensure that the critical issues defined above were addressed. The CRWQMP provides a three-tiered approach to water quality management with progressively more regulation: the first tier is voluntary implementation, the second tier is regulatory-based encouragement, and the third includes effluent requirements and waste discharge permits. This approach would work only with a good monitoring program to verify adequate compliance and effectiveness.

Management of Roads

As part of each timber harvest plan, a systematic road inventory should be conducted on all active and historic roads in the Watershed Assessment Area, by the submitter of the plan. This inventory should identify sites with sediment diversion potential or high erosion potential and historic stream crossings with high failure potential, and prioritize roads that should be

“storm-proofed” or removed. Sites identified in this inventory can be treated as mitigation measures in efforts to achieve the “zero net increase in sediment” requirements set forth by CDFG (see Appendix III, this document). Given modern changes in silvicultural practices, the overall goal should be the reduction of the total number of road miles (i.e. “zero net increase in roads”).

Detailed guidelines for road maintenance, construction, and removal in the Mattole Watershed--

(1) No roads will be abandoned; roads will either be maintained or else they will be removed.

Roads are maintained primarily through removal of diversion potential at stream crossings, outsloping the road bed where possible, culvert size upgrading where necessary, winter culvert cleaning and trash rack installation and cleaning. Roads are removed by excavating fill and pulling culverts at stream crossings, and removing diversion potential by constructing rolling dips.

Both road maintenance and road removal seek to ensure that streams remain in their natural drainage.

(2) In any road network associated with timber harvest operations, all stream crossings will be assessed for culvert failure potential and for diversion potential before the start of harvest operations. Measures which prevent stream diversions would greatly reduce gully erosion and its long term effects, lowering efforts needed to reconstruct roads after prolonged abandonment.

Simple land management measures to accomplish this include:

(a.) construct and reconstruct road and skid trail stream crossings so they have no diversion potential (i.e. both approaches dip into the crossing),

(b.) perform regular and storm maintenance of roads and drainage structures throughout the life of the road,

(c.) put unused roads “to bed” by excavating fill crossings and removing culverts,

- (d.) install adequately sized culverts (none under 24" diameter), with trash racks,
- (e.) excavate skid trail stream crossings following harvest operations, and
- (f.) install culverts in a manner that does not limit the upstream or downstream migration of anadromous fish species.

(3) New or reconstructed roads will be outsloped to the greatest extent possible or constructed with rolling dips, adequately sized culverts, bridges, or rocked fords. Berms on the outside edge will be avoided except where necessary to prevent concentration of water on the road surface.

Lower ends of culverts will have downspouts where necessary and energy dissipation measures. New landings are no larger than 6000 square feet, their excavated banks are less than 6 feet high, and the landings may cover at most 1% of the area harvested.

Erosion Hazard Rating -- A geologist will be brought into the timber harvest plan development process to perform the erosion hazard rating of the areas proposed for timber harvest and the areas proposed for road construction, reconstruction, and access to the site. The erosion hazard rating will address not only surface erosion, but also other, often more significant erosion processes, such as mass wasting, gullying, and other forms of fluvial erosion.

Timber Tax -- The BOF should negotiate with the State of California and with the County governments of Humboldt and Mendocino to allow landowners to pay for road upgrade and road removal out of the timber harvest yield tax. The tax in Humboldt County is 2.9% of the immediate harvest value of the timber. This very roughly approximates between \$100-\$200/truckload of logs, depending on the grade and species and exact load. This apparent loss of revenue to counties is a wise investment in the future productivity of the land base. It is a positive

incentive helping landowners to storm-proof their roads in a watershed that is highly sensitive to tectonic and climatic forces.

Moratorium on Harvesting of Late-Seral or Old-Growth Forests

The California Department of Fish and Game (1995) identified a 15% minimum of potential late seral forest coverage in a watershed in order to maintain an ecologically functional forest ecosystem with its full compliment of native species. A moratorium on harvesting late-seral forest (as defined by Franklin et. al. 1986) should be enacted in the Mattole until at least 25% of the original forest is returned to late-seral (see also Zuckerman 1992, 1996). At that time a representative panel of interested watershed residents may be convened to reconsider the issue.

Monitoring of Timber Harvests and Adaptive Management

In order to track the success or failure of any recommendations proposed to address the critical issues of our findings (temperature, fine sediments, late seral forests, action thresholds, and road-reclamation), we recommend monitoring of proposed Timber Harvest Plans (THP's) for one to three years prior to, and for at least 10 years following harvest. At a minimum, this would include a standardized protocol for tracking water temperature changes and fine sediment input in and below the harvest area. Additional useful information which could be gathered during this process, includes other microclimatic parameters (e.g., relative humidity, air temperature) within and adjacent to the harvest area and presence/absence or relative abundance of selected sensitive species. Monitoring would be conducted by a CDFG biologist or a qualified contractor of CDFG as a regular part of the THP process. This program could be overseen by the Monitoring Study

Group which was established by the BOF to address the Environmental Protection Agency's (EPA) concerns about California Forest Practice rules being best management practices.

Mitigation Monitoring Plan-- The CA Forest Practice Rules Section 1050 should be expanded so that they are consistent with California Environmental Quality Act (CEQA) Section 21081.6 to assure long-term maintenance and monitoring of mitigation, especially as regards erosion control. THP's must have a maintenance plan which spells out who, what, and when.

With a monitoring plan in place, "action thresholds" could be established and adaptive land management initiated. Adaptive management (Walters 1986) works by initiating a land management activity, monitoring its effects on the species or habitats of interest, and then modifying the management activity if effects are undesirable. Using an adaptive management approach in the Mattole, would allow for testing and modification of our recommendations, ultimately resulting in improved protection and restoration of fish, wildlife, late seral forests, and water quality.

Monitoring, restoration, and many aspects of timber harvest planning would be enhanced by the creation of central repositories of watershed information that are accessible to THP submitters, agency personnel, and the public. One serving the Whitethorn/Ettiërsburg area and another in the Honeydew/Petrolia area would be ideal.

Incentives for Private Landowners

Human nature and our economic system being what they are, people are more inclined to do the right thing (by the fish and wildlife) if they perceive a personal benefit. Consequently, we would like to see the Board of Forestry create incentives that would reward people with tax

breaks, fee breaks, cost-sharing, and work-generating programs, for better forest, stream, and riparian management on private lands. Financial support of activities such as maintaining and improving roads, planting conifers in riparian areas, removing old culverts and logging roads, would create a “win-win” situation for the people and the resources, and could stimulate the local economy with new restoration jobs.

Throughout the United States the land trust movement has enabled farmers, dairymen, forest and rural landowners, and places of historic value to be protected from increasing economic social and political pressures. Recognizing the underlying health and vitality for our society in the conservation of natural resources, and the need and benefits of biodiversity for humans and animals, a number of incentives for land protection have been developed. The following is an explanation of processes available to the landowners in the Mattole River watershed. Additional technical and financial assistance programs for maintaining and enhancing water quality and riparian values are described in Appendix E of the California Rangeland Water Quality Management Plan (1995).

Conservation Easements-- Owning land also means owning many “rights” to the land. Among these are the right to harvest timber following rules from the California Forest Practices Act, the right to build structures or subdivide according to code and zoning limitations, and the right to grow crops or graze livestock. Easements are legal agreements between a property owner and a qualified conservation organization or government agency that permanently limits a property’s uses in order to protect conservation values. This is a flexible tool that protects land while leaving it in private ownership. In the Mattole River watershed there are ample opportunities to use conservation easements for productive forest lands, ranch lands, residential, and recreational

properties. When the landowners limit the "opportunities" for their property by deferred harvest or habitat preservation, it gives a financial value to an easement that can be appraised. With a qualified conservation easement, the landowner gets compensation by receiving income or income tax benefits as well as a reduction in the value of their estate, therefore reducing or eliminating estate taxes. In addition, private and governmental programs are being established to offer direct financial compensation in exchange for the values protected. To qualify for tax and other benefits, the conservation easement must allow for the protection of natural values that have been identified as having public benefit, such as open space or fish and wildlife habitat. Future owners will also be bound by the terms of the easement. The easement can apply to just a portion of the property, leaving the remaining part unrestricted. Each agreement is a unique document tailored to meet the financial and personal needs of the landowner.

Land Trusts -- A land trust is a private, non-profit organization. They are "public charities" as defined by the federal tax code and can receive, acting as the grantee, conservation easements thereby qualifying the grantor (landowner) for income and estate tax benefits. There are two active land trusts able to assist Mattole River watershed landowners: (1) The Sanctuary Forest, Inc. which primarily assists in dedications of land for preservation of old-growth forests, riparian areas, wildlife corridors, and scenic roadways and (2) The Pacific Forest Trust, located in Mendocino County, which serves the need of conserving working forest lands in the northwestern United States. These organizations assist non-industrial forest landowners to structure timber management plans that give rewards for voluntary restrictions on lands that benefit habitat and water quality. They help design conservation easements and financial benefits that prevent

owners from being forced into unwanted over-harvesting and parcelization of property with the goal of keeping family lands in family ownership.

Forest Legacy Program -- This is a federal program created in 1990 and administered by the California Department of Forestry and Fire Protection. The goal is to "assure that both the traditional use of private lands and public values of America's forests are protected for future generations." This project is for private forest landowners who wish to voluntarily protect their forest resources through the establishment of conservation easements. As funds become available, financial compensation is provided to landowners who voluntarily protect their working forest lands by limiting threats of parcel divisions and non-forest development projects. The Forest Legacy Program is in the development stage and depends on annual state and federal budgetary allotments.

Stewardship Forestry Carbon Storage Model -- This is a new, emerging strategy that promotes "acting locally while thinking globally". The idea is that there are several alternatives to industrial forest management that can contribute to greater long-term, global carbon storage. Landowners participate by using stewardship forestry practices that follow natural, native forest composition, age distributions, and processes with forest stands managed for older age classes and size structures. Increasing overall forest age while maintaining more large woody debris will contribute to carbon storage and also improve wildlife habitat, water quality, fisheries. Carbon users, oil companies, and public utilities have realized the need to invest in carbon storage to compensate for their drain on world carbon storage. Local forest landowners would receive financial rewards for carbon storage from funds provided by large corporations. The first demonstration grant has been awarded to Pacific Forest Trust for an experimental project in the

Redwood Region. Forest lands in the Mattole River watershed are eligible for this first demonstration project and for future carbon storage grants. This is clearly a way for property owners in a rural area like the Mattole River watershed to be financially rewarded for maintaining mature forests and open space. This allowing low population, clean air, and water. The Mattole River watershed, land and lifestyle can be a positive contribution to a world-wide environmental problem.

No Application of Herbicides and Pesticides in the Watershed

In view of the well documented negative effects of many biologically active industrial chemicals (e.g., herbicides, pesticides, etc.) on the reproductive biology of fish, wildlife, and humans, (Colburn et al. 1996) we request a moratorium on their use. Until such time as the manufacturers, users, and regulators meet their moral obligation to test and exonerate each and every one of these chemicals for hormone mimicking and blocking effects, we request they be banned from use in the Mattole (and everywhere else in the world).

Local Control

In the interest of returning local resource issues to local control, we propose a model based on that used in Swiss cantons where a local forester is chosen by the people. We suggest that the people of the Mattole establish a Forest and Watershed Health Advisory Board (FWHAB) to work cooperatively with the local County Resource Conservation Districts. The FWHAB could be appointed by the County Boards of Supervisors, with citizen input, and would hopefully represent a broad range of the socio-economic perspectives.. This board would be comprised of

at least three local residents, and at least one State agency representative familiar with timber harvest planning and practices. Members could serve staggered four-year terms. The only qualifications for membership would be residency in the watershed and some expertise in at least one of the following areas: forestry, ranching, farming, soil science, wildlife/fisheries biology, or geology. The FWHAB would advise and assist timberland owners and their foresters on ways to practice ecologically sustainable forestry as they plan timber harvests in the Mattole. We recommend the Board of Forestry investigate the possibility of providing tax breaks (e.g. reduction of timber yield tax) or other incentives for landowners who submit their Timber Harvest Plans for review and approval by the FWHAB. Once approved by the FWHAB, a Timber Harvest Plan could then receive minimal review from CDF, relieving the state agency's work-load considerably.

7. Other information about the watershed that may assist the board to evaluate the nomination.

Legal Challenges in the Mattole River Watershed

The legal challenges to proposed timber harvests are more numerous in the Mattole Basin than in any other watershed in California. This is due to several factors which warrant consideration in determination of whether this watershed will be designated as "Sensitive": (1) an informed and educated populous, (2) a mixture of commercial timberlands with numerous private residences, and (3) the fact that land management practices and the status of natural resources have an immediate and obvious effect on the quality of life of residents. The following is a

summary of recent lawsuits that have addressed environmental issues in Timber Harvest Plans within the Mattole Basin.

Mattole Watershed Salmon Support Group, et al. v. Eel River Sawmills, et al.
Humboldt County Superior Court Case No. 83221 (1988)

International Indian Treaty Council, et al. v. Eel River Sawmills, et al.
Humboldt County Superior Court Case No. 83393 (1988)

Challenging timber harvest proposed by Eel River Sawmills and Barnum Timber in the headwaters of the Mattole River on Helen Barnum and Baker Creek drainages, THP 1-88-520 HUM. Plan was withdrawn.

Californians for Native Salmon and Steelhead, et al. v. California Department of Forestry
Humboldt County Superior Court Case No. 83329 (1988)

Challenging the pattern and practice of CDF's failure to provide written responses to comments at time harvest plans are approved, and challenging CDF's failure to provide a mechanism to evaluate and a pattern and practice of not evaluating the cumulative impacts of harvesting of old growth. Included THP 1-88-520 HUM as example of this pattern. Case resulted in published opinion permitting a cause of action for a pattern and practice.

Californians for Native Salmon and Steelhead v. CDF (1990) 221 Cal.App.3d 1419. Case settled after CDF adopted rules requiring issuance of written response to comments at time of approval, and adopted rules to evaluate cumulative impacts, including impacts upon late seral stage habitat.

Californians for Native Salmon and Steelhead, et al. v. California Department of Forestry, et al.
Humboldt County Superior Court Case No. 85252 (1989)

Challenge to Timber Harvest Plan 1-89-230 HUM proposed by Eel River Sawmills and Barnum Timber Company in headwaters of Mattole River on Helen Barnum Creek and Baker Creek. A successor to THP 1-88-520 HUM. Case settled, with an area being cut (some clearcut, the evidence of which remains starkly visible from the County Road), and agreement by Eel River and Barnum to sell for public ownership Collins Parcel 4. Ultimately Collins Parcel 5 was also sold.

Coastal Headwaters, et al. v. California Department of Forestry, et al.
Humboldt County Superior Court Case No. 91CP0162 (1990)

Challenge to three timber harvest plans proposed by Barnum Timber Company, on Baker Creek, Mill Creek, THPs 1-90-179 and 188, both in the headwaters of the Mattole River; and Redwood Creek, THP 1-89-426 HUM. Judgment in favor of Petitioners, with court noting the cumulative impact of harvesting upon fisheries, given admission that some small sediment may land on a redd.

Coastal Headwaters, et al. v. California Department of Forestry, et al.
Mendocino County Superior Court Case No. 60344 (1990)

Challenge to Eel River Sawmills timber harvest plan proposed in headwaters of Mattole River on Helen Barnum Creek, THP 1-90-063 MEN. Judgment in favor of Petitioners on a technical failure to provide correct mapping.

Coastal Headwaters et al. v. California Department of Forestry, et al.
Mendocino County Superior Court Case No. 63450 (1991)

Challenge to proposed timber harvest by Randal Falk/Mendocino Investment Company in the headwaters of the Mattole River on Lost River Creek, THP 1-90-232 MEN. Case ultimately settled, with harvesting. After harvesting, intervention required because mitigation to prevent erosion into Lost River had not been done. Eel River Sawmills ultimately did the mitigation work. Falk was to correct the erosion on the road along Lost River.

Oil Creek Alliance, et al. v. California Department of Forestry
Humboldt County Superior Case No. 92 DR0056 (1992)

Proposed harvest by Pacific Lumber at the confluence of Rattlesnake and Oil Creeks on Rainbow Ridge, on the upper North Fork of the Mattole River near the town of Honeydew, THP 1-91-349 HUM. Settlement was reached in which Pacific Lumber agreed to cut only dead and dying timber as defined in settlement, and extended watercourse protection.

Coastal Headwaters, et al. v. California Department of Forestry, et al.
Mendocino County Superior Court Case No. 68285 (1993).

Challenge to proposed timber harvest by Eel River Sawmills and Barnum Timber Company for harvest in the headwaters of Mattole River on Helen Barnum Creek, THP 1-92-187 MEN. This is a resubmission of THP 1-90-063 MEN. Decision in favor of Petitioners in June 1994 for failure to evaluate cumulative impacts upon biological habitat. Plan revised and reapproved; court hearing to review second approval was scheduled for March 3, 1995.

Lost Coast League v. California Department of Forestry, et al.
Humboldt County Superior Court Case No. 94 DR0046 (1994)

Challenge to timber harvest plan proposed by Pacific Lumber Company in the lower North Fork of the Mattole River. Decision in favor of the Petitioners in July 1994, with court noting the inability of CDF to evaluate cumulative watershed impacts when it does not even know if its rules effectively protect water quality. In his ruling, Judge Buffington noted that in light of the cumulative impacts in the Mattole, the public trust should require a reduction in net sediment (= negative net sediment) to protect salmon. Plan revised and decision by CDF is still pending.

Mark Winthers, et al (Friends of Eubanks Creek) v. CDF, et al.
Humboldt County Superior Court Case No. 94 CP0270 (1994)

Challenge to timber harvest proposed by Richard Priest on the headwaters of Eubanks Creek in upper Mattole River, THP 1-94-028. Case challenging THP was settled when operation was modified beyond requirements of current forest practices; portion of case dealing with cumulative watershed impacts and validity of zero net sediment discharge was appealed and denied. Challenge to plan under water quality regulations was addressed by further modification of the plan and mitigations following partial harvest at owners expense.

This THP and three others have been combined in a "pattern and practice" suit against CDF under the allegations that in the Mattole River basin CDF does not lawfully assess cumulative impacts, fails to provide 15-day public comment periods, and fails to include mitigation monitoring programs in timber harvest plans. This case is currently on appeal.

8. Literature citations, expert written opinion, and other relevant sources of information and, where possible, copies of information used to complete the nomination.

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Personal Communications

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Roche, Maureen. Salmon Enhanceress, Mattole Salmon Group. Petrolia, CA.

Sutherland, Robert. Redway, CA.

Contributors

The creation of this document was sponsored by the Mattole Institute as a part of its program for science in the public interest. The technical coordinators were Hartwell H. Welsh and Amy J. Lind. The following individuals authored sections of this document: S. Dugan, T. Dunklin, P. Higgins, D. Kahan, A. Lind, J. Morrison, R. Snodgrass, E. Taylor, and H. Welsh. The following individuals provided ideas, input, energy, and moral support: M. Courson, M. Evanson, R. Gienger, G. Gregori, F. House, S. Marks, L. Radloff, M. Roche, W. Smith, R. Sutherland, and R. Yosha. Any errors are the responsibility of the technical coordinators alone.

9. A list of names and mailing addresses of the following:

A. Landowners of forty acres or more of lands zoned for timber production in the planning watershed.

There are 268 landowners in Humboldt and Mendocino counties in this category (Appendix VI.)

Assessor's Book #

Humboldt County Mendocino County

103 108 051

104 215 052

105 220

107 222

B. Public water purveyors and known private purveyors within the planning watershed.
public water purveyors:

California Department of Forestry and Fire Protection
1416 Ninth Street
Sacramento CA 95814

County of Humboldt
1106 Second Street
Eureka CA 95501

Southern Humboldt Unified School District
P.O. Box 129
Garberville CA 95442

U.S. Bureau of Land Management
2550 N. State Street
Ukiah, CA 95482

Known private water purveyors:

Larry Bachetti
3812 Melody Lane
Santa Clara CA 95051

James Buhlert
808 Villa Nova Drive
Davis CA 95616

Nicholas Blonder
P.O. Box 5513
Mill Valley CA 94942

Dipolo Cabalse
7013 Cutting Boulevard
El Cerrito CA 94530

Chambers Cattle Company
P.O. Box 12
Petrolia CA 95558

Russell Chambers
P.O. Box 33
Petrolia CA 95558

Leonard Cook
2750 St. Giles Lane
Mountain View CA 95501

Sterling Cousins
205 Tamara Court
Windsor CA 95492

Mary Fishman
Ettersburg Star Route
Garberville CA 95442

Lee French
20 French Ranch Road
Garberville CA 95442

Richard French
12051 Wilder Ridge Road
Garberville CA 95442

Marian Hoyle
36588 Mattole Road
Petrolia CA 95558

Lyman Jewett
2279 Jewett Road
Garberville CA 95542

Louise Klingenspor
no address given

Frederick Liu
NBU #36625
Petrolia CA 95558

James McGuire
22501 Bald Hill Road
Fort Bragg CA 95437

Robert McKee
P.O. Box 400
Whitethorn CA 95589

Lola Moore
P.O. Box 129
Petrolia CA 95558

North Fork Ranch
P.O. Box 22
Petrolia CA 95558

Diane Paoli
19278 Noyo Acres Drive
Fort Bragg CA 95437

James Phillips
23974 Stanwood Avenue
Hayward CA 94544

Redwood Abbey Incorporated
Whitethorn CA 95589

Karen Ruth
15 Echo Place
San Rafael CA 94901

Roger Safier
P.O. Box 71
Petrolia CA 95558

Richard Scheinman
P.O. Box 49
Petrolia CA 95558

Stanwood Schmidt
797 K Street
Eureka CA 95501

John Shee
P.O. Box 120
Honeydew CA 95545

Cara Sholes
460 Summer Street
Fortuna CA 95540

George Spaulding
P.O. Box 1197
San Juan Capistrano CA 92693

Jacqueline Volk
9046 Alcott
Los Angeles CA 90035

Jim Wilson
41400 Pacific Coast Highway
Malibu CA 90265

Richard Wohlers
P.O. Box 307
Fortuna CA 95540

Joe Yonts
6160 Elk River Road
Eureka CA 95503

*C. Commonly known watershed associations
within the planning watershed.*

American Fisheries Society, Humboldt
Chapter
791 Eighth Street, Suite N
Arcata CA 95521

Bear Creek Watershed Association
1197 Kings Peak Road
Whitethorn CA 95589

Californians for Native Salmon and
Steelhead
P.O. Box 64
Bayside CA 95524

Coastal Headwaters Association
P.O. Box 12
Whitethorn CA 95589

Doodyville Road Association
1901 Doodyville Road
Garberville CA 95542

Environmental Protection Information
Center
P.O. Box 397
Garberville CA 95542

Fire Creek Watershed Association
P.O. Box 1502
Redway CA 95560

Friends of Eubank Creek
2210 Ettersburg Rd
Garberville CA 95542

Honeydew Creek Watershed Association
4062 Wilder Ridge Road
Garberville CA 95542

Institute for Sustainable Forestry
P.O. Box 1580
Redway CA 95560

Lost Coast League
P.O. Box 60
Petrolia CA 95558

Mattole Forest and Rangelands Cooperative
(Soilbankers)
P.O. Box 182
Petrolia CA 95558

Mattole Institute
P.O. Box 1189
Redway CA 95560

Mattole Restoration Council
P.O. Box 160
Petrolia CA 95558

Mattole Salmon Group
P.O. Box 188
Petrolia CA 95558

Mattole Taxpayers Association
c/o 1901 Doodyville Road
Garberville CA 95542

Mattole Watershed Alliance
P.O. Box 116
Petrolia CA 95558

Mattole Watershed Protection Association
c/o P.O. Box 153
Whitethorn CA 95589

Mill Creek Watershed Conservancy
P.O. Box 173
Petrolia CA 95558

Sanctuary Forest
P.O. Box 166
Whitethorn CA 95589

Shelter Cove Commercial Fish Marketing
Association
1197 Kings Peak Road
Whitethorn CA 95589

D. Commonly known neighborhood or community associations within the planning watershed.

Whitethorn Grange
Whitethorn CA 95589

Honeydew Volunteer Fire Company
P.O. Box 74
Honeydew CA 95545

Inter-Tribal Sinkyone Wilderness Council
190 Ford Road #333
Ukiah CA 95482

KMUD Radio
973 Redwood Street
Garberville CA 95542

Mateel Community Center
59 Rusk Lane
Redway CA 95560

Mattole Valley Community Center
P.O. Box 72
Petrolia CA 95558

Mattole Valley Historical Society
544 Green Fir Road
Petrolia CA 95558

Mattole Valley Grange
P.O. Box 61
Petrolia CA 95558

Mattole Valley Women's Club
P.O. Box 61
Petrolia CA 95558

Petrolia Volunteer Fire Department
Petrolia CA 95558

Redwood Abbey
Whitethorn CA 95589

E. Chairman, county board of supervisors.

Humboldt County Board of Supervisors Chairman:
Stan Dixon
Humboldt County Courthouse
Supervisors' Chambers, First Floor
825 Fifth Street
Eureka, California 95501

Mendocino County Board of Supervisors Chairman:
Seiji Sugawara
Supervisors' Chambers
Courtthouse
Ukiah, California 95842

F. Chairman, county planning commission.

Humboldt County Planning Commission Chairman:
Dave Kirby
P.O. Box 66
Phillipsville, California 95559

Mendocino County Planning Commission Chairman:
Tom Piper
Planning Commission
Courthouse
Ukiah, California 95842

G. Local manager for any public agency having custodial responsibility for timberlands within the planning watershed.

Bureau of Land Management, Arcata Resource Area - King Range National Conservation Area
and other scattered BLM lands in the Mattole watershed
Lynda Roush, Area Manager,
Gary Pritchard-Peterson, King Range Manager
1695 Heindon Road
Arcata CA 95521

California State Department of Parks and Recreation
District Superintendent Bill Beat
Northcoast Redwoods District Office
600A W. Clark St.
Eureka CA 95501

Humboldt and Mendocino County Unified Schools - scattered "school lands" parcels within the
Mattole watershed

Sinkyone Wilderness State Park, and Shadowbrook, the park rangers' residency
William Wiseheart
P.O. Box 245
Whitethorn CA 95589

Nature Conservancy - parcels near the mouth of the Mattole River, on Moore Hill
Scott Ferguson
785 Market St.
San Francisco CA 94103

Sanctuary Forest (a land trust)
Rondall Snodgrass, Executive Director
P.O.Box 166
Whitethorn CA 95589

State Lands Commission
Steve J. Sekelsky, Public Land Manager
100 Howe Ave., Suite 100S
Sacramento CA 95825

Wildlife Conservation Board
Jim Sarro, Assistant Dire
801 K. St., Suite 806
Sacramento CA 94814

H. District or local representatives for review team agencies.

California Department of Fish and Game
Jim Froland, Ken Moore
619 2nd Street
Eureka CA 95501

California Department of Forestry and Fire Protection

- Mike Howe

324 Alderpoint Road

Garberville CA 95442

- Ernie Roll

P.O.Box 161

Weott CA 95571

North Coast Regional Water Quality Resources Board

Holly Lundberg

5550 Skylane Blvd., Suite A

Santa Rosa CA 95403

USDI Fish and Wildlife Service

Ken Hoffman

1125 16th St. Room 209

Arcata CA 95521

10. A draft notice for newspaper publication containing the information in (a)1-3, a statement that a public hearing will be scheduled before the Board within 60 days of Board receipt of a nomination forwarded by the committee, and a statement that further information can be obtained from the local Department Ranger Unit headquarters.

NOMINATION OF PROPOSED SENSITIVE WATERSHED

A nomination for designating a Sensitive Watershed has been submitted to the California State Board of Forestry for the watershed(s) of the Mattole River located in Humboldt and Mendocino counties.

The nominated area includes Planning Watershed numbers 112.30010, 112.30011, 112.30012, 112.30013, 112.30020, 112.30021, 112.30030, 112.30031, 112.30032, 112.30033, 112.30034, 112.30040, 112.30041, 112.30042, 112.30050, 112.30051, 112.30052, 112.30053, 112.30060, 112.30061, 112.30062, 112.30063, 112.30070, 112.30071, and 112.30072. The Mattole Watershed extends from Township 1 South to Township 5 South, and from Range 2 East to Range 3 West, Humboldt Baseline Meridian and part of Township 24 North, and Range 19 West, Mt. Diablo Baseline and Meridian. The Mattole is not a tributary. The Mattole River is located on the following USGS 7.5 min quadrangles - Bear Harbor, Briceland, Buckeye Mountain, Bull Creek, Capetown, Cooskie Creek, Ettersburg, Honeydew, Petrolia, Shelter Cove, Shubrick Peak, Taylor Peak, and Weott. The nominated watershed covers an area of approximately 194,560 acres.

Based on criteria in Title 14 of the California Code of Regulations, Sections 916.8, 936.8, and 956.8, and the Forest Practice Rules, the Board must determine whether nominated watersheds are "sensitive" to further timber operations on non-federal timberlands. For watersheds classified as "sensitive", the Board must identify specific resources that are sensitive to further timber operations, and specific mitigation measures that will provide the necessary protection of those resources. The

nomination contains detailed information on the fish, wildlife, and vegetation that has been impacted by extensive non-federal timber harvesting and related road-building in the Mattole Basin. Some examples are: chinook and coho salmon, old-growth associated birds, mammals, amphibians, and late-seral habitats themselves. It also details the unique geology and seismic activity of the Mattole watershed that contribute to the sensitivity of the watershed, its soil, and geomorphology. Publication of this notice is part of the notification process. A public hearing will be conducted by the Board within 60 days of receipt of the Committee's recommendation.

Futher information can be obtained from the California Department of Forestry and Fire Protection located at 118 Fortuna Blvd., Fortuna, California. (707)-725-4413.

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Licensed Timber Operators
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Page Two

must be formally adopted by the board in March. As it stands at this date this language will be in effect on May 1, 1994. We will not be sending another copy of these rules to you but will notify you if there are any minor changes by the board, changes required by the Office of Administrative Law, or there is a further change in the effective date. Please retain this copy of the rules for reference.

EFFECT ON THPS NOT APPROVED

The new rules could substantially affect any Timber Harvesting Plans (THP) that you have in the THP review pipeline. If your THP is not approved by the date a rule becomes effective it must be changed to conform to the new rules before it can be approved. An example of a rule that would affect approval is the requirement in the new Late Succession Rule Package that the THP must include habitat structure and other information if late succession forest stands are proposed for harvest. If it appears likely that approval cannot be obtained before the effective date of a given rule package, you will save time by incorporating the new requirements in your original THP.

Since 14 CCR 1032.10 (written and newspaper notice to landowners within 1000 feet downstream of the THP) was adopted by the Board as a requirement for submission and not for approval, a THP submitted prior to March 1, 1994 need not comply with this section. After March 1, when a THP is submitted or resubmitted, it must contain a copy of the written notice, proof of service (a list of names and addresses, and RPF certification of mailing), and proof of publication (a copy of the newspaper notice, including the newspaper name, with the date published certified by RPF).

EFFECT ON APPROVED THPS

If you have an approved plan your attention is called to section 4583 of the Public Resources Code entitled "Standards and rules; conformance of plan; changes or modifications; exceptions." Effectively, the section states that all operations shall conform to any changes in regulation unless prior to the adoption of such changes or modifications substantial liabilities for timber operations have been incurred in good faith and in reliance upon the standards in effect at the time the plan became effective, and the adherence to such new rules would cause unreasonable additional expense to the owner or operator.

The THP submitter has three options regarding compliance with the new rules in an approved plan. First, if

DEPARTMENT OF FORESTRY AND FIRE PROTECTION

P. O. Box 944246
SACRAMENTO, CALIFORNIA 94244-2460
(916) 653-9422



R17

February 22, 1994

TO: ALL REGISTERED PROFESSIONAL FORESTERS, LICENSED TIMBER OPERATORS, AND OTHER INTERESTED PARTIES

FROM: RICHARD A. WILSON, DIRECTOR *RAW*

SUBJECT: NEW REGULATIONS FOR SENSITIVE WATERSHEDS/DOMESTIC WATER SUPPLIES AND LATE SUCCESSIONAL STAGE; NEW SILVICULTURAL REGULATIONS AS CHANGED BY BOARD OF FORESTRY

The following information is provided to keep you current on changes in the Forest Practice Act and the Forest Practice Rules. If there are any questions, or if more detail is needed, contact one of the regional offices of the California Department of Forestry and Fire Protection (CDF).

RULES EFFECTIVE MARCH 1, 1994

The regulations for Sensitive Watersheds/Domestic Water Supplies and Late Successional Stages will go into effect on March 1, 1994. In the attached language the two rule packages are blended together numerically as they would occur within the rules in total. CDF will prepare and present several one day training sessions for Registered Professional Foresters (RPF) on the implementation of the Late Succession rules in the near future. Dates and locations will be announced.

RULES EFFECTIVE MAY 1, 1994

During the February meeting of the Board of Forestry the board delayed implementation of the new Silviculture Rules from March 1 until May 1, 1994, so that changes to the adopted rules made in the January and February meetings would have time to take effect. We have attached a copy of the new rules with the January and February changes incorporated. These changes

Appendix I

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must be formally adopted by the board in March. As it stands at this date this language will be in effect on May 1, 1994. We will not be sending another copy of these rules to you but will notify you if there are any minor changes by the board, changes required by the Office of Administrative Law, or there is a further change in the effective date. Please retain this copy of the rules for reference.

EFFECT ON THPS NOT APPROVED

The new rules could substantially affect any Timber Harvesting Plans (THP) that you have in the THP review pipeline. If your THP is not approved by the date a rule becomes effective it must be changed to conform to the new rules before it can be approved. An example of a rule that would affect approval is the requirement in the new Late Succession Rule Package that the THP must include habitat structure and other information if late succession forest stands are proposed for harvest. If it appears likely that approval cannot be obtained before the effective date of a given rule package, you will save time by incorporating the new requirements in your original THP.

Since 14 CCR 1032.10 (written and newspaper notice to landowners within 1000 feet downstream of the THP) was adopted by the Board as a requirement for submission and not for approval, a THP submitted prior to March 1, 1994 need not comply with this section. After March 1, when a THP is submitted or resubmitted, it must contain a copy of the written notice, proof of service (a list of names and addresses, and RPF certification of mailing), and proof of publication (a copy of the newspaper notice, including the newspaper name, with the date published certified by RPF).

EFFECT ON APPROVED THPS

If you have an approved plan your attention is called to section 4583 of the Public Resources Code entitled "Standards and rules; conformance of plan; changes or modifications; exceptions." Effectively, the section states that all operations shall conform to any changes in regulation unless prior to the adoption of such changes or modifications substantial liabilities for timber operations have been incurred in good faith and in reliance upon the standards in effect at the time the plan became effective, and the adherence to such new rules would cause unreasonable additional expense to the owner or operator.

The THP submitter has three options regarding compliance with the new rules in an approved plan. First, if

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new rule requires a change in his operational methods that constitutes a substantial deviation from his THP, then an amendment to the THP should be submitted to CDF.

Second, if the submitter determines that he/she has incurred substantial liabilities and that he/she will incur unreasonable additional expense by complying with the rules a notice of qualification under PRC 4583 should be sent to CDF. The notice should state the rationale by which the submitter determined that he/she qualified. This notice will not constitute an amendment to the THP.

Third, the submitter may take no action. In this case, CDF will assume that all new rules will be complied with and will inspect accordingly.

An example of a rule in the new Silviculture package that would require compliance even though your THP was already approved is the acreage limitation on Evenaged Management. If your approved THP contained units larger than those allowed in the new rules and you had not already harvested them, you would be required to reduce the unit size, unless you could show qualification under PRC 4583 as explained above. Another example which would require similar consideration is the new requirement that all trees to be cut or left must be marked prior to the commencement of operations.

If you have an approved THP you do not have to comply with new rules that only affected the review of the THP. An example in the Silviculture Package of such a rule is the requirement to show in the THP how Maximum Sustained Production will be achieved by the choice of silvicultural method.

bp

Attachment

916.8, 936.8, 956.8 Sensitive Watersheds (All Districts)

The Board, at a public hearing, shall determine whether nominated planning watersheds are "sensitive" to further timber operations. Classification of a watershed as "sensitive" shall be supported by substantial evidence that a condition, or conditions, exist(s) where further timber operations within the planning watershed will create a reasonable potential to cause, or contribute to ongoing, significant adverse cumulative effect(s) on the resources identified in 916.8(a)(3) [936.8(a)(3), 956.8(a)(3)], and as set forth in Technical Rule Addendum No. 2 (14 CCR 912.9)[932.9, 952.9] and that mitigation of such significant cumulative effects requires the application of protection measures not required by the Forest

Practice Rules. For all planning watersheds classified as "sensitive", the Board shall identify the specific resources which are sensitive to further timber operations and specific mitigation measures that will provide the necessary protection of the sensitive resource(s). A Board finding that a planning watershed is no longer sensitive shall be supported by substantial evidence that such conditions no longer exist. Unless and until a planning watershed(s) is classified as sensitive and any necessary rulemaking is completed, the existing rules shall apply:

(a) **Nomination process:** The Director, local, state, or federal agencies and the public may nominate planning watersheds to the Board and shall provide evidence supporting classification of the watershed as sensitive. The nominator shall discuss the effects that further timber operations will have on the specific resources identified in 14 CCR 916.8(a)(3) [936.8(a)(3), 956.8(a)(3)] which are at risk within the nominated watershed and specify those effects not sufficiently addressed under the forest practice rules and discuss the significance of the effects in light of the condition of the resources in areas adjacent to the planning watershed. Such nominations must be accompanied by the following information, descriptions, documents, or maps as appropriate:

1. Name, approximate size and location of the watershed(s) identified by county, township and range, and name(s) of USGS topographic map(s) on which the planning watershed is found.

2. The name of the higher-order stream, if any, to which the watershed is tributary.

3. Specific resources that are significantly threatened by further timber operations on non-federal timberland in the nominated watershed, including, as appropriate, but not limited to:

A. Fish, aquatic organisms, aquatic habitat, or riparian habitat;

B. Domestic and other water supplies, water quality, other beneficial uses of water existing at the time of nomination or factors related to the stream system and channel morphology.

C. Downstream reservoirs, navigable channels, water diversion and transport facilities, estuaries, and harbors;

D. Wildlife species, or the habitat of species, listed under state or federal law as rare, threatened or endangered, candidate, or sensitive, including discussion of the habitat features threatened by timber operations;

E. Wildlife species with narrow geographic range, low density, low reproductive rates, and highly dependent on localized habitat features, including discussion of the habitat features threatened by timber operations and a discussion of why protective measures are required to prevent a loss of population viability.

4. Natural or management-induced conditions present in the watershed which pose a significant threat to the resources identified in 14 CCR 916.8(a)(3) [936.8(a)(3) and 956.8(a)(3)], above, including, as appropriate, but not limited to:

A. Steep slopes and easily destabilized soils;

B. Continuing landslide or soil erosion problems related to past or ongoing land-use activities;

C. Extensive ground disturbance, particularly associated with roads, skid trails, landings, and watercourse crossings;

D. Accelerated aggradation, streambank erosion, and channel scouring;

E. Changes in the habitat or condition of wildlife species identified in 14 CCR 916.8(a)(3) [936.8(a)(3) and 956.8(a)(3)], above.

F. Accelerated rates of proposed road construction or timber harvesting within a watershed or near streams or springs.

5. Approved Habitat Conservation Plans or other documents approved or under review by public agencies within the nominated watershed which provide for maintenance or improvement over time of management induced conditions within or adjacent to the planning watershed or forest district.

6. Suggested, feasible mitigation measures needed, in addition to current forest practice rules, to provide adequate protection for resources identified in 14 CCR 916.8(a)(3) [936.8(a)(3) and 956.8(a)(3)], above, and to mitigate or avoid new or continuing significant cumulative effects related to timber operations, including, but not limited to, restoration or rehabilitation of degraded resources within any

portion of the proposed sensitive watershed.

7. Other information about the watershed that may assist the Board to evaluate the nomination.

8. Literature citations, expert written opinion, and other relevant sources of information and, where possible, copies of information used to complete the nomination.

9. A list of names and mailing addresses of the following:

A. Landowners of 40 acres or more of lands zoned for timber production in the planning watershed;

B. Public water purveyors and known private purveyors within the planning watershed;

C. Commonly known watershed associations within the planning watershed;

D. Commonly known neighborhood or community associations within the planning watershed;

E. Chairman, county board of supervisors;

F. Chairman, county planning commission;

G. Local manager for any public agency having custodial responsibility for timberlands within the planning watershed; and

H. District or local representatives for review team agencies.

10. A draft notice for newspaper publication containing the information in (a)(1)-(3), a statement that a public hearing will be scheduled before the Board within 60 days of Board receipt of a nomination forwarded by the committee, and a statement that further information can be obtained from the local Department Ranger Unit Headquarters.

(b) Notice Process: The Board shall mail notice of the nominated watershed, as provided in (a)10, to the addresses of parties described in 9 A-H and shall publish the provided notice one time in a newspaper with general circulation in the county containing the planning watershed. Such notice shall be provided following a determination that information contained in the nomination meets the requirements of 14 CCR 916.8(a) [936.8(a) and 956.8(a)], above.

(c) Screening Process: Before consideration by the Board, nominations shall be screened for compliance with the informational requirements by a nominations review committee, which may consist of the appropriate District Technical Advisory Committee or other Board Committee, as determined by the Board. The nominations review committee shall consult with CDF, the appropriate Regional Water Quality Control Board, the Department of Fish and Game, the Division of Mines and Geology, and other(s) as deemed necessary to determine whether the nomination is supported by substantial evidence. The nominations review committee shall then forward a recommendation for approval or denial of the nomination to the Board within 120 days of the date of receipt by the committee, or such longer time provided by the Board. The nominations review committee shall describe its specific reason(s) for recommending approval or denial of the nomination. In the event that the committee forwards a recommendation for approval, it shall describe the substantial evidence which supports nomination, including specific reasons why the current forest practice rules are inadequate to protect the specific resources at risk and shall provide the following information:

1. A list of which resource is threatened and by which timber operations;
2. If possible, performance standard(s) for timber operations that will avoid or mitigate new or continuing significant cumulative effects;
3. Additional information that is needed for evaluating the impacts of proposed timber operations and is to be included in harvesting plans submitted in the planning watershed;
4. On-site mitigation measures in addition to the current forest practice rules, which can be required by the Director to mitigate the impacts of timber operations within the watershed;
5. Offsite mitigation measures that can be applied within or outside of the sensitive watershed area to offset adverse on-site impacts of timber operations. If such mitigation measures are proposed to protect the resource discussed in subdivision (a)(3)(A) and (B), they must occur in the same drainage. Such measures may include, but are not limited to, voluntary mitigation agreements among ownerships.
6. If needed, recommended alternatives to evaluate the implementation and effectiveness of mitigations required under this section.
7. Exemptions for ownerships, emergencies, or land-use classifications that are different than those

provided in the current forest practice regulations and that may be applied in the watershed.

(d) Public hearing Process: The Board shall consider the recommendations of the nominations review committee at a public hearing on classification of the planning watershed, which will be held within 60 days of receipt from the committee. The watershed nomination and recommendations of the committee will be made available to the public between the date of receipt by the Board and the public hearing. Recommendations adopted by the Board which have the effect of a regulation shall be processed in accordance with the Administrative Procedures Act (Section 11340, et seq. Gov. Code).

State of California

M e m o r a n d u m

Date: November 4, 1994

To: Mr. Mike Howe
CDF
118 Fortuna Blvd.
Fortuna, CA 95540

From: Department of Fish and Game

Subject: Timber Harvest Plan (THP) 1-93-537 HUM

Dear Mr. Howe,

Department of Fish and Game (DFG) personnel have completed review of THP 1-93-537 HUM. This THP was reviewed previously by DFG and a pre-harvest inspection (PHI) report was completed on January 13, 1994. The THP is being proposed by The Pacific Lumber Company (TPL) and is located in the North Fork Mattole River sub-drainage, tributary to the Mattole River. The proposed plan will affect approximately 121 acres of habitat dominated by late-seral Douglas-fir forests. The proposed plan occurs in 5 distinct units.

The issues investigated at the time of the first submission of the plan were late-seral habitat, late-seral habitat dependent or associated species, watercourse protection, snags and snag recruitment, downed woody debris, and zero-net-discharge (ZND) of sediment to watercourses. These same issues were the focus of this review with emphasis added to ZND and late seral cumulative impacts. The additional issue of mitigation banking was discussed during the review but requires further discussion between the agencies party to the ZND recommendation made for the Mattole watershed, and TPL.

As a result of a pre-second review team meeting held on October 18, 1994, the following items were agreed to by TPL and are only paraphrased here. A final description of these mitigations to be made part of the THP will be submitted for the record by TPL.

- 1) Expanding the Watercourse and Lake Protection Zones (WLPZ) on all Class II watercourses to a minimum of 100' feet; Establishing a 25' foot no-cut area along all Class II watercourses in addition to leaving all hardwoods in the zone; and establishing a minimum 50 foot Equipment Exclusion Zone (EEZ) on all Class III watercourses. Selected trees may be felled from the Class II no-cut areas but only to facilitate yarding operations.
- 2) TPL will conduct Northern Goshawk surveys in the spring of 1995, prior to beginning operation of this plan and will consult with DFG on methodology and station locations prior to commencing. Surveys in 1995 will represent the second of a consecutive two year survey.
- 3) DFG will be contacted and provided an opportunity to conduct a post-harvest inspection prior to the filing of a completion report to CDF.
- 4) All trees which have or show evidence of having a red tree vole nest will not be felled. Trees which have interlocking branches with trees that have or show evidence of having a red tree vole nest will not be felled. Operators will require specific training

Mr.

November 4, 1994

Page 2

in red tree vole nest identification or trained personnel should pre-mark the stand.

5) Snags felled for safety or fire safety purposes will not be removed from the site but will be retained as large downed woody debris.

LATE-SERAL FOREST HABITATS/CUMULATIVE IMPACTS

In evaluating cumulative impacts to late-seral forest habitats the ecological value of the habitat should be considered. The more uncommon or rare in terms of availability, the more fragmented, or isolated (i.e. lacks connectivity) the habitat, the greater its ecological value. Since many rare fish and wildlife species tend to occur in rare habitats, these habitat have greater ecological value than perhaps other more common habitat types.

The scale of analysis when considering ecological value is also important. Depending on the habitat type and the species of concern, especially those dependent or associated species which have specific habitat requirements involving a particular habitat type during all or a significant portion of their life cycle, the size or scale of the assessment area will need to be fitted to the particular species needs, and the availability of suitable habitat. In other words, the assessment area for evaluating habitat dependent cumulative impacts will correlate to the size of the area actually used and availability for use by dependent species.

Finally, the thresholds of significance, or the maximum amounts of change the habitat can endure and still function biologically is a critical fact for measuring cumulative impacts. If over time, a habitat type is lost or modified to where it no longer provides suitable habitat for dependent or associated species, impacts have exceeded the threshold of significance. Any additional loss or modification that would further render it unsuitable or reduce its capacity for recovery, or compound its already degraded condition, would indicate cumulative impacts have and are occurring. Thresholds are not static, but rather change based on the differing levels of sensitivity, i.e. use and availability, for individual or groups of species.

For late-seral habitat, our concern is usually focused on the degree of fragmentation within stands capable of supporting dependent species, connectivity between stands of similar ecological value, and reduction of areas capable of supporting the same dependent species, and the likelihood that the threshold of significance is being approached or has already been exceeded for each of these.

The distinction between late-seral habitat and ecological "old-growth" is a point needing clarification. Late-seral habitat when discussed with regards to late-seral dependent or associated species is really referring to ecological "old-growth". When the BOF references WHR (Wildlife Habitat Relationship) it is referring to the DFG computer based model used to predict the correlation between species and their habitats, or changing habitats. The BOF has used WHR to define late-seral habitat as being those forest which have trees which could be classified as "WHR Types 5M, 5D, and 6".

"Type 5" refers to forests with trees having an average diameter (diameter breast height or DBH, as determined by the quadratic mean diameter method) greater than 24" inches. The canopy cover is either "M" for moderate (40-59%), or "D" for dense (60-100%). "WHR Type 6" refers to a multi-layered forest that has type "5" trees in the overstory and type "3" - "4" (12"-24"DBH) trees in the understory, and a canopy cover exceeding 60%.

One failing of the use of the WHR classification system to predict or define late-seral habitat is that it pertains to size class and canopy cover and ignores age. It may be logical to conclude a larger diameter tree is older than a smaller diameter tree unless, its a poor growing site, or a slow growing tree species, or the trees are being out competed for limited growing space, nutrients, or water.

The consequence of applying the WHR habitat classification to define forest ecosystems is that all ecological old-growth forests could potentially be classified as "WHR Type 5M, 5D or 6", but all "WHR Type 5M, 5D or 6" forests will not necessarily function as ecological old-growth. In considering cumulative impacts to late-seral forest habitat it is essential to recognize if the analysis needs to be focused towards "ecological old-growth", that is specific forest attributes which develop over time need to be considered, as is the case for this particular plan, or if potential impacts are more related to tree size and canopy cover.

The sensitivity related to late-seral forests is farther reaching than its importance to late-seral forest dependent or associated species. Socio-economic and political realities lead the Board of Forestry to promulgate rules pertaining to late-seral forest in light of these realities and because of the inherent ecological value, and biological significance of this unique but vanishing resource. The rule, 14 CAC 919.16, Late Successional Forest Stands, requires discussion in the THP of how proposed harvesting will affect existing functional wildlife habitat for species primarily associated with late-successional stands in the plan, including impacts on vegetation structure, connectivity and fragmentation. A list requiring several informational items and analysis to be provided by the plan proponents [items (a)(1-6)], is contained in the rule. Together, the additional information and analysis would enhance understanding of particular habitat issues under review and enable complete consideration of any potential for project related impacts and judgement of mitigation adequacy by the reviewing public and government agencies.

TPL did not specifically address the informational requirements of 14 CAC 919.16, but rather included an index to the THP where the information was supposed to be contained. Lacking was a statement of objectives over time for late-seral forest habitats on the ownership, a discussion of the affects of this plan to existing functional wildlife habitat, and an analysis of anticipated long-term significant adverse effect on fish, wildlife and listed species known to be primarily associated with late-successional forest. The reason TPL did not specifically address 14 CAC 919.16 is because they concluded there would not be a significant reduction of the amount and distribution of late-successional forest stands, therefore not triggering subsection (a) of 14 CAC 919.16. TPL's conclusions are supported only by addition of reference material without any meaningful analysis of the material.

Limiting the effectiveness of 14 CAC 919.16, subsection (a) pertains only to those plans which as proposed will "significantly reduce the amount and distribution of late-successional forests stands or their habitat value so that it constitutes a significant adverse impact on the environment". Unfortunately, thresholds available to gauge significant reductions in late-seral habitat within a defined area do not exist within the context of the rules. As referenced in our January 24, 1994 PHI report for this plan, 15% is commonly thought as a defensible threshold of concern for late-seral forest habitats when considering cumulative impacts if equal amounts of forest exist in the other seral stages within the assessment area. The percentage of forest needed in each seral stage (WHR Types: Seedling Tree, Sapling Tree, Pole Tree, Small Tree, Medium/Large Tree, Multi-layered Tree) is actually more correctly determined depending on a complex of conditions including differences in vegetative communities driven by physical conditions such as elevation, aspect, and soil type; the historic or natural range of variability between habitat types within the assessment area; and the spacial and dispersal requirements of dependent species.

Considering the complexity of the issue it is understandable why the BOF and CDF have had little success in defining a threshold which could be applied universally. With dependence on such a wide range of variables, a universal threshold could not be applied to all habitat types, vegetative types, growing regions, and species needs, without raising questions of adequacy or inadequacy by all interested parties. It is for these reasons, where late-seral issues exist, thresholds be established for an interim period, and adjusted as science provides greater knowledge. Through this process of fine tuning, the resource will benefit from "intelligent tinkering" rather than blindly following the same path, looking at landscape issues on a plan by plan basis.

The CDF has applied a policy based on its interpretation of the Rules where they believe there will not likely ever be a situation where harvesting late-seral forests will be considered a "significant effect" unless an endangered species concern exists. This was first encountered during the review of TEP 1-93-311 DEL. DFG determined that although surveys of the plan area did not produce detections of late-seral dependent species, the habitat was once functionally suitable to support late-seral dependent species. Loss of late-seral habitat and the fragmented distribution of remaining habitat patches was resulting in cumulative impacts that were now rendering the area unsuitable for those species dependent upon late-seral forest habitat. Clearly, the threshold of significance had been passed. CDF in the Official Response, dated October 5, 1994, stated:

"The remaining functional habitat within and adjacent to the ownership has been fragmented to the point that there is no functional habitat. Considering the Department of Fish and Game's own interpretation of the conditions and observation of the absence of species which may be late-seral dependent, no significant adverse or cumulative impacts are expected to occur."

This statement by CDF effectively narrows the definition provided by the California Environmental Quality Act (CEQA) for cumulative impacts, which states, "Cumulative Impacts" refers to two or more individual effects which, when considered together, are considerable or which compound or increase

other environmental impacts. Without recognizing the potential for impacts from current proposed projects, to compound existing cumulative impacts which resulted from past projects, and to justify this interpretation based on the absence of species, which is the primary consequence of loss or fragmentation of habitats and which is the essence of the environmental adversity being effected, leaves the resource clearly unprotected. Without clear guidelines pertaining to the threshold at which significance will be acknowledged and appropriately mitigated, there will essentially never be a point when cumulative impacts will be significant, if above the threshold there are no cumulative impacts, and below the threshold resources are already degraded to the point they are no longer worth protecting.

Harvesting of late-seral forests is unarguably an adverse impact for late-seral forest habitat dependent species. The point at which this impact becomes significant if left unaddressed, and may be exceeded unwittingly, rendering yet additional late-seral dependent species extirpated from an area or endangered with extinction. The lack of presence of those species commonly found in late-seral forest habitats, such as the proposed plan area, and within the same geographical area, may be an indicator that significant cumulative impacts have and are continuing to occur. If this is indeed the case, and DFG believes it is, it is occurring without recognition on the part of the lead agency, CDF, or the BOF, as demonstrated by the lack of any defining guidance towards a recognizable threshold at which loss or fragmentation of late-seral forest habitats is or becomes a significant impact on the environment.

A clearly defined and unambiguous threshold is therefore needed to allow agencies and the public to fulfill their responsibility in applying a test for significance to this plan, and all future plans affecting similar late-seral forest habitats. CEQA Section 21000 (d), describes the intent of the Legislature and responsibilities of State agencies to "take immediate steps to identify any critical thresholds for the health and safety of the people of the state and take all coordinated actions to prevent such thresholds from being reached". CDF may, pursuant to PRC 4555, rectify such inadequacies as the lack of thresholds of significance for late-seral forests, when "substantial questions exist concerning whether the intent of this chapter (Z'berg-Nejedly Forest Practice Act of 1973) is currently provided for in the rules and regulations of the board, and that approval of a timber harvesting plan which has been filed could result in immediate, significant, and long-term harm to the natural resources of the state.

"Substantial questions" do exist regarding thresholds of significance pertaining to late-seral forest habitats for this THP and others as well. DFG believes a reasonable argument can be made to support the premise that in the State of California, with over 95% of the late-seral forest habitat having been harvested, and with the majority of harvesting having occurred over the last 100 years, and with recovery time requirements of 150-200 years needed to begin developing functional late-seral forest habitats, that it is logical to conclude, species dependent or closely associated with late-seral forests have been significantly and detrimentally impacted. This conclusion is further supported by the number of late-seral forest dependent or associated species that have either been listed as threatened or endangered or are proposed for listing as threatened or endangered status by the State Fish and Game Commission or the U.S. Fish and Wildlife Service, species such as the

Northern spotted owl, the marbled murrelet, coho salmon, Pacific fisher, Southern seep salamander, Northern goshawk, tailed frog, Del Norte salamander, and the red-tree vole.

The CDF in contrast has stated it does not foresee any circumstances in which a plan would be denied based on an argument that cumulative impacts to late-seral forest habitat is occurring except when an already listed species is directly affected. Commonly, CDF's gauge to determine if significance impacts are occurring is whether significant impacts are occurring on-site or in a narrow assessment area. They reason, if significant impacts are not occurring on-site, how then can they be occurring off-site. This particular reasoning fails to recognize or acknowledge the incremental effect of cumulative impacts. A single harvest plan alone may not cause cumulative impacts, but several or numerous plans in the same drainage may.

The issue of defining thresholds for cumulative impacts assessments was recognized by the Wildlife/Scientific Committee for the BOF in it's recent report, Approaches to Wildlife Cumulative Effects Assessment and Analysis, September, 1994 (attached). The report contains the following statements:

"Forest Practice Rules alone do not determine future forest conditions. Implementation of current Forest Practice Rules could lead to a wide range of future outcomes at the stand and landscape level."

"The Forest Practice Rules by themselves are not likely to constrain the landscape within bounds clearly linked to conditions that avoid cumulative impacts."

"The Rules are very specific regarding the fate of certain habitat attributes (e.g., nests trees) and therefore would appear to be susceptible to modelling. However those rules are triggered only by the discovery of such attributes. The likelihood of finding an attribute depends on the level of effort expended in searching for it yet the Rules provide no standard for level of search effort."

"Rules highlight the importance of attributes such as sediment, water temperature, organic matter, hardwoods, and late-seral habitat continuity but provide little guidance regarding appropriate levels of these attributes."

"The Rules defer critical policy decisions on thresholds or desired conditions to local groups of resource professionals. Without better guidance from authorities at the state level on critical issues of thresholds or desired conditions, such delegation opens the door to quite different outcomes depending upon the nature of the local professional groups."

"The process engaged to determine an appropriate ecosystem indicator should therefore also specify the appropriate scale for its use. At least four different geographic scales could be useful: the project site (1-100 acres), a sub-watershed (100-10,000 acres), the river-basin or topographic unit (10,000-100,000 acres), and the bio-region or species range (100,000 + acres)."

While the level of precision in which absolute threshold cannot be defined, scientific knowledge has adequate experience to develop working guidelines which, over time, can be refined to reflect new knowledge. To abrogate the issue due to lack of absoluteness perpetuates the ineffectiveness of the timber harvest review process. The Little Hoover Commission, in its report to the Governor, Timber Harvest Plans: A Flawed Effort to Balance Economic and Environmental Needs, June 1994, states:

"Finding #1. The current Timber Harvest Plan process is complex, inequitable and costly, producing frustration for the administering state departments, the timber industry and environmental advocacy groups."

and

"Recommendation #1. The Governor and the Legislature should direct the Board of Forestry to develop integrated policies and guidelines -- in consultation with the Department of Forestry and Fire Protection, the Department of Fish and Game, the timber industry and environmental groups -- to govern wildlife, fish and plant issues raised by Timber Harvest Plans."

Clear direction upon which to base decisions of project significance are needed. With this direction, uncertainty pertaining to whether the resource is being protected, and whether a landowner can harvest his timber, or what he might anticipate during review of his THP, can be resolved. The direction must be science based and implemented before ecosystems and species have been pushed beyond the point of recovery.

DFG has requested from TPL, among other items, its available information on the late-seral habitat within a 100,000 acre assessment area surrounding the proposed plan. This information was requested to permit DFG to assess the potential impacts from fragmentation, and/or lack of connectivity, which may exist or occur as a result of the proposed plan. On October 27, 1994, TPL provided DFG with additional information summarizing the acreage of late-seral forest habitat. TPL concluded based on its available information roughly 17,712 acres or 17.7% of the 100,000 acre assessment area was late-seral forest. Unfortunately, TPL did not provide a map showing the relative location of these habitat areas to the proposed plan area which would allow analysis of the degree of inter- and intra-stand fragmentation and the juxtaposition or habitat linkages between these areas.

DFG's knowledge of the Mattole River Drainage suggests late-seral habitats are highly fragmented, and isolated from other areas of similar habitat. Much of the habitat while suitable for species known to use late-seral redwood and Douglas-fir forests, do not actually support dependent species or they are extremely rare. The marbled murrelet for instance, is unexpectedly absent from the Mattole/Bear River drainages even though suitable habitat exists. The Northern spotted owl, less a habitat specialist during drought conditions, has opportunistically made use of the abundant second growth. It is unknown at this point, but this strategy may be only temporarily successful. The Northern goshawk and Pacific fisher are also very rare, but have never been considered common in the area. The Southern seep salamander, tailed frog and coho, are all species which may not be late-seral habitat

dependent per se, but are extremely susceptible to disturbance. Therefore, late-seral habitats tend to provide better and more stable habitat due to the low disturbance factor affecting water quality as opposed to areas recently harvested or intensively managed. Red tree voles are considered old-growth dependent species although many researchers have observed their use of young-growth forest structure similar to that reported for Northern spotted owls. Red tree voles were surprisingly absent from the THP assessment area in all seral stage forests.

ZERO-NET DISCHARGE

The THP has identified nineteen locations which require remedial treatment to reduce ongoing sediment input into the North Fork Mattole River drainage. These locations were identified by consultants to TPL, Mr. Danny Hagens and Dr. Bill Weaver, both recognized erosion control specialists. The THP includes their respective reports base on limited field investigation, both described as preliminary with regard to the findings and conclusions.

The method developed by TPL to identify a "sediment yield" budget, and to identify locations for remedial action is commendable. The effort to seek expert advice and incorporate the findings, although preliminary, indicates a willingness on the part of TPL to cooperate in the protection of valuable and sensitive natural resources. TPL estimates a total of 1,198 cubic yards of sediment could potentially be delivered into the Mattole, Bear, and Fel River drainages from all potential sources during lawful operation of this plan.

DFG's concerns regarding the zero-net aspects of the plan is the lack of a mechanism to monitor the effectiveness of mitigations over time, and the lack of a formal process in which to "bank" mitigation credits to be applied to future plans.

Monitoring, or lack thereof has been one of the greatest failings of timber harvest plan mitigation. Mitigation measures proposed to reduce a potentially significant impact to a level of non-significance may not always work. When mitigation measures are not effective in reducing the level of significance of a potential impact, adjustments need to be made. Through effective monitoring, for example, the adequacy of mitigating sediment input in an already highly degraded aquatic system, such as the Mattole, on a one to one basis can be evaluated. Adjustments of this ratio to better offset project impacts may be necessary but unknown without a required analytical validation of the effectiveness of these mitigations. Referring again to the Little Hoover Commission Report, it states:

"Recommendation #8. The Governor and the Legislature should enact legislation to direct the Department of Forestry and Fire Protection to draft a plan within one year for shifting priorities from plan review to performance monitoring, feedback on effectiveness of requirements and enforcement activities."

Although it may be premature to expect the draft plan at this date, the Little Hoover Commission, has come to a parallel conclusion in addressing the need for monitoring in their report.

Mitigation banking is becoming a useful tool for landowners and resource managers and providing an empirical approach to offsetting project impacts. The process of mitigation banking simply allows a landowner to "fix" existing problems or potential problems, and receive credit for fixing them. The term "credit" refers to some amount that can be banked, and is quantified based on, for example, the amount of sediment kept from entering the creek, or snags left on the landscape, or another habitat variables. Credits are then used as current or future project impacts as they occur.

This plan suggest the concept of mitigation banking but does not include a process to account for the credits, or recognize that not all problems which occur on the landscape if fixed will receive credit. For instance, several of the nineteen sites identified by TPL for remedial treatment were created on timber harvest operations conducted over the past few years. These problems have occurred following current or formerly current Forest Practice Rules. The THP identified that from these sites, 713 cubic yards of fill have already entered the watercourses, and that a future erosion and that a future erosion potential exist in the amount of 4,430 cubic yards. The THP reduces this amount by calculating the yield of sediment which would actually enter the creek, based on an arbitrary "mid-point" figure, to roughly 2,637 cubic yards of sediment.

The issue of whether credits should be allowed for these projects needs to consider if these problem could be fixed by another motivation, either required by the rules, or from responsible and ethical land stewardship, or enforcement of other laws.

In discussion with CDF, only one site (Site #1) is associated with an active plan (THP1-92-281 HUM) being operated by Sierra Pacific Industries. This plan uses as an appurtenant road, the road involving Site #1. Although not a violation of the Forest Practice Rules, even though it has delivered approximately 60 cubic yards of sediment into a creek, with 150 cubic yards of additional sediment in a position to enter the creek, Fish and Game Code Section 5650 may be applicable. All other sites originate from THP's operated beyond the statute of limitations to initiate enforcement actions under the Forest Practice Rules.

The actual occurrence, and the future potential for these problems to result despite lawful operation of a THP following the Forest Practice Rules suggests the premise of Best Management Practices (BMP's) upon which the Rules are based, are not effective. If preliminary, and cursory field investigation by TPL's consultants can lead to the discovery of nineteen sites with the potential to deliver a total of nearly 5,000 cubic yards of sediment into the creeks, and many of these nineteen sites were created recently during the lawful operation of THP's, the conclusion suggesting inadequate rules, or rule mis-interpretation is appropriate. A review of the adequacy of BMP's for erosion control, in light of the disclosures made in this plan, and the sizable estimate of sedimentation now occurring if the 1,198 cubic yards of sediment estimated from this plan were extrapolated to the 400+ THP's process each year on the coast, should become a high priority for anyone hoping to avoid future endangered listings of aquatic dependent species.

RECOMMENDATIONS

1. Develop a monitoring plan which will measure the effectiveness of the mitigation measures incorporated into this plan to meet zero-net-discharge. This recommendations is necessary to establish confidence in the concept of mitigation banking and ZND mitigation adequacy.
2. Formalize a process for mitigation banking. A memorandum of understanding should be prepared with participation from CDF, RWQCB, DMG, and DFG.
3. Incorporate all recommendations from the first DFG PHI report dated January 13, 1994.

CONCLUSIONS

Notwithstanding incorporation of recommendations 1-3, DFG has concluded this THP does not provide adequate information upon which to evaluate cumulative impacts to late-seral forest habitats. This conclusion is based on our understanding that TPL cannot provide the information, or the information does not exist (although we know more information is available to TPL than provided), for DFG to evaluate adequately if cumulative impacts area occurring. Potentially significant cumulative impacts are likely occurring as a result of late-seral habitat fragmentation within individual stands and connectivity between stands appears to be lacking to the degree dispersal of animals is being hindered detrimentally possibly beyond a threshold of significance which could lead to immediate, significant and long-term impacts to the environment. The assessment area used for analysis by TPL is not adequate to evaluate the potential for impacts to occur over broader regions and therefore would not reveal a true measure of significance.

The issue of significance cannot be addressed without measuring this plan against a threshold at which point significance occurs with regards to late-seral forest habitats. The 13,857 acre assessment area will maintain 26.3% late-seral habitat post-harvest, while the 100,000 area assessment area will have 17.7% late-seral forest habitat post-harvest. Evaluation of these data have limited value without guidance and reference to an appropriately sized assessment area for evaluating late-seral forest habitats and without first establishing the threshold below which immediate, significant and long-term impacts occur to late-seral forest habitats or late-seral forest dependent or associated species. A determination that this plan conforms to 14 CAC 898.1 (c)(1) cannot logically be made without first defining significance.

DFG recommends that the recommendation to the Director of CDF for this THP be to disapprove this plan pursuant to 14 CAC 898.2 (c), in that the information in the plan is incomplete and is therefore insufficient to evaluate significant environmental effects. As an alternative to this recommendation, we encourage a recommendation to the Director of CDF requesting delay of final decision on this plan pending an emergency determination pursuant to PRC 4555. Clear guidance for determination of a significant threshold for late-seral forest habitats and the appropriate scale to assess potential impacts should be requested of the BOF.

11.
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Department of Fish and Game personnel are available to discuss this plan or the issues raised further. Please contact Mr. Mark Stopher, telephone (916) 225-2275 or myself, telephone (707) 441-5669.

Sincerely,



Armand G. Gonzales
Environmental Specialist III

memorandum

To : William Imboden, Chief
California Department of Forestry
and Fire Protection
Region I
P.O. Box 670
Santa Rosa, CA 95402

Date : June 13, 1990

From : Department of Fish and Game - Region 1
601 Locust Street, Redding 96001

Subject: Department of Fish and Game Concerns Over Cumulative Adverse
Impacts to Fishery Resources in the Mattole River Drainage

The Department of Fish and Game (DFG) has recently completed an analysis of available data regarding anadromous fish stocks and habitat conditions in the Mattole River watershed. We have found that fish populations in the drainage are severely depressed because the carrying capacity of the habitat has been seriously degraded. This degradation is most likely due to cumulative adverse impacts caused by a variety of land use practices. These include timber operations, residential development, private road construction, agricultural operations and others. Natural events such as large wildfires and flood events have no doubt also played a major role. The primary impacts to the fishery has resulted from sedimentation problems caused by erosion in this sensitive watershed, loss of large woody debris for instream cover and increased summer water temperatures due to removal of protective streamside shade canopy.

Based on our analysis and first hand knowledge of the area, the Mattole River drainage appears to be severely impacted. Many of its tributaries have sediment in storage and continue to erode due to land management practices and natural processes. In some areas, there is evidence of siltation of spawning gravels as well as in-filling of pools and streambed aggradation. Water temperatures are warm due to the absence of or a significant reduction in shade canopy. Water flow over silted gravels which absorb solar radiation also contributes to the problem. The lack of large woody debris stream results in fewer plunge pool habitats for supporting fish during low flow periods. Domestic water use appears to be responsible for decreasing flows in some tributaries. Some streams still contain moderate migration barriers occasionally preventing fish from reaching suitable habitat upstream. Many streams that now support steelhead, which can tolerate warmer water temperatures, could and should be supporting salmon except for the above conditions.

Coho salmon are the most habitat-limited species in the Mattole. They require cool pools scoured by water flow over woody debris or rock outcrops. Because much of this habitat has been lost in the lower reaches of the Mattole, most of the remaining coho population now exists in the headwaters and its tributaries as well as Mill Creek near Petrolia.

June 13, 1990

Studies of the Mattole estuary are being conducted as part of a cooperative research effort between the United States Bureau of Land Management and Humboldt State University which began in 1984 and will continue until 1991. Preliminary evaluation of this data indicates that the estuary habitat is severely limited for over-summering chinook in the coastal lagoon. Lower Mattole water temperatures are too warm to provide refuge for chinook or coho, and pool habitat is limited. These conditions add to the overall inability of fish to survive in the Mattole system.

Salmon spawning counts are made by the Mattole Watershed Salmon Support Group (MWSSG) in conjunction with Coastal Headwaters Association personnel, often with DFG administered funds. The data consists of actual fish counts which are reflective of population trends.

The Mattole adult chinook and coho escapement data as presented by the MWSSG for the period of 1981-1989 is as follows. Klamath River fall-run chinook escapements are included for comparison.

<u>Year</u>	<u>Mattole River</u>		<u>Klamath River</u>
	<u>Chinook</u>	<u>Coho</u>	<u>Chinook</u>
1981	3,000	500	77,300
1982	1,800	600	65,000
1983	1,200	240	56,800
1984	1,000	350	45,600
1985	600	300	63,400
1986	800	275	192,400
1987	1,500	1,000	204,100
1988	600	275	186,200
1989	150	50	122,500

Clearly a decline is evident for Mattole stocks over the decade when compared to the Klamath River stocks.

The lack of increase in Mattole stocks indicates the fishery is not responding to reduced harvest quotas in the ocean fishery like the Klamath stocks did. This and other information leads us to conclude that present degraded habitat conditions in the Mattole are a critical key factor causing decline in the fish population.

We recommend that when reviewing timber harvest plans (THPs), including those currently in the review process, all of the reviewing agencies should be looking for the maximum protection possible to avoid any erosion resulting in subsequent

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sedimentation of streams, loss of any existing large woody debris (including potential sources for recruitment) for instream cover and any increased water temperatures. We also recommend that THP submitters be requested to provide plans for eliminating or significantly decreasing existing erosion and discharge of sediment from areas occurring both within the THP area or off-site. Such action would help offset sediment discharge that is normally expected to come off a THP site even when all of the available best management practices are in place and presumably implemented on the ground.

In the THP review process, we recommend an overall objective which achieves at the very least a net zero discharge of sediment to watercourses, retention of existing large woody debris (including potential sources for recruitment) and no further increases in summer water temperatures within the Mattole system.

The DFG believes these extraordinary measures are now necessary because it appears the anadromous fishery resource dependent on the Mattole River watershed is very sensitive to further degradation. The legislature has directed us by specific mandate (SB2261) to double existing anadromous fishery resources within this State by the year 2000. Maintaining and ultimately restoring the Mattole River watershed for that purpose is crucial for achieving that goal.

This approach must be a cooperative effort among all of the various federal, state and local agencies, private landowners and public interest groups, all of which stand to benefit from the protection and restoration of the Mattole watershed. To this end we will be contacting other agencies and interested parties in the near future to begin recommending a similar protective approach as an integral part of their regulatory or management activities.

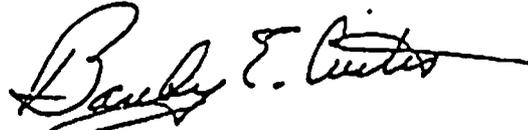
The position we have taken here regarding impacts to the Mattole River watershed and the condition of the fishery is based on the best available information we have at this time. We will further analyze and refine our position as additional and more current information becomes available concerning this drainage.

Mr William Imboden

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If you have any questions regarding these comments, please contact me directly at ATSS 442-2363 or Gary Stacey of my staff at ATSS 442-2371.



Banky E. Curtis
Regional Manager

cc: Ross Johnson, CDF, Sacramento
Steve Wert, CDF, Fortuna
North Coast Regional Water Quality Control Board
Humboldt County Planning Department
Mendocino County Planning Department
Bureau of Land Management, Ukiah

TABLE 1. NORTH COAST HISTORIC EARTHQUAKES OF MAGNITUDE ≥ 5.5 AND/OR INTENSITY $\geq VI$.

Location	Date	M	MMI	Lat. °N	Long. °W	Reference
Eureka area (wharf sank 4 feet, or 1.2 m)	10/23/1853	(5.7)	VII	40.80	124.20	Toppazada and others, 1981
Eureka (affected flow of streams, milk thrown from pans)	3/20/1855		VI			Townley and Allen, 1939
Eureka	6/14/1857		VI			Townley and Allen, 1939
Humboldt Bay (damage to plaster and chimneys)	11/13/1860	(5.7)	VII	40.80	124.20	Toppazada and others, 1981
Eureka (damaged brick houses, fissure near Fort Humboldt)	10/1/1865	(5.4-5.7)	VII-VIII	40.80	124.20	Toppazada and others, 1981
Petrolia (chimneys damaged in Rohnerville and Petrolia)	3/2/1871	(5.9)	VIII	40.40	124.20	Toppazada and others, 1981
Crescent City (damaged most buildings in Crescent City, landslides)	11/23/1873	(6.7)	VIII	42.00	124.00	Toppazada and others, 1981
Southeast of Eureka	9/30/1875	(5.8)	VII	40.70	124.00	Toppazada and others, 1981
West of Brice land (knocked down all chimneys in Petrolia)	5/9/1878	(5.8)	VIII	40.10	124.00	Toppazada and others, 1981
North of Hoopa	1/28/1884	(5.7)	V	41.10	123.60	Toppazada and others, 1981
Petrolia (chimneys down in Ferndale and Petrolia)	7/26/1890	(6.0)	VII	40.33	124.25	Toppazada and others, 1981
Near Miranda (chimneys down in southern Humboldt County)	9/30/1894	(5.6-5.8)	VII	40.30	123.70	Toppazada and others, 1981
Offshore Arcata (damaged mill in Eureka)	4/16/1899	(6.4)	VI	41.00	124.40	Toppazada and others, 1981
Offshore Eureka	12/9/1903		V-VI	40.80	124.20	Woodward Clyde, 1980
*San Francisco (rupture began near San Francisco and extended north possibly to Shelter Cove; damage throughout Humboldt Bay region.	4/18/1906	8.3	XI	37.70	122.50	Real and others, 1982
*McKinleyville (chimneys fell in Ferndale)	4/23/1906		VII	41.00	124.00	Real and others, 1982
Offshore Eureka	8/11/1907		VI	40.80	124.20	Toppazada and others, 1978
*Eureka (chimneys fell)	8/18/1908	5.0	VII	40.83	124.17	Simila, 1980
*Petrolia (damaged chimneys)	5/18/1909		VIII	40.25	124.17	Simila, 1980
*West of Scotia (much damage in Rohnerville & Upper Mattole)	10/29/1909	6.4	VIII	40.58	124.17	Simila, 1980
Offshore Petrolia	3/19/1910	6	V	40.83	124.17	Bolt and Miller, 1975
Offshore Cape Mendocino	12/31/1915	6.2-6.5	III	41.00	126.00	Bolt and Miller, 1975
*West of Ferndale	7/5/1916	4.5	VI	40.58	124.25	Bolt and Miller, 1975
Offshore Arcata	7/15/1918	6.0-6.5	VI	41.00	125.00	Bolt and Miller, 1975
Eureka (chimneys fell)	9/15/1919		VI	40.80	124.20	Simila, 1980
Offshore Cape Mendocino	1/26/1922	6.0	I	41.00	126.00	Real and others, 1982
*Offshore 37 miles (60 km) west of Arcata (felt in San Jose, California, and Oregon and Nevada)	1/31/1922	7.3-7.6	VI	40.87	125.35	Smith and Knapp, 1980
*Offshore Cape Mendocino (buildings damaged in Petrolia area)	1/22/1923	6.5-7.3	VIII	40.30	124.50	Smith and Knapp, 1980
Offshore, west of Orick	6/4/1925	6.0	I	41.50	125.00	Bolt and Miller, 1975
80 miles (130 km) west of Eureka	12/10/1926	6.0	I**	40.75	126.00	Bolt and Miller, 1975
*Offshore of Arcata (chimneys fell, landslides)	8/20/1927	5.0	VIII	41.00	124.60	Bolt and Miller, 1975
*Eureka (chimneys fell)	9/23/1930	5.0-5.5	VII	40.80	124.20	Bolt and Miller, 1975
Offshore Cape Mendocino	12/11/1930	5.0	VI	40.08	124.50	Bolt and Miller, 1975
Offshore Cape Mendocino	3/10/1931	5.6	V	40.00	125.00	Real and others, 1982
Offshore Cape Mendocino	8/23/1931	5.3	VI	40.20	125.60	Real and others, 1982
Offshore Eureka (chimneys damaged)	9/9/1931	5.8	VI	40.80	125.00	Real and others, 1982
112 miles (180 km) west of Cape Mendocino	3/2/1932	5.6	I**	40.20	127.00	Woodward Clyde, 1980
*Near Arcata (one death, much damage in Eureka)	6/6/1932	5.9-6.4	VIII	40.87	124.02	Smith and Knapp, 1980
56 miles (90 km) west of Trinidad	7/6/1934	6.5	I**	41.25	125.42	Smith and Knapp, 1980
Offshore Cape Mendocino	1/2/1935	5.8	V	40.25	125.25	Real and others, 1982
93 miles (150 km) west of Cape Mendocino	6/3/1936	5.8	V	40.16	126.45	Woodward Clyde, 1980
Offshore Cape Mendocino (slight damage)	2/6/1937	5.7-5.8	V	40.50	125.25	Coffman & von Hake, 1973
*Southeast of Cape Mendocino (slight damage in Ferndale)	9/11/1938	5.5	VI	40.00	124.00	Real and others, 1982
*Offshore Cape Mendocino (chimney damage)	11/19/1940	5.5	V-VI	40.75	124.90	Berkeley Seism. Stn.
Near Shelter Cove	12/20/1940	5.5	VI	40.00	124.00	Real and others, 1982
*Offshore northwest of Cape Mendocino	2/9/1941	6.4-6.6	VI	40.70	125.40	Real and others, 1982
Offshore Cape Mendocino	5/13/1941	6.0	V	40.30	126.40	Berkeley Seism. Stn.
*Offshore northwest of Cape Mendocino (chimneys damaged)	10/3/1941	6.4	VII	40.54	125.00	Smith and Knapp, 1980

VII-IX in southern Humboldt Co. and Humboldt Bay region

M Richter magnitude (magnitudes in parentheses are estimated)
 MMI Modified Mercalli Intensity

* Data from these earthquakes were used to make Figure 5 map
 ** Modified Mercalli Intensity estimated from this study

TABLE 1 (continued). NORTH COAST HISTORIC EARTHQUAKES OF MAGNITUDE ≥ 5.5 AND/OR INTENSITY $\geq VI$.

Location	Date	M	MMI	Lat. °N	Long. °W	Reference
Offshore Cape Mendocino	5/19/1945	6.2	V	40.60	126.40	Coffman & von Hake, 1973
*Offshore Cape Mendocino (damage in Ferndale and Capetown)	12/18/1946	4.7	VI	40.30	124.60	Woodward Clyde, 1980
Offshore Cape Mendocino	3/30/1947	4.6	VI	40.38	124.68	Woodward Clyde, 1980
Offshore Cape Mendocino	5/27/1947	5.2	VI	40.40	124.70	Woodward Clyde, 1980
*Offshore Cape Mendocino	9/23/1947	5.6	VII	40.40	125.20	Coffman & von Hake, 1973
93 miles (150 km) west of Orick	3/24/1949	5.9	II-III	41.30	126.00	Real and others, 1982
*Offshore Cape Mendocino	1/14/1950	4.6	VI	40.22	124.42	Woodward Clyde, 1980
*Petrolia	3/10/1951	4.1	VI	40.30	124.30	Woodward Clyde, 1980
*Offshore Cape Mendocino 10 miles (16 km) west of Petrolia	10/8/1951	5.8-6.0	VII	40.35	124.60	Smith and Knapp, 1980
*Near Scotia (minor damage)	11/14/1951	4.9	VI	40.43	124.05	Woodward Clyde, 1980
12 miles (20 km) southwest of Petrolia (chimneys fell, foundation damage)	9/22/1952	5.2-5.4	VII	40.20	124.42	Real and others, 1982
Offshore Cape Mendocino	11/25/1954	6.1-6.3	V	40.48	125.46	Smith and Knapp, 1980
12 miles (20 km) northeast of Arcata (\$2,100,000 damage, one death)	12/21/1954	6.5-6.6	VIII	40.85	123.96	TERA, 1977
Offshore northwest of Cape Mendocino (slight damage in Ferndale)	10/11/1956	6.0	V	40.67	125.77	Real and others., 1982
*Near Petrolia	5/24/1958	4.8-4.9	VI	40.30	124.02	Berkeley Seism. Stn.
Offshore, 56 miles (90 km) west of Trinidad	7/23/1959	5.8	IV	41.13	125.30	Real and others, 1982
*Offshore Arcata (plaster fell at Eureka City Hall)	6/5/1960	5.7	VI	40.87	124.50	Smith and Knapp, 1980
Offshore Cape Mendocino (felt in San Francisco and southern Oregon)	8/9/1960	6.0-6.2	V	40.32	127.07	Berkeley Seism. Stn.
Offshore 11 miles (18 km) west of Cape Mendocino (triggered landslide)	4/6/1961	5.0-5.5	VI	40.49	124.81	Smith and Knapp, 1980
*Offshore Crescent City (slight damage)	8/23/1962	5.6	VI	41.84	124.39	Nowroozi, 1973
Offshore northwest of Arcata (slight damage)	9/4/1962	4.9-5.0	VI	41.01	124.21	Nowroozi, 1973
*Offshore 12 miles (20 km) west of Petrolia (slight damage)	12/10/1967	5.6-5.8	VI	40.56	124.58	Smith and Knapp, 1980
*Offshore Cape Mendocino	6/26/1968	5.5-5.9	VII	40.29	124.67	Nowroozi, 1973
*Near Petrolia (slight damage in Petrolia)	8/9/1973	4.9-5.0	VI	40.35	124.30	Smith and Knapp, 1980
*Fortuna	6/7/1975	5.2-5.7	VII	40.51	124.27	Smith and Knapp, 1980
Offshore 93 miles (150 km) northwest of Eureka	11/26/1976	6.3	IV	41.30	125.70	Berkeley Seism. Stn.
*Offshore 16 miles (25 km) west of Arcata (pipes and windows broken in Eureka)	2/3/1979	5.2	VI-VII	40.92	124.42	Berkeley Seism. Stn.
*30 miles (48 km) west of Trinidad (bridge collapsed, six injured, \$1,750,000 damage)	11/8/1980	6.9-7.4	VII	41.12	124.67	Berkeley Seism. Stn.
Offshore Cape Mendocino	8/24/1983	5.5	V	40.38	124.83	Berkeley Seism. Stn.
Offshore 155 miles (250 km) west of Eureka (felt from San Francisco to Oregon)	9/10/1984	6.6	V	40.50	126.83	NEIS
*Just offshore Cape Mendocino (two events in 1 minute, slight damage)	11/21/1986	5.1, 5.1	VI	40.37	124.44	Berkeley Seism. Stn.
*Just offshore Cape Mendocino (damage and rockslides in Petrolia)	7/31/1987	5.5	VII	40.42	124.41	NEIS
Near Honeydew (caused damage in Honeydew and Petrolia)	1/16/1990	5.3	VII**	40.23	124.14	Berkeley Seism. Stn.
Offshore 50 miles (80 km) west-northwest of Crescent City	7/13/1991	6.7-6.9	V	42.14	125.61	NEIS
Offshore 62 miles (100 km) west of Crescent City	8/16/1991	5.9-6.3	V	41.73	125.39	NEIS
Near Honeydew (chimney, foundation damage, landslides, well changes)	8/17/1991	6.0-6.2	VIII**	40.21	124.28	NEIS
Offshore 62 miles (100 km) west of Crescent City	8/17/1991	6.9-7.1	V	41.61	125.51	NEIS
South of Petrolia (foundation damage, landslides)	3/7/1992	5.3-5.6	VII**	40.23	124.29	Berkeley Seism. Stn.
3 miles (5 km) north of Petrolia (preliminary estimate - \$48 million in damage, 356 injuries, tsunami, coastal uplift, liquefaction, landslides)	4/25/1992	7.0	\geq VIII**	40.37	124.31	NEIS
20 miles (33 km) west-northwest of Petrolia (fire destroyed Scotia Shopping Center)	4/26/1992	6.0	VII**	40.44	124.58	NEIS
15 miles (25 km) west of Petrolia (additional damage)	4/26/1992	6.5	VII-VIII**	40.40	124.56	NEIS

** Richter magnitude (magnitudes in parentheses are estimated)
 ** Modified Mercalli Intensity

* Data from these earthquakes were used to make Figure 5 map
 ** Modified Mercalli Intensity estimated from this study

Best Management Practices for the Maintenance of Forest Ecosystem Health and Sustainability.

The following are general guidelines and specific forest practices that will be used in the Mattole basin and evaluated by the Forest and Watershed Health Advisory Board described in Section 6..

A. Basic guidelines for forest practices in the Mattole Basin:

- (1) Forest practices will maintain and/or restore the aesthetics, vitality, and structure, and functioning of the natural processes, including fire, of the forest ecosystem and its components.
- (2) Forest practices will maintain and/or restore surface and groundwater quality and quantity, including aquatic and riparian habitat.
- (3) Forest practices will maintain and/or restore natural processes of soil fertility, productivity, and stability.
- (4) Forest practices will maintain and/or restore a natural balance and diversity of native species of the area, including flora, fauna, fungi, and microbes, for purposes of long-term health of ecosystems.
- (5) Forest practices will encourage a natural regeneration of native species to protect native gene pools.
- (6) Forest practices will not include the use of artificial chemical fertilizers or synthetic chemical pesticides.
- (7) Sites of archaeological, cultural and historical significance will be protected and will receive special consideration.
- (8) Forest practices executed under an approved Forest Management Plan will be of appropriate size, scale, time frame, and technology for the parcel, and adopt the appropriate monitoring program, not only in order to avoid negative cumulative impacts, but also to promote beneficial cumulative effects on the forest.
- (9) Old-growth forests (as defined by Franklin et. al. 1986) will be subject to a moratorium on commercial logging, at least until 25% of the forested lands within the Mattole Basin are in old-growth status. At that time, a panel of watershed residents may convene to reconsider the issue.

B. Long-term Forest Management Plans

Landowners with commercial intent will submit a forest management plan. The plan will contain all of the information required by the CDF Non-industrial Timber Management Plan (NTMP) and industrial Sustained Yield Plans (SYP) as well as these additional specifications:

- (1) A list and map of actively eroding areas on the site, including slides, gullies, mass movement and surface and channel erosion, and a list of treatments proposed for any of these areas.
- (2) A list and map of roads, landings, and watershed boundaries. The road inventory should identify sites with high stream diversion potential or high erosion potential. A list of treatments to mitigate these potentials shall be proposed for these areas. An overall goal should be to reduce the total number of road miles and to safeguard against failure of those that remain.
- (3) A list and map of all stream channels and a survey of their condition.

Appendix V

- (4) Inventory of tree species and diameter classes; minimum requirements being the same as for an NTMP.
 - (5) Inventory of threatened and endangered plant and animal species and species of special concern.
 - (6) Description of existing structure (physical elements) of forest (including large woody debris) condition and types of soil, and projection of how structure, species composition, and ecological processes will develop under the proposed management regime, at points 50 and 100+ years in the future.
 - (7) How the plan proposes to use fire or mimic its role in the forest. Description of fuels management and wildfire suppression plan. Any bare fuel breaks must follow road and trail erosion control rules.
 - (8) How the forest will be managed for a diversity of successional stages and age classes of trees in the forest ranging from early to late-successional and from tree seedling to old-growth. Plans will indicate the geographical scope over which each of these age classes will be present, now and in the future. If areas outside the management plan under consideration are invoked to meet this requirement, their management plans will be included as well.
 - (9) Harvesting results in less than 15% of the watershed in forest clearings or forest stands less than 10 years old. Single tree selection and thinning do not count as clearings.
 - (10) How managers will ensure that the growth of wood in the forest is equal to or greater than the amount of wood harvested. On young-growth forests where there exists a need to restore the forest, less wood will be cut than is grown.
 - (11) A thorough evaluation of erosion hazards and cumulative effects including evaluation of the potential to induce mass movements or fluvial erosion. Any geotechnical evaluations should be done by a geologist instead of a forester. All timber harvest plans should attempt to go beyond zero discharge of sediment (striving instead for negative net discharge), in that repairs to any existing road networks or other real or potential sources of sediment should be undertaken as a part of each plan.
 - (12) A program to update resource data (via permanent plots) and monitor resource conditions over time and to adapt management strategies to reduce environmental impact based on data collected (e.g., California Rangeland Water Quality Management Plan 1995).
- All previously approved Forest Management Plans would benefit from being reevaluated using the criteria in this nomination upon their renewal date.

C. Silviculture and Marking

- (1) Multi-aged (uneven-aged) management techniques are used, including methods that have the effect of even-aged management in small openings.
- (2) Openings created in the forest are only as large as needed (up to 2 acres on north slopes and 1 acre on south slopes) to regenerate all of the forest species native to the site.
- (3) The following techniques are avoided:
 - (a.) diameter cuts (choosing the trees to be cut primarily on the basis of their diameter class)
 - (b.) high-grading (removal of only the observably superior trees in a diameter class)
 - (c.) management for conversion of more than 3 acres of timberland to other uses.

(4) The area is to be managed to maintain all native species of flora and fauna that were present in the forest before harvest and that are appropriate to the current stage of ecological succession.

(5) Levels of dead wood as appropriate to the ecosystem are maintained and recruited, including downed logs on land and in streams, and standing snags. The target levels shall vary depending on forest type. For example, in redwood stands, aim for 20 tons per acre of large woody debris on the forest floor, including at least two pieces 50 feet or more in length, 24 inches or more in diameter at their narrow end. In Douglas-fir-hardwood forests, targets will depend on the aspect and moisture of the site, but will minimally aim for 10 tons per acre with at least two pieces six feet or more in length and 20 inches or more in diameter.

(6) Over the long term, harvests remove at most the amount of saw timber grown. Further, if more than 10% of the basal area is to be cut in a single entry, special attention is paid to the windfirmness of remaining trees and to possible alterations of the microclimate of the forest floor.

(7) At least one superior dominant or co-dominant tree per acre of each principal species (comprising 20% or more the stand's basal area) are left after harvest, well-distributed through the stand, as seed sources to grow until the end of their natural lifetimes. For other tree species in the stand, at least one such tree is left for every ten acres. Mature trees are marked for preservation, and younger trees are marked for recruitment into this class eventually to replace older ones that die. These trees help with the recruitment of snags and woody debris.

(8) Dominant and co-dominant trees to be cut, which are six inches in diameter at breast height (DBH) and greater are marked before harvest.

(9) Forest practices ensure the recruitment of trees to all age classes, including a component of overmature and decaying trees.

D. Regeneration

(1) To the extent possible, natural regeneration is employed. Where that is not feasible, nearby seedlings are transplanted or seedlings are planted that were grown from seed collected in the same seed zone as the site.

(2) Where openings are created, if they do not restock naturally to 400 healthy seedlings per acre within three years, the openings are replanted to achieve that level of stocking by the end of five years after harvest.

E. Falling and Slash Treatment

(1) To the greatest extent feasible, established regeneration and other leave trees are protected from harm, skinning, or scraping during falling, limbing and yarding.

(2) Encourage retention of a balance of wildlife trees.

(3) Snags are felled only where they constitute a safety or fire hazard.

(4) At least three snags per acre, at least 13 inches DBH and ten feet tall are maintained. In areas that lack this density of snags, at least one snag per acre is recruited on each entry.

(5) Trees are bucked to lengths that will stay on skid roads and not sideswipe leave trees or embankments, nor push sediment into streams.

(6) Slash is lopped and scattered to a height above the ground of 18 to 30 inches depending on fire hazard, hand-piled and burned, distributed onto skid trails or bare soil, or placed in contour windrows on steeper slopes (buttressed by residual stand and no higher than 30 inches above ground).

(7) Slash is not left at landings, on, or adjacent to roads, except when used for mulch and in those cases, no higher than 18 inches above ground.

F. Yarding

(1) Yarding systems are chosen to minimize potential impacts.

(2) Where cable yarding is used, logs are yarded through corridors no wider than 8 feet and at least 200 feet apart, except where they converge on the yarder.

(3) Yarding and skidding corridors are laid out before logging begins.

(4) Corridors and other places where timber operations have created a water channel are water barred when not in use or when a chance of measurable rain is forecast. These corridors are located where water is unlikely to collect or channel.

(5) Tractor access is prohibited on slopes exceeding 50%, or 35% on areas with high or extreme erosion hazard.

(6) Where appropriate, new skid trails are outsloped.

(7) All vehicles stay on roads and designated equipment trails, except where winching equipment needs to move off the road to avoid damage to residual stand.

(8) Equipment is excluded from seeps or springs.

G. Riparian Areas - see Nomination, Section 6.

H. Roads - See Nomination, Section 6.

I. Areas Excluded From Timber Harvest

(1) Sites of archeological, cultural and historical significance and their immediate surroundings.

(2) Old-growth forests (as designated by Franklin et. al. 1986) - See Nomination, Section 6.

(3) Riparian zones (see above, WLPZ's) - See Nomination, Section 6.

API	NAME	ADDRESS1	ADDRESS2	CITY	STATE	ZIP
10418201	S RANCHES INC	14001 ROAD 38		MADERA	CA	93638
10730013	ALLEN JENNIFER	PO BX 201		HONEYDEW	CA	95545-0201
10730008	ALLEN TRACY J	1895 H ST APT #13		ARCATA	CA	95521
10801512	ANTHONY LESLIE K	21382 RANCHERIAS RD		APPLE VALLEY	CA	92307
10503133	AUSTIN DAN	SM	PO BX 198	PETROLIA	CA	95558-0198
104192145	BAKER LEO C	UM	PO BX 154	PETROLIA	CA	95558
10413116	BARBOUR DENISE M	COHEN ANDREA M	PO BX 172	PETROLIA	CA	95558
10723310	BARCUS JEFFREY H & MARY M	HW CP	2320 COFFEE LN	SEBASTOPOL	CA	95472
21519138	BARNUM TBR CO	PT	PO BX 1365	EUREKA	CA	95502-1365
10502101	BARRY GEORGE		21225 SARATOGA HILLS RD	SARATOGA	CA	95070
10813107	BATTI IMA J		5041 FRUITVALE RD	NEWCASTLE	CA	95658
107043025	BEAT ROBERTA	SE	3521 HIGH ST	EUREKA	CA	95503
10713605	BELLINGER LESTER A & EDITH H	JT	7251 WILDER RIDGE RD	GARBERVILLE	CA	95542
107055205	BERTHEAU CHRISTOPHER L	SM	1798 BLUEJAY CT	FORTUNA	CA	95540-3360
10711602	BETTS E S & HE TR		20 ANSON WY	KENSINGTON	CA	94707
10517104	BLASENHEIM NINA	JT	VARGO JOHN A JR	PETROLIA	CA	95558
10304206	BOAK WILLIAM N & ELIZABETH M	HW JT	1739 BELLA VISTA RD	MCKINLEYVILLE	CA	95519
10302101	BOBER LINDA R	TC	MULLEN SALLY H	MOUNTAIN VIEW	CA	94043
10303102	BRA SHEAR IVY M LE	WD	ROBINSON BARBARA J REM	FORTUNA	CA	95540
22031203	BRICE LAND CORPORATION	CR	PO BX 400	WHITEHORSE	CA	95589-0400
10409106	BRIDGES HENRY J & MARGARET S TR		SQUIRES H W	EUREKA	CA	95503
10314101	BROWN ISABELLA M		280 FERNWOOD RD	FORTUNA	CA	95540
10511121	BRUNET BONITA J	SW	15063 BREWSTER AV	SAN JOSE	CA	95124
10422103	BUGBEE ROBERT W TR		PO BX 328	WILLOW CREEK	CA	95573-0328
10802308	BULLOCK DANIEL	JT	KIETHLEY JASON	REDWAY	CA	95580-0988
22018134	BUNTON ERNEST E JR TR		15426 BOLIVAR DR	SUN CITY	AZ	85351
10712602	BUSCH ROBERT & JANET	HW JT	BX 144	HONEYDEW	CA	95545
10702101	CABRAL JESSE	SM	BOGART SCOTT	REDWAY	CA	95560-0661
10807103	CABRERA VIRGINIA R		372 COVENTRY RD	KENSINGTON	CA	94707
10801117	CADGENE ALLAN H	UM	PAFF JOSEPH E & KAREN J	PETROLIA	CA	95558-0058
10414116	CAMERON MARK & LISA	HW	PO BX 1417	ZEPHYR COVE	NV	89448-1417
22119104	CARR ETHEL L	WD JT	9459 FICKLE HILL RD	ARCATA	CA	95521
10801205	CARRINGTON ALBERT		6486 LEWIS RD	VACAVILLE	CA	95688
107102035	CASLOW PEARL		C/O ZENA G SIMON	SANTA MONICA	CA	90405
10711502	CASON JAMES JR & REBECCA M		486 MICHIGAN AV	BERKELEY	CA	94707
10815112	CHAMBERS JOHNNIE L JR TR		PO BX 12	PETROLIA	CA	95558-0012
10713108	CHENEY JOHN K	SM	4001 FOX SPRING RD	GARBERVILLE	CA	95542
10712403	CHESEBRO MARK B	UM	37509 TASSAJARA RD	CARMEL VALLEY	CA	93924
10802503	CHRIST DARWIN W & SHIRLEY L	HW JT	PO BX 281	CLOVERDALE	CA	95425-0281
10324201	CHURCH OF SPIRITUAL TECHNOLOGY INC CR		419 N LARCHMONT #86	LOS ANGELES	CA	90004
107026055	CLARK JAMES T & COLLEEN S TR		PO BX 122	MT VERNON	OR	97865-0122
10802313	CLARK RONALD L & JOANNE	HW JT	PO BX 1355	REDWAY	CA	95560

10503139	COHEN GABRIELLE	SW	PO BX 81		PETROLIA	CA	95558-0081
10802403	COOK JOHN	SM	722 BAY ST		SAN FRANCISCO	CA	94109-
10504301	COULTAS WALTER T & ETHEL E TR		1662 DEL DAYO DR		CARMICHAEL	CA	95608-
10806311	COY THOMAS N		12394 WILDER RIDGE RD		GARBERVILLE	CA	95542-
10316204	CROSS DONNA TR		PARKS EDWINA TR	397 HOLMES FLAT RD	REDCREST	CA	95569-
22117119S	CROSSLEY VELISSA		888 MILLS AV		SAN BRUNO	CA	94066-
10730008	CZAJKOWSKI ELSIE	WD	7 ATCHINSON STAGE CT		CLAYTON	CA	94517-
10801210	DE CORDOVA JAMES H	JT	BARKER JOAN C	PO BX 5650	SANTA MONICA	CA	90405-
10801510	DELL'ERA LOWELL J	JT	SMITH JUDITH A	PO BX 255	REDWAY	CA	95560-
10802305	DELLAMAS DALE	MM	GRENCHFIELD ROBIN E & MARJORIE	183 SANTA ROSA AV	PACIFICA	CA	94044-2547
10412108S	DIAMOND ELIOT & ELLEN	HW JT	GROOVER JOHN L & MARIE L	PO BX 1044	ASHLAND	OR	97520-1044
22028106	DOBSON RUSSELL	SM TC	BUTTERWORTH CHARLES & MARGY	PO BX 1190	REDWAY	CA	95560-
22117101	DOMINIS PAUL		18706 RAILROAD AV		SONOMA	CA	95476-
10801602	DOVEY CHARLES J	JT	WILKINSON JULIA M	40348 CALLE MEDUSA	TEMECULA	CA	92591-
10708619	DOWNIE DAVID B & KATHIE L TR		1548 PLATEAU AV		LOS ALTOS	CA	94024-
104122349	DOYLE WILLIAM A CO-TR		DOYLE FRANCES M	3527 KERSEY LN	SACRAMENTO	CA	95864-1506
10723501	DROUIN ERNEST	JT	CROWDER ELIZABETH	PO BX 261	WEOTT	CA	95571-0261
22030107	EASTWOOD WILLIAM	JT	BX 424		REDWAY	CA	95560-
10422208	EDMONSTON 1990 FAMILY TRUST		SAGE MAGGIE	2817 CARLARIS RD	SAN MARINO	CA	91108-
10327102S	EDMONSTON JOHN M TR		EDMONSTON JOHN M	2817 CARLARIS RD	SAN MARINO	CA	91108-
10327103	EDMONSTON JOHN M TR		2817 CARLARIS RD		SAN MARINO	CA	91108-
10422112S	EDMONSTON ROBERT TR		75 SO SAN RAFAEL		PASADENA	CA	91105-
22105104	EEL RIVER SAW MILLS	CR	1053 NORTHWESTERN AV		FORTUNA	CA	95540-
10311113	EMMERSON R H & SON	PT	PO BX 1189		ARCATA	CA	95518-
10311114	EMMERSON R H & SON	PT	PO BX 496014		REDDING	CA	96049-6014
10311202	EMMERSON R H & SON	PT	C/O SIERRA PACIFIC INDUSTRIES	PO BX 496014	REDDING	CA	95049-6014
22030102Y	ERICKSON LEIGH		PO BX 127		REDWAY	CA	95560-0127
10801606	ETCHEVERRY RICHARD P & MARGUERITE TR		10110 WILDER RIDGE RD		GARBERVILLE	CA	95542-
10408106	ETTER DONALD E	MS	ETTER DONALD E		PETROLIA	CA	95508-
10408210	ETTER ERNEST W & SUSAN L	HW CP	34492 MATTOLE RD		PETROLIA	CA	95558-
10710501	ETTER EVA L LE		C/O RAYMOND M ETTER	PO BX 61	HONEYDEW	CA	95545-
10807205	ETTER LEO J	MS JT	ETTER LARRY L	S 2360 SPROWL CREEK RD	GARBERVILLE	CA	95542-
10710205	ETTER MARY		PO BX 57		HONEYDEW	CA	95545-
10806212	ETTER MICHAEL J & BETTY	HW JT	PO BX 494		REDWAY	CA	95560-
10714401	ETTER RAYMOND M & MARY S	HW JT	PO BX 61		HONEYDEW	CA	95545-
21523204	FALK RANDAL J		PO BX 347		PHILO	CA	95466-
10404102	FEARRIEN A L		PO BX 371		HYDESVILLE	CA	95547-
22107132	FEINSOD DOUG	SM	4703 OLD SAN JOSE RD		SOQUEL	CA	95073-
10432113	FIELDER DALE V & CAROL	HW JT	FIELDER RICHARD & MARILYN	37300 MATTOLE RD	PETROLIA	CA	95558-
10310202	FLOWERS DALE		3540 TAMI DR		FORTUNA	CA	95540-
10806507S	FOK THOMAS P	UM	22227 CHATSWORTH ST		CHATSWORTH	CA	91311-
10408205	FOY GEORGE		FOY W C	3200 PLEASANT VALLEY RD	APTOS	CA	95003-
22121123	FRENCH LEE S & MARY A	HW	20 FRENCH RANCH RD		GARBERVILLE	CA	95542-
22121110	FRENCH RICHARD L & SALLY J	HW JT	12051 WILDER RIDGE RD		GARBERVILLE	CA	95542-

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10411202	KEENEY CLARK K TR		KEENEY SOPHIE FBO	5697 SHADOW RIDGE DR	CASTRO VALLEY	CA	94552-
10705602	KLIMA J R JR	SM	308 ROCKWOOD DR		S SAN FRANCISCO	CA	94080-
10802302	KNOX JAMES	UM	851 MT VIEW RD		GARBERVILLE	CA	95542-
10802311	KNOX KEVIN	UM	851 MT VIEW RD		GARBERVILLE	CA	95542-
10713808S	LANDERGEN FRANK C & ELSIE M TR		6731 WILDERRIDGE RD		GARBERVILLE	CA	95542-
22123002F	LARSEN PHILIP B	MS	PO BX 532		REDWAY	CA	95560-
10417209	LAWRENCE VADA R TR		C/O PAT KESTERSON	911 13TH ST	FORTUNA	CA	95540-
10709607	LEASK PETER R	SM	BX 506		GRATON	CA	95444-
10713505	LEHMAN CRAIG S	JT	BX 195		GARBERVILLE	CA	95542-
22028215	LIGHTRAIN MICHAEL		PO BX 69		WILLITS	CA	95490-
10714417S	LIMBER ERIC A & KAREN A	HW JT	PO BX 6		HONEYDEW	CA	95545-0006
10708510	LINDLEY DARREL L & GUIMAR		STAR RT		PETROLIA	CA	95558-
10712502	LONG MELINDA		C/O MICHAEL LONG	2424 WAXWING AV	VENTURA	CA	93003-
10722417	LOVELL BENJAMIN F & ELSIE M TR		LOVELL FAMILY TRUST FBO	3730 A VENITIA LN	SANTA BARBARA	CA	93105-
10312102	LOWRY SANFORD E & DORIAN C	HW	PO BX 68		FERNDALE	CA	95536-
21523101	LUSTER FAMILY FOUNDATION INC	CR	C/O ELIZABETH S LUSTER	6517 DRY CREEK RD	NAPA	CA	94558-
22028217	MAGNATTA DIANNE	UW	PO BX 1048		REDWAY	CA	95560-1048
10801404	MARGETTS PAULA J	JT	C/O CHARLES DOVEY	40348 CALLE MEDUSA	TEMECULA	CA	92591-
10709603	MAST VIRGINIA M		C/O VIRGINIA M TUXON	931 FERNBIDGE OR	FORTUNA	CA	95540-
10730014	MATHIS GREGORY & SUSAN TR		C/O TISCO INC	6704 CENTRAL AV	UKIAH	CA	95482-
10723202	MAZZONE CLEMENTI CARLO		PO BX 818		BLUE LAKE	CA	95525-
10802402	MCPHERSON RANDY W & VICTORIA A	JT	C/O DON DELLAMAS	510 G ST	PETALUMA	CA	94952-
10423104S	MCWHORTER FAMILY RANCH PARTNERSHIP		C/O BILLIE L MCWHORTER	926 MAIN ST	FORTUNA	CA	95540-
22029208S	MELTZER SHELLEY	SW	PO BX 5217		SANTA CRUZ	CA	95062-
10711301S	MENDENHALL MATHEW W	MS	577 NO MOUNTAINVILLE CIRCLE		ALPINE	UT	84003-
10709606	MERRYMAN DOROTHY E TR		1808 BRIER WY		CARMICHAEL	CA	95608-
22110101	MESSINGER ROBERT T	SM	PO BX 109		REDWAY	CA	95560-0109
10704604	METHENY DOYLE & GWENDOLYN	HW JT	PO BX 122		REDCREST	CA	95569-0122
10431120	MINER GEORGE H	NO	36328 MATTOLE RD		PETROLIA	CA	95558-
10407102	MIRANDA JOSEPH L & DOROTHY L	HW JT	100% ATLANTA		RIO DELL	CA	95562-
10814132	MOORE ERIC S		PO BX 395		WHITETHORN	CA	95589-0395
10730002	MORAS KIRK F	SM	PO BX 132		REDCREST	CA	95569-
10711121	MORRISON MALCOLM	SM	ROCHA LITA	PO BX 52	WEOTT	CA	95571-0052
10709301	MOZZETTI ROBERT G	HW TC	MOZZETTI SHARON A	H PO BX 137	PETROLIA	CA	95558-0131
10413107	NASH LARRY		PO BX 90		PETROLIA	CA	95558-
10416209S	NEE ROY & LINDSAY M	HW JT	201 SOUTH RIDGEWOOD RD		KENTFIELD	CA	94904-
10707303	NELSON DENVER H & JUDITH D	HW CP	5240 BLACKBERRY LN		EUREKA	CA	95503-
10713204	NESVOLD STEPHEN G	MS	WALLER MARNI	PO BX 2022	TRINIDAD	CA	95570-2022
22029215	NOLL NANCY C		PO BOX 258		GARBERVILLE	CA	95542-
10711122	NOTESTINE FRED C	MS	WATERMAN BRUCE	PO BX 262	REDCREST	CA	95569-0262
10801111	OCHOA RICHARD C		1115 WILLOW AV		NAPA	CA	94558-
10421210	OHMAN ALYCE S	WD	PO BX 550		EUREKA	CA	95502-0550
10723309	OSBORN JACK E TR		OSBORN IVA M TR	4040 MT RUSH NO MORE RD	GREENWOOD	CA	9563-
10723	PATRICK PATRICIA E	UW	PO BX 32		HONEYDEW	CA	95545-0032

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10730012	FRIEND RONALD S & TRICIA J	HW JT	CLAPPER JOHN P & ALLISON	325 10TH AV #2	SAN FRANCISCO	CA	94118-
10710410	FUEL ROBERT L & NOREEN A	HW JT	PO BX 121		HONEYDEW	CA	95545-
10801212	GARDNER MARGARET G	WS JT	GARDNER MICHAEL R	M 10309 N W THOMPSON RD	PORTLAND	OR	97229-
10409203	GILL CARMELLO		BX 663		FERNDALE	CA	95536-
10408207	GILL CARMEN C		PO BX 663		FERNDALE	CA	95536-
22120128	GOFF LAWRENCE R & DEANNA F	TR	5815 ETTERSBURG RD		GARBERVILLE	CA	95542-
22107136	GORDON KATHY		PO BX 1458		HEALDSBURG	CA	95448-1458
10710409	GOSSARD WALDO D & LOIS H	TR	2600 R ST		EUREKA	CA	95501-
10713506	GRAEDNER ANNETTE		PO BX 107		REDWAY	CA	95560-
10326201S	GRAHAM ELWOOD		PO BX 487		FERNDALE	CA	95536-
22107127	GRIBI DANIEL M & LEANNA R	HW JT	TYRNAUER GARETH T	PO BX 15	PHILLIPSVILLE	CA	95559-
22107142	GRIBI DANIEL M & LEANNA R	HW JT	PO BX 15		PHILLIPSVILLE	CA	95559-
21517203	GROSS ROBERT & LYNDA R	HW JT	VALLOTTON KENNETH & THERESA	6247 BERRY LN	EUREKA	CA	95503-
10707509	GRUNDMAN JAMES E & ELIZABETH K	HW CP	253 PRICE CREEK RD		FERNDALE	CA	95536-
10710604	GRUNDMAN THOMAS C & ALLISON L	HW JT	3448 NELSON DR		FORTUNA	CA	95540-
10713601	HALL J J		PO BX 107		REDWAY	CA	95560-
10423106	HANSEN NIELS W	SE	19383 BRUSK CT		CASTRO VALLEY	CA	94546-
10801204	HARROW STEPHEN & HOLLIE	JT	12031 WILDER RIDGE RD *		GARBERVILLE	CA	95542-
10419213S	HARTMAN JUNE	WD	HARTMAN JUNE TR	PO BX 3592	EUREKA	CA	95502-3592
10416208	HARTMAN WILLIAM R & MILDRED V	TR	1230 E WINDSOR RD #225		GLENDALE	CA	91205-
10714304	HAWTHORNE GLENN S & JOY T	JT	BX 336		WHITETHORN	CA	95589-
10714418S	HEADY ALLEN T	UM	9220 LAKE COUNTRY DR		SANTEE	CA	92071-
10317102	HENLEY ISABELLA M &		BROWN ISABELLA M	280 FERNWOOD RD	FORTUNA	CA	95540-
10807207	HENRY STEPHANIE M	SW	PO BX 6292		TAHOE CITY	CA	96145-6292
10730010	HOBART COTT & SANDY	HW JT	PO BX 803		WINDSOR	CA	95492-0803
22111127	HODGES GAYLE	SW	PO BX 527		REDWAY	CA	95560-
10411104	HOUGH EDITH O	WD	C/O HAROLD HOUGH	PO BX 556	WILLOW CREEK	CA	95573-
10707501	HOUGH HAROLD O		PO BX 556		WILLOW CREEK	CA	95573-
10411204	HOUGH MARJORIE L	WD	98 GILTRIX DR		MARTINEZ	CA	94553-
10707404	HOUGH ROBERT E & ELIZABETH H	TR	6336 STONE BRIDGE RD		SANTA ROSA	CA	95409-
10303101	HOUGH VIOLA M	TR	920 WEYMOUTH BLUFF RD		FERNDALE	CA	95536-
10813303	HOULAHAN MICHAEL J	SM	C/O LAWRENCE D OVIAN	PO BX 384055	WAIKOLOA VILLAGE	HI	96738-4055
22009204	HOWLAND PAMELA A		178 SAND HILL CIRCLE		MENLO PARK	CA	94025-
10708209	HOYLE ROBERT H & MARIAN S	HW JT	36588 MATTOLE RD		PETROLIA	CA	95558-
10708302	HOYLE ROBERT H & MARIAN S	HW JT	38501 MATTOLE RD		PETROLIA	CA	95558-
10806605	HUDSON MARILYN J	UW JT	MCCANN CHRIS H	S PO BX 1015	REDWAY	CA	95560-1015
10412219S	HUDSON PIETER	SM	PO BX 107		PETROLIA	CA	95558-0107
10707103	HUNTER DANIEL G		PO BX 23		BAYSIDE	CA	95524-0023
10802508S	JENNINGS JEANE TR		PO BX 362		REDWAY	CA	95560-0362
21519208	JOHANNESSEN NORMAN A JR		BX 24		WHITETHORN	CA	95589-0024
21518202	JOHANNESSEN SETH B	SM	PO BX 24		WHITETHORN	CA	95589-0024
22029211S	JONES STUART L & JANICE H	TR	2351 PICKENS CANYON RD		LA CRENCENTA	CA	91214-
10801209	K & L LOGGING INC	CR	15715 BRICELAND THORN RD		WHITETHORN	CA	95589-
10407103	KAMPH THOMAS F		1789 HAWAII CIR		COSTA MESA	CA	92626-

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10421208	PEARCE CAROLE A		RT 1 BX 1060		COQUILLE	OR	97423-1060
10712503	PELOV ROUMEN		PO BX 283		REDCREST	CA	95569-0283
10806406	PETERSON MAURICE JR	SM	PO BX 1301		REDWAY	CA	95560-
22111128	PETRILLO MICHELLE	SW JT	HOLLINGER LYNN	S	REDWAY	CA	95560-1838
22029214V	PEHELPS TODD R & PAMELA A	HW JT	BX 160		REDWAY	CA	95560-
22007108	PHILLIPS ARTHUR J	MS	PO BX 180		COLUMBUS	NJ	08022-0180
22001116	POOL MAURINE B TR		FRENCH RICHARD L & SALLY J		GARBERVILLE	CA	95540-
22111125	PREBOR VALLI	SW TC	PREBOR KARL & CATHY R TC		REDWAY	CA	95560-0906
21523109	PRINCE WALTER E & KATHRYNA TR		PO BX 487		GARBERVILLE	CA	95542-0487
10802205S	PROFANT PETER J	SM	ROBERTS MARK B		OAKLAND	CA	94602-
10414140	RATHBUN REX B & RUTH M	HW JT	RATHBUN DANIEL W		PETROLIA	CA	95558-
10504207	RATHBUN REX B & RUTH M	HW JT	HOWE RUTH M		PETROLIA	CA	95558-0009
10504303	REDIGER HAZEL C TR		3463 CHRISTIANSEN LN		CASTRO VALLEY	CA	94546-
10802601	REED ROBERT & DARYL	HW JT	4101 SPROWEL CREEK RD		GARBERVILLE	CA	95542-
10801613	REGA GENE R	UM	500 KEVIN REGA RD		GARBERVILLE	CA	95542-
10411207	REYNOLDS R A & MERISE	JT	STAR RT BX 32		PETROLIA	CA	95558-
22028110	ROBBINS DARRELL	HW CP	1282 45TH		SAN FRANCISCO	CA	94122-
10723401	ROCK LELAND J & PAULA	HW JT	ROCK PEGGY L		FORTUNA	CA	95540-
10723405	ROCK PEGGY L	WD	3542 NEWBURG RD		FORTUNA	CA	95540-
10412215	RODGERS MARK & KIM D	HW JT	PO BX 37		LOLETA	CA	95551-0037
10707601	ROHNER FRANKLIN B	MS	FILERMAN MICHAEL		LOS ANGELES	CA	90025-
22120115	ROLFF WILLIAM F	SM	PO BX 2093		REDWAY	CA	95560-2093
10710606S	ROLLINS KATHERINE J		SMITH ANNE B TR		FORTUNA	CA	95540-
10707405	ROSCOE CAROLYN A	UW	OLMSTED CHARLOTTE R		THATCHER	AZ	85552-3060
10706502	ROSCOE GEORGE W	MS	255 ROSCOE RD		PETROLIA	CA	95558-
10503140	SAFIER ROGER K	MS	PO BX 212		PETROLIA	CA	95558-0212
22028111	SANGER WERNER J & MARY H	HW CP	400 SANGER LN		REDWAY	CA	95560-
10708402	SCARPULLA FRANCIS O & KAREN M	HW JT	ROSCOE MARIE TR		SAN FRANCISCO	CA	94118-
10806609	SHEEL DANIEL C & KATHLEEN	JT	5001 C ST		SACRAMENTO	CA	95819-
10413102	SCHNEINMAN RICHARD	UM	PO BX 49		PETROLIA	CA	95558-
10711501	SCHMIDT DOUGLAS R		3223 WEBSTER ST		SAN FRANCISCO	CA	94123-
10301103	SCOTT PACIFIC HOLDING CO	CR	PO BX 712		SCOTIA	CA	95565-0712
10806102	SCOTT CHARLES W & JUDITH A	HW JT	13322 SPRINGDALE		WESTMINSTER	CA	92623-
10709504	SEQUOIA FAMILY PRODUCTS INC		PO BX 1261		WILLITS	CA	95490-
10502103	SHANAHAN FRANCIS		PO BX 388		EUREKA	CA	95502-0368
10714423	SHOWEN TIM		PO BX 63		HONEYDEW	CA	95545-
10517101	SIMPSON DAVID W	JT	LAPINER JANE		PETROLIA	CA	95558-
22011105	SNODGRASS ERYN	SM TC	PHILLIPS JD		WHITETHORN	CA	95589-0413
22008218	SOLOMON MICHAEL T	MM	2500 DEL MONTE ST		WEST SACRAMENTO	CA	95691-
10711105	SPECK RANDALL	SM	PO BX 126		WEOTT	CA	95571-0126
10432112	SQUAW CREEK RANCH PARTNERSHIP	PT	CAO GEOFF FRIEDMAN		SANTA ROSA	CA	95407-
10709604	STAMM GRAEME H	UM	735 4TH ST		EUREKA	CA	95501-
10711605	STANSBERRY ROBERT D & VALERIE	HW JT	PO BX 56		HONEYDEW	CA	95545-
21516219	STEELNACK JOHN E	SM	8303 MIDWOOD ST		ALEXANDRIA	VA	22308-

Maitole TPZ Landowners-Humboldt

22101120	STEPHENS PETER J	UM	PO BX 101B			REDFAY	CA	95560-1018
10814131	STEVENSON DAVID P		STEVENSON BARBARA M		PO BX 276	WHITETHORN	CA	95589-0276
10417101	STEWART MARGUERITE B TR		FORT SEWARD RANCH STAR RT			GARBerville	CA	95542-
10281188	SUMMERS RALPH P	MS	4701 WILDER RIDGE RD			GARBerville	CA	95542-
10405202	SUND JOHN E	MS	3455 BEEHIVE CIRCLE			WEST VALLEY CITY	UT	84119-
10423202	SWEET FRANCIS		PO BX 195			PETROLIA	CA	95558-
10422212	SYKES RICHARD	SM TC	WARNER JIM	S	1140 SUTTER ST	BERKELEY	CA	94707-
10319202	TARRIO JOAN	WS TC	CHRISTIANSEN EUGENE	M	624 HIGHLAND AV	EUREKA	CA	95503-
10723307	TAYLOR KIMBERLY B		1385 S LOS ROBLES			PASADENA	CA	91106-
10701303	URMANN ROBERT B	MS TC	HOFFMAN KARISSA M	S	3392 PINER RD	SANTA ROSA	CA	95401-
10730001	VAUGHAN WILLIAM J & BARBARA A	HW CP	870 WILDCAT CANYON RD			BERKELEY	CA	94708-
10329205	VEVODA JOHN P & LOTTA R TR		VEVODA JOHN P & LOTTA R		3451 YOSEMITE AV /C	EL CERRITO	CA	94530-
10422175	WALKER LOWELL C	SE	PO BX 175			PETROLIA	CA	95558-
10723212	WARD GABRIELLE A	WS	PO BX 14			REDCREST	CA	95569-0014
10711601	WATSON SANDRA A	JT	C/O MARTIN WATSON		1975 NORTON RD	MCKINLEYVILLE	CA	95519-
10419205	WEAVER DANIEL C	HW JT	WREN SUZANNE T	H	PO BX 190	PETROLIA	CA	95558-0190
10424103	WHITCHURCH GEORGIA M		PO BX 22			PETROLIA	CA	95558-
10802401	WILSON JAMES R JR & NANCY R	JT	6525 BRICELAND-THORN RD			GARBerville	CA	95542-
10710302S	WILSON JIM	SM	41400 PACIFIC COAST HWY			MALIBU	CA	90265-
22002107	WOLF CORA B		3810 ETTERSBURG RD			GARBerville	CA	95542-
22001102	WOLF WILLIAM J H & NANCY S	HW CP	3810 ETTERSBURG RD			GARBerville	CA	95542-

Maltbie TPZ Landowners-Mandocino

AP#	NAME	ADDRESS	CITY	STATE	ZIP
051-050-01	BURKIVERA M	156 GRANADA AVE	SAN FRANCISCO	CA	94112
051-060-01	LESKAR MICHAEL A	349 MARK WEST STATION RD	WINDSOR	CA	95492
051-060-09	ROBINSON JAMES A	PO BOX 276	GARBERVILLE	CA	95542
051-060-10	OAKES CHERYL DIANE	PO BOX 766	REDWAY	CA	95560
051-072-03	GREEN DOUGLASH	424 WALLAN RD	GARBERVILLE	CA	95542
051-080-01	LUSTER FAMILY FOUNDATION INC	6517 DRY CREEK RD	NAPA	CA	94558
051-080-02	CABRAL JESSE JAMES	104 E DATE ST	BREA	CA	92621
051-090-01	MATSON MAT C/O MICHAEL LESKAR	349 MARK WEST STATION RD	WINDSOR	CA	95492
051-090-03	PERCY E WHITTEN LIMITED PARTNERSHIP C/O THOMAS J WHITTEN	850 ROSEDALE AVE	LAFAYETTE	CA	94549
051-100-01	MERCER JACK H & LEONA B	711 36TH AVE	SAN FRANCISCO	CA	94121
051-110-02	BARNUM TRIMBER COMPANY	PO BOX 1365	EUREKA	CA	95501
051-120-01	REDWOODS ABBEY		WHITETHORN	CA	95589
051-130-03	KINSER JESS BURKETT & MARJORIE BEJACH	16427 BRICELAND RD	WHITETHORN	CA	95589
051-130-04	RANSOM WILLIAM C	12100 BRICELAND THORN RD	WHITETHORN	CA	95589
051-140-03	FALK RANDAL J TTEE	PO BOX 347	PHILO	CA	95466
051-150-04	MENDOCINO INVESTMENT COMPANY	PO BOX 347	PHILO	CA	95466
051-180-01	ANDERSON HAROLD B CO - TTEE UND 1/8 ET AL	PO BOX 581	CARMICHAEL	CA	95608
051-240-11	BROWN STANLEY F & DOROTHEA M	PO BOX 1759	REDWAY	CA	95560
051-250-04	HULSE ANITA C TTEE	13600 BRICELAND RD	WHITETHORN	CA	95589
051-260-05	KENT MARK ALLEN 1/3 ET AL	404 W HEMLOCK	OXNARD	CA	93030
051-260-06	CLAUSEN DONALD E & ELIZABETH M CO - TTEES	620 W LOCUST ST	LODI	CA	95240
051-260-12	GRAY BRYCE II TTEE	PO BOX 274	WHITETHORN	CA	95589
051-270-02	GREISER JOHN W 1/2 ET AL	12500 BRICELAND RD	WHITETHORN	CA	95589
051-270-06	LEE PETER T & BETTY JEAN 1/2 ET AL	247 WINWOOD AVE	PACIFICA	CA	94044
051-280-01	JOHNSON CHRISTOPHER P 1/3 ET AL C/O EVELYN ROSTER	423 CAROLINA ST	VALLEJO	CA	94590
051-290-03	SANCTUARY FOREST	PO BOX 166	WHITETHORN	CA	95589
052-060-13	DIMMICK JOHN THOMAS 1/3 ET AL	PO BOX 640	GARBERVILLE	CA	95542