

UNIT, WQ, F&G, RPF, GEO FILE, GEOLOGIST

Memorandum

To: Craig E. Anthony
Deputy Director for Resource Management
California Department of Forestry and Fire Protection
P.O. Box 670
Santa Rosa, California 95402

Date: August 21, 1997

From: Department of Conservation
Division of Mines and Geology
P.O. Box 670
Santa Rosa, California 95472

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D. F. G. - EUREKA

Subject: Reconnaissance Engineering Geologic Evaluation of Watershed Conditions in the Bear Creek Drainage, Pepperwood, California

Inspection Date: July 28, 1997

Participants-Affiliation: Jim Adams, SCOPAC, Bruce Beck, SCOPAC, Bill Solinsky, RPF; Tom Osipowich, CDF; Pete Cafferata, CDF; Joe Fassler, CDF; Ernie Rohl, CDF; Elmer Dudik, WQ; Tom Spittler, DMG; Jim Falls, DMG

Time Spent on Review: 7h Field, 6h Office, 1h Travel

County: Humboldt

Location: T1N&1S/R1&2E, HBM

Quadrangles: Scotia and Redcrest 7.5 min.

Watershed: Bear Creek

Area: appx. 4,900 ac.

Slopes: Moderate to very steep

EHR: Moderate to high

Geologic Concerns: Excessive sedimentation of Bear Creek causing degradation of aquatic habitat, road construction, unstable areas, steep slopes.

References:

California Department of Natural Resources, Division of Forestry, 1941, black and white photographs, frames CVL-3B-62 through 67, dated November 6, 1941, and CVL-9B-167 through 170, dated February 16, 1942, nominal scale 1:24,000.

California Department of Natural Resources, Division of Forestry, 1954, black and white photographs, frames CVL-9N-116 through 120, dated August 3, 1954, CVL-12N-39 through 41, dated August 9, 1954, nominal scale 1:12,000.

- Humboldt County Assessor, 1963, black and white photographs, frames HC-S-2-3 20-42 through 45, 21-44 through 48, 22B-4 through 11, 23B-25 through 30, nominal scale 1:12,000, dated August 15, 1963.
- Spittler, T.E., 1982, Geology and Geomorphic Features Related to Landsliding, Scotia 7.5' Quadrangle: California Division of Mines and Geology Open File Report OFR-82-20 S.F., scale 1:24,000.
- Spittler, T.E., 1983, Geology and Geomorphic Features Related to Landsliding, Bull Creek 7.5' Quadrangle: California Division of Mines and Geology Open File Report OFR-83-3 S.F., scale 1:24,000.
- Spittler, T.E., 1983, Geology and Geomorphic Features Related to Landsliding, Weott 7.5' Quadrangle: California Division of Mines and Geology Open File Report OFR-83-6 S.F., scale 1:24,000.
- Spittler, T.E., 1983, Geology and Geomorphic Features Related to Landsliding, Redcrest 7.5' Quadrangle: California Division of Mines and Geology Open File Report OFR-83-17 S.F., scale 1:24,000.
- Spittler, T.E., and McKittrick, M.A., 1995, Geologic and Geomorphic Features Related to Landsliding, North and South Forks of Caspar Creek, Mendocino County, California: California Division of Mines and Geology Open-File Report 95-08, scale 1:12,000.
- U.S. Forest Service, 1947, black and white photographs, frames CDF2-10-162 through 165, nominal scale 1:26,400, dated, October 13, 1947.
- WAC Inc., 1984, black and white photographs, frames WAC-84C, 24-82 through 85, 24-178 through 181, nominal scale 1:31,680, dated May 6, 1984.
- WAC Inc., 1988, black and white photographs, frames WAC-88CA, 18-42 through 44, dated June 18, 1988; 20-134 and 135, dated July 15, 1988, nominal scale 1:31,680.

Geologic Conditions:

The vast majority of the Bear Creek drainage is mapped by Spittler (1982 and 1983) as underlain by sedimentary rocks of the Coastal Belt of the Franciscan Complex. The northeastern 3/4 mile of the drainage is mapped as underlain by the Yager Formation (see Figure 1, Regional Geologic Map).

The rocks in the Coastal Belt are indicated as being siltstone, shale, sandstone, and mudstone. The unit is noted to be highly sheared in places. The Coastal Belt of the Franciscan Complex is also described as generally more deformed than the younger Yager Formation mapped to the northeast.

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The Yager Formation in the area is described as well-consolidated silty shale, siltstone, sandstone, mudstone and conglomerate. The shale and mudstone disaggregate by flaking when wetted. The unit in this locality is mapped as dipping steeply to the northeast.

More specifically, the slopes that underlie the bulk of the drainage are mapped as mantled with a veneer of disrupted ground formed by complex mass wasting processes (see Figure 1). Numerous debris slides, debris flows, debris slide amphitheaters and rotational landslides are mapped throughout the system.

General Observations:

Interpretation of numerous historical aerial photographs for the Plan vicinity show that the area has been heavily impacted by past land-use activities. Many debris slides are now present along the inner portions of the Bear Creek drainage and its tributaries. Logging haul roads were located in the channels in many instances. The area appeared to have been intensively entered in the 1950's and 60's.

Many of the mapped debris slides, debris flows, and inner gorge failures appear to have occurred in the time between the early 1963 aerial photographs and the present day in areas that had been heavily cut and roaded.

The slopes in the drainage should be expected to behave in a similar manner unless future operations are carefully mitigated taking the past performance of slopes in the drainage into account.

2. Several large debris slides and debris flows have occurred in the upper portions of the drainage this past winter. These slides have delivered extensive amounts of sediment directly into the main channel via its tributaries.

3. Most of the main channel appears to have been entirely re-worked, and has accumulated tremendous amounts of sediment. Large amounts of stored sediment associated with the old roadway up the Creek appear to have been eroded this past winter and added to the system. The level of gravel embedment appears to be high, based upon qualitative field tests.

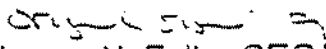
4. Numerous large logjams are located along the perimeter of the channel. Occasional buried logs form small steps in the gravelly bottom.

5. The channel has only a few small pools, and appears to be nearly one continuous riffle. Channel width is typically 3 to 6 feet, and water depth is only 2 to 3 inches. The channel flows through a flat gravel plain that is locally up to 60 feet wide.

The proposal to build new roads across steep slopes in watersheds that have been heavily impacted by slope failures, such as Bear Creek, should be anticipated to trigger additional adverse impacts unless significant mitigations are proposed and properly executed.

General Recommendations:

1. A planning watershed-level assessment of the road network should be developed to identify which roads will be needed for long-term management, and which ones may be abandoned (re-graded, fills and crossings pulled, replanting, etc.). The report should also document areas where mitigations could substantially reduce the management-induced high rate of sediment yield from the slopes within this watershed.
2. The channel conditions should also be carefully evaluated and an inventory of the channel network should be developed in order to identify which reaches are most heavily impacted, and which ones will benefit from restoration efforts.
3. Proposed silvicultural systems should address slope stability, particularly in the steep portions of the watershed. Areas of past instability, and slopes near channels that have been impacted by excessive amounts of sediment should be addressed and mitigated. This may require minimizing the use of even-aged management or developing a mosaic of small, even-aged patches surrounded by thrifty conifer vegetation.
4. These assessments should be submitted to CDF for review and approval prior to any mitigation activities.

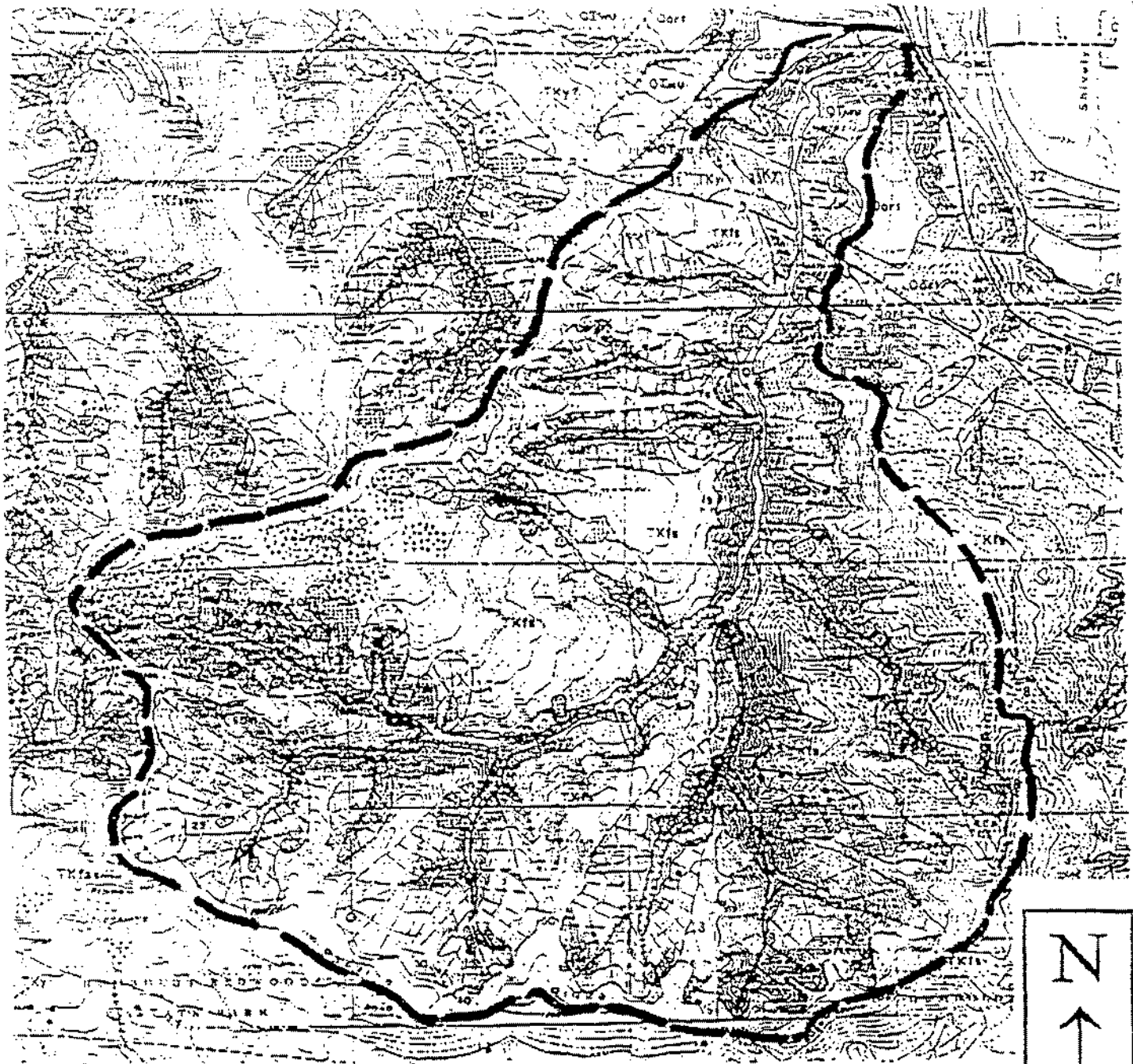

James N. Falls, CEG 1696
Associate Engineering Geologist
Fortuna, California

Concur:

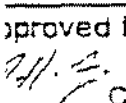
9-6-97 
Date Thomas E. Spittler, CEG 1078
Senior Engineering Geologist

Attachments

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Spittler, 1982, 1983, Geol. and Geomorph. Features Related to Landsliding, Scotia, Redcrest, Bull Creek, and Weott 7.5 min. Quads.

Date: 8/28/97	<h2 style="text-align: center;">Regional Geologic Map</h2> <p style="text-align: center;">To Accompany Reconnaissance Engineering Geologic Review of Watershed Conditions in Bear Creek</p>	<h1 style="font-size: 2em;">Figure</h1>
Scale: 1"=3,125'		
Approved By:  CDMG	<h1 style="font-size: 3em;">07626 1</h1>	