State of California | The Resources Agency

Memorandum

To : Warden Bill Anderson   Date : September 29, 1982

From : **Department of Fish and Game**

Subject : Coleman Creek Siltation Investigation, Preliminary Assessment, Mendocino County

Upon your request a siltation investigation was conducted on Coleman Creek, Mendocino County, on August 5-6, 1982. Field work was centered around a hunting camp and road system which contribute sediment to Coleman Creek. Sediment quality and benthic invertebrate samples were collected; fish population sampling is to be conducted during the last week of September. This report deals with sediment quality data; benthic samples are being processed and a separate report will be issued upon completion.

An inspection of the road system constructed from the streambed up to the ridgetop on the southern valley hillside revealed a great potential for large volumes of loose roadbed material to enter Coleman Creek during this winter. Major sources of potential sediment contributions to Coleman Creek are sidecast and mounds of loose material placed adjacent to gullies. Road cuts into the hillside are unstable and would slip onto the roadbed, contributing further quantities of sediment downhill to Coleman Creek. Over 13 gully crossings were not protected by culverts; runoff would cross the roadbed and erode more sediment into Coleman Creek.

Sampling station locations (Figure 1) and descriptions are as follows:

Station	Description
A	control, approx. 100m upstream of encampment
B	approx. 0.1m downstream of encampment
C	approx. 0.3m downstream of encampment
D	approx. 0.8m downstream of encampment
E	approx. 2.1m downstream of encampment

No surface water flow was present at Station E.

Sediment quality was determined by a method similar to that outlined by McNeil and Ahnell (1964) using a McNeil-type sampler. Immediately upon sample collection sediments were partitioned through 12.5mm, 4.75mm, 2.36mm, and 0.85mm sieves. Sediment retained by each sieve was quantified by volumetric displacement. The volume of material reported to be less than 0.85mm diameter was the measurement of deposited solids in Imhoff cones after a 10 minute settling period. Due to lack of water at Station E, sediment samples were placed in separate buckets and analyzed at DFG Water Quality Laboratory in Yountville. Approximately 2 gallons volume of loose roadbed material was collected which would enter Coleman Creek.

Sediment quality analysis results are listed in Appendix I. These data indicate that fine sized sediment, <0.85mm diameter, comprise 40% and 70% of the sample at Stations B and C, respectively (Figure 2): These values are 2.2 and 4.2 times the fines content measured at the upstream control. Fines content at Stations D and E were measured to be 15%. Analysis results for the roadbed material reveals that 80% of the sample is comprised of <0.85mm diameter. It is apparent that the encampment and road system has caused the increase in fine sediment observed at Stations B and C, and that the affect has not yet moved downstream to Stations D and E.

Large quantities of fine sized sediment have been shown to cause the following deleterious effects:

1. Reduction in spawning habitat productivity.
2. Reduction in space for fish and invertebrates.
3. Stress in fish and invertebrates due to gill abrasion.
4. Increased water temperature.
5. Reduction in primary production.

Increased fine sediment would detrimentally affect spawning success. Data presented by McNeil and Ahnell (1964) indicate that if fines constitute greater than 15-20% of the sample, the salmonid spawning gravel beds would have lowered water permeability as layered fines would prevent water from entering the sub-gravel environment or fines would fill intergravel spaces; reduced permeability has been shown to lower spawning habitat productivity (Cooper 1965, and McNeil and Ahnell 1964).

Increased fine sediment would be expected to cause reduced living space for fish and invertebrates. Sediment would cover the stream bottom and fill intergravel spaces. Benthic invertebrates inhabiting these gravels prior to fines deposition would be detrimentally affected. Smothering of invertebrates and any incubating eggs and pupae would occur. Loss or reduction of invertebrates, the primary food source for fish, would result in lowered fish populations within the affected areas (Hynes 1970). Filling of pools would reduce fish holding capacity, causing population density shifts upstream or downstream; crowding would result and increased competition for food and space would eventually lead to a loss of fish through starvation or increased predation (Warren 197l).

Turbidity due to suspension of fine sized sediment would be expected to cause several adverse conditions to stream biota. Gill abrasion in fish and invertebrates would lead to stress and gill clubbing or scarring, resulting in lowered gill efficiency. Elevated suspended solids in surface flows would effectively scrape invertebrates and periphyton from riffles, resulting in lower productivity. Turbid conditions would prevent light penetration, thus inhibiting photosynthesis and resulting in lower productivity. Suspended solids absorbs sunlight, thereby elevating water temperatures and eliminate parts of Coleman Creek that steelhead utilize for nursery habitat.

In summary, adverse changes due to siltation have occurred in Coleman Creek as a result of activities associated with the hunter encampment and road system. The potential for further degradation of resources in Coleman Creek would justify stabilization of loose roadbed material, emplacement of culverts on gully crossings, and bridging road crossings in Coleman Creek.

If you have any questions, give me a call at (707) 944-4478.

COPY Original Signed by Howard Wm. Jong

Howard Wm. Jong
Water Quality Biologist
Region 3

HWJ/kls

cc: Weldon Jones, Mike Rugg, Bill Jong

LITERATURE CITED

Cooper, A. C. 1965. The effect of transported stream sediments on the survival of sockeye and pink salmon eggs and alevin. Int. Pac. Sal. Fish. Comm. Bull. XVIII. 7lp.

Hynes, H. B. N. 1970. The ecology of running waters. Univ. of Toronto Press. 555p.

McNeil, W. J., and W. H. Ahnell. 1964. Success of pink salmon spawning relative to size of spawning bed materials. U.S. Fish Wildl. Serv. Spec. Sci. Rept. Fish. No. 469. 15p.

Warren, C. E. 1971. Biology and water pollution control. W. B. Saunders Co., Philadelphia. 434p.

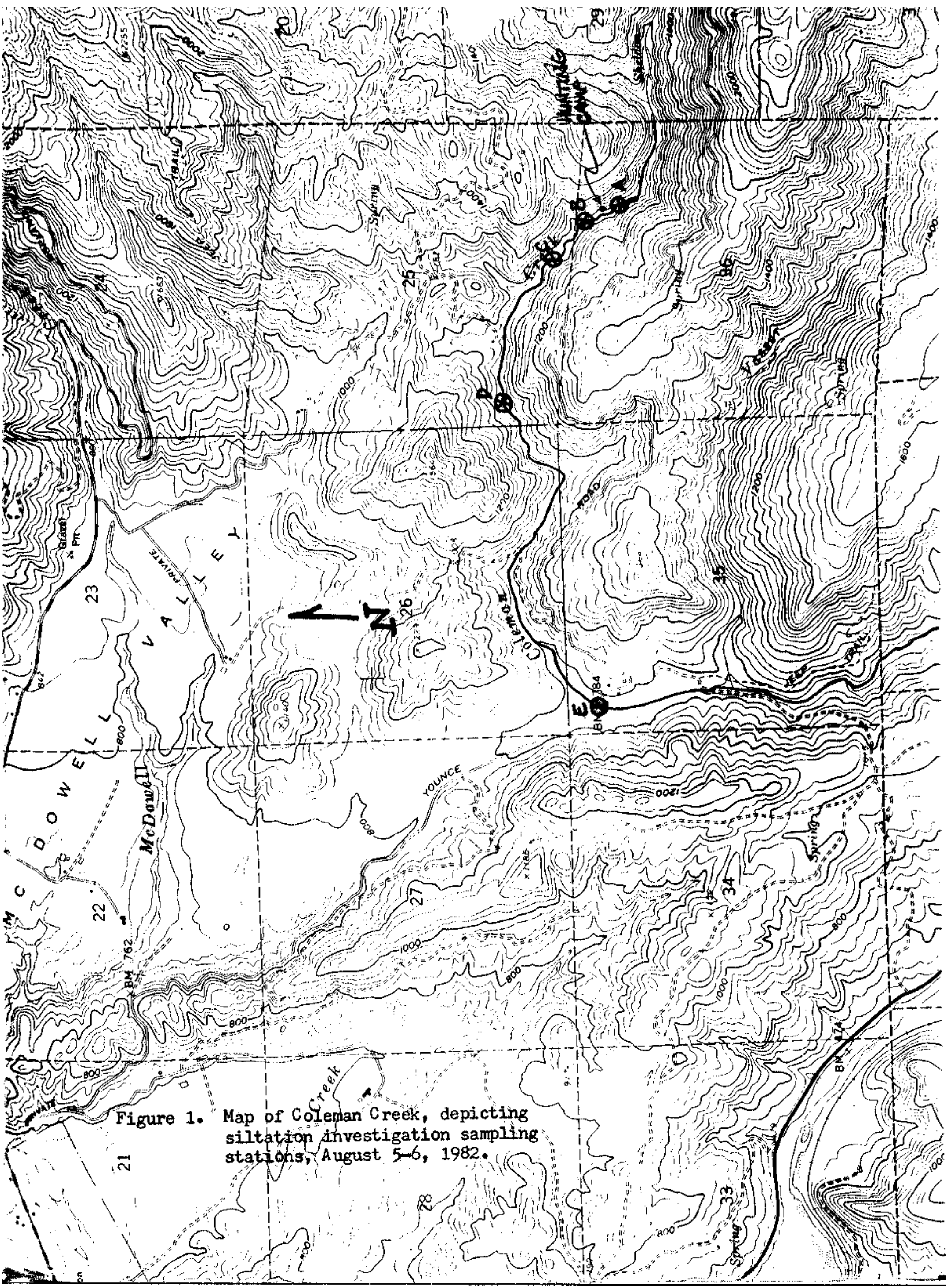
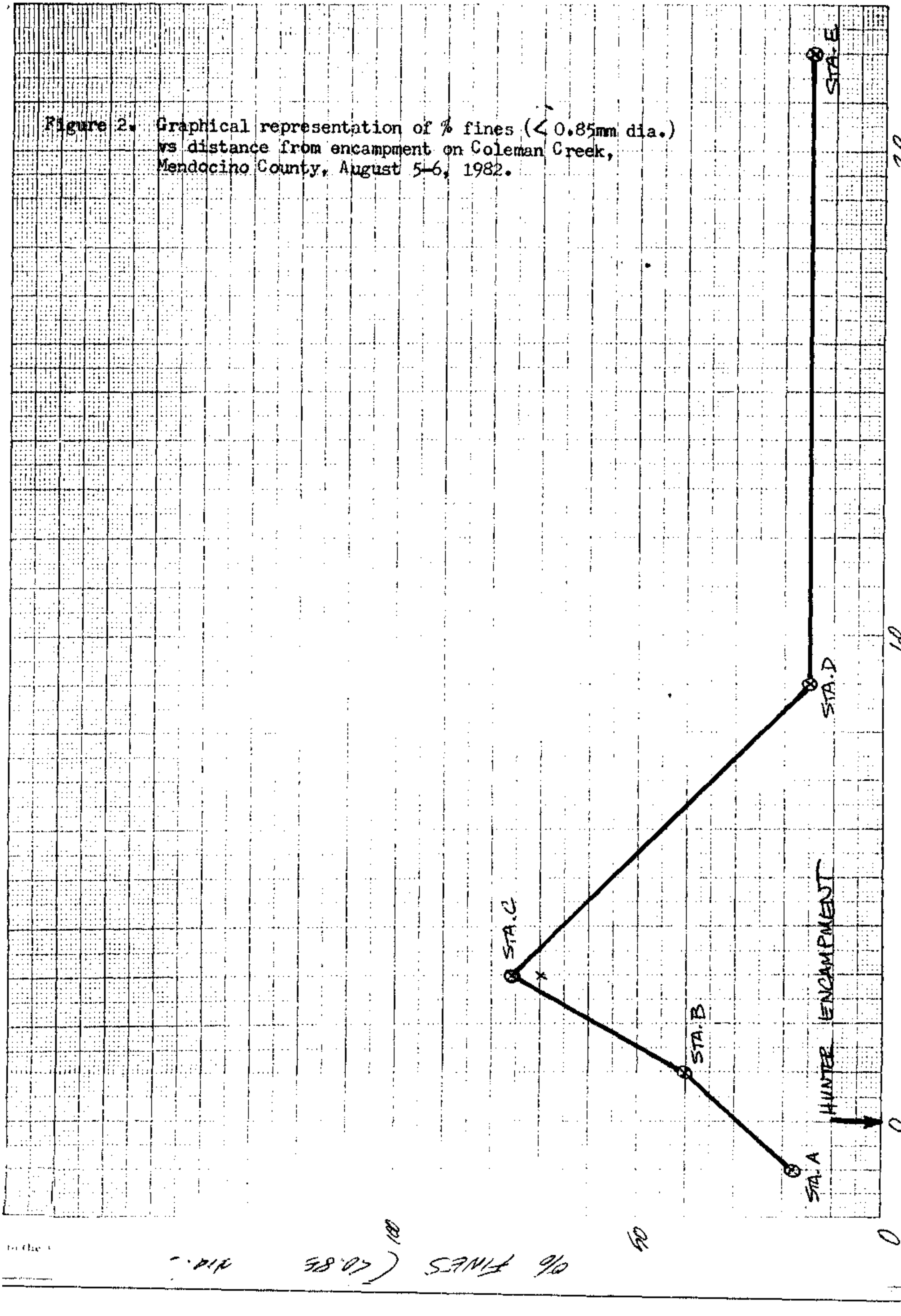


Figure 1. Map of Coleman Creek, depicting siltation investigation sampling stations, August 5-6, 1982.

Figure 2. Graphical representation of % fines (< 0.85mm dia.) vs distance from encampment on Coleman Creek, Mendocino County, August 5-6, 1982.



CALIFORNIA DEPARTMENT OF FISH AND GAME
REGION III
WATER QUALITY

McNEIL SEDIMENT ANALYSIS *APPENDIX I*

Date : *August 5, 1982*
Stream : *Coleman*
County : *Mendocino*

Samplers : *Mann, S.*
Jong, H.
Anderson
Jones

Control

Station : A

Screen Size	Sample A Volume	Sample A Percent	Sample D Volume	Sample D Percent	Sample C Volume	Sample C Percent	X Volume	X Percent
>12.5 mm	1300	46	1300	45	1100	38		43 ± 4
4.75	500	18	500	17	500	17		17 ± 1
2.36	350	12	250	9	300	17		13 ± 4
0.85	250	9	200	7	350	12		9 ± 2
<0.85	400	15	580	22	670	16		18 ± 4
Total	2800	100	2880	100	2920	100		

Station : B

Screen Size	Sample A Volume	Sample A Percent	Sample D Volume	Sample D Percent	Sample C Volume	Sample C Percent	X Volume	X Percent
>12.5 mm	2220	21	1000	39	1420	62		40 ± 20
4.75	380	4	500	19	300	13		12 ± 8
2.36	10	> 1	240	9	70	3		4 ± 5
0.85	60	> 1	230	9	50	2		4 ± 5
<0.85	7820	75	590	24	460	20		40 ± 31
Total	10490	100	2560	100	2300	100		

Station : C

Screen Size	Sample A Volume	Sample A Percent	Sample D Volume	Sample D Percent	Sample C Volume	Sample C Percent	X Volume	X Percent
>12.5 mm	670	8	600	10	1200	19		12 ± 6
4.75	200	3	400	6	360	6		5 ± 2
2.36	70	1	250	4	220	3		3 ± 2
0.85	240	3	300	5	240	4		4 ± 1
<0.85	5990	85	4750	75	4320	68		76 ± 8
Total	7110	100	6300	100	6340	100		

Comments :

CALIFORNIA DEPARTMENT OF FISH AND GAME
REGION III
WATER QUALITY

McNEIL SEDIMENT ANALYSIS

Date : *August 6, 1982*
Stream : *Coleman*
County : *Mendocino*

Samplers : *Mann, S*
Jong, H.

Station : *D*

Screen Size	Sample A Volume	Sample A Percent	Sample D Volume	Sample D Percent	Sample C Volume	Sample C Percent	X Volume	X Percent
>12.5 mm	1100	38	1200	48	1100	45		44 ± 5
4.75	600	20	400	16	350	14		17 ± 3
2.36	500	17	200	8	200	8		11 ± 5
0.85	460	16	300	12	300	12		13 ± 2
<0.85	260	9	400	16	480	21		15 ± 6
Total	2920	100	2500	100	2430	100		

Station : *E*

Screen Size	Sample A Volume	Sample A Percent	Sample D Volume	Sample D Percent	Sample C Volume	Sample C Percent	X Volume	X Percent
>12.5 mm	1000	60	1000	49	1600	54		54 ± 6
4.75	300	18	250	12	350	12		14 ± 3
2.36	40	2	190	9	20	7		6 ± 4
0.85	60	3	300	15	390	13		10 ± 6
<0.85	260	17	280	15	400	4		15 ± 2
Total	1660	100	2020	100	2940	100		

Road Sample Station :

Screen Size	Sample A Volume	Sample A Percent	Sample D Volume	Sample D Percent	Sample C Volume	Sample C Percent	X Volume	X Percent
>12.5 mm	200	3						
4.75	600	8						
2.36	350	5						
0.85	320	4						
<0.85	5900	80						
Total	7370	100						

Comments :