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To: Christine Wright-Shacklett, SEG
THP File

October 17, 2002

From: David Fowler, AEG
Jonathan Warmerdam, ES
Jim Burke, EG

Subject: **Inspection Memorandum for Timber Harvest Plan 1-02-175 MEN, Hanes Ranch (landowner), Navarro River (watershed)**

Three preharvest inspections (PHI) have been conducted to date on Timber Harvest Plan (THP) 1-02-175 MEN. The inspection dates were August 8, August 14, and September 16, 2002. The participants on the August 8, 2002 inspection were Jim Burke from the North Coast Regional Water Quality Control Board (Regional Water Board), Jim Purcell and Mike KcKay from the California Department of Forestry and Fire Protection (CDF), David Longstreth and Bill Short from the California Geological Survey (CGS), and Ken Wood, the Registered Professional Forester (RPF) who prepared the plan. John Hanes, the landowner was present intermittently during the inspection. The participants on the August 14, 2002, inspection were David Fowler and Jonathan Warmerdam (Regional Water Board), Jim Purcell (CDF), David Longstreth and Bill Short (CGS), Thomas Englehardt form the California Department of Fish and Game (DFG), and Ken Wood (RPF). The participants on the September 16, 2002, inspection were David Fowler and Nathan Quarels (Regional Water Board), Jim Purcell (CDF), David Longstreth (CGS), Thomas Englehardt and John Hendrix (DFG), Wayne Hiatt, Licensed Timber Operator (LTO), and Ken Woods (RPF). The primary purpose of North Coast Regional Water Quality Control Board (Regional Water Board) staff attending the inspection was to evaluate protection to the waters of the State from the proposed timber operations.

General THP Summary:

This THP is located in southern Mendocino County, approximately 6 air miles southwest of the town of Boonville. The THP contains Class I, II, and III watercourses, tributaries to the Rancheria Creek which is a tributary to the Navarro River. The Navarro River is recognized as containing anadromous fish including Coho Salmon (*Oncorhynchus kisutch*) and Steelhead Trout (*Oncorhynchus mykiss*), both species are listed as "threatened" under the Federal Endangered Species Act. The Navarro River has been listed under Section 303(d) of the Clean Water Act as impaired due to excessive sediment and high temperatures. The U.S. EPA established a Total Maximum Daily Load (TMDL) for Temperature and Sediment for the Navarro River in December 2000.

The THP proposes to log 300 acres using the seed tree removal step (245 acres), and selection (55 acres) silvicultural methods. Ground based equipment (tractor including endline and long line, and rubber tired skidder) and cable (high lead and skyline) will be

used to yard the THP area. Ground-based equipment is proposed on slopes over 65 percent grade, and on slopes over 50 percent with a high Erosion Hazard Rating (EHR). The EHR is listed in the THP as moderate to high. Site preparation is not proposed in the THP. Winter operations are not proposed in the plan. The THP proposes standard minimum Watercourse and Lake Protection Zone (WLPZ) widths.

Background:

This THP is a resubmission of THP 1-02-118 MEN. THP 1-02-118 MEN was withdrawn by the plan submitter on July 3, 2002, in response to staff from the Regional Water Board, CGS, DFG, CDF, unanimously recommending that the THP be denied approval as a result of inconsistencies, inadequacies, nondisclosure and/or violations of established regulations specific to each agency and/or the Forest Practice Rules. The THP was revised and resubmitted as 1-02-175 MEN "Ranch Rough II" on July 12, 2002. A letter dated August 6, 2002, was submitted by the Forester to amend portions of the THP 1-02-175 MEN in response to review agencies First Review questions.

Onsite Observations

During each inspection the PHI team entered the property and drove to the THP area on roads indicted as appurtenant roads in the THP. An appurtenant road as used in this context is a road owned and controlled by Hanes Ranch, Inc., that is proposed for use in the THP, but outside of the harvest areas. Consistent with the finding made during the PHI for THP 1-02-118 MEN, Regional Water Board staff identified numerous erosion sites along the appurtenant road system that were not disclosed in the THP. Many segments of the appurtenant roads were observed to have long sections of inside ditches without relief. Inside ditches with a potential to deliver sediment were observed to flow directly into watercourses. Infrequent ditch relief has allowed for the concentration of water to form gullies at road drainage outlets leading into watercourses.

Significant portions of the appurtenant road are generally insloped with long stretches of inboard ditch that drain directly into watercourses. One segment of road drainage that drains directly into Minnie Creek, a Class I fish bearing stream was estimated to be in excess of approximately 600 feet long. This watercourse location is shown as Road Map Point 2 on the "Appurtenant Roads" Site Map. At least one watercourse appears to have been diverted down an inside ditch above Minnie Creek on the eastern approach to a bridge crossing. Other surface waters also drain into the inside ditch, but it has not been determined which of these are natural watercourses or excessive drainage being discharged from discrete road drainage structures associated with upslope roads or skid trails. This has resulted in gully and rill erosion from upslope drainage. Evidence of sediment was observed in the inside ditch that drains directly into Minnie Creek.

Prior to the inspection on August 8, 2002, the RPF submitted a letter in response to First Review questions, dated August 6, 2002. Included in the response letter is an "Appurtenant Road Information and Drainage Structure Inventory for Ranch Rough II". The Appurtenant Road Information includes very general descriptions of existing conditions with minimal explanation of proposed mitigations and no description measures to prevent further

discharges of sediment to watercourses. Many of the drainage structures listed in the inventory were not identifiable in the field.

Many culverts throughout the THP area and along the appurtenant road system were installed in a shot-gunned style extending beyond the road prism (some exceeding seven feet) or above watercourse grade where flows discharge onto the earthen fill material. Shot-gunned culverts increase the likelihood for erosion of the earthen fill slopes, streambanks and channels as descending water gains velocity and splashes onto erodible surfaces. Culvert outlets discharging onto fresh or unprotected fill results in further discharge of sediment to the watercourse.

At several locations within the THP (THP Map Points 9 through 11, and 13 through 18), new culverted watercourse crossings had been recently installed by the landowner. Most of the culverts were installed without regard to accepted Best Management Practices. Several new culverts were installed by placing them above the natural grade of the stream channel. A number of the culverts were not properly aligned with the watercourse channel. Nonalignment of culverts in the stream channel increases the potential for plugging and erosion of the stream banks at the outlet. Placement of culverts above stream grade increases fill saturation that can result in erosion of the road prism or catastrophic failure.

The Landowner also installed culverts on Class II watercourses without having obtained Department of Fish and Game 1600 series Streambed Alteration Agreements.

The recently installed culverts appear to be too small for the expected discharge volume in several of the stream channels. Culverts should be sized and installed to accommodate the 100-year storm event to handle large storm events plus debris, in accordance with requirements in the Forest Practice Rules for new culverts. Undersized culverts are less capable of accommodating large storm flow plus associated debris that may plug the culvert. The PHI review team requested information about the method used to determine proper culvert sizing. The landowner stated that the culverts were sized based on his personal experience and that no sizing calculations had been performed. During the PHI, the PHI team requested from the landowner calculations for the sizing of the newly installed culverts. No calculations have yet been provided.

Prior to installation of the new culvert at THP Map Point 18, the Class II watercourse had been diverted down the road for an indeterminate period of time. The watercourse appears to have drained down the inside ditch and then flowed over the road prism approximately 50 feet below the new culvert location. At this location the road prism has been completely eroded away leaving a large gully. On August 8, 2002, CGS inspectors measured the maximum dimensions of the gully at 47 feet wide and 13 feet deep. The road is located within 200 feet of Rancheria Creek on a moderately steep slope. It must be assumed that the majority of the volume of sediment evacuated from the gully was delivered to Rancheria Creek. In addition, three isolated gullies, averaging approximately 10 feet wide by 6 feet deep, are located at the outside edge of the road 100 to 150 feet north of the large gully. The review team could not identify the source of these gullies, but they do not appear to have been caused by the diversion that caused the larger gully. The gullies appear to have delivered sediment directly into Rancheria Creek. Estimates based on dimensions of the four

erosion sites in this area indicate in excess of approximately 300 cubic yards of sediment delivered to Rancheria Creek from the road.

Best management practices for "fail-safe" road drainage facilities to prevent the diversion of water down the road should a culvert fail, such as rolling dips in the road grade located at or near the crossings, were lacking in many locations.

During road reopening within the THP area, the landowner had typically sidecast earthen fill over the road edge with little or no consideration for adjacent watercourses. Eroded gullies through the sidecast earthen fill were observed at several locations including the road between and east of THP Map Points 4 and 5. Abundant sidecast was observed for approximately 250 feet along the road down hill from THP Map Point 2. Eroded rills were observed in the road surface. Deep gullies were observed through the sidecast fill. Abundant sediment from the erosion sites was observed in the watercourse below THP Map Point 2.

Earthen fill was placed by the Landowner, above culvert inlets and outlets, and along significant portions of the road system where some material has been deposited in stream channels.

A large slide complex located on the hillslope above THP Map Point 15 was identified by CGS inspectors Dave Longstreth and Bill Short. This slide had not been disclosed in the THP. The CGS inspectors observed that the slide complex is characterized by scarps displaying varying degrees of modification by erosion, and that the slide has been active over time. Visible scarps extend at least 200 feet upslope from the seasonal logging road, across an area at least 200 feet wide. The extent of the slide complex has not been determined. Active slumping was observed across an area approximately 50 feet wide and extending 50 feet upslope from the road. Material from this slide encroaches onto the road, causing drainage problems. The road is insloped at this point. Surface runoff from the road flows along the toe of the slide and into an inside ditch. The inside ditch leads into a Class III watercourse, which crosses the seasonal logging road through a 12-inch culvert at THP Map Point 16. Freshly deposited sediment leading from the toe of the slide is present in the inside ditch and can be traced into the Class III watercourse below the culvert crossing. A gully originates approximately 150 feet upslope from THP Map Point 16 and extends to the culvert crossing at the map point.

Several sections of appurtenant roads were observed to be deeply gullied._The appurtenant roads appeared to be active erosion sites that are currently delivering sediment to several watercourses. The THP did not address the appurtenant road system. As a result, the PHI team requested an erosion control plan for the THP road system.

The September 16, 2002, PHI for THP 1-02-175 MEN was conducted in order to review supplemental proposed activities to control erosion along the appurtenant roads and within the THP area. The inspection team included Regional Water Board staff and staff from CDF, CGS, and DFG. The supplemental information submitted was found to be inadequate to address the erosion observed within the proposed logging area.

The supplemental information was submitted in response to the request for an erosion control plan and consisted of a proposed Appurtenant Road Management Plan (Road Plan) and Road Abandonment Plan. The Road Plan contained appurtenant road inventories, general maintenance prescriptions, and proposed improvements to 17 locations. The Road Plan reuses the same map point numbers as the THP even though they represent entirely different locations. For this reason the Road Plan map point are designated here as Road Plan Points 1 through 17. The Road Plan was inadequate for the following reasons:

a) The Road Plan contained no road point map. The Road Plan contained sketches of individual locations, but no map of the appurtenant road system with the locations of each point.

b) The Road Plan contained no time schedule for completion of required corrective actions.

c) The Road Plan uses terminology which is undefined and inappropriate in this context (such as Riparian Management Zones, RMZs).

d) The Road Plan states "winter use does not rut the road or produce sediment fines that can move to watercourses." This statement is not correct. During the inspection, Regional Water Board Staff observed rills and gullies in the road surface and road surface derived fine sediment within inside ditches and several watercourses.

e) The Road Plan contained two separate road inventories which referenced the same Road Plan Points, but were difficult to cross reference. Distances between Road Plan points listed in the two inventories did not agree. The inventories listed numerous "drainage structures" which were not identifiable in the field.

f) The descriptions of the proposed improvements were inadequate to insure appropriate corrective actions. The descriptions consist of a series of sketch maps with a very brief check list of various possible actions to be performed. They did not contain a description of existing conditions nor adequate detail of proposed actions. The sketches are not to scale and there is no indication of dimension or distance. For actions such as "remove berm/out-slope" there is no indication of the length of berm to be removed. There are no specifications for the rock to be used for the various actions. The size, amount, and method of placement were not specified.

During the September 16, 2002 inspection, active sediment delivery to watercourses was observed at several locations. Examples include:

a) At THP Map Point 7 a brow log had been used to attempt to stabilize fill above a culvert. The fill had eroded from under and behind the brow log resulting in an unstable road base and a direct delivery of the eroded sediment to the watercourse.

b) At Road Plan Point 17 it appeared that approximately 8 to 10 cubic yards of fill material had eroded from the fill slope resulting in direct delivery to the watercourse.

c) The outlet of the 12-inch diameter culvert at Road Plan Point 15 was almost completely buried under sidecast material. The outlet was discharging directly onto fresh, loose fill material.

d) Road derived fine sediment was traced from the inside ditch drainage relief culvert at Road Plan Map Point 6 to deliver into the watercourse.

e) The THP states "The existing roads were constructed with balanced cuts and small fills." Several sections of existing road, specifically the section of road down the ridge which includes THP Map Points 2 through 5, appeared to be constructed with large amounts of sidecast. Gullies from road surface runoff through the sidecast material were observed in several locations. Cracks were observed in several areas in the outer edge of the road fill.

f) Regional Water Board and DFG staff reinspected Minnie Creek at the bridge at Road Plan Point 2. The inside ditch was estimated to run in excess of approximately 600 feet without drainage relief directly into Minnie Creek. Deliverable sediment was observed in depositional cones below both the ditch outlet on the upstream side of the bridge and from direct road surface runoff on the downstream side. Abundant fine sediment was observed within the watercourse immediately downstream of the bridge. The road plan proposes only to place a hay bale in the ditch as a sediment dam. No additional drainage relief for the ditch is proposed.

During all three PHIs for THP 1-02-175 MEN, as well as the initial PHI for the THP 1-02-118 MEN, Regional Water Board staff determined that the THP, as submitted, had not adequately addressed onsite sources of erosion including those sources associated with the appurtenant road and the THP area. Additionally, the THP does not fully disclose numerous active erosion sites. Several of the areas covered by the THP remain an imminent threat of sediment discharge to waters of the State during future winter storm events**.**

The multiple ongoing existing and threatened discharges observed within the proposed logging area to the downstream watercourses represents a violation of the prohibitions contained in the Water Quality Control Plan for the North Coast (Basin Plan). The Basin Plan requires, in part, that the discharge of waste in amounts deleterious to the beneficial uses of water is prohibited.

The Basin Plan's Action Plan for Logging, Construction, and Associated Activities includes the following prohibitions:

a. The discharge of soil, silt, bark, slash, sawdust, or other organic and earthen material from any logging, construction, or associated activity of whatever nature into any stream or watercourse in the basin in quantities deleterious to fish, wildlife, or other beneficial uses is prohibited.

b. The placing or disposal of soil, silt, bark, slash, sawdust, or other organic, and earthen material from any logging, construction, or associated activities of whatever nature at

> locations where such material could pass into any stream or watercourse in the basin in quantities which could be deleterious to fish, wildlife, or other beneficial uses is prohibited.

The Basin Plan also states that "controllable water quality factors shall conform to the water quality objectives contained herein. When other factors result in the degradation of water quality beyond the levels or limits established herein as water quality objectives, then controllable factors shall not cause further degradation of water quality. Controllable water quality factors are those actions, conditions, or circumstances resulting from man's activities that may influence the quality of the waters of the state and that may be reasonably controlled." Reasonably controllable activities which may influence the quality of waters of the state include road and watercourse construction, reconstruction and abandonment, selection of silviculture, yarding and site preparation prescriptions, WLPZ buffers, unstable area prescriptions and rate and timing of harvest.

Beneficial Use Impacts:

Several management-related factors have contributed to the elevated sediment delivery rates throughout the Navarro River watershed. Two of the most impactive include timber harvest and associated road systems. Erosion from road surfaces is currently the largest single component of sediment loading in the watershed (U.S. EPA, 2000). Surface erosion from roads can produce chronic sources of fine sediment which can diminish salmon and steelhead spawning success (Cedarholm, et al., 1981). Watercourse crossings are chronic contributors of fine sediment. Accumulated failures and surface erosion can contribute to reduced aquatic habitat complexity. Logging roads can produce up to 50 to 80 percent of the sediment that enters a watercourse (Hagans, et al., 1986). Further, Sediment delivery from forest roads may be up to 300 times greater than background (Morrison, 1975).

Fine sediment within the salmon spawning gravels has been shown to increase significantly in watersheds with road densities greater than three miles per square mile (Cedarholm, et al., 1981). The National Marine Fisheries Services guideline for salmon habitat characterize watersheds with road densities greater than three miles per square mile as not functioning properly (NMFS, 1996).

Two of the beneficial uses of particular concern within the watershed are salmonid spawning and rearing, as listed in the Basin Plan. Current scientific studies indicate that chronic and episodic fine sediment discharge and deposition to fish bearing streams reduces the viability of salmonid production. Several studies show evidence of impacts to coho salmon from excess fine sediment. Sediment pollution directly affects salmonids in many ways. Initial effects occur to spawning redds created within gravels on the channel bottom (Everest et al., 1987). Fine sediment less than 0.85 mm can intrude into redds and smothers eggs while sand-sized particles (<6.4 mm), cover spawning redds, and prevents salmon fry emergence. Salmonid survival rate falls significantly when fine sediments exceed 13 percent (McHenry, et al., 1994).

Embeddedness is an important indicator of the quality of gravels where eggs incubate and young salmon use to hide, and where aquatic insects, a key salmonid food, are reared. Embeddedness is defined as "*the degree that larger particles (boulders, rubble, or gravel) are surrounded or covered by fine sediment. Usually measured in classes according to percentage of coverage of larger particles by fine sediments* (California Department of Fish and Game 1998)." In healthy streams with good spawning habitat embeddedness values are 25% or less (McCain, et al., 1990). Rill and gully erosion from roads, watercourse diversions, culvert failure, and improper road drainage all contribute to substrate embeddedness or bottom deposits.

Primary pools provide critical summer habitat for steelhead and coho under low-flow conditions. California Department of Fish and Game's California Salmonid Stream Habitat Restoration Manual indicates that the better salmonid streams may have as much as 40% of their total habitat length in primary pools. Primary pools are defined as those pools having a maximum depth of at least two feet in first and second order streams, and at least three feet in third and forth order streams. The Navarro River watershed Technical Support Document for the Total Maximum Daily Load (TMDL) indicates that primary pool ratios in Rancheria Creek are 22% of the total habitat length. Within the tributary streams, approximately 11% of total habitat is in primary pools. The THP is located along Rancheria Creek and includes tributaries to Rancheria Creek.

Turbidity may be caused by suspended sediments such as silts or clays, or fine particulate organic material. Increased turbidities can be injurious to fish and aquatic life, particularly if conditions of high turbidity persist for a long duration (Newcombe and MacDonald, 1991). Effects on fish range from avoidance of highly turbid areas and reduced growth to direct mortality (Bisson and Bilby, 1982; Sigler et al., 1984; Cordone and Kelly, 1961). A high degree of correlation exists between elevated turbidities and high road densities and widespread, recent timber harvesting. Models based on the field data indicate that in disturbed watersheds, streams experience turbidities greater than 100 nephlometric turbidity units (NTU) for two to three months a year, whereas streams in undisturbed watersheds have such high NTU readings only two or three days in a three year period. There is a strong correlation between turbidity levels and suspended sediment transport (Lewis and Eads, 1996). It is expected that during storm events, discharges of sediment to watercourses may result in increased turbidity.

Observations indicate the elevation of all types of sediment inputs to the watercourses onsite and downstream of the THP area that affect beneficial uses of water. To prevent further impairment to the beneficial uses within the watershed, onsite sediment sources that threaten to cause further pollution or nuisance should be promptly addressed and mitigated.

The following table represents typical sediment delivery and potential delivery from various sites within the THP and on the appurtenant road network. It lists only a few typical examples and is only a small portion of the total sediment delivery sites. It is not a comprehensive list of all sediment delivery sites.

	Estimate of Approximate Volume of Sediment that has Delivered to a Watercourse (cubic yards)	Estimate of Approximate Volume of Sediment with a Potential to be Delivered to a Watercourse (cubic yards)
THP Map Point		
2	17	in excess of 30
6	10	in excess of 15
7	7	in excess of 10
Below 18	in excess of 300	unknown
Road Point		
17	10	in excess of 15

References:

Bisson, P. A., and Bilby, R.E., 1982, Avoidance of suspended sediment by juvenile coho salmon; North American Journal of Fisheries Management

California Department of Fish and Game, 1998, California Salmonid Stream Habitat Restoration Manual, Third Edition; Inland Fisheries Division, California Department of Fish and Game

California Regional Water Quality Control Board, North Coast Region, 2000, Navarro River Watershed Technical Support Document for the Total Maximum Daily Load for Sediment, July 28, 2000.

Cederholm, C.J., Reid, L.M., and Salo, 1981, Cumulative watershed effects of logging road sediment on salmonid populations in the Clearwater River, Jefferson, Co., Washington; In: Proceedings from Salmon Spawning Gravel: A Renewable Resource in the Pacific Northwest? P. 38-74. State of Washington Research Center, Pullman, WA

Cordone, A.J., and Kelly, D.W., 1961, The influence of sediment on aquatic life in streams; California Department of Fish and Game Journal

Everest, F.H., Beschta, R.L., Scrivener, J.C., Koski, K.V., Sedell, J.R., and Cedarholm, C.J., 1987, Fine sediment and salmonid production: a paradox, in: Salo, E., and Cundy, T. (ed), Streamside management and forestry and fishery interactions. University of Washington, College of Forest Resources, Contribution 57, Seattle, WA.

Hagans, D.K., Weaver, W.E., Madaj, M.J., 1986, Long term onsite and offsite effects of logging and erosion in the Redwood Creek Basin, Northern California; In: Papers presented at the American Geophysical Union Meating on Cumulative Effects, National Council on Air and Streams, Technical Bulletin No. 490

Lewis, J., and Eads, R., 1996, Turbidity-controlled suspended sediment sampling, Watershed Management Council Networker, Vol. 6, No. 4

McCain M., Fuller, D., Decker, L., and Overton, K., 1990, Stream Habitat classification, and Inventory Procedures for Northern California; U.S. Forest Service, Region 5

McHenry, M. L., Morrill, D. C., and Currence, E., 1994, Spawning Gravel Quality, Watershed Characteristics and Early Life History Survival of Coho Salmon and Steelhead in Five North Olympic Peninsula Watersheds; Lower Elwha S'Klallam Tribe, Port Angeles, WA, and Makah Tribe, Neah Bay, WA, Washington State Department of Ecology

Morrison, P.H., 1975, Ecological and Geomorphological Consequences of Mass Movements in the Alder Creek Watershed and Implications for Forest Land Management; B.A. Thesis, University of Oregon

National Marine Fisheries Service (NMFS), 1996, Factors Contributing to the Decline of Chinook Salmon: An Addendum to the 1996 West Coast Steelhead Factors For Decline Report, NMFS Protected Resources Division

Newcombe, C.D., and MacDonald, D.D., 1991, Effects of suspended sediments on aquatic ecosystems; North American Journal of Fisheries Management

Sigler, J.W., Bjornn, T.C., and Everest, F.H., 1984, Effects of Chronic Turbidity on Density of Steelheads and Coho Salmon; Transactions of the American Fisheries Society

U. S. Environmental Protection Agency, 2000 Total Maximum Daily Load for Temperature and Sediment for the Navarro River; U. S. Environmental Protection Agency, Region IX

Weaver, W. E., and Hagans, D. K., 1994, Handbook for forest and ranch roads; Pacific Watershed Associates.

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