

Hatzimanolis 1972 #

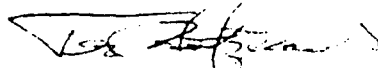
Superintendent, Redwood

November 14, 1972

Resources Management Specialist

Photo - Report on Redwood Creek Survey

Attached is my narrative and photo - report of the reconnaissance survey made of the Redwood Creek Hydrologic Unit.


Ted Hatzimanolis

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REDWOOD CREEK
RECONNAISSANCE REPORT

General

This survey was conducted in the absence of any records to reflect on-the-ground evaluation documentation of conditions in Redwood Creek, its immediate slopes, and apparent quality of its tributaries as reviewed from the stream itself. This is the first known traverse by foot of the entire 60 miles of this water course.

Dates of Survey

Field examination was carried out during the periods September 11 through 15, and September 18 through 22, 1972.

Weather

While the survey was conducted during the driest period of the rain year with streams at their lowest ebb, two rainy periods occurred. These were on September 18 and 21, with the latter having the greatest force although it deposited only an estimated three-fourth inch of precipitation at Orick. Other than those two exceptions, the weather was largely clear and cool.

Personnel

The field party consisted of the following:

T. F. Hatzimanolis, Forest Scientist, Redwood National Park
Dave Rogers, Fisheries Biologist, Department of Fish and Game,
State of California

Travel

Foot travel was accomplished over the entire length (60⁺ miles) of the water course, using back-packing procedures.

Equipment

Aquatic Ecology Test Kits (Field) - Hach Company
Clinometer - Suunto
Compass - Sylva Ranger
Wind Gauge - Taylor, "Air-guide" - pocket type
Thermometer - Taylor
Quadrangle Sheets - 7½ inch - USGS
Quadrangle Sheets - 15 inch - TSGS
Soil-vegetation Maps - U.S. Forest Service
Six Rivers National Forest Map - USFS

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Stream Identity

Redwood Creek is a north-northwest trending stream. It originates on the divide with Mad River at Board Camp Mountain. Elevation at the source is 4,750 feet, at a point about 20 miles airline ESE of Eureka, California, in Section 34, T4N, R4E, Humboldt Base and Meridian.

Tributaries

There are a total of 28 named tributaries. These are: Twin Lakes, Smokehouse, ardee, Bradford/Panther, Lake Prairie, Minon, High Prairie, Cool Spring, Noisy, Lupton - to U.S. 299 Crossing.

Those below U.S. 299 Crossing are: Toss-up, Minor, Mill, Beaver, Roaring, Stover, Lacks, Panther, Devils, Coyote and Copper - to the South Park Boundary. Between the South Park Boundary and the Pacific Ocean are Bridge, Tom McDonald, Harry Wier, Forty-four, Bond, McArthur, and Prairie Creeks.

The estimated length of the named tributaries is 153 miles. Un-named tributaries have an estimated length of 121 miles.

Land Ownership and Jurisdictions

It is estimated that 90 per cent of the Redwood Creek hydrologic unit is private ownership under control of the following:

- | | |
|--------------------------------|-----------------------------|
| Barnum Land and Timber Company | Georgia-Pacific Corporation |
| Kerr Land and Timber Company | Simpson Timber Company |
| Stover Ranch | Arcata Redwood Company |

Federal lands are under the jurisdiction of:

Six Rivers National Forest and Redwood National Park

Land Practices

In the area above Bradford Creek (Zone I), falling of four trees directly into, over, and across Redwood Creek was observed. A bull dozer was constructing a landing on the gravel bar in Redwood Creek, logs were being decked, and a log stringer bridge has been constructed. Photos were taken and the incident was reported to: North Coast Regional Water Quality Board at Santa Rosa, California Division of Forestry at Fortuna, California Department of Fish and Game at Eureka, U.S. Forest Service and Redwood National Park.

As provided for in the Alternate Plans approved by the State Board of Forestry, seed trees are now being removed in Zone III. The larger timber owners in the area, (Georgia-Pacific Corporation, Simpson Timber Company, and Arcata Redwood Company) are well on their way in management and use of

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the Second Redwood Forest.

Within Redwood National Park, the inheritance of a stream side strip of old-growth redwoods along the Emerald Mile which embraces the Tall Trees area, is a legacy of tenuous nature to be appreciated and enjoyed by humanity. On the west side, the upper slopes are almost wholly cutover under Seed Tree provisions of the Forest Practices Act. Regeneration is well established. Soils appeared stable. On the east side, the upper slope areas immediately next to the Park are still covered with old-growth redwoods. That situation is rapidly changing with logging having progressed down to the "buffer" area outside the Park near the Tall Trees. There is no indication, as viewed from the stream, that soil movement has occurred. Further down stream between Elam and Bond Creeks, the Park boundary sweeps to the upper limits of the slopes which are covered with old growth redwood forests.

Near Orick, Arcata Redwood Company Mill is operating at the foot of the Bald Hills Road.

A gravel operation was underway adjacent to U.S. 101 as a source point for surfacing material on the new freeway south of Orick. The stream bottom was wholly violated and adverse effects were many. Dikes constructed to protect Orick after the '64 flood, have greatly altered the character of the stream changing it from a meandering one with solid banks covered with maples and alders behind which were lush meadows grazed by stock, to a disappointing channelization which is sterile in nature and aesthetically displeasing. The adverse inputs of the gravel operation were reported to the California Department of Fish and Game at Eureka, for prosecution.

Accessability

Free-and-easy public access is limited to the following locations:

- Zone I - Board Camp Mountain to U.S. 299
 - a. ~~Friday Ridge Road~~ ^{Board Camp Mt. Rd.} - Six Rivers National Forest
 - b. U.S. 299 Crossing - State of California
- Zone II - U.S. 299 to Stover Ranch
 - a. Redwood Valley Road Crossing - Humboldt County
- Zone III - Stover Ranch to Pacific Ocean
 - a. U.S. 101 Crossing - State of California
 - b. Redwood Creek Beach - Humboldt County
 - c. Tall Trees Trailhead and Parking - Redwood National Park.

Restricted access (non-public) is available at follows:

- Zone I - :
 - Roddiscraft Road - Section 22, T4N, R4E.
 - Snow Camp Road - Section 4, T4N, R4E.
 - Pardee Creek Road - Section 28, T4N, R4E.
 - Lake Prairie Road - Section 20, T4N, R3E.
 - High Prairie Road - Section 15, T4N, R3E.

(Un-named) - Section 36, T6N, R3E.
Holey Creek Road - Section 35, T6N, R3E.
Negro Ridge Road - Section 14, 23, 26, T10N, R3E.

Zone II - Simpson Klamath-Karbel Road - Section 22, T9N, R2E.

Zone III - Georgia-Pacific Corporation - Section 36, T10N, R1E.

A plethora of abandoned, badly eroded, non-usable roads are scattered along the upper two thirds of the stream length.

For practical purposes, only the following segments of the creek are available to the public through free-and-easy access:

Board Camp Mountain - two miles
Redwood National Park - ten miles
Mouth of Redwood Creek - one quarter mile

Drainage Description

The area studied is completely within the Coast Ranges. In this sub-region the mountains are relatively low and therefore there is little snow-melt run-off. Because of the shallowness of the soils, and low permeability of the soil and surficial rock, the bulk of the run-off occurs during and shortly after the rains of fall and winter. The base flow is poorly sustained.

Climate

Precipitation is mostly in the form of rain, except for the upper reaches above U.S. 299 which receive snow to depths of 5 feet and more. Rain falls generally throughout the year in the lower reaches, though mostly in the period September through May.

Topography

At its southern limits, Redwood Creek drainage is characterized by ragged mountains abruptly uplifted from the sea, as well as narrow valleys. The whole moderating to maring terraces and a lagoon at its mouth. Numerous tributaries cut through it in deeply incised canyons. The area is geologically very young, unstable, and in a state of dynamic tension.

Earthquake Zones

Redwood Creek follows the Grogan Fault Zone which establishes direction, gives depth and character to it, while also contributing to the highly unstable nature of the watershed. Rocks appear to be cretaceous, metasedimentary, of the jurassic period. Mica schist, green schist, and conglomerates were observed.

The Grogan Fault Zone and Redwood Creek are bounded on the east by the South Fork Mountain Fault and on the west by the Bald Mountain Fault.

There is evidence on the ground of a massive shifting of the area west and north of Ayers Cabin towards the east in Sections 6 and 7, T5N, R4E, and in all of Sections 1 and 12, T5N, R3E, HB&M.

A second shifting of the earth's surface athwart the creek itself had occurred in Section 10, T4N, R4E, and is called Hatzis Roughs. A drop of approximately 2000' in elevation within one-half mile occurs there. It is characterized by major blocks of rocks varying in size from car to house sizes, all jumbled together with the stream falling around, over, or between these blocks of rocks. Travel is difficult.

A map is attached showing the relationship of the Grogan Fault Zone with the South Fork Mountain Fault Zone to the east and the Bald Mountain Fault Zone to the west.

Soils Stability

Severity of mass movement of soils along the slopes directly adjacent to the stream was, in decreasing magnitude, as follows:

- Zone I - upper third of Redwood Creek - to U.S. 299
- Zone II - middle third of Redwood Creek - to Stover Ranch
- Zone III - lower third of Redwood Creek - Pacific Ocean

Vegetation maps have indicated that 80% of the slopes adjacent to the stream have an erosion hazard rating of moderate to low. Classification of erodability ratings of slopes were determined from inspection of soil vegetation maps to be as follows:

EROSION HAZARD RATINGS

CLASS	LEFT BANK	BANK MILES	RIGHT BANK
Moderate	44		37
High	5		12
Gravels	9		9
Cultivated	2		2
TOTALS	60		60

However, field examination showed severe erosion to be present and that actually a colluvium appears to overlay unstable phases of Atwell, Master-son, Tyson and others for over 60% of the slope areas in contact with the creek. There is present, a wide and continuing movement of soils. Of the original stream banks in Redwood Creek, only an estimated 5% are still intact. Stream aggradation following the 1964 flood has been complete. Gravel deposition presently is from "toe-of-slope to toe-of-slope". Several multi-staged gravel terraces were observed. Almost all of them were in the upper third (Zone I) of Redwood Creek. Some have an estimated depth of thirty feet.

Erosion Causes

Evidence on the ground indicates that the primary causal agent was the sheer ferocity and high intensity of the 1964 Flood, which was repeated locally (within 600' etc) early in 1972. A relatively shallow and under-silted channel, totally lacking in capacity, forced a vertical movement of these tremendous volumes of water suddenly placed there. This displacement removed both banks and cut into the toe of the immediately adjacent slopes. That action eliminated banks and the riparian vegetation, cut into the slopes, and triggered mass soil movement bordering on total collapse of the slopes. This mass movement of the soil mantle progressed up slope and across slopes. It is still occurring.

Contributing as a secondary cause in large measure to this occurrence, was the proliferation of poorly located roads which had been used in timber harvesting operations (circa 1945-1960) and immediately abandoned. These roads were located at the toe of the steep slopes, undercutting them badly, or about 15' to 40' above the stream banks. Evidence of the ground shows that this network of roads was either abandoned after use or that the roads were inadequately maintained. Road location standards of that period prohibited the use of gravel bars as haul routes and encouraged the use of ball-drawers for logging which in turn increased the road mileage necessary, under the Forest Practices Act and the Fish and Game Code. A newer and more enlightened policy now encourages cable logging systems and permits the use of gravel bars for haul routes.

The third factor contributing to degradation of the watershed was the earlier use of tractors in logging. This procedure resulted in deep cuts on steep slopes for skid roads, and - worse of all - approximately twice as many miles of haul roads have been necessary ^{with} for cable logging. The high intensity storms of winter changed the skid roads and abandoned haul roads into water courses. Erosion became rampant.

Slopes

As viewed from the creek, slopes ranged from 40% to 80%.

Zone I The more gentle slopes were in this zone and ranged from 40% to 60%. Further up-slope, the greatest amount of soil instability and mass soil movement existed for the entire creek. Batsis Roughts are in this zone where the greatest elevational changes (estimated to be 2000' in 1/2 mile) occur.

Zone II Slopes ranged from 40% to 60% in some places. This Zone has Redwood Valley in it with a long and relatively broad expanse of flat ground on the right bank.

Zone III Slopes became somewhat more gentle and ranged from 20% to 50%.

Vegetation

- Zone I Was in the true firs, grading into the mixed conifers at lower reaches. Hardwoods and brush were prevalent in those areas where cutting had been complete. This Zone was the most heavily cut over of all.
- Zone II Was in the Douglas fir type, with large expanses of "balds" at upper slope limits. Large expanses of cut-over lands were visible.
- Zone III Graded from Douglas fir-redwood at the up stream end to redwood-Douglas fir and then almost pure stands of redwood near U.S. 101.

Higher elevations of all three Zones, as seen from the creek, were in large grassy prairies called "balds". Zone II has the largest expanses of such.

Regeneration

Coniferous regeneration was judged to be fair to poor in Zones I and II. Zone III appeared to have the best management practices, with reproduction well established on old cuttings.

Pollution Sources

Road construction and road maintenance operations contribute in very large measure to watershed degradation. Other land use practices having adverse inputs to stream values are grazing, forest harvesting, recreational uses, and miscellaneous other types.

Stream Characteristics

Gradients: Variations in stream gradients were as follows:

Zone I Range was from 15% to 60% in the area of Hatzia Roughs. Average gradient for this zone was 25%.

Zone II Range was from 1% to 3% with an average of 2%.

Zone III Gradients smoothed out to a nearly constant 1%.

The lower 55 miles averaged 3% with very low reaches of about 1% or less.

Stream Depths: Zone I had depths ranging from "dry" at the source to 10" deep with very few pools. Size of pools varied but generally were less than 50 feet long.

Zone II had depths ranging from 4" to 10" with some pools to 100' long.

Zone III had depths which ranged from 12" to 30", for larger expanses of the creek. Exceptions were the gorge inside the south Park boundary.

At no time on this journey was it necessary for us to swim and to float our camp gear across any section of the stream. Average depth for this water course was judged to be 4".

Stream Width: At its source, the stream had a width of 12' and was dry. Wet areas i.e., where water was present ranged from 12' to 60' in width, and the dry bottom from 12' to 100' additional.

Zone II had a stream width which generally held at 12' wet and 150' dry. This was changed by the several recreation impoundments which were built by use of dozers pushing gravels to a height of 12" to 24". By-passes were provided for under the California Department of Fish and Game permits which had presumably been issued. In each case, the entire stream bottom was turned into a lake.

Zone III had a change in bottom characteristics with wet areas about 16' wide and dry gravels to 40' wide in addition. A narrow rocky gorge, about 40' wide, exists at the South Boundary, above Bridge Creek. Below this gorge, the stream changes to an average width of 100'. Sometimes this was much wider. Near the Arcata Redwood Company Mill at U.S. 101, protective dikes began and changed the stream into a confined sluiceway to the ocean.

Stream Bottom

- Zone I At the source, gravels ranged in sizes from 2" to 4" with changes at the 1/2 mile mark to bedrock and some fragments to 10". Mid-reaches of this zone were characterized by massive blocks of rocks from car to house size in the area of Hatzis Roughs where an easterly displacement of the land mass had occurred along the Grogan Fault.
- Zone II Gravels were loose and unstable. Sediment size ranged from silt and sand to cobbles with 70% under gravel size - the whole being rather tightly cemented.
- Zone III A rocky gorge exists at the South Fork boundary.. Fractured rocks are car size or smaller. Below Bridge Creek, the bottom is characterized by silt (which predominates) and sand - the whole being tightly cemented.

Pool/Riffle Ratio

- Zone I There was almost a complete absence of pools of any size in this section due to bedrock areas.
- Zone II A slight increase of pools was noted and the ratio approached 1 per 100 yards.
- Zone III The pool/riffle ratio in this section changed to about 1 per mile of stream length.

Generally, for the entire water course, the pool/riffle ratio was 1 to 50.

Stream Flow

The average hydrologic budget* over an 89 year period is as follows:

Drainage Area	Pptn.	Pot. Evap.	Water Loss	Natural Runoff	% of Diff. Actual	Calculated
a. 67.5 sq. mile	80"	33.5"	26"	54.2"	57.1"	+ 5.4%
b. 278.0 sq. mile	80"	32.0"	26"	53.5"	58.5"	+ 9.3%

- a. At O'KANE - crossing on (old) U.S. 299
- b. At CRICK - crossing of U.S. 101

Maximum stream flow of record, as measured at Crick, was 50,500 cfs on December 12, 1964. Minimum flow of record, as measured at Crick, was 10 cfs on September 22, 1911.

Water Quality

Tests were made during the survey from the headwaters to the mouth, with no significant changes except for the diurnal changes in temperatures.

The publication, "Water Quality Criteria - State of California" published April 1971 shows the following limits for values indicated:

- Dissolved Oxygen - minimum values for trout are 5.00 ppm
- Ph - upper limits of tolerance for trout (Brook Trout from 4.1 to 9.5 in 9.2)
- Total hardness - no criteria for aquatic life
- Free acidity - no criteria for aquatic life
- Total alkalinity - no criteria for aquatic life

Rain fell on the night of September 18 and during the day on September 22. Stream levels were at their lowest levels for the rain year. All tributaries and Redwood Creek had 100% clarity of their waters. The only exceptions, (minor) were in the immediate area of the damming observed near Bradford Creek, and the (major) one at the gravel collection upstream of Crick.

Spawning Conditions

There was a fair to poor distribution and availability of aquatic insects such as May flies and Ephemeroptera fly larvae at most points along the stream. The extremely wide stream bottom provided for an excessively high rate of insolation. Riparian vegetation and trees were absent over almost all the creek. Slopes were too far back to provide for much shading during critical parts of the day during the summer.

Absence of sufficiently high water levels in summer made this stream suitable only for anadromous fish. This stream was an exceedingly high importance to the off-shore commercial fishery and less to the stream sport fishery. There is almost a complete absence of resident fish populations. Only two catchable fish were observed. They were 4" and 18" land-locked steelhead. Two pools supported some fingerlings and a few fry.

ERRATA:

This page reissues and replaces previously issued one which should be destroyed. 3/30/73

Habitat Conditions

Down to all three zones, but with minuscule exceptions, were the absences of cover, concealments, and large enough volumes of water to sustain native populations. This is largely due to the inherent nature of the stream. In the upper ten miles, boulders and rubble interspersed with gravel dominated the bottom. From 10 miles down to the vicinity of Redwood Valley, cobbles and gravels act in sand and silt are the rule. Below Redwood Valley the sediments become finer until sand, silt, and pea gravel covered the lower 15 miles.

Water Quality

original 400 high
28.6% high

Date	Place	Time	D.O.	ph	Total Hardness	Free Acidity	alka.	Air Temp.	Water Temp.
9/12	2 1/2 mi. below Board Camp	3 pm	10.0ppm		--	.00	.00	56	53
9/13	Camp 1	7 am	10.0ppm	9.0	102.6	.00	.00	44	--
9/13	Below Snow Camp Cr.	9 am	6.4ppm	7.5	342.0	.00	.00	53	--
9/13	Below Twin Lakes Cr.	11:40 am	--	--	--	--	--	78	61
9/13	confluence of above w/Redwood Cr.	4:40 pm	--	--	--	--	--	58	46
9/14	Above Pardee Cr.	Noon	10.0ppm	9.1	239.4	.00	.00	60	60
9/14	Below Pardee Cr.	Noon	9.3ppm	--	--	--	--	60	53
9/14	Junction Pardee & Redwood Creeks	Noon	--	--	--	--	--	60	56
9/14	Above Bradford Cr.	12:05 pm	--	--	--	--	--	72	62
9/14	Camp #3	6 pm	9.3ppm	9.0	290.7	.00	.00	82	69
9/14	Camp #3	7 am	--	--	--	--	--	50	--
9/18	O'Kane/US 299	2 pm	9.3ppm	9.2	304.91	.00	.00	60	61
9/19	Redwood Valley Ranch	9 am	7.8ppm	9.2	334.9	.00	.00	58	62
9/19	Below Dry Cr.	Noon	7.8ppm	--	--	--	--	58	62
9/19		3:45 pm	10.0ppm	--	--	--	--	--	--
9/20	Simpson Elk Road	7:10 am	10.0ppm	9.2	290.7	.00	.00	42	52
9/20	Below Devils Cr.	12:25 pm	9.3ppm	9.2	205.2	.00	.00	68	62

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filed in 1/11/73
of 1/11/73

ERRATA. This page supersedes and replaces previously issued one which should be destroyed. 3/30/73

Date	Place	Time	D.O.	ph	Total Hardness	Free Acidity	alkn	Air	Temp. water
9/20	Below Bridge r.	4:30pm	--	--	--	--	--	66	64
9/21	Tall Trees	7:45am	--	--	--	--	--	42	56
9/21	Moquet C/O	1:pm	11.6ppm	9.2	290.7	.00	.00	65	62
9/22	Below Brick	1:35am	--	--	--	--	--	56	60
9/22	Mouth of Redwood	9:50am	10.7ppm	--	--	--	--	--	--

Winter Conditions

"Secur marks" on trees and slopes indicate extreme fluctuations with almost constant turbidity and an extremely heavy bed load.

Fish

Salmonoids were seen about 1/2 mile below the barrier in a few isolated pools. The fish were about 6 to 8 inches long and usually one per pool. About 1/5 mile above Garden Creek, the stream became constant flowing and more salmonoids (about 20 per 100 lineal feet of stream) were seen. Those fish were from 2' to 5' long. Below the upper 10 miles of stream, fish sightings became fewer. In the mid and lower reaches there are mile long sections where no salmonoids were observed. In the upper section of Redwood National Park, and just above it, salmonoid count increased slightly per 100 feet. In this same area, two 16 to 18" long salmonoids were noted. Redwood Creek has little to offer resident trout or juvenile salmon or in using it as a nursery area.

Other Vertebrates

Frogs, salamanders, otter, beaver, elk, bear, deer, racoon, Great Blue Herons, buzzards, wood ducks, quail, raven, mice, squirrels, water ouzels, mergansers, and song birds were present.

*This page superseded by Errata Sheet 3/30/73
due to error in D.O.
data.*

Habitat Conditions

Common to all three Zones, but with minuscule exceptions, were the absence of cover, concealments, and large enough volumes of water to sustain native populations. This is largely due to the inherent nature of the stream. In the upper ten miles, boulders and rubble interspersed with gravel dominated the bottom. From 10 miles down to the vicinity of Redwood Valley, cobbles and gravels set in sand and silt were the rule. Below Redwood Valley the sediments became finer until sand, silt, and pea gravel covered the lower 15 miles.

Water Quality

Date	Place	Time	D.O.	ph	Total Hardness	Free Acidity	alka.	Air	Temp. Water
9/12	2 1/2 mi. below Board Camp	3 pm	13.57ppm		--	.00	.00	56	53
9/13	Camp #1	7 am	13.57ppm	9.0	102.6	.00	.00	44	--
9/13	Below Snow Camp Cr.	9 am	8.72ppm	7.5	342.0	.00	.00	53	--
9/13	Below Twin Lakes Cr.	2:40 pm	--	--	--	--	--	78	61
9/13	Confluence of above w/Redwood Dr.	2:40 pm	--	--	--	--	--	58	46
9/14	Above Pardee Cr.	Noon	13.57ppm	9.1	339.4	.00	.00	60	60
9/14	Below Pardee Cr.	Noon	12.60ppm	--	--	--	--	60	53
9/14	Jct. Pardee & Redwood Crks.	Noon	--	--	--	--	--	60	56
9/14	Above Bradford Cr.	11:05 am	--	--	--	--	--	72	62
9/14	Camp #3	6 pm	12.6ppm	9.0	291.7	.00	.00	82	69
9/14	Camp #3	7 am	--	--	--	--	--	50	--
9/18	O'Kane/US 299	2 pm	12.6ppm	9.2	304.91	.00	.00	60	61
9/19	Redwood Valley Ranch	9 am	10.66ppm	9.0	334.1	.00	.00	58	62
9/19	Below Dry Cr.	Noon	10.66ppm	--	--	--	--	58	62
9/19		3:45 pm	13.57ppm	--	--	--	--	--	--
9/20	Simpson K&K Road	7:10 am	13.57ppm	9.0	291.7	.00	.00	42	52
9/20	Below Devils Cr.	12:25 pm	12.60ppm	9.0	305.2	.00	.00	68	62

This page organized by
 Emma Hunt 7/30/73
 date . A .

Date	Place	Time	D.O.	ph	Total Hardness	Free Acidity	alka	Air	Temp. Water
9/20	Below Bridge Cr.	4:30 pm	--	--	--	--	--	66	64
9/21	Tall Trees	7:45 am	--	--	--	--	--	42	56
9/21	Clouquet C/O	1 pm	15.51ppm	9.2	290.7	.00	.00	65	62
9/22	Below Orick	11:30 am	--	--	--	--	--	56	60
9/22	Mouth of Redwood	9:50 am	14.54ppm	--	--	--	--	--	--

Winter Conditions

"Scour marks" on trees and slopes indicate extreme fluctuations with almost constant turbidity and a extremely heavy bed load.

Fish

Salmonoids were seen about 1/2 mile below the barrier in a few isolated pools. The fish were about 6 to 8 inches long and usually one per pool. About 1/5 mile above Pardee Creek, the stream became constant flowing and more salmonoids (about 20 per 100 lineal feet of stream) were seen. Those fish were from 2' to 5" long. Below the upper 10 miles of stream, fish sightings became fewer. In the mid and lower reaches there are mile long sections where no salmonoids were observed. In the upper section of Redwood National Park, and just above it, salmonoid count increased slightly per 100 feet. In this same area, the 16 to 18" long salmonoids were noted. Redwood Creek has little to offer resident trout or juvenile salmon or in using it as a nursery area.

Other Vertebrates

Frogs, salamanders, otter, beaver, elk, bear, deer, racoon, Great Blue Herons, buzzards, wood ducks, quail, raven, mice, squirrels, water ouzels, manganers, and song birds were present.

Stream Obstructions

Zone I - This area had the greatest number and highest volume of debris jams. It was estimated that a total of perhaps two million feet (gross) was scattered at several points above U.S. 299. No practical or economical means of removing it exists at this time. When re-logging of those sections occurs again, that material might be removed at that time if it is still present. Burning of this material would have to be conducted in mid-summer to have any chance of success. Fire danger would make this a very "chancy" situation.

The Zone also had two formidable, natural, obstructions. Either of them is sufficient to limit the upstream movement of fish. One high, 50', bluff is present about three miles below the source point of Redwood Creek. At about 1 mile above the power line crossing is a massive and extensive jumble of rocks from car to house size, called Hatzi Roughs. It is in the area where the stream loses about 1500' elevation in a short distance with a gradient of about 60%. This provides a primary, and final barrier to upstream movement of spawning fish.

Zone II - This is characterized by a flatter gradient than the upper Zone (less than 3%) and an absence of obstructions. However, two sections of flood deposited bridges are lodged against the right bank in the vicinity of the Park boundary. The end result is a diversion and deflection of the winter floods to the opposite side of the stream. Thus, undercutting of unstable slopes is accelerated. Action has since been taken to remove those bridge sections prior to the winter storms of 1972-1973.

Zone III - Except for the gorge between South Park boundary and Bridge Creek, there are no obstructions to fish.

Springs

Almost the entire stream length is characterized by springs and seeps. Many of these are associated with the Atwell soils prevalent to the area and which are in constant movement.

Fishing Intensity

There were no signs of sport fishing. Local residents and U.S. Forest Service personnel reported superior fishing existed prior to the 1964 floods, in the upper area. A salt trough and smoke tree in the area of the Tall Trees are mute proof of the heavy spawning runs which once existed in the stream.

Other Recreational Uses

Low level, seasonal, recreation dams for swimming were observed both above and below U.S. 299, and particularly in Redwood Valley. These are presumably constructed under permits from the California Department of Fish and Game. Bull dozers were used to push gravels to heights of 24" to 36" to

form impediments clear across the stream, with a small by-pass at one end to permit the stream to flow freely. It is believed that reliance for removal of the structures is dependent upon winter flood conditions. Minor, and localized, surging of the water probably occurs.

Camping was in progress within Redwood National Park with five groups noted between the Tall Trees area and Elm Creek. There were signs of much camping at scattered points along the gravel bars.

Aesthetics

Zone I - Near the source, slopes were steep (40%) and covered by virgin stands of true firs and Incense Cedar, with a scattering of hardwoods. An almost total absence of brush and undergrowth resulted from the absence of fire. This shading out of the undergrowth made a park-like setting which was very attractive on the Forest Service lands. As one moved downstream, at a point about three miles below the source, the scene changed. New logging was currently in progress on the right bank. Increasingly visible as one moved downstream, were the old cut-over lands. Areas of widespread stream side and upper slope erosion became common on both slopes. This portion of the watershed was suffering the most from widespread erosion. Land use practices of a quarter century ago had initiated adverse impacts to Redwood Creek which are still in progress.

Zone II - Slopes were equally precipitous. The forest had been cut over about 1970 to 1960. Hardwoods and brush species now dominated the scene. Slides were equally common. Redwood Valley, downstream of U.S. 299, was broad, green, verdant, and quiet near Redwood Creek. Upper slopes show widespread evidence of massive soil creep in the "balds", as well as many natural slides. Forested lands are almost wholly cut-over and ranching is now the dominant industry with sheep being grazed. Several recreation homes were seen. Erosion from natural causes seems to be the greatest in this section.

Zone III - A particularly beautiful area, about 4 stream miles long, was observed below the Stover Ranch. Because of the very sinuous nature of Redwood Creek at this point (four stream miles exist where the map shows only two air line miles) it was termed the "Snake". Vertical walls of rock, with consequent difficulty of access, protected the stream here. This section was perhaps the wealthiest in terms of quantity, quality and diversity of fauna and flora of the entire stream.

Comments

Redwood Creek is at its nadir as a producer of trout, steelhead, and silver salmon at this time. The upper ten miles are choked with flood deposited gravels and debris. Collapsed roads and bridges add sediments to the remainder. Gravel deposits to 30' (estimated) were noted in the upper two thirds of the stream. All but 5% of the original stream banks are absent. About 60% of the slopes are unstable or actually moving. About 80% of the watershed is the victim of unwise land use practices.

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Summary

A photo report with a keyed strip map is attached to this report.

This is, necessarily, a ^{empirical} subjective report conducted on an extensive basis. From facts gathered or observed in the field the following conclusions are reached:

1. The greatest contributor to adverse down stream inputs was the 1964 flood. This situation continues due to unstable soils, particularly in Zones I and II, combined with the very steep slopes.
2. A secondary contributor to the poor watershed conditions is the poor location, the great number, maintenance, and the abandoned nature of old logging roads.
3. In the background, as a causal agent of adverse inputs, is the use of bull dozers in logging steep and unstable ground.
4. Another contributor to poor watershed conditions is the removal under Alternate Plans of the seed trees or seed blocks which had been left as provided for through the Forest Practices Act. The wide distribution requires use of bull-dozers and this results in opening up old skid roads and loss of the small amount of coniferous reproduction present.
5. During this survey, logging was underway in the watershed to the extent that the sounds of power saws and trucks were heard almost daily.
- * 6. Except in two instances, Bradford Creek and Orick areas as previously mentioned, water quality was perfect.
- * 7. This stream has its highest fishery value as a spawning stream for anadromous fish.
- * 8. There were scattered signs that the stream is now cutting itself a new channel through the gravels which had been aggrading it to this time.

Recommendation

It is recommended that a watershed rehabilitation program be initiated, particularly in Zones I and II. This effort to include erosion control measures on skid roads and abandoned haul routes as well as field planting of conifers.

Further, it is recommended that efforts be made to modify the Forest Practices Act to require continuing, effective, maintenance of all permanent roads i.e., those to be used another season. All temporary, single season, roads to be restored to near natural conditions prior to the winter storms.

Appendix

Photo - Report

on

Redwood Creek Survey

<u>Photo No.</u>	<u>Caption</u>
1.	The journey begins on the divide between Mad River and Redwood Creek. In photo is Ted Hatzimanolis, Forest Scientist, Redwood National Park. 9/12/72.
2.	Stream aggradation within two miles of beginning of Redwood Creek (West Fork). No logging in area. Site is just above Friday Ridge Road. 9/12/72
3.	View of stream bed immediately above crossing of Friday Ridge Road - USFS. Note sizes of gravels and absence of stream banks. 9/12/72
4.	Typical section of stream and side slope conditions within first three miles. 9/12/72
5.	Redwood Creek below confluence of the East and West Forks. Note open nature of stand, stable slopes, and absence of stream banks. 9/12/72
6.	Old cut over area with stream from right bank showing erosion in process. Cutting about 1950(?).
7.	Testing for ph was conducted by Dave Rogers, Fishery Biologist, California Department of Fish and Game, with Hach Co. field test kit. 9/13/72
8.	Color comparator in use by Ted Hatzimanolis, Forest Scientist, Redwood National Park to complete testing for ph. 9/13/72
9.	Another view of some old cutting on right bank of Redwood Creek with erosion on entering stream. 9/13/72
10.	Freshly started logging along west bank on private lands. Only falling and bucking operations were noted. About 4 miles below head of creek. 9/13/72
11.	Conditions on intermittent stream as noted. Slopes are stable and stream is deeply incised. 9/13/72

12. Close-up view of stream bottom in Redwood Creek showing rock sizes and encroachment of vegetation. 9/13/72
13. Fresh logging down to the edge of the slope. Water running clear in stream. Same area as preceding photo. 9/13/72
14. View of Roddiscraft Road (private) at its crossing of Redwood Creek. Note absence of surfacing and a cause of winter and spring erosion. 9/13/72
15. View of old cut-over area (1969?) near Roddiscraft Road. 9/13/72
16. Natural slide and erosion on right bank of Redwood Creek. Note absence of any true stream bank. 9/13/72
17. Typical situation following logging about 1955-60. Note badly eroded tractor roads and slope erosion. 9/13/72
18. Roddiscraft Road crossing of Redwood Creek with log culvert providing a 10' wide by 4' high freeboard for water to pass underneath. 9/13/72
19. Old, abandoned, corduroy road crossing in Redwood Creek from which lead the badly eroded and unusable sections of road. Below Roddiscraft Road. 9/13/72
20. Typical view of old cut-over lands and eroding slopes resulting from logging immediately after WW II. 9/13/72
21. Conditions in Redwood Creek immediately below Corduroy Crossing resulting from old logging. 9/13/72
22. Severe stream aggradation above Hatzis Roughs with some success by Redwood Creek to cut a new channel. 9/13/72
23. General view of upper end of Hatzis Roughs with rocks to car and house size. 9/13/72
24. Old, but deteriorated, bridge crossing with abandoned road across Redwood Creek. 9/13/72
25. Scientist standing on relict stream bank viewing the extensive stream aggradation. Area below Hatzis Roughs. 9/13/72
26. Flood conditions of 1964 were almost repeated in February 1972 with resultant bank undercutting which threw these trees into and across Redwood Creek. 9/13/72

27. Note the silts and sands common to Redwood Creek from here to the Ocean. Most often they were tightly cemented. 9/14/72
28. Approximately 10' of gravel have been deposited on the top of a 5' dia. stump which remains after logging off the stream banks. 9/14/72
29. Old logging by tractors on unstable slopes - and the results today. 9/14/72
30. Typical stream section above Pardee Creek. 9/14/72
31. Old cable car crossing near Ayers Cabin, and cut-over areas sliding into creek. 9/14/72
32. Camp scene near Pardee Creek with slopes eroding down to the stream. Note large amounts of sands and silts now common in stream bed. 9/14/72
33. The first tree had landed moments before the camera was readied near Bradford Creek on Kerr lands being logged by Goodson Bros. 9/14/72
34. -- and the dust had almost cleared away. Note angle of trees on left bank denoting unstable soils. 9/14/72
35. Above Bradford Creek. The cry was heard "Down the hill" -- "Down the hill". 9/14/72
36. The camera caught this tree being felled into, over, and across Redwood Creek. Kerr Ranch and Timber Co. lands, with Goodson Bros. logging. 9/14/72
37. Note unstable slopes of left bank and tractor working in stream bottom. 9/14/72
38. Tractor crossing of Redwood Creek during logging near Bradford Creek. Situation reported to CF&G wardens. 9/14/72
39. A general view of the bottom of Redwood Creek in the area where logging was in progress. 9/14/72
40. Slope and stream conditions in the logging area. 9/14/72
41. Stream crossing near Bradford Creek which will have to be removed before winter floods so spawning fish can utilize the stream. 9/14/72
42. Another example of improper stream crossing in Redwood Creek. 9/14/72

43. "Drott" log loader parked on edge of new landing in Redwood Creek at Bradford Creek. 9/14/72
44. Stream crossing near Bradford Creek in Redwood Creek prepared under permit from California F&G Department. 9/14/72
45. Near Bradford Creek the tractor was skidding logs to a landing it had prepared in Redwood Creek. "Drott" log loader (left) not operating. 9/14/72
46. View of skid road on dry gravel bar and the out-haul road on logging near Bradford Creek. 9/14/72
47. General view of slope conditions. 9/14/72
48. Another view of slope conditions. 9/14/72
49. Above U.S. 299 Crossing - with natural erosion occurring in the tall and the un-cut timber. Note continued absence of stream banks. 9/14/72
50. Recreation Homesite with impounded Redwood Creek in foreground to serve as a swimming hole. Note water clarity.
51. Upstream view of the man-made pool, one of several, in Redwood Creek. 9/15/72
52. Typical conditions in old cut-over with remnants of two road grades visible. Note the silt-sand nature of stream bottom. 9/15/72
53. An apparently abandoned road constrained on un-stable soils near U.S. 299 crossing. Note water clarity. 9/15/72
54. Another impoundment of Redwood Creek to serve as "an 'ole swimming hole". These are (Presumably) constructed under CF&G Permits. 9/15/72
55. View of the bridge crossing of U.S. 299 at Redwood Creek. 9/15/72
56. Below the U.S. 299 Crossing of Redwood Creek. Gravel sizes remain small and tightly cemented with silt. 9/15/72
57. Vehicle tracks on the gravel bars in the vicinity of U.S. 299 crossing and above O'Kane (Old U.S. 299). 9/15/72
58. The old U.S. 299 crossing of Redwood Creek at O'Kane and the lower end of Zone I. 9/15/72

59. Continued stream aggradation, removal of banks, and consequent undercutting of slopes initiated this additional slide in un-cut timberlands. 9/15/72
60. An idyllic summer scene created with impoundment of Redwood Creek in Redwood Valley to provide summer swimming facilities. 9/15/72
61. Redwood Creek in upper Redwood Valley. Gradients are easy, fish are absent, and stream banks are absent. 9/18/72
62. Typical view of Redwood Creek in Redwood Valley. 9/18/72
63. Remains of old bridge crossing near Redwood Valley Ranch. 9/18/72
64. County bridge crossing of Redwood Creek in Redwood Valley, from U.S. 299 above. February 1972 storm, a repeat of 1964 flood, severely damaged structure. 9/18/72
65. Up-stream of Humboldt County Road Department Maintenance Yard, Redwood Valley. 9/18/72
66. Soil creep and mass soil movement so typical of the area in Redwood Valley, The grassy "balds" not visible in photo are heavily grazed by sheep. Jeep roads criss-cross the unstable areas causing erosion. 9/18/72
67. View of stream bottom and slopes below Redwood Valley Ranch. 9/18/72
68. Another view of Redwood Creek in Redwood Valley. 9/18/72
69. Remains of old Dolly Varden Log. Co. bridge near Beaver Creek. 9/18/72
70. View of Redwood Creek near Beaver Creek. 9/18/72
71. In this cleft of rock, behind the log, lives a family of five otters. 9/18/72
72. There went the otter, to the left of the picture, only to climb the bank and deprive us of a picture. 9/18/72
73. Remains of the old Beaver Creek Road crossing. 9/18/72
74. This pool caught our eye and we soon saw it was the home of a family of five river otters, which we saw. 9/18/72

75. In the left of photo, nicely blending with the foliage, is a mature river otter. 9/18/72
76. A second otter, in the upper left of photo, followed the first one out of the creek and up the hill. 9/18/72
77. Some of the area in the otter habitat. 9/18/72
78. An otter was scrambling up the side draw (left of photo) to escape. 9/18/72
79. Recreation impoundment for swimming near Beaver Creek. 9/18/72
80. Diversion at edge of dam for the above impoundment. 9/18/72
81. Simpson Timber Co. Bridges on the Klamath-Korbek off-highway (private) road. 9/18/72
82. The newly (1972) re-constructed Panther Creek Bridge below E&K Road Crossing. Stringers - 4' dia., Span 24', all redwood construction. With 3' dirt fill on top. 9/18/72.
83. Un-stable soils and old-cut-over below the Panther Creek Bridge. 9/18/72
84. Bridge across Coyote Creek, built about 1960. 9/19/72
85. New logging to the toe of slope near Park boundary. No debris in stream. Cables system used. 9/19/72
86. Typical section of Redwood Creek above Park boundary. Note clarity of water and size of gravels. 9/19/72
87. The only debris pile seen between U.S. 299 and the Fall Trees Trailhead near Orick. -this one outside Park. 9/19/72
88. The upper end of "The Gorge", South boundary of the Park. 9/19/72
89. An old bridge section, 1964 flood deposited, for which arrangements were later made to have removed. It was deflecting water to undercut banks. 9/20/72
90. A redwood stump at toe of slope being mined for its curly grained, rare, material used by novelty manufactures. Upstream of Park boundary - Copper Creek. 9/20/72.

91. **Sedimentary rock, the only large example seen thus far, right bank, outside Park boundary. 9/19/72**
92. **Remains of Simpson Timber Co. "1800" bridge above Park boundary. 9/20/72**
93. **Badly deteriorated bridge across Devil's Creek. Structure should be replaced or removed before it falls and blocks creek. 9/20/72**
94. **Unstable nature of soils in area above Park boundary clearly shown with trees of small size leaning in all directions. 9/20/72**
95. **Between Bridge Creek and the Tall Trees stream (wet) width increased and silt and sands remained cemented. 9/21/72**
96. **At Tom McDonald Creek the contractor was removing accumulated debris lodged against the bridge. Access from G.P. Corp. - private road through Big Lagoon. 9/20/72**
97. **The morning sun highlights the cut-over lands outside the Park on the West side. 9/21/72**
98. **An extremely high dew point of the preceding two nights made for a wet camp. Camp gear drying out. 9/21/72**
99. **Breakfast is being prepared while wet gear dries out. Firewood was a minor problem at Tall Trees area because visitors used it up. Note silt. 9/21/72**
100. **Upstream of the Tall Trees, and opposite our camp, was a spike deer having its breakfast on acorns and hazelnuts. We approached it for a better picture. 9/21/72**
101. **The spike buck had seen us. He returned to his feeding. 9/21/72**
102. **As we crossed the creek with the camera, he raised his head to check up on man - the interloper. 9/21/72**
103. **Again, the spiked deer raised his head to check our progress as we were in the middle of the stream. 9/21/72**
104. **He is still not quite sure of our intentions - but he "thinks" we will not be hurting him. 9/21/72**
105. **Back to breakfast, but he moved downstream a bit, and much closer to a handier escape route. 9/21/72**

106. "Hmmm! but this is good. I guess there is enough here for man to eat some of this".
107. The spike stopped for a drink of water, and I got closer again. 9/21/72
108. This was as close as I tried to get, after all he had breakfast to eat - and we returned to ours. 9/21/72
109. As we turned to cross the creek, a magnificent 4-point buck was caught as he raced toward the young spiked buck - a dispute on territorial rights. 9/21/72
110. The young spike quickly left the scene, while the older buck - followed. The new arrival was in full rut as evidenced by his swollen glands. 9/21/72
111. Plant invasion of gravel bars is increasing with signs of caryx, vetch, and equisetum present. 9/21/72
112. Hard wind driven rain began at about 3 p.m. at about Elm Creek. The next day, this photo was taken of the diked area, scene of gravel operations about ARCO Mill. 9/22/72
113. Indiscriminate removal of gravels by the operator had caused much heavy siltation yesterday during the first rise of water which now cleared. 9/22/72
114. The proper, established, practices were not followed by the gravel operator which lead to undercutting the toe of the dikes and severe siltation. He has since been cited. 9/22/72
115. Stream bed alteration was accomplished in violation of CPM Code 1602. Violator subsequently was cited and convicted, 9/22/72
116. Below Orick, Redwood Creek filled its "banks" as it continued to the Pacific. Signs of pollution were noted at Orick (farming, suds, dirty scum). 9/22/72
117. This point is about half way between Orick and the Pacific Ocean. Our long journey is almost over. 9/22/72
118. The mouth of Redwood Creek and the ocean breakers are now in view, as is the end of the (left) dikes. Ocean associated waterfowl observed. 9/22/72

119. The breakers continue to roll over the sand-spit in the annual contest between the ocean and the lagoon, trying to widen the mouth. 9/22/72
120. Breakers rolling over the sandbar, the mouth is widening, and the lagoon will be almost completely open for spawning steelhead to move upstream. 9/22/72
121. The battle between the sea and the creek continues. Or, is it the creek has finally returned to the ocean from which it came - each needing the other? 9/22/72
122. We have followed the drop of water to the ocean. Our long journey is over. 9/22/72