FINAL REPORT

HOOPA VALLEY INDIAN RESERVATION

INVENTORY OF RESERVATION WATERS
FISH REARING FEASIBILITY STUDY
AND A
REVIEW OF THE HISTORY AND STATUS OF ANADROMOUS FISHERY RESOURCES OF THE KLAMATH RIVER BASIN

U.S. Fish and Wildlife Service
Arcata Field Station
Arcata, California

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INTRODUCTION

The U.S. Fish and Wildlife Service (FWS) has conducted a fisheries assistance program on the Hoopa Valley Indian Reservation since 1969. Utilizing funding obtained through the Trinity River Basin Fish and Wildlife Task Force (TRBFWTF), the FWS established the Arcata Field Station in January, 1977. Later in 1977, the Bureau of Indian Affairs (BIA), through two Memorandums of Understanding with FWS, provided funding to (1) review the history and status of anadromous salmonids in the Klamath River basin, (2) conduct habitat and biological inventories of reservation waters and (3) conduct fish rearing feasibility studies on the reservation. This report presents the results of these investigations.

Results of a literature review concerning the history and status of fisheries resources in the drainage were submitted on January 1, 1978 (Rankel, 1978). Information from this report has been revised and updated and is included under "The Fishery Resource" section of this report.

The stream inventory of reservation waters consisted of an assessment of tributary spawning stocks utilizing reservation waters, an inventory of spawning and rearing habitat available in reservation streams, a survey of fish migration obstacles and barriers located in reservation streams, an inventory of unscreened water diversions on the reservation and an evaluation of spawning success and recruitment in reservation waters. A number of computer programs were established to facilitate data storage and retrieval of information collected during the surveys. Computer printouts of stream survey results appear in appendices to this report.

Fish rearing feasibility studies basically involved an assessment of the potential for rearing anadromous salmonids on the reservation through a demonstration fish rearing project, an evaluation of water source characteristics, an analysis of land ownership patterns and a review of hatchery development alternatives. This section also addressed the natural production potential of reservation waters. With the procurement of 200,000 "eyed" chinook salmon eggs from the Trinity River Hatchery on January 5, 1979, further fish rearing data will be collected at the Hoopa Valley Hatchery facility.

This report is submitted in fulfillment of revised Memorandums of Understanding between the Sacramento, California Area Offices of BIA and FWS dated August 18, 1977. Because of the interrelated nature of the studies covered by the memoranda, results are presented in a single document containing appropriate sub-sections.

Another related report entitled "Watershed Condition Inventory of the Hoopa Valley Indian Reservation Utilizing Landsat Digital Data" has also been recently completed by the U.S. Fish and Wildlife Service - Arcata Field Station in conjunction with the National Aeronautics and Space Administration and the Remote Sensing and Technology Transfer Project at Humboldt State University. The report contains color-coded maps of the reservation depicting various watershed conditions and includes tabular summaries of acreages representing each of the conditions.

HOOPA VALLEY INDIAN RESERVATION -

LAND BASE, WATER BASE AND TRIBAL ENTITIES

The Klamath River watershed (Figure 1, Photograph 1), an extensively forested area containing large stands of virgin timber, drains approximately 15,600 square miles (25,100km^2) in Oregon and California, including over 8,000 square miles (12,900km^2) below Iron Gate Dam. Most of the drainage in California lies within the boundaries of the Six Rivers, Klamath, Shasta and Trinity National Forests while the lower 42 miles (67km) of the Klamath River and lower 16 miles (26km) of the Trinity River lie within the confines of the Hoopa Valley Indian Reservation (Figure 2). High elevation peaks exceeding 9,000 feet (2,743m) occur near the headwaters of the Trinity River in the Trinity Alps and Scott Mountains and numerous peaks and ridges exceeding 5,000 feet (1,524m) in elevation occur throughout the watershed. Mt. Shasta, at 14,161 feet (4,316m) borders the eastern limit of the Shasta River.

The Klamath River flows westward from Iron Gate Dam, joins with the Shasta and Scott Rivers and then turns southward and unites with the Salmon River. After joining with the Trinity River, its largest tributary, at Weitchpec, the Klamath River changes course and flows in a northwestward direction before emptying into the Pacific Ocean near Requa, California. Throughout most of its course, the Klamath River and its tributaries drain steep mountainous terrain. The Trinity River drains 2,970 square miles (4,778km^2) while the Shasta, Scott and Salmon Rivers each have drainage areas comprising approximately 800 square miles (1,287km^2). Precipitation exceeds 40 inches (101cm) annually throughout much of the basin, ranges to 90 inches (229cm) per year along the coast and gradually decreases inland to approximately six inches (15cm) in the eastern portion of the basin. A comprehensive overview of Klamath River basin characteristics is contained in California Department of Water Resources (CDWR) Bulletin No. 83, 1960.

The Hoopa Valley Indian Reservation comprises approximately 144,000 acres (58,299ha) in Humboldt and Del Norte Counties, California. That portion of the reservation referred to as "The Square" comprises 90,000 acres (36,437ha) and is generally mountainous and rugged, ranging in elevation from 320 feet (97.5m) to over 5,000 feet (1,524m). Steep mountainous terrain comprises approximately 97 percent of "The Square" while the remaining area is the low alluvial Hoopa Valley plain bordering the Trinity River (Photograph 2). Climatic conditions in this area vary appreciably, e.g., rainfall averages approximately 49 inches (124cm) annually at Hoopa and exceeds 75 inches (190cm) per year in the higher mountains near Weitchpec. Snowfall is negligible adjacent to the Trinity River but substantial at the higher elevations. Temperatures vary from mean January and July values of 54°F (12°C) and 70°F (21.1°C), respectively, with extreme variations to 16°F (-8.8°C) and 102°F (38.9°C). Soils fall within the broad vegetational class referred to as the Douglas Fir-White Oak prairie type. The timber covered terrain provides desirable habitat for blacktail deer, bear, quail, grouse and many fur bearing animals. The economic base of "The Square" is centered around the timber industry with large stands of Douglas fir providing the principal resource.

Land-conditions and environmental factors along "The Strip" are similar to the Hoopa Square. The Klamath River is characterized by steep canyon walls with slopes in excess of 100 percent. Vegetational communities are similar with the exception of redwoods which are found near the mouth of the Klamath River.

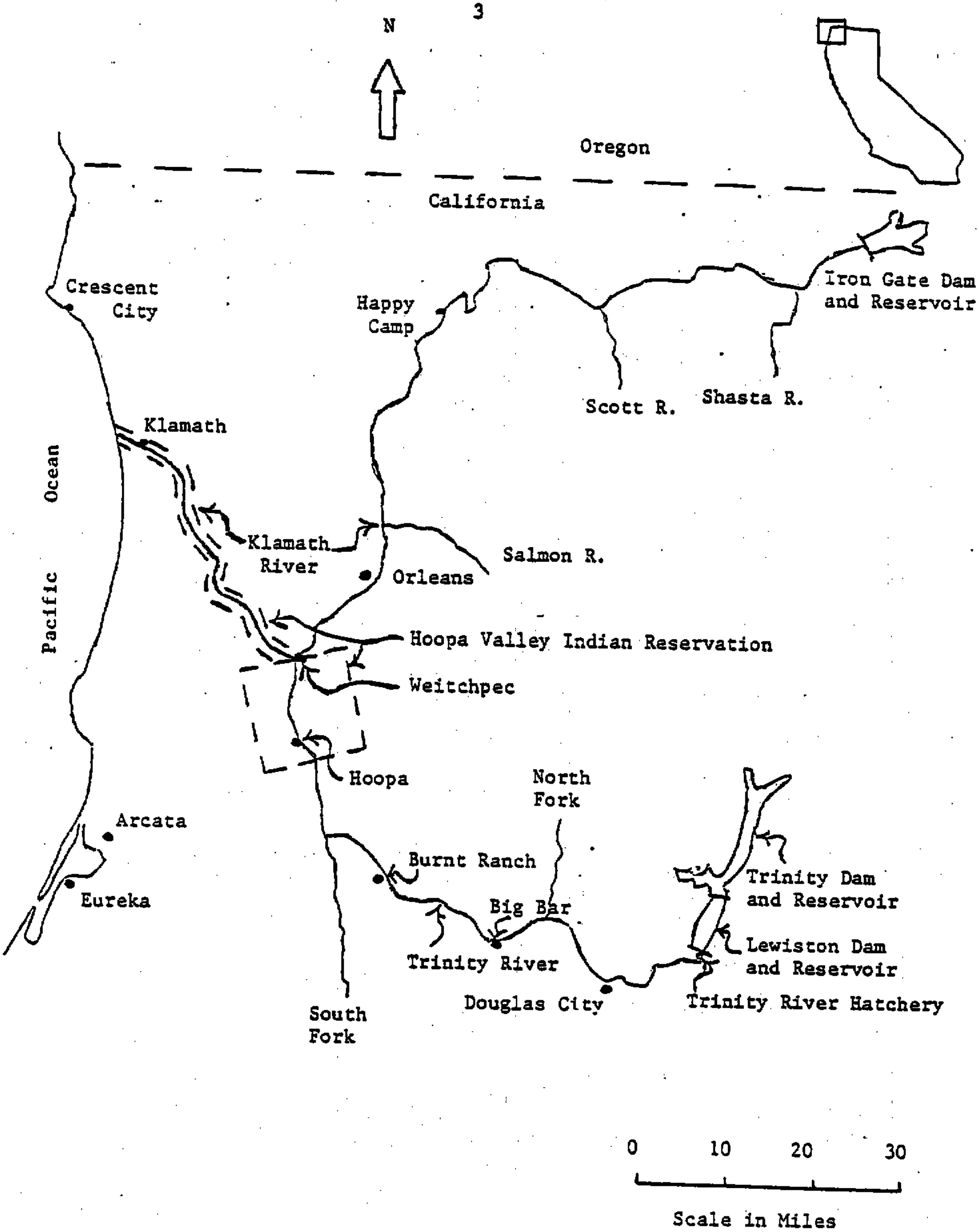


Figure 1. The Klamath-Trinity River Drainage.

Photograph 1. U-2 aerial overview of the Klamath River drainage with mouth of river in foreground and Mt. Shasta in background (courtesy of Pilot Rock, Inc., Arcata, California).

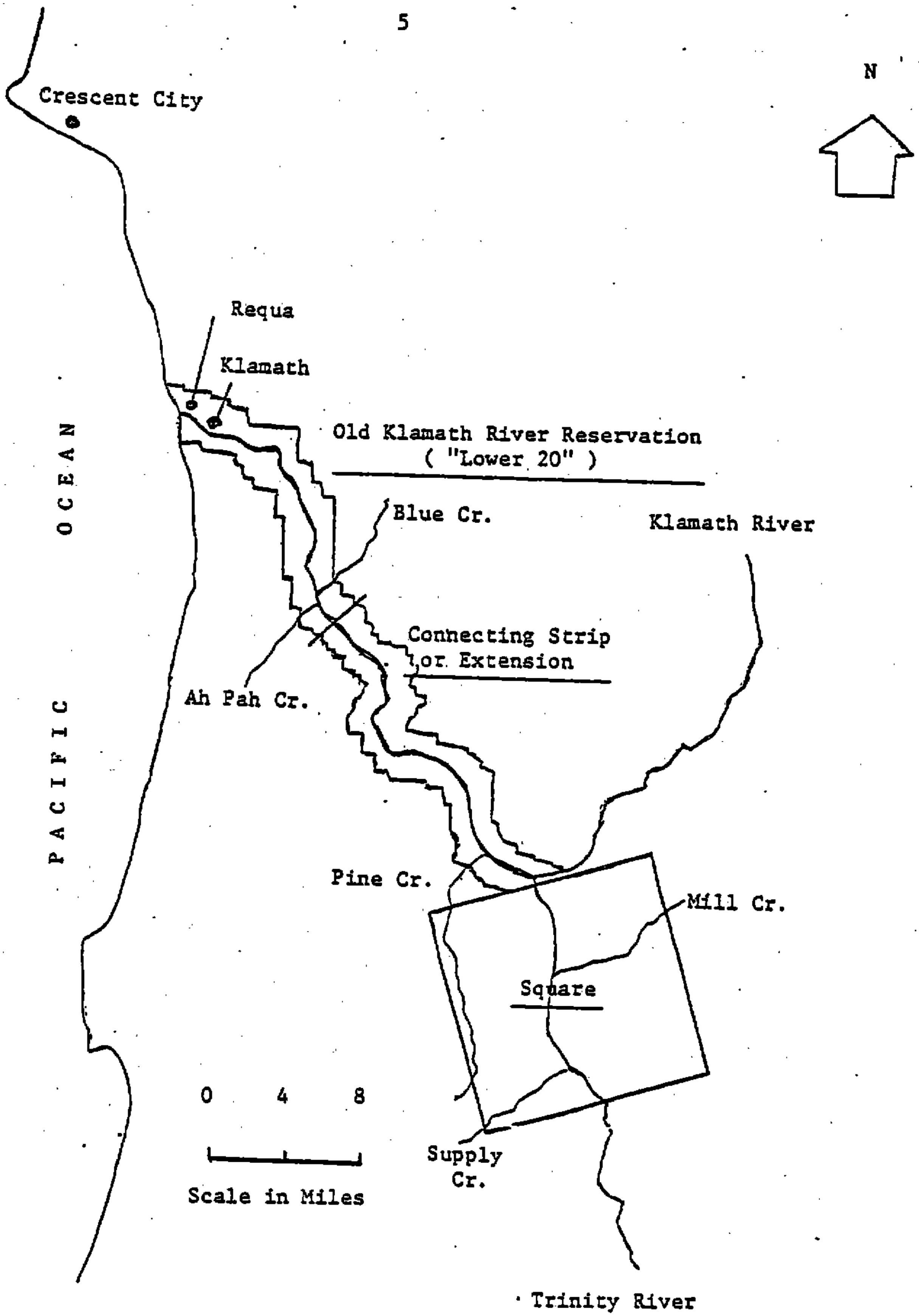
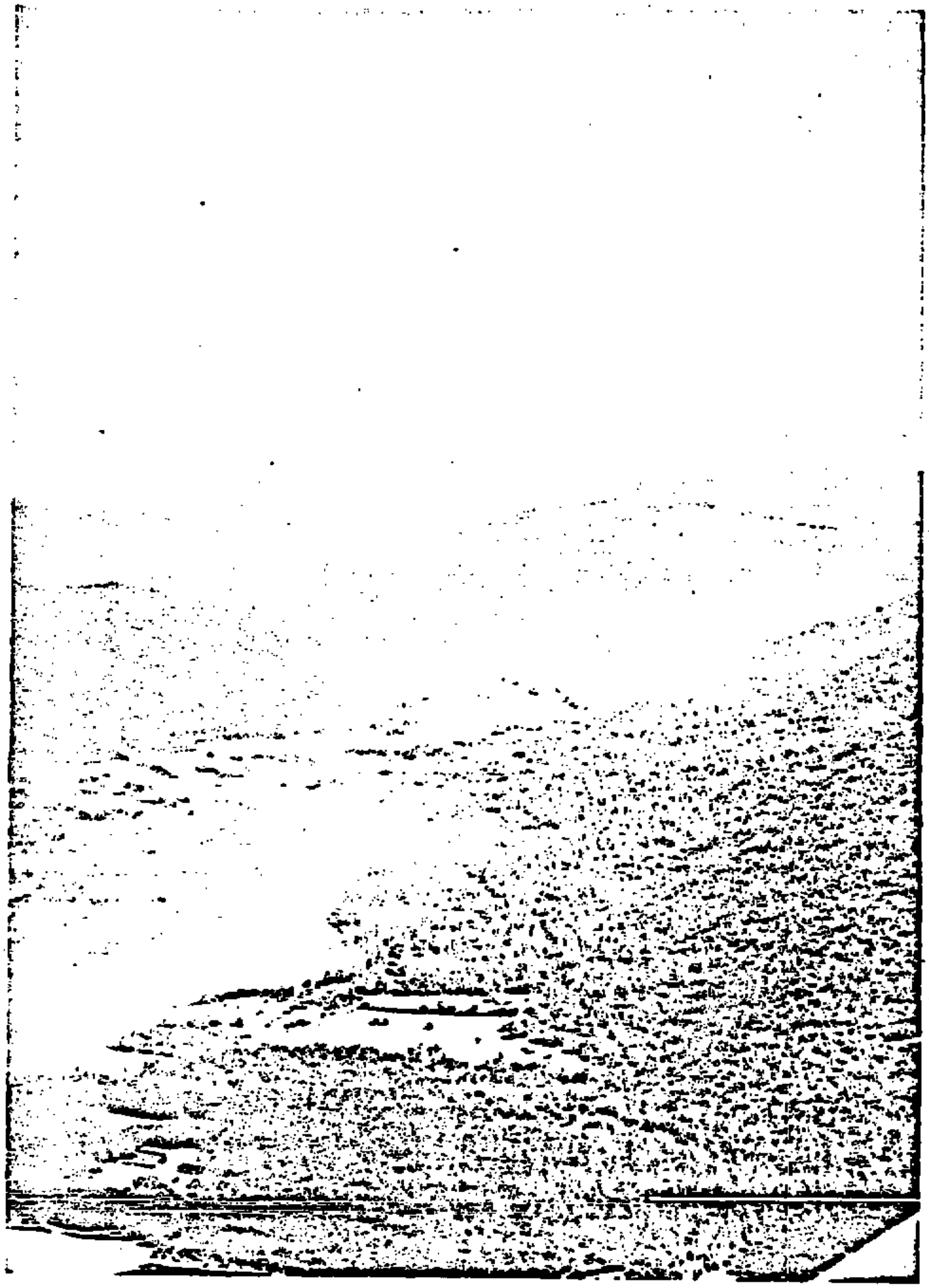


Figure 2. The Hoopa Valley Indian Reservation.



Photograph 2. The Hoopa Valley, Hoopa Valley Indian Reservation.

The two tribes which reside on the Hoopa Valley Indian Reservation include the Hupa Indians of "The Square" portion of the reservation, bisected by the lower 16 miles of the Trinity River, and the Yurok Indians who occupy land along the lower 42-mile stretch of the Klamath River. Another tribe, the Karoks, recently acquired trust land along the Klamath River above its confluence with the Trinity River at Weitchpec. The original Hoopa Valley Reservation (that portion referred to as "The Square") created in 1864 was enlarged in 1891 to include a tract of land one mile in width on either side of the Klamath River extending from "The Square" to the Pacific Ocean. This extension incorporated the old Klamath River Reservation or "Lower 20" section created in 1855, into the Hoopa Valley Reservation. Most of the "Lower 20" has since passed into non-Indian ownership resulting in controversies concerning Indian ownership and rights within the Klamath River section of the reservation. Despite the large private holdings, the U.S. Supreme Court in 1973 held that the "Lower 20" portion was still considered "Indian Country".

Tribal members of "The Square" have formed a government based on an official tribal roll which has exercised a broad range of jurisdiction over Indian affairs including fishing. A gill netting ordinance adopted by the tribe in 1976 prohibits the placement of any gill net which extends beyond two-thirds of the distance across the Trinity River, the placement of any net in front of the mouth of any tributary stream and the taking of fish for commercial purposes. Gill nets must also be lifted and removed from the river on a daily basis.

Unlike the Hupas, the Yurok people have had no officially-recognized tribal government, tribal roll or means of jurisdiction. Their lack of authority to control or regulate individual tribal fishermen has, in part, resulted in the current controversy surrounding Indian fishing rights on the Klamath River. An Ad Hoc Fishing Committee comprised of Yurok Indians formed in 1975 to advise the Yurok people about fishing rights was disbanded in 1977 because of widespread tribal non-support. Attempts are underway by a number of Yurok leaders to form an interim tribal government for the purpose of establishing fishing regulations and governing fishing on the reservation.

The Klamath River basin has historically supported large runs of salmon and steelhead trout which have contributed considerably to sport and commercial fisheries in California. Concern over the depletion of this valuable resource emerged around the turn of the century and has accelerated in recent decades coincident with expanded logging and fishing operations and dam building activity.

Generations of Indians have utilized fishing grounds in the Klamath River drainage and their fisheries for salmon and steelhead have historically provided the mainstay of Indian economy in the area. Heavily utilized trade routes from the interior to the sea existed resulting in a lively commerce in dried fish and shells. Much of the ritual and labor of the Indian people was related to the capture and care of salmon and steelhead. The migration times of the various species were so distributed that the catch of fresh fish was possible at any season of the year. The fall chinook salmon run was most important because low river flows and considerable numbers of large fish provided optimum fishing conditions. The flesh of this fish was ideal for smoke curing and storing for winter use. Indians historically constructed fish weirs of logs, poles and brush across the rivers and speared or netted upstream migrants. Weirs remained in place until late fall high flows washed them away. In recent decades, the weirs have been replaced by the more efficient gill net and a variety of jurisdictional questions regarding Indian fishing rights have arisen.

Kesner (1977) estimated an annual net economic value of salmon and steelhead fisheries attributable to the Klamath River watershed, exclusive of the Trinity River drainage, of $21.5 million. Average annual net economic values per mile of chinook salmon, coho salmon and steelhead trout habitat within the Klamath National Forest were also estimated at $25,000, $2,300 and $4,500, respectively. Smith (1978) estimated the annual net economic value of the anadromous fishery resource of the Trinity River drainage at approximately $3.9 million.

The Trinity River Division of the Central Valley Project (Photograph 3), the first major water development project in northwestern California involving large-scale trans-basin water exportation, was completed in 1963 and resulted in an average annual diversion of 1,279,000 acre-feet of Trinity River water, 382,000 acre-feet above the planned design diversion of 897,000 acre-feet and about double the 660,000 acre-feet diversion originally proposed, through a transmountain tunnel into the Sacramento River drainage. The post-project diversion has amounted to 91,000 acre-feet above the historic annual flows past Lewiston of 1,188,000 acre-feet and the 1976 drought year diversion of 1,467,000 acre-feet was the largest since project initiation. Exported Trinity River water is routed through a series of electrical power plants, is used for irrigation in the Sacramento and San Joaquin valleys and helps improve water conditions in the Sacramento River and Delta.

Annual post-project flows in the Trinity River below Lewiston through 1976 averaged approximately 248,000 acre-feet, a 79 percent reduction in pre-project flows, while scheduled post-project flows of 120,300 acre-feet for fishery purposes represent about ten percent of historical mean annual runoff (Figure 3). In 1973, the Bureau of Reclamation turned down a request by the California Department of Fish and Game (CDFG) to release 315,000 acre-feet annually into the Trinity River but did agree to increased experimental releases during 1974, 1975 and 1978. Post-project flows in 1974 and 1975 averaged 159,000 acre-feet annually, an 87 percent reduction in annual pre-project flows.

The post-project period up until the 1976-77 drought years was wetter than average throughout the drainage. This is reflected by the fact that downstream from Lewiston, mean annual post-project flows declined 39 percent at Burnt Ranch and 15 percent at Hoopa (Figure 4) while the flow of the Klamath River at Klamath during the corresponding periods increased six percent (Figure 5) and the Klamath River flow at Orleans increased 25 percent. The relationship between the magnitudes of mean monthly post-project flows at Lewiston, Burnt Ranch and Hoopa is depicted in Figure 6.

Maximum post-project sustained flows for a 24-hour period (comparable to sediment flushing flows) declined by 81 percent at Lewiston (Figure 7). Corresponding flows decreased by 18 percent at Burnt Ranch but increased by 14, 97 and 46 percent at Hoopa, Orleans and Klamath, respectively.

Project construction resulted in the loss of 59 miles of chinook salmon spawning and nursery habitat, 109 miles of steelhead habitat and an undetermined amount of coho salmon habitat located above Lewiston Dam. Reduced flows have also resulted in earlier and more rapid warming of downstream areas during spring months.

Photograph 3. Trinity Dam - Trinity River Division, Central Valley Project.

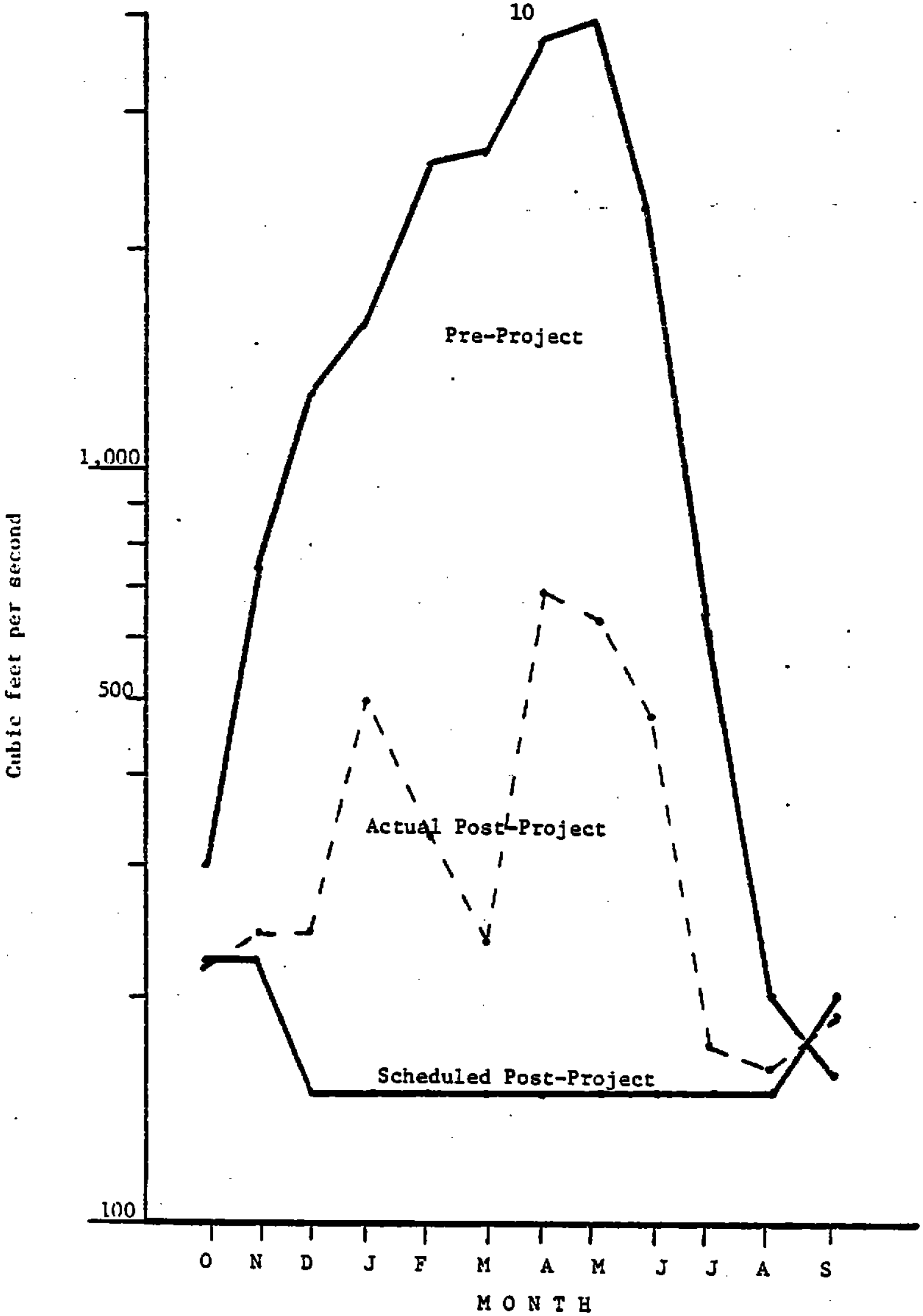


Figure 3. Mean Monthly Pre-Project, Actual Post-Project and Scheduled Post-Project Flows at Lewiston

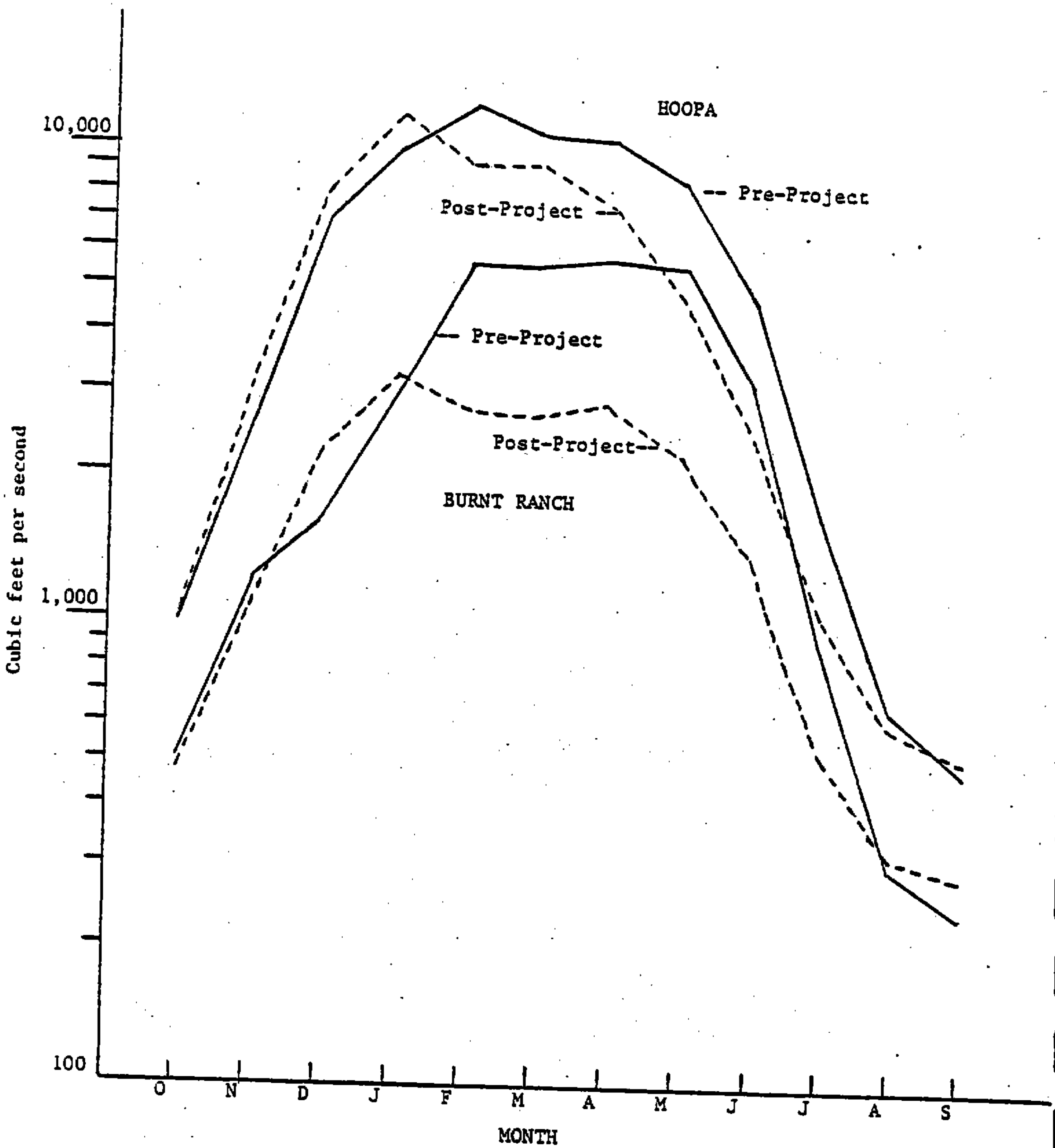


Figure 4. Mean Monthly Pre-Project and Post-Project Flows at Hoopa and Burnt Ranch.

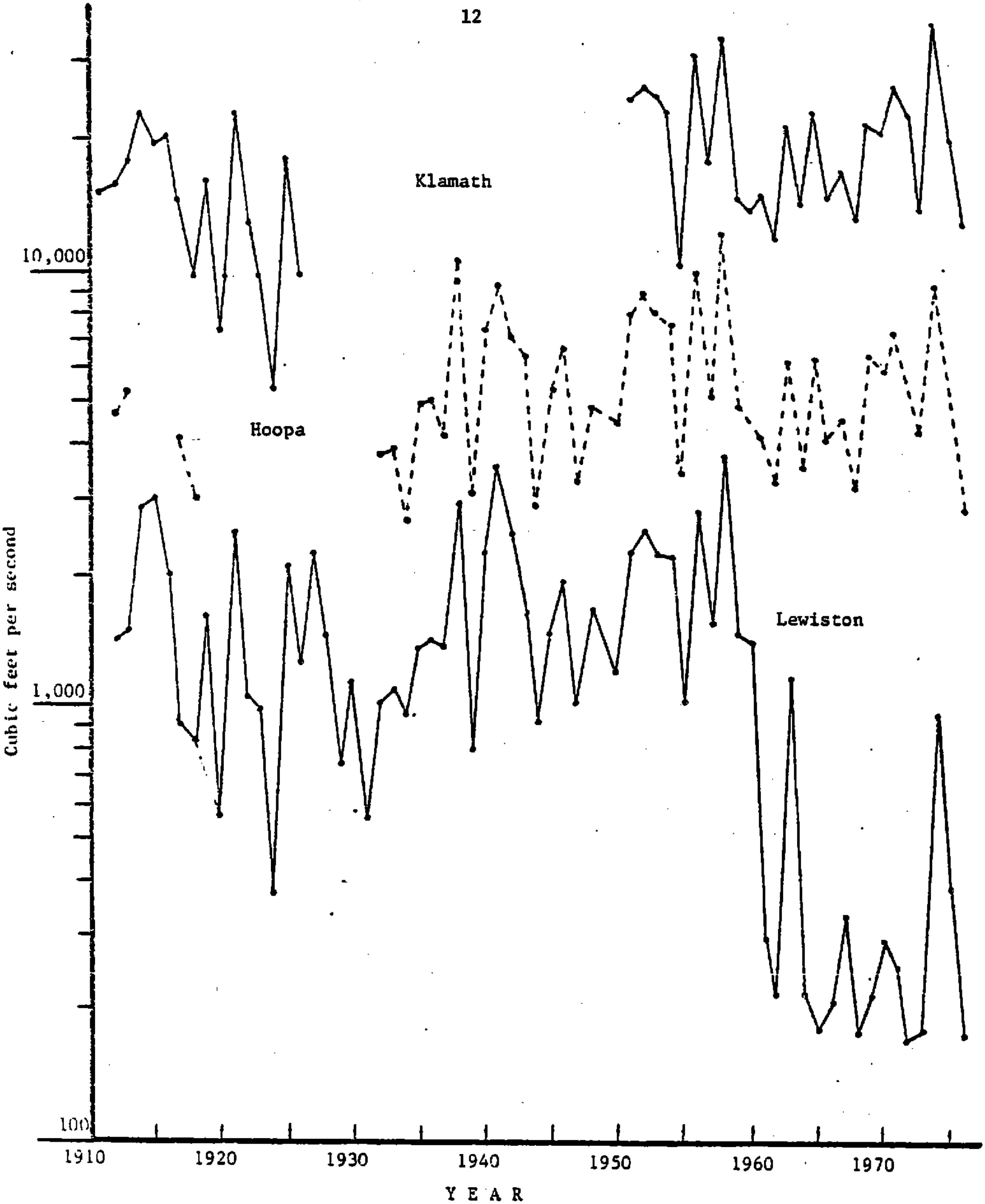


Figure 5. Mean Annual Flows at Lewiston, Hoopa and Klamath - 1911 to 1976.

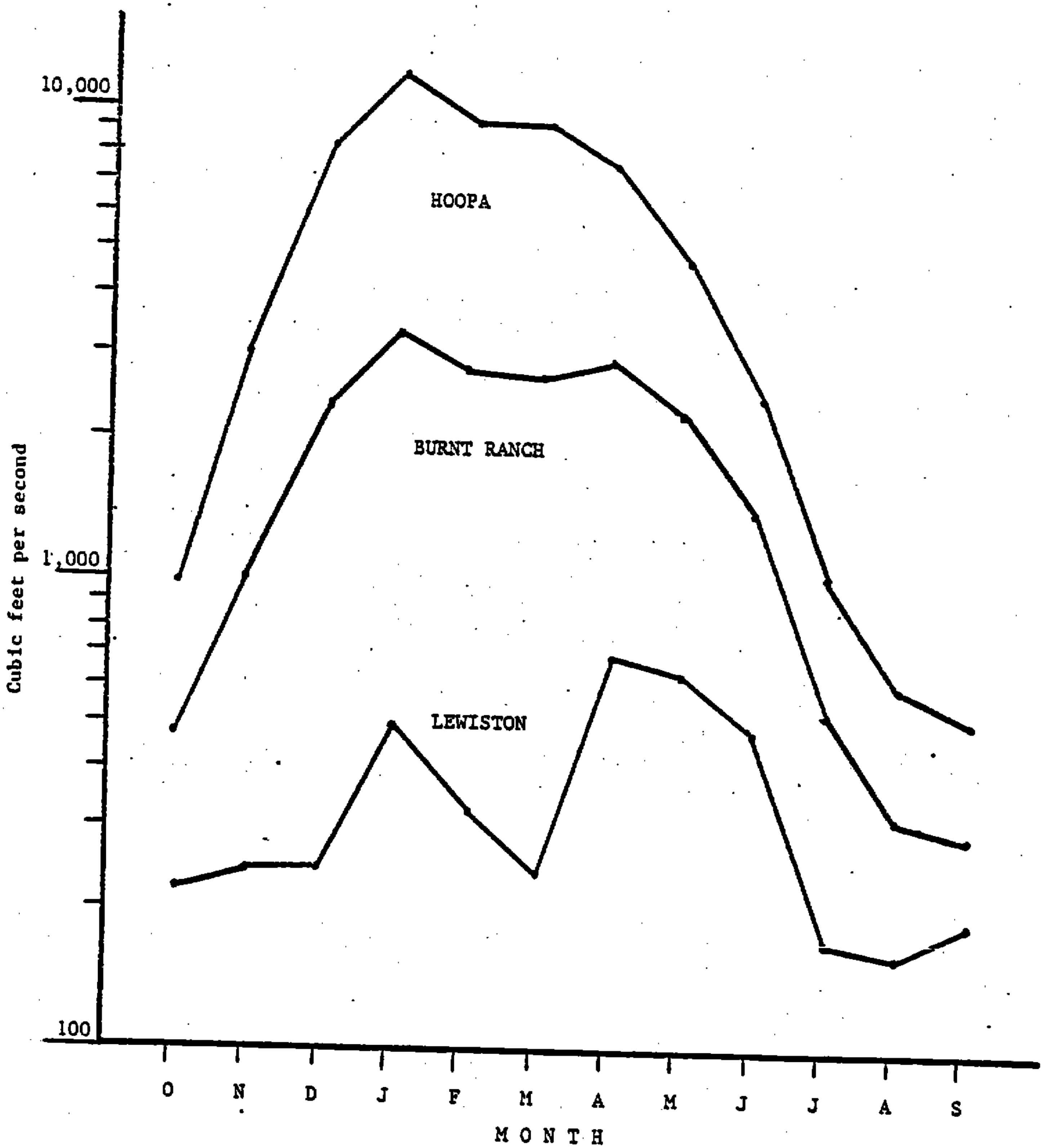


Figure 6. Mean Monthly Post-Project Flows at Lewiston, Hoopa and Burnt Ranch.

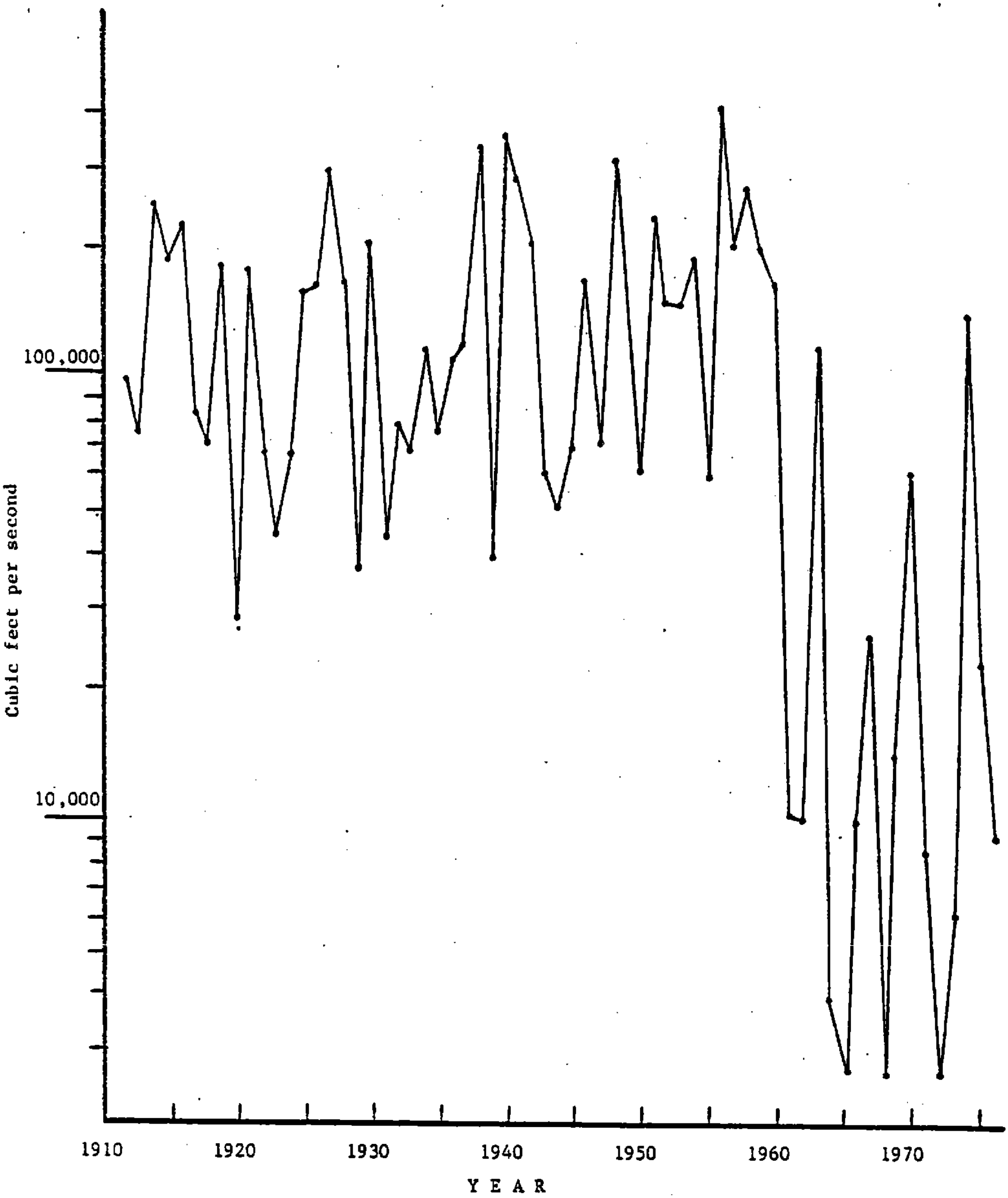


Figure 7. Maximum Sustained Flows for a 24-Hour Period at Lewiston - 1911 to 1976.

Chinook salmon spawning habitat surveys conducted prior to and following dam construction indicate that available habitat has been reduced by 44 percent between Lewiston and the North Fork (Hubbell, 1973), the most important spawning area in the basin. An undetermined amount of juvenile salmonid rearing habitat and adult resting habitat has also been lost.

THE FISHERY RESOURCE

Ten anadromous fishes spend portions of their life cycles in the Klamath River system: chinook or king salmon (Oncorhynchus tshawytscha), coho or silver salmon (Oncorhynchus kisutch), steelhead trout (Salmo gairdneri), coastal cutthroat trout (Salmo clarki clarki), brown trout (Salmo trutta), green sturgeon (Acipenser medirostris), white sturgeon (Acipenser transmontanus), American shad (Alosa sapidissima), Pacific lamprey (Lampetra tridentata), and candlefish (Thaleichthys pacificus). Resident species include native rainbow trout (Salmo gairdneri), brown trout (Salmo trutta), eastern brook trout (Salvelinus fontinalis), and several species on non-game and warmwater game fishes. Notable marine visitors include the starry flounder (Platichthys stellatus), surf smelt (Hypomesus pretiosus) and redtail surfperch (Amphistichus rhodoterus).

Chinook Salmon

Chinook salmon runs in the Klamath River occur during the spring (March through June and normally peaking in May) and fall (July through October and peaking in August and September). Spring-run fish are reportedly deliberate in their migration, travelling upstream rapidly and fighting all obstacles encountered until reaching resting pools where they remain in a semi-quiescent state until they begin spawning in mid-September. Spawning streams utilized by spring-run chinook salmon include the Trinity River, South Fork-Trinity River, Salmon River, Clear Creek, Elk Creek and Scott River (CDFG Letter Report, March 24, 1978).

Fall-run fish seem more cautious in their migrations, ascending the river in August and beginning to spawn in October. Spawning occurs from October through December and peaks in November. The majority of chinook salmon spawning habitat in the Trinity basin is located between Lewiston Dam and Junction City and in the South Fork Trinity River.

Principal spawning areas in the Klamath River basin include the Salmon River, Shasta River, Scott River and Blue Creek. Little spawning now occurs in the formerly heavily-utilized section of the Klamath River located immediately below Iron Gate Dam (CDFG Letter Report, March 24, 1978). Dams which have blocked gravel recruitment to this reach for several decades are probably most responsible for the decline. Approximately 60 percent of chinook salmon habitat in the Klamath River drainage, exclusive of the Trinity River basin, occurs within the Klamath National Forest (Kesner, 1977).

Historically, spring-run fish were dominant in the Klamath River system but by 1892, they had dwindled to near extinction (CDFG Letter Report, March 24, 1978). In the mid-1940's, the salmon run consisted primarily of fall-run fish (Moffett and Smith, 1950). Since construction of the Trinity Project, numbers of spring-run chinook entering Trinity River Hatchery have increased and have outnumbered fall-run fish since 1971. It is believed, however, that most of the spring run enters the hatchery while the small population spawning in the main Trinity River consists mainly of fall-run fish (CDFG Letter Report, March 24, 1978). LaFaunce (1967) reported that the spring run was about 3.5 times the size of the fall run in the South Fork, Trinity River drainage in 1964.

Chinook salmon spawning in the Trinity River reportedly prefer water velocities of 1.5 to 2.5 feet per second (fps), water depths of 0.8 to 2.0 feet and gravels measuring 1.0 to 6.0 inches in diameter and containing less than 30 percent silt and fine sand (Hubbell, 1972)

Chinook salmon normally initiate their seaward migration 90 to 150 days after emerging from the gravel, beginning in March, peaking during the May-June high runoff period and ending by August (Moffett and Smith, 1950). A few fish remain in fresh water for a year.

Salmon canneries were established on the Klamath River estuary prior to 1892, reached their highest state of development during the period 1910-15 and operated until 1933 when the State of California banned commercial fishing on the river. Snyder (1931) reported that an historical peak in the Klamath River commercial fishery occurred in 1912 with a pack of over 1,384,000 pounds from a catch conservatively estimated at 141,000 salmon. Subsequent annual packs as reported in Snyder (1931), averaged considerably less (Table 1).

Table 1. Commercial salmon pack in pounds from the Klamath River during 1915 to 1928 as reported to the California Division of Fish and Game.

Year	Pack	Year	Pack
1915	1,232,229	1922	1,039,580
1916	801,150	1923	824,291
1917	265,537	1924	814,572
1918	672,345	1925	956,082
1919	535,198	1926	811,714
1920	872,295	1927	408,081
1921	614,247	1928	308,826

Moffett and Smith (1950) estimated that salmon originating from the Klamath River system contributed an average of 2,286,588 pounds annually (approximately 200,000 fish annually) to the offshore commercial catch during the 28-year period, 1916-43, including a mean annual contribution of 2,553,726 pounds during the years 1940 to 1943. Combining Snyder's river catch statistics with Moffett and Smith's offshore harvest data, assuming a mean weight of salmon comprising the river pack of ten pounds and further assuming that combined sport harvest and natural escapement approximated one-half the number of fish involved in the annual packs, it appears that roughly 300,000 to 400,000 salmon originating from the Klamath River system comprised the annual catch and escapement during the period 1915-28.

Murphy and Shapovalov (1951) and Holmberg (1972) reported sizes of chinook salmon runs at counting stations located on the upper Klamath River (Klamathon racks) and Shasta River (tributary to the upper Klamath River). Annual counts at the Klamathon racks ranged from 2,393 to 33,144 and averaged 12,086 between 1925 and 1949, ranged from 2,000 to 22,000 while averaging nearly 12,000 during the period 1950-55, and ranged from one thousand to seven thousand while averaging only three thousand between 1956 and 1969 (Figure 8). Annual counts at the Shasta River racks ranged from 11,570 to 81,844 and averaged 43,752 between 1930 and 1937, ranged from 7,590 to 55,155 while averaging 18,266 during the years 1938-46, ranged from a few hundred to 34,000 while averaging approximately 10,000 between 1950 and 1969, and ranged from 3,641 to 16,032 annually with a mean of 9,328 between 1970 and 1976 (Figure 8).

Moffett and Smith (1950) estimated that chinook salmon runs on the upper Trinity River (upstream of the Lewiston Dam site) numbered approximately 12,000 and 9,000 in 1944 and 1945, respectively, and that these runs probably represented one-third to one-half of the total runs utilizing the Trinity River drainage in those years. Consequently, an estimated 18,000 to 36,000 chinook salmon spawners ascended the Trinity River in each of these two years.

In an "Angler's Guide to the Klamath River" published in 1967 by the California Department of Fish and Game, Coots (1967) estimated that the annual run of chinook salmon in the Klamath River averaged about 168,000, almost half of which entered the Trinity River. Sport fishermen harvested an estimated 28,000 salmon annually, most from the estuary.

In "A Preliminary Survey of Fish and Wildlife Resources of Northwestern California" prepared by the U.S. Fish and Wildlife Service in 1960, it was stated that annual runs of 100,000 to 125,000 salmon were considered present-day averages. The FWS report, referring to CDFG estimates of 35,000 and 55,000 chinook salmon comprising Trinity River spawning runs in 1955 and 1956, respectively, noted that these estimates probably represented one-third to one-half of the entire Klamath River system that year, a run which the FWS report referred to as unusually small. The report also noted that an estimated 4,000 chinook salmon spawned in tributaries downstream from the Trinity River confluence, with Blue Creek supporting most of the activity.

Citing Appendix C of California Department of Water Resources Bulletin-136, Holmberg (1972) refers to historical chinook salmon spawning escapements of 66,000 in the Trinity River system and 109,000 for the Klamath River system exclusive of the Trinity River system, for a total escapement of 175,000 salmon in the entire Klamath River drainage. Hallock, Pelgen and Fisk (1960) estimated an average annual spawning escapement of chinook salmon in the Klamath River drainage of at least 109,000 including 40,000 in the Trinity River above the South Fork, 20,000 in the Shasta River, 12,000 in the Klamath River near Klamathon, 5,000 in the Scott River, 2,000 in the Salmon River and 10,000 in other tributaries.

Burton, Haley and Stone (1977) reported chinook salmon escapements in the Trinity River below Lewiston Dam of 75,600 in 1963, averaging 30,500 annually during the period 1968-72 and averaging 4,067 annually during the years 1973-75, an overall 89 percent reduction. Adult chinook salmon returns to the Trinity River trapping facilities and hatchery between 1959 and 1976 have remained relatively uniform, ranging from 2,586 to 11,381 annually while averaging about 6,200 between 1959 and 1972 and averaging about 6,800 between 1973 and 1976 (Figure 9). Returns to the Iron Gate Hatchery have increased from approximately 3,000 during the years 1966-69 to over 10,000 in 1974 and 1975 (Figure 10).

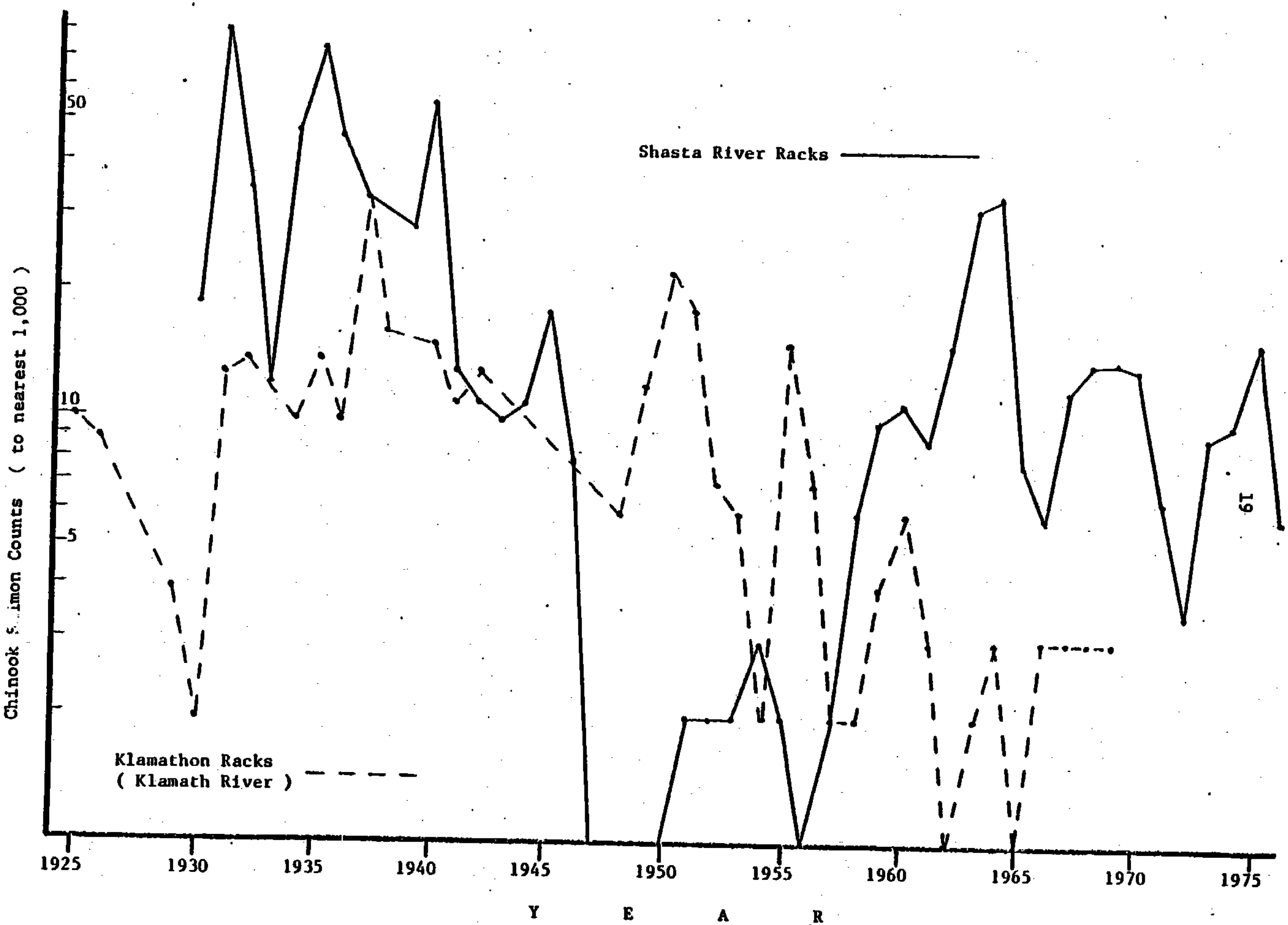


Figure 8. Chinook Salmon Counts at the Klamathon and Shasta River Racks

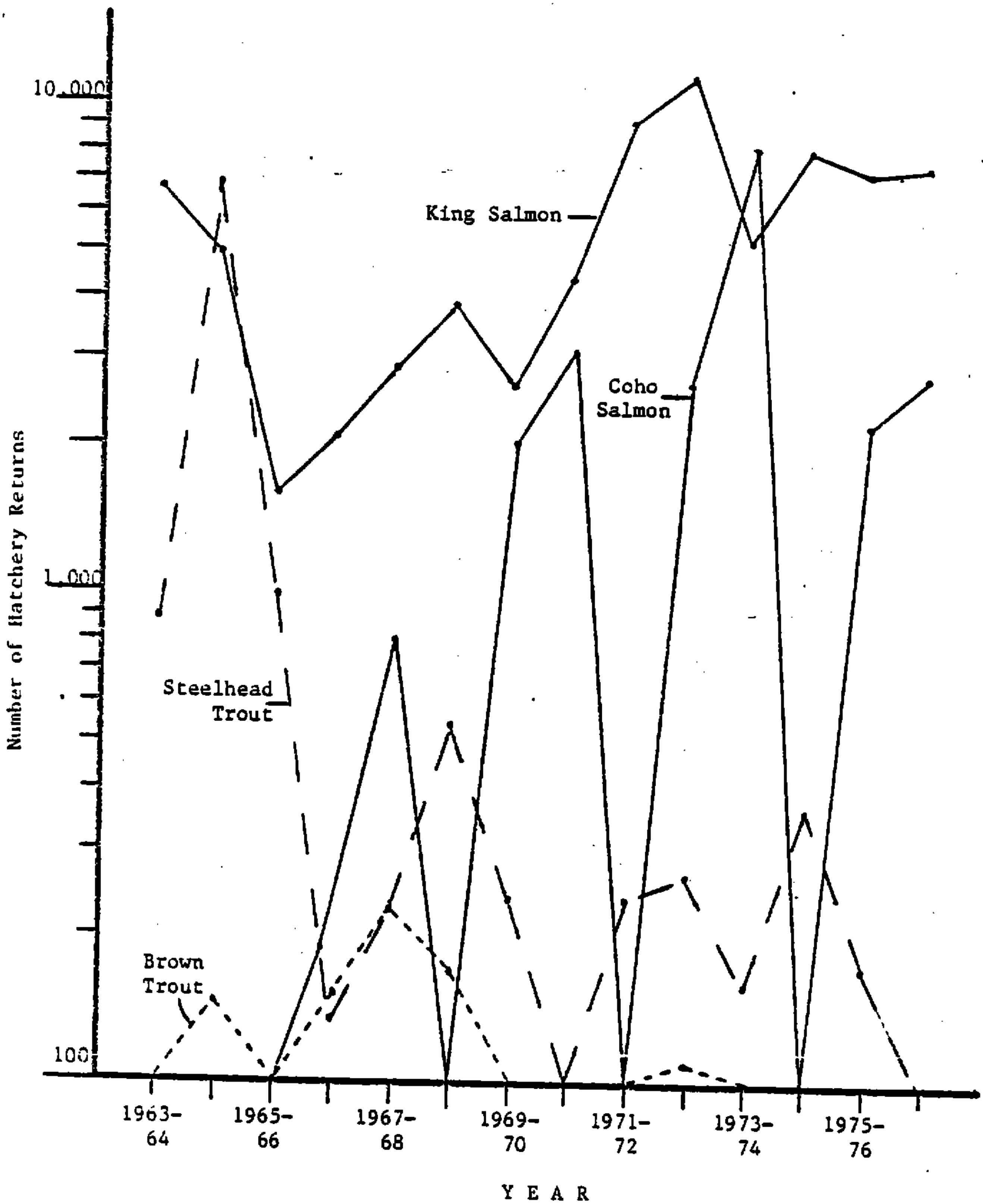


Figure 9. Anadromous Fish Returns to the Trinity River Hatchery - 1963 to 1976

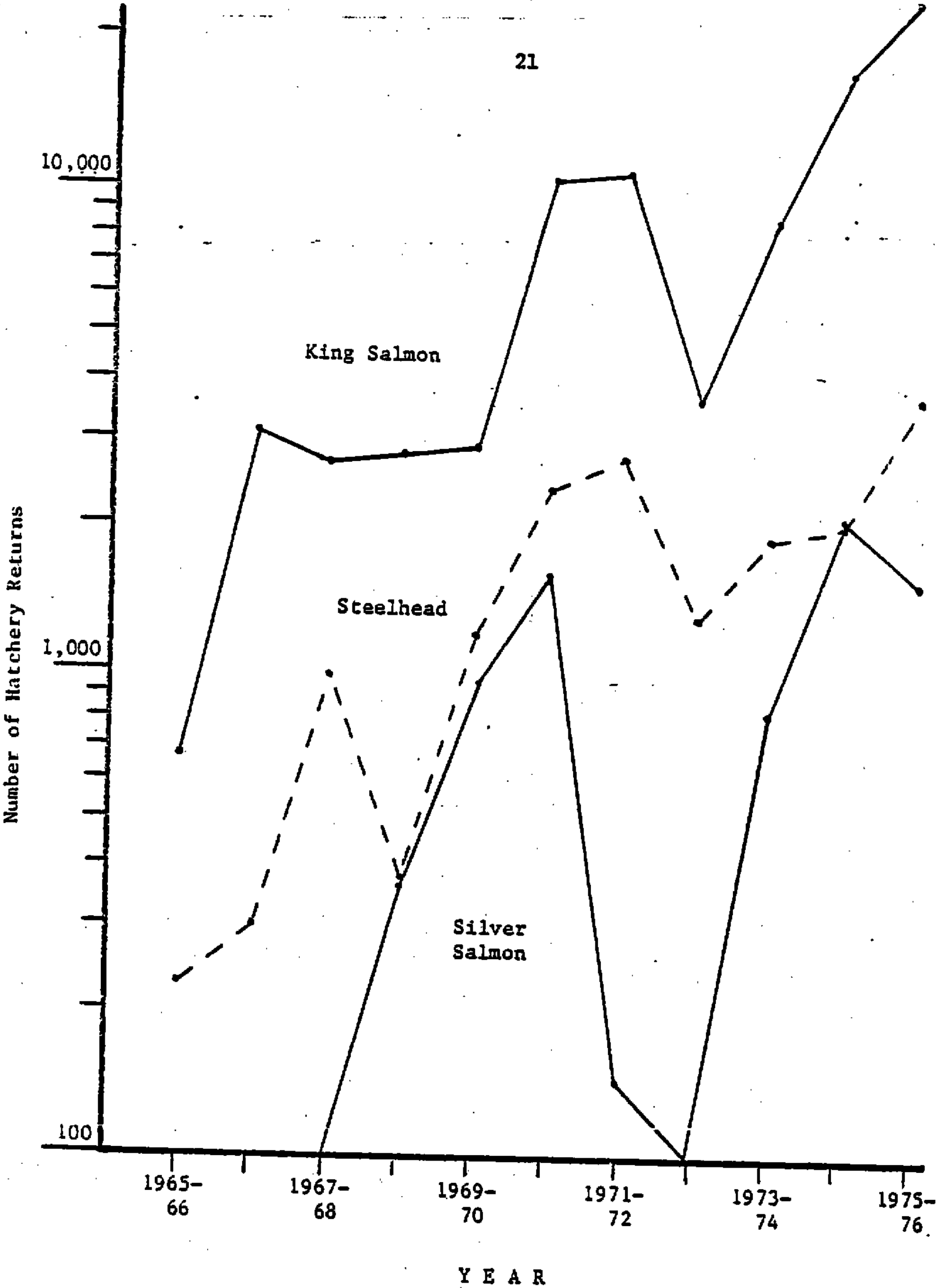


Figure 10. Anadromous Fish Returns to the Iron Gate Hatchery - 1965 to 1975

Since 1976, the California Department of Fish and Game has conducted studies to determine sizes of returning sea-run fish populations in the Klamath River system. Studies have involved a beach seining and tagging effort on the Klamath River just below the Highway 101 bridge coupled with a recapture program using Petersen and Schaefer population estimation models to determine run size. Salmon and steelhead were seined and tagged daily during summer and fall months and mark sampling for tagged fish was conducted at Iron Gate and Trinity River hatcheries, through a sport creel census program and at a number of temporary weir-trapping facilities located on the Trinity River.

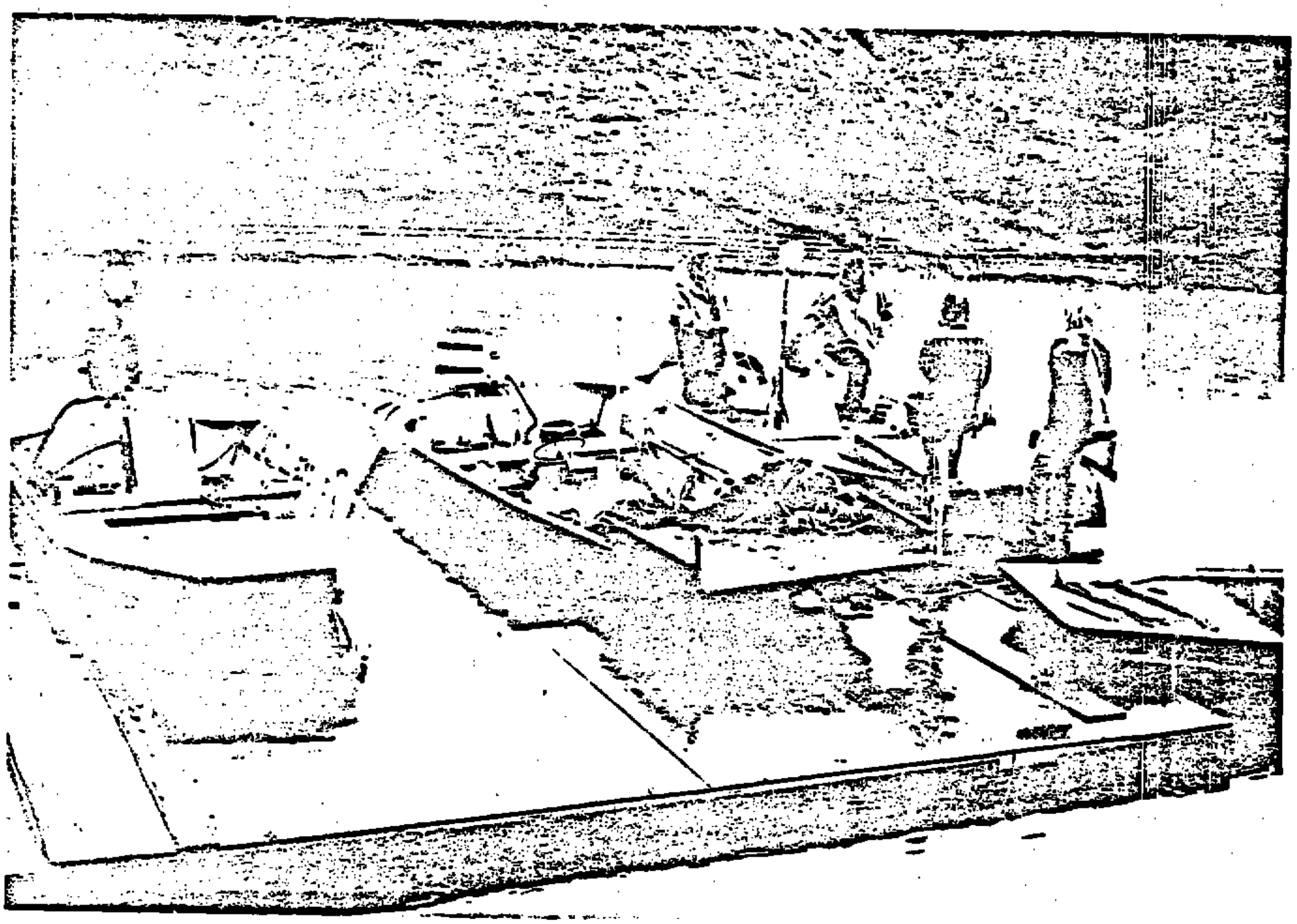
The 1976 run of fall chinook salmon was estimated at 194,000 using the Schaefer model and at 210,000 using the Petersen model (Boydstun and Hopelain, 1978). The 95 percent confidence interval was approximately ± 21% of the estimate. More than 50% of the run passed the Highway 101 bridge by mid-September. Based on a length-frequency analysis of seined fish, the length separation between grilse and adult salmon was placed at 20 inches. Adults comprised 77% of the catch while grilse comprised 23%. Returns to the Iron Gate and Trinity hatcheries were 13,726 and 3,916 salmon, respectively.

The 1977 fall chinook run was estimated at 192,000 using the Petersen model (Boydstun, personal communication) with a 95% confidence interval of ± 23% of the estimate. The length separating grilse from adult salmon was estimated at 22.4 inches. Adults comprised 67% of the catch, approximately 10% lower than 1976. Chinook salmon returns to the Iron Gate and Trinity hatcheries were 4,833 and 4,687, respectively. Oregon Department of Fish and Wildlife (ODFW) and Oregon fish buyer records indicate that approximately 260,000 pounds (about 20,300 fish) of chinook salmon of Klamath River origin were sold in Oregon in 1977.

Preliminary estimates of the 1978 fall chinook run by CDFG include 139,102 salmon of which 110,326 (including 87,443 adults) comprised spawner escapement (Boydstun, personal communication). The length separating grilse from adults was approximately 22.4 inches. Returns to Iron Gate Hatchery, Trinity River Hatchery and Shasta Racks were 7,840 (including 6,925 adults), 8,755 (including 7,399 adults) and 18,731 (including 12,024 adults), respectively.

Working in conjunction with federal regulations governing Indian netting on the Hoopa Valley Indian Reservation, FWS biologists participated in harvest monitoring and run estimation programs in 1978 (Photograph 4). Sport and net harvest of chinook salmon from the lower Klamath River, which was evaluated until the moratorium went into effect, was estimated at 1,014 and 8,503, respectively (Tables 2 and 3). It is believed that the majority of the 8,503 netted fish were sold with approximately 44,311 pounds (about 3,462 fish) having been sold in Oregon according to ODFW and Oregon fish buyer receipts.

Run size estimation activities conducted by FWS prior to the moratorium resulted in the tagging of 41 chinook salmon of which 13 tags were recovered from a mark sample of 7,064 fish (Table 4). Based on this data, a run-size estimate of 22,820 salmon was obtained as of August 23 (Table 5). Because of what appeared to be an unusually small run, a moratorium on sport fishing and netting for commercial purposes went into effect on August 28, 1978.



Photograph 4. Biologists with the U.S. Fish and Wildlife Service preparing for nightly gill-netting and tagging operations in conjunction with 1978 run-estimation investigations on the Klamath River.

TABLE 2. Cumulative Projected Sport Harvest of Chinook Salmon from the Lower Klamath River During the 1978 Season.

Date	Daily Catch	Cumulative Daily Catch	Confidence Factor	Projected Catch	Cumulative Projected Catch
JULY					
4	1	1	.95	1	1
8	3	4	.95	3	4
9	4	8	.95	4	8
12	2	10	.95	2	10
13	4	14	.95	4	14
14	18	32	.95	19	33
15	2	34	.95	2	35
16	7	41	.95	7	42
17	13	54	.95	14	56
18	8	62	.95	9	65
19	5	67	.95	5	70
20	47	114	.95	49	119
21	33	147	.95	35	154
22	24	171	.95	25	179
23	36	207	.95	38	217
24	14	221	.95	15	232
25	20	241	.95	21	253
26	17	258	.95	18	271
27	16	274	.95	17	288
28	13	287	.95	14	302
29	41	328	.95	43	345
30	49	377	.95	52	397
31	19	396	.95	20	417
AUGUST					
1	49	445	.99	49	466
2	40	485	.99	40	506
3	26	511	.99	26	532
4	19	530	.99	19	551
5	18	548	.99	18	569
6	7	555	.99	7	576
7	14	569	.99	14	590
8	11	580	.99	11	601
9	8	588	.99	8	609
10	9	597	.99	9	618
11	1	598	.99	1	619
12	11	609	.99	11	630
13	12	621	.99	12	642
14	15	636	.99	15	657
15	25	661	.99	25	682
16	27	688	.99	27	709
17	63	751	.99	64	773
18	37	781	.99	37	810
19	26	807	.99	26	836
20	38	845	.95	40	876
21	24	869	.95	25	901
22	50	919	.95	53	954
23	21	940	.95	22	976
24	5	945	.95	5	981
25	25	970	.75	33	1014

TABLE 3. Cumulative Projected Commercial Net Harvest of Chinook Salmon from the Klamath River During the 1978 Season.

Date	Daily Catch	Cumulative Daily Catch	Confidence Factor	Projected Catch	Cumulative Projected Catch
JUNE		150	.50	300	300
JULY					
3	2	152	.50	4	304
5	26	178	.50	52	356
11	13	191	.50	26	382
12	54	245	.50	108	490
17	24	269	.50	48	538
19	13	282	.50	26	564
22	21	303	.50	42	606
23	7	310	.50	14	620
24	14	324	.50	28	648
25	4	328	.50	8	656
26	7	335	.50	14	670
27	4	339	.50	8	678
28	10	349	.50	20	698
29	2	351	.50	4	702
30	1	352	.50	2	704
31	75	427	.50	150	854
AUGUST					
2	115	542	.75	153	1007
3	357	899	.75	476	1483
4	222	1121	.75	296	1779
5	84	1205	.75	112	1891
6	0	1205	.90	20	1911
7	76	1281	.75	101	2012
8	44	1325	.90	49	2061
9	21	1346	.90	23	2084
10	36	1382	.90	40	2124
11	54	1436	.90	60	2184
12	75	1511	.90	83	2267
13	37	1548	.90	41	2308
14	343	1891	.90	381	2689
15	320	2211	.90	356	3045
16	586	2797	.90	651	3696
17	1110	3907	.90	1233	4929
18	429	4336	.90	477	5406
19	786	5122	.90	873	6279
20	446	5568	.80	558	6837
21	671	6239	.90	746	7583
22	221	6460	.90	246	7829
23	229	6689	.90	254	8083
24	51	6740	.50	102	8185
25	105	6845	.50	210	8395
26	54	6899	.50	108	8503

Table 4. Tag recoveries of Klamath River salmon for periods (ij) in 1978.

Week of Recovery	7/29-8/12	8/13-8/19	8/20-8/23	Total Tagged Fish Recovered Rj	Fish examined for Tags Cj
7/30-8/12	1			1	1547
8/13-8/19	5	4		9	3819
8/20-8/23	-	2	1	3	1700
Total Tags Recovered Rj	6	6	1	13	7064
Total Tagged Fish Mj	20	16	5	41	

Table 5. Estimates of chinook salmon entering the Klamath River during the early portion of the 1978 run.

Week of Recovery (j)	7/29-8/12	8/13-8/19	8/20-8/23	Run Size at the End of Each Recovery Period	Cumulative
7/30-8/12	5145			5,145	5,145
8/13-8/19	7197	4617		11,816	16,961
8/20-8/23	--	3026	2833	5,859	22,820

The closure of the lower river Indian fishery and resultant cessation of the associated mark sample necessitated a change in run-size estimation programs from one which relied on mark-recapture techniques to one which depended on catch/effort relationships. A relationship between salmon catch per seine haul and estimated run size at the CDFG seining site on the lower Klamath River was established utilizing a similar relationship computed by CDFG for the 1976 fall chinook salmon run. The cumulative run-size and escapement estimates obtained through these methods as of October 28, 1978 were approximately 116,000 and 101,000 adult chinook salmon respectively.

A run-size estimation program, utilizing mark-recapture techniques, was also conducted by CDFG biologists. Though complicated by tag loss, harbor seal predation and other factors, this method resulted in run-size and escapement estimates of approximately 123,000 and 96,000 adult chinook salmon, respectively.

Of the three spawner escapement estimates obtained (87,443, 101,000 and 96,000) it is believed that the 87,443 figure is most reliable because it was based on actual spawning ground surveys and hatchery returns and did not include subjective estimates of harvest. The adult escapement was 27,557 less than the 115,000 escapement goal.

Run-estimation studies conducted during 1978 resulted in the procurement of relevant life history information concerning chinook salmon. Of 20 fish tagged in the estuary during the period, July 30, to August 12, 1978, six fish were recaptured in the same area after an average of 12.7 days since they were tagged indicating that salmon reside in the estuary for a considerable period of time before proceeding upstream. FWS netting activities and harvest monitoring programs also resulted in the collection of length-frequency data of chinook salmon taken in the sport and net fisheries (Figure 11).

Coho Salmon

Coho salmon begin entering the Klamath River in September with runs peaking in October and November and ending by late December. Spawning occurs mainly in November and December. Coho salmon prefer smaller streams than chinooks, and it is believed that they utilize many tributaries to the Klamath and Trinity rivers for spawning. Kesner (1977) reported that 56 percent of the coho habitat in the Klamath River basin, exclusive of the Trinity River drainage, occurs in the Klamath National Forest.

Juvenile coho salmon prefer small tributaries and at times actively migrate into such streams. Coho smolts normally enter the ocean after having spent about a year in fresh water. Peaks of smolt migration occur during April and May and again during September and October (Healey, 1973).

Historically, coho salmon have not utilized the Klamath River system to the extent that chinook salmon have. The sizeable runs which currently exist on the Trinity River probably stem in large part from the Trinity River Hatchery release program. Holmberg (1972) and the USFWS (1960) survey list the mean

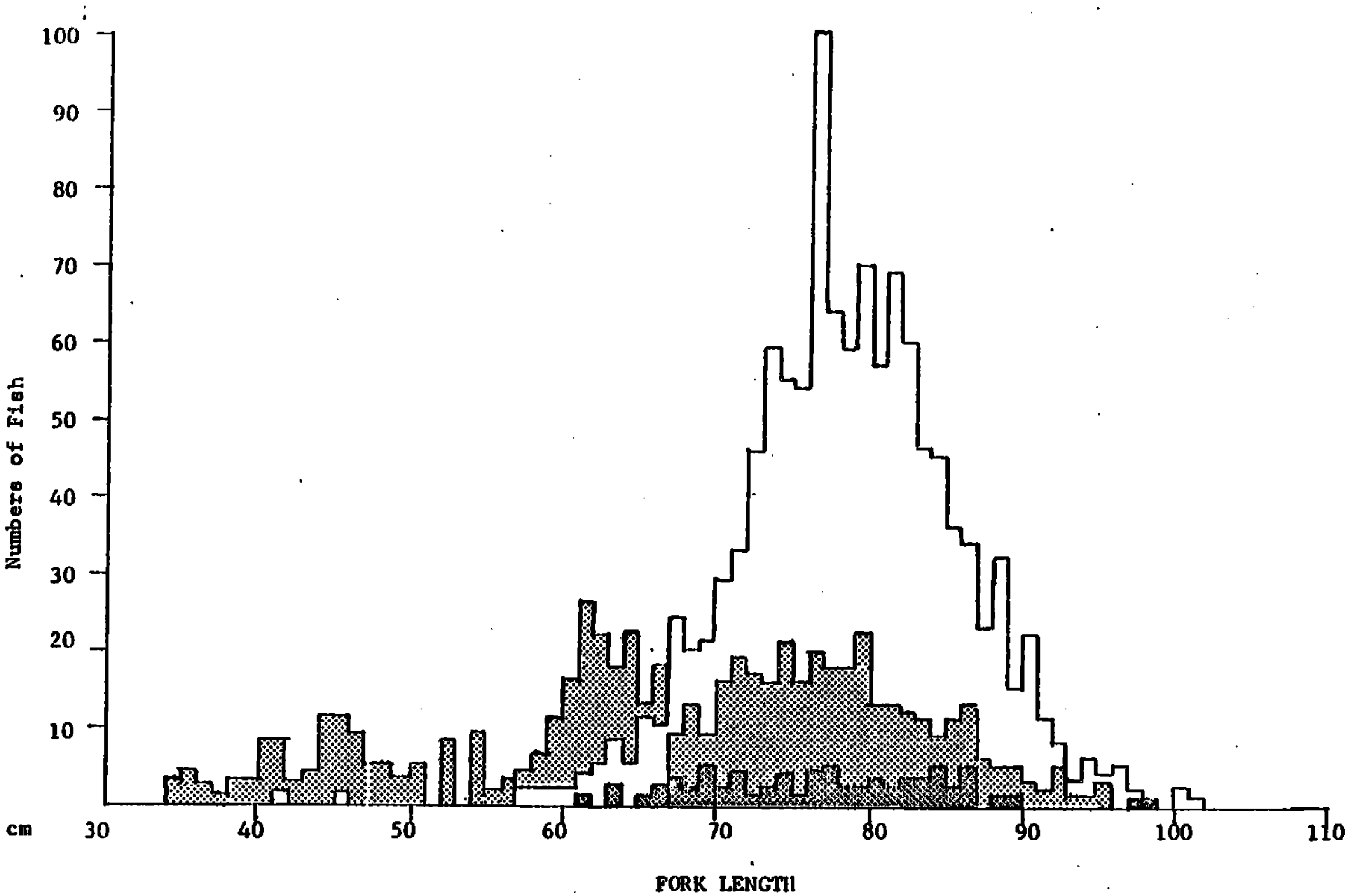


Figure 11. Length frequencies of chinook salmon observed in Indian, sport, and tagging catch records.

Indian fisheries, July 30 - August 26, 1978. n = 1108
sport fisheries, up to August 25, 1978. n = 599
FWS, July 30 - Sept. 13, 1978. 6" & 7 1/2" mesh. n = 71

historical annual spawning escapement of coho salmon in the Klamath River system at 20,000 while Coots (1967) placed the escapement at 15,400. Holmberg (1972) listed the Trinity River escapement at 8,000.

Moffett and Smith (1950) reported that coho salmon historically were present in the lower Trinity River (Hoopa Valley area) during October but were not known to migrate above the South Fork - Trinity River. A 1956 report prepared jointly by CDFG and USFWS, however, reported coho juveniles in Ramshorn Creek in 1949 and 1950 and in Stuarts Fork in 1953, both creeks located upstream from the Trinity Project. Hubbell (1973) reported estimated escapements in the Trinity River above the North Fork confluence of 3,220 and 5,245 in 1969 and 1970, respectively.

Coho salmon returning to the Trinity River and Iron Gate hatcheries appear to exhibit abundance peaks in three-year cycles (Figures 9 and 10). Coho salmon annually trapped at the Trinity River facilities numbered between 12 and 8,081 while averaging 1,208 per year during the period 1958-75. Runs increased from an annual mean of 182 during the 1958-64 period to over 2,000 per year during the 1965-76 period, an eleven-fold increase probably attributable to the hatchery program.

In 1976, CDFG estimated the coho salmon run at 21,000 fish using the Petersen estimate and 30,000 using the Schaefer estimate (Boydstun and Hopelain, 1978). Because of the small number of coho tagged and recovered, the 95% confidence limits were wide, ranging from 12,500 to 35,000 fish. The run peaked in the vicinity of the Highway 101 bridge on the Klamath River during the first week of October. Returns to Iron Gate and Trinity River hatcheries were 1,757 and 2,808, respectively.

In 1977, few coho salmon were sampled in seining operations. Returns to Iron Gate and Trinity River hatcheries were 623 and 1,928 respectively. The Petersen population estimate was 16,000 with wide confidence limits (Boydstun, personal communication).

Steelhead Trout

Steelhead remain in the ocean one to three years before their initial spawning run and may spawn three or four times during their life. In the Klamath River system, it is believed that most steelhead spawn only once (CDFG Letter Report, March 24, 1978). The Klamath River system supports three runs of steelhead, a fall run, winter run and spring or summer run (Van Kirk, 1977). Spawning occurs from December through May with peak activity in February and March.

The fall run normally enters the river in August, peaks in September and continues into November. The early portion of this run consists primarily of "half-pounders", steelhead ranging in length from approximately 10 to 18 inches which migrated to the ocean in the spring of the same year. These fish are normally immature and return to the ocean the following winter or spring. The "half-pounder" run is unusual in that it only occurs in large numbers on a few rivers; the Klamath and Eel rivers in California and the Rogue River in Oregon. Progressively greater numbers of large steelhead of this run enter the river as the season continues, utilizing smaller streams and tributaries to spawn.

Winter-run steelhead enter the river in November through February and spawn in February through April. A limited run of spring or summer steelhead enters the river in April through June, holds over in deep pools and spawns the following winter. The New River and Salmon River contain populations of summer steelhead.

Juvenile steelhead normally spend two years in fresh water before entering the ocean although some fish emigrate after one or three years of fresh water residence. Although steelhead move downstream during all months of the year, greatest movements typically occur from April through June and again for brief periods in the fall and winter (Hubbell, 1973).

Studies conducted in 1976 indicate that steelhead trout released from the Trinity River Hatchery at sizes smaller than six inches, failed to emigrate (CDFG Admin. Rpt. No. 77-5, 1977). Smolting at the hatchery was asynchronous with the onset occurring before March 4, and with no clear cycle peak. In contrast, mean gill ATPase levels in wild Trinity River steelhead increased steadily to a peak on May 11, and then declined steadily until June 15 (Kerstetter and Keeler, 1976).

The USFWS (1960) survey placed the historical mean annual steelhead run in the Klamath River system at 400,000 including "half-pounders" out of a combined estimated average annual run of 583,000 for all northwest California streams. Coots (1967) estimated the Klamath River adult steelhead run at approximately 250,000. The California Department of Fish and Game estimated a mean annual steelhead escapement above the Lewiston Dam site of 10,000 adults during pre-project years (Hubbell, 1973).

Citing more recent CDFG studies, Hubbell (1973) reported that approximately 7,000 to 9,000 steelhead spawned in the 83 miles of the Trinity River and 11 tributaries sampled between the North Fork and Lewiston Dam in 1964, that about 400 steelhead comprised the escapement in 95 miles of tributary streams located between Canyon Creek and Lewiston Dam in 1971 and that 1,000 steelhead made up the escapement in 69 miles of tributary streams located between Browns Creek and Lewiston Dam in 1972.

Numbers of steelhead entering the Trinity River trapping facilities and hatchery averaged 3,035 per year between 1958 and 1964, 431 annually during the period 1965-69 and only 186 per year since 1970 with only 13 steelhead returns to the hatchery during the 1976-77 season (Figure 9). The reduction in numbers of steelhead trapped between the 1958-64 period and since 1970 is 94 percent and the reduction from historical escapements above Lewiston is 98 percent. Annual steelhead returns to the Iron Gate Hatchery have consistently numbered between one thousand and three thousand since 1969 (Figure 10).

Studies conducted on Manzanita Creek, a tributary of the Trinity River, by the U.S. Forest Service and California Cooperative Fishery Research Unit since 1971 show a declining trend in numbers of steelhead entering the stream (Figure 12). Between ten and 62 steelhead entered the stream during the years 1971 to 1976. Two coho salmon also ascended the creek during the 1973-74 season. No fish entered Manzanita Creek during the 1976-77 season, possibly because of low water conditions resulting from the recent drought. Analysis of scales from steelhead trapped during the 1971-72 and 1972-73 seasons revealed

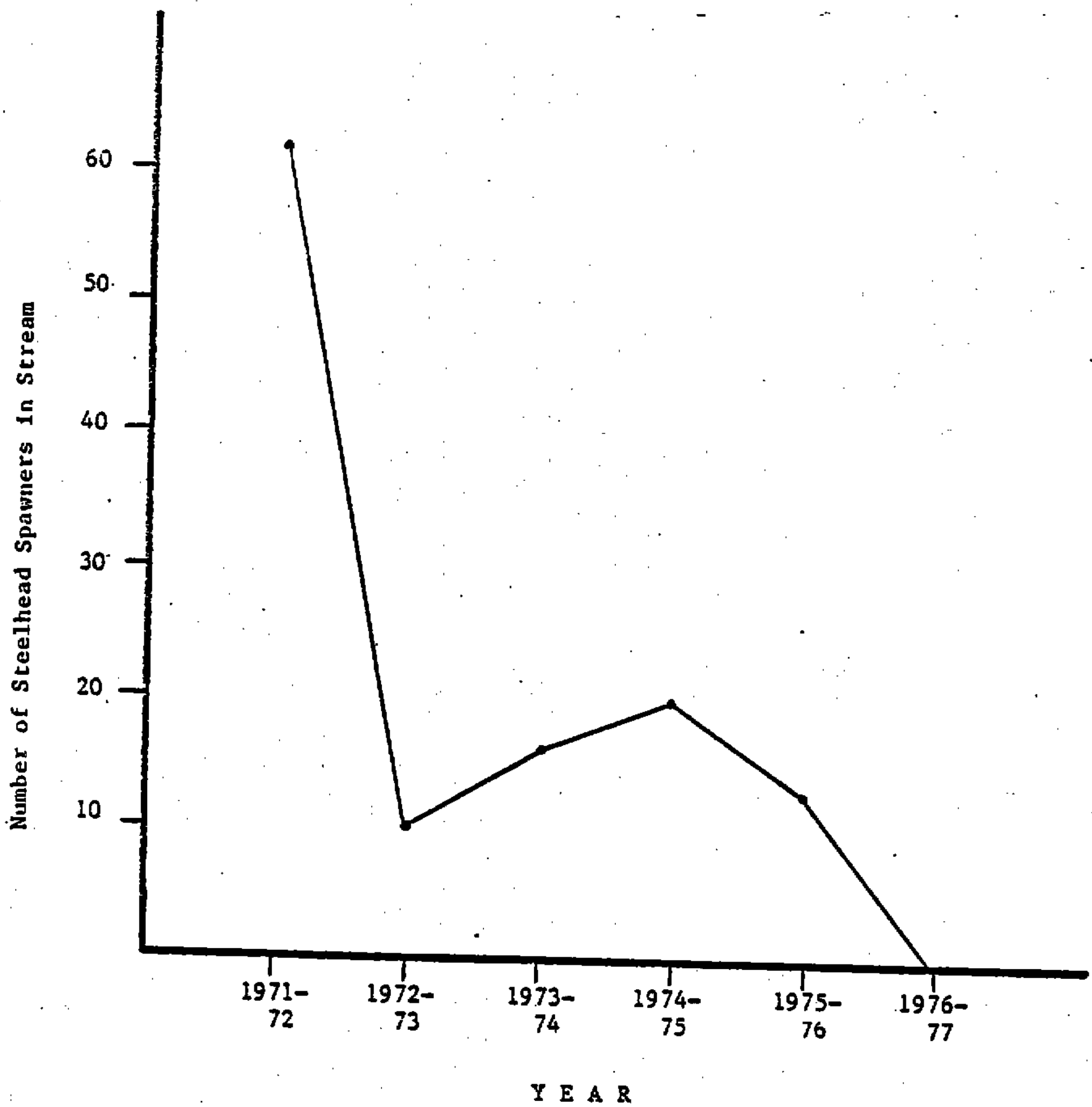


Figure 12. Numbers of Steelhead Trout Trapped While Ascending Manzanita Creek to Spawn since 1971

that 25 percent of these fish were of hatchery origin (Newhouse and Barnes, 1972; Newhouse, 1973).

A number of Indian people have reported that numerous steelhead spawned in reservation streams during the 1950's. Spawning ground surveys conducted by FWS biologists in 1977 and 1978 show low levels of utilization by steelhead spawners (Appendix 5).

A tag-recapture program conducted by CDFG biologists in the Klamath River drainage during the 1976-77 season resulted in Petersen population estimates of 135,096 adult fall-run steelhead and 504,207 "half-pounder" steelhead (Boydstun, 1977). Tagging mortality, especially involving "half-pounders", may have been a significant source of error. Assumptions included a tag loss rate of four percent and an angler non-response rate of twenty percent. A total of 3,890 steelhead, ranging in length from 7.9 to 28.3 inches, were netted. Of these, four bore gill net marks and 327 were of known or probable hatchery origin including a small number of probable Rogue River origin.

Green and White Sturgeon

The literature refers to both green and white sturgeon in the Klamath River system and both were captured in 1974-77 netting operations conducted by CDFG. Sturgeon have been observed well inland in the Klamath and Trinity rivers with Happy Camp considered near the upstream limit of their distribution. A "sturgeon hole" located upstream from Orleans may be a major spawning ground on the Klamath River as leaping and other frantic behavior indicative of spawning or courtship is frequently observed there in the spring or early summer (Moyle, 1976). Other streams in the Klamath River drainage frequented by sturgeon are the Salmon, Trinity and the South Fork - Trinity rivers (CDFG Letter Report, March 24, 1978).

Pacific Lamprey

Adult lampreys move into the Klamath River during the spring and summer with peak movements occurring at night. They presumably spawn in the main Klamath and Trinity rivers and tributaries during April through June but their activity is obscured by roiled waters of spring run-off. Nests are normally found along the river bottom where the current is not very swift.

Young lampreys remain in the larval stage for about four years and can be found along the Trinity River during any month. Downstream migration of lamprey ammocoetes is probably quite passive and begins during the first fall after hatching. The flesh of the lamprey is prized by Indians along the river.

Coastal Cutthroat Trout

A small run of coastal cutthroat trout consisting of fish which rarely exceed three pounds in weight, utilizes the lower Klamath River tributaries for spawning in late winter and spring. Young fish may move downstream to larger waters as they grow and usually migrate to sea when two to four years of age. These fish generally return to the estuary within a few months and can spawn more than once. Many cutthroat reportedly spend much time in the estuary and do not migrate far to sea (Fry, 1973).

Brown Trout

A small run of anadromous brown trout reportedly occurred in the Klamath and Trinity rivers in the past but recent CDFG studies and returns to the Trinity River Hatchery indicate that few, if any, sea-run brown trout currently utilize the system. Prior to 1977, the Trinity River Hatchery released approximately 22,000 brown trout annually and received a mean annual return of less than 100 adults. No stocking of brown trout from the hatchery has occurred since April, 1977. Anadromous brown trout commonly exhibit relatively low tendencies to enter salt water and many reportedly reside in estuaries (Fry, 1973). Like steelhead, brown trout oftentimes spend two years in fresh water before beginning their seaward migration. The degree to which populations of brown trout affect salmon and steelhead in the Klamath River basin is not well understood.

American Shad

A small spawning run of Amercian shad occurs in the Klamath River from April through July with spawning occurring as far upstream as the Trinity and Salmon rivers. Most spawning occurs over gravel or sand well above tidal influence and many shad die after spawning. Some juveniles move downstream into brackish water soon after hatching but large numbers remain in freshwater until they are five to six months old (Fry, 1973). Shad mature in three to five years.

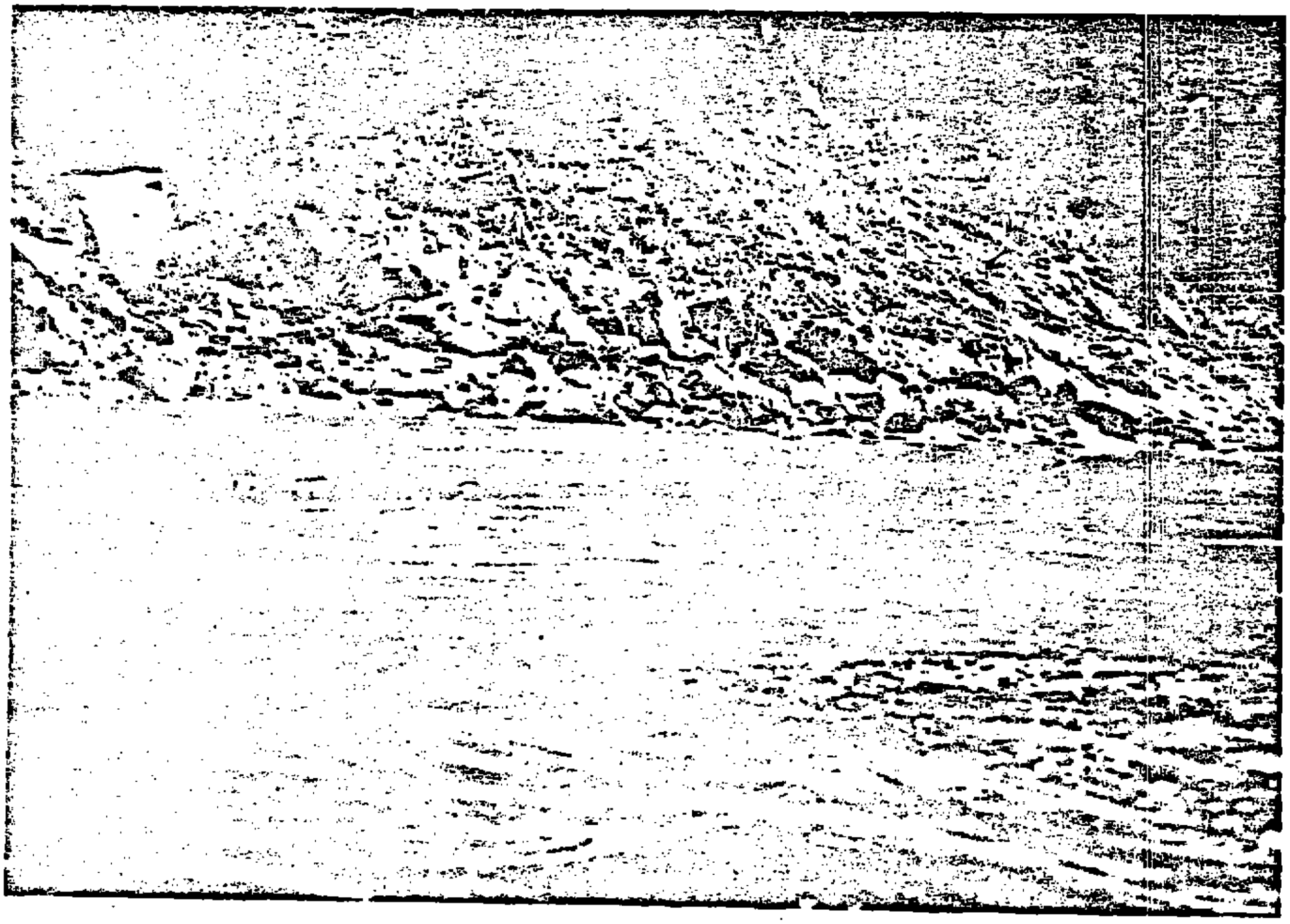
Factors Affecting the Magnitude of Anadromous Fish Runs

As much misunderstood as the magnitudes of anadromous fish declines in the Klamath River basin is the relative importance of factors responsible for such declines. Snyder (1931) suggested that a degree of depletion occurred during the first quarter of this century attributable to placer mining operations, offshore fishing and fishing in the Klamath River estuary. Factors most frequently referred to with regard to recent population declines include:

1. Overfishing
2. Logging
3. The Trinity River Division - Central Valley Project
4. Irrigation Diversions
5. The 1964 Flood
6. The 1976-77 Drought
7. Sea Lion Predation
8. Brown Trout Predation

1. Overfishing

The components involved in the harvest of Klamath River fish include the Indian gill-net fishery, the inland sport fishery and the offshore sport and commercial fisheries. Data concerning the numbers of Klamath River salmon and steelhead involved in each component is very incomplete and not well understood. The offshore fisheries involve primarily salmon while the inland sport fishery harvest is dominated by steelhead. Indian net fisheries have focused on the fall-run chinook salmon (Photograph 5).



Photograph 5. Indian gill-net in the Klamath River.

A CDFG memorandum dated May 24, 1967 and authored by John Radovich, Chief of the Marine Resources Branch, provided comparative data on the various components of harvest associated with the Klamath River system. He stated that annual production (landings plus spawners) of chinook salmon in the system was about 500,000 and that about 350,000 of these are harvested. Of the total landings, Mr. Radovich estimated that 88 percent were attributable to the ocean fisheries, eight percent involved river sport landings and four percent were accounted for by the Indian net fishery. Using prior CDFG data and assuming that net harvest for the entire reservation would result in twice the net harvest from the Trinity River, he estimated that between 8,000 and 20,000 salmon would comprise the net harvest for the reservation annually which would represent between two and four percent of the annual production.

Moffett and Smith (1950) estimated that salmon originating from the Klamath River system contributed an average of 2,286,588 pounds annually (approximately 200,000 fish annually) to the offshore commercial catch during the 28-year period, 1916-43, including a mean annual contribution of 2,553,726 pounds during the years 1940 to 1943. Hallock, Pelgen and Fisk (1960) estimated that approximately 218,000 salmon of Klamath River origin were harvested offshore annually (circa 1955). They also reported that marking studies showed that these fish were harvested as far south as Monterey, California and as far north as Oregon and Washington.

It seems reasonable to assume that offshore harvest ratios of Klamath River salmon may be comparable to those of Columbia River salmon. It has been estimated that, depending on the stock, between two and six fish of Columbia River origin are taken in the ocean for each one returning to the river (Pacific Northwest Regional Commission, 1976). Average annual catch and escapement ratios for coho salmon during the 1970-74 period included an ocean harvest of 78.8 percent, a river harvest of 10.2 percent and an escapement of 11.1 percent. During the same period, respective ratios for fall chinook salmon released from lower Columbia River facilities included an ocean harvest of 68.6 percent, a river harvest of 20 percent and an escapement of 11.1 percent while for fall chinook salmon originating from the upper Columbia River, the ratios included an ocean harvest of 71 percent, a river harvest of 19.5 percent and an escapement of 9.6 percent.

The magnitude of annual salmon mortality attributable to offshore fisheries is related to total annual harvest and hooking mortality ("shaker" mortality). In recent years, according to data accumulated by the Pacific Fishery Management Council (PFMC, 1978), the California offshore commercial and sport fisheries have accounted for an average annual harvest of approximately 744,000 chinook salmon. The average annual harvest off the Oregon coast during the 1971-75 period included approximately 981,000 coho salmon and 208,000 chinook salmon in the commercial troll fishery and an additional 272,000 coho salmon and 50,000 chinook salmon in the offshore sport fishery. The average annual harvest off the coast of Washington during the same period included about 280,000 chinook salmon and 871,000 coho salmon in the commercial troll fishery and an additional 211,000 chinooks and 567,000 cohos in the offshore sport fishery. Ricker (1976), citing several studies, suggested that the Pacific coast catch is comprised of about equal numbers of legal and undersized coho and chinook salmon and that approximately one-half of the undersized salmon released do not survive. Hence, for every two fish harvested, one additional salmon is lost through hooking mortality. Applying this factor to the mean annual harvest of coho and chinook salmon off the coasts of California, Oregon and Washington during the 1971-75 period (approximately 4.6 million salmon), it appears that the offshore fisheries account for approximately seven million salmon annually. Additional large numbers of salmon are accounted for off the coasts of Canada and Alaska.

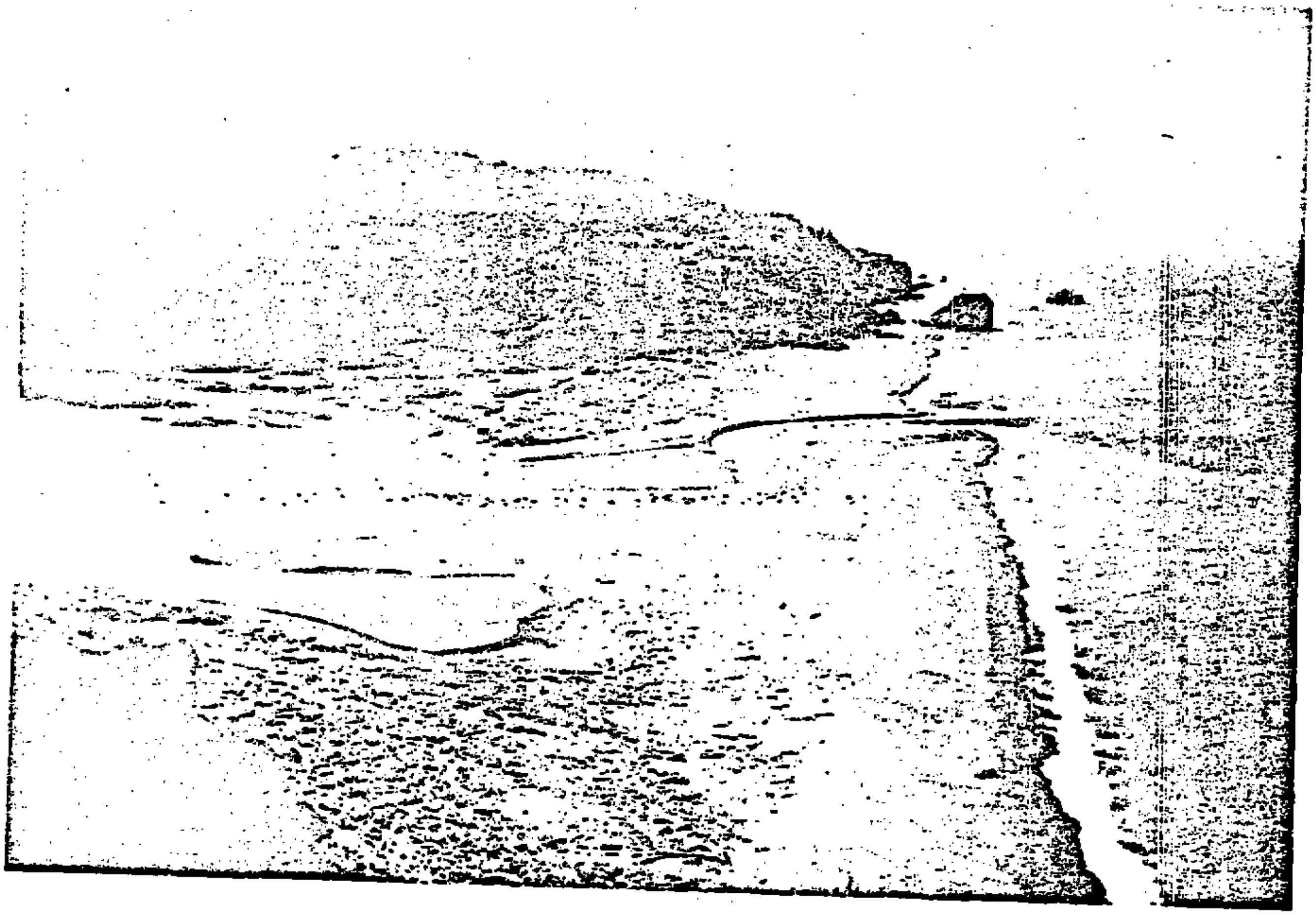
A postal card survey conducted by CDFG indicated that sport fishermen harvested approximately 72,500 salmon from the Klamath River and 22,500 salmon from the Trinity River in 1955 for a total drainage harvest of 95,000 (Hallock, Pelgen and Fisk, 1960). A creel check indicated that approximately 10,500 of the salmon were taken in the Klamath River estuary (Photographs 6 and 7). The postal card survey also resulted in a drainage-wide estimated harvest of about 100,000 steelhead trout in 1955. Coots (1967) estimated an annual chinook salmon sport harvest from the basin of 28,000 prior to 1967 and Boydstun (personal communication) estimated that sport fishermen harvested approximately 9,900, 13,900 and 3,800 chinook salmon in 1976, 1977 and 1978, respectively.

Data concerning Indian harvest from the Klamath and Trinity Rivers is sketchy and incomplete. Estimates for a few years are contained in memoranda from the U.S. Fish and Wildlife Service and California Department of Fish and Game. A USFWS memorandum dated January 16, 1969 cited Indian harvest data received from a BIA representative for the years 1965, 1966 and 1967. During these years, respectively, an estimated 45,000 pounds, 45,000 pounds and 35,000 pounds of chinook salmon were harvested by Indians on the entire Hoopa Valley Indian Reservation. Assuming an average weight per fish of ten pounds, respective numbers of salmon harvested during these years were 4,500, 4,500 and 3,500.

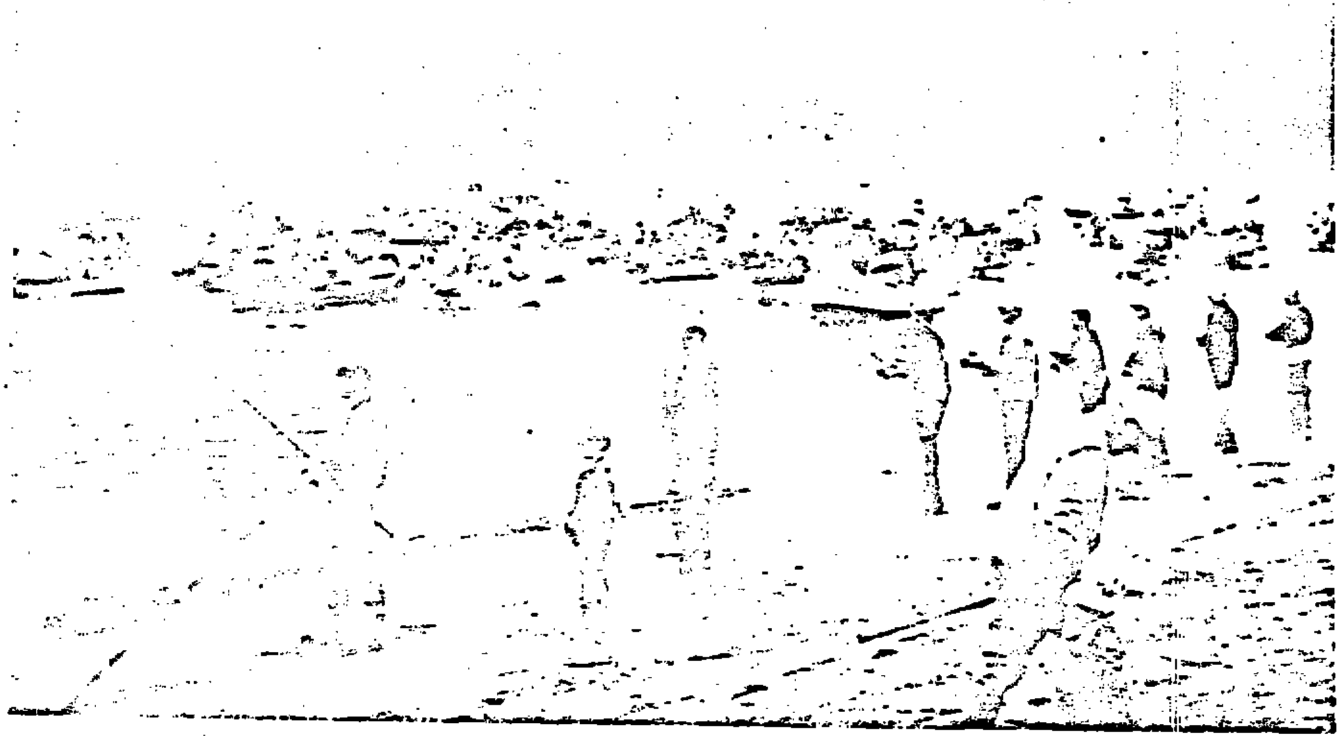
A CDFG memorandum dated March 21, 1963 roughly estimated a net harvest of 15,100 salmon on the Hoopa Valley Indian Reservation in 1962. The author of the memorandum, Walter L. Gray, noted that Indian fishermen commonly used seven and one-quarter inch mesh nets which allowed most steelhead and "chub" salmon to pass through. He reported that most Indians felt that steelhead and "chub" salmon were nuisance fish but did note that some fishermen used six-inch mesh nets which caught a greater proportion of these smaller fish. Mr. Gray assumed that the Indian take about equalled the take by sports fishermen at the mouth of the Klamath River (exclusive of sport harvest in the upper drainage). A CDFG memorandum dated January 7, 1964, estimated that approximately 10,000 to 20,000 fish were netted on the reservation in 1963.

The commercial net fishery on the lower Klamath River which has intensified since 1975 and the lower water conditions resulting from the 1976-77 drought undoubtedly resulted in substantially larger net harvests during the 1976 and 1977 seasons. A review of records kept by the Oregon Department of Fish and Wildlife and Oregon fish buyers showed that approximately 260,000 pounds of salmon (about 20,300 fish) of Klamath River origin were sold in Oregon in 1977. In 1978, it is believed that most of the 8,503 salmon netted from the lower Klamath River prior to the moratorium were sold with approximately 44,311 pounds (about 3,462 salmon) having been sold in Oregon according to ODFW and Oregon fish buyer receipts. Sales of unknown additional numbers of fish, for which records are unavailable, also reportedly occurred and a number of fish shipments were intercepted by law enforcement agents.

Little information is available on Indian harvest above the Highway 101 bridge during 1978. Forty-one gill nets conficated by law enforcement agents during the period of August 28, to September 28, ranged in length from approximately 20 feet to 200 feet while averaging about 80 feet and had mesh sizes ranging from five to eight and one-half inches while averaging about 7.25 inches. A total of 90 fish, including two sturgeon, were recovered from the confiscated nets. Below the Highway 101 bridge, 22 nets containing 47 fish were also seized.



Photograph 6. Sport fishing for chinook salmon in the Klamath River estuary (courtesy of John Grondalski, California Department of Fish and Game).



Photograph 7. Sport fishing for chinook salmon in the Klamath River estuary (courtesy of California Cooperative Fishery Unit, Humboldt State University).

2. Logging

Logging of the Klamath River drainage has resulted in considerable degradation of stream ecosystems and fish habitat (Photograph 8). The degree to which large-scale clear-cutting operations have altered stream temperatures, sedimentation rates in spawning gravels, nursery habitat and aquatic and terrestrial insect production remains unknown but appears considerable. Visible evidence of past logging in the form of log jams and debris barriers can be observed in many locations (Photographs 9 and 10). A field inventory of reservation waters (see next section and Appendix 6) conducted by FWS biologists in 1977 and 1978 revealed that all drainages have been partially or extensively clearcut and that 22 streams have undergone major or moderate alterations, nearly all a result of logging operations. Fourteen streams had impassable log jams near their mouths, many having resulted from improper logging practices. Prior to its removal by the Hoopa Valley Tribe, a large log jam on Pine Creek restricted spawner access to most of the nearly 50 square mile drainage. Barrier removal operations on the reservation have also been initiated by the Young Adult Conservation Corps in conjunction with FWS (Photograph 11) and by Indian people associated with the Klamath River Indian Wildlife Conservation Association.

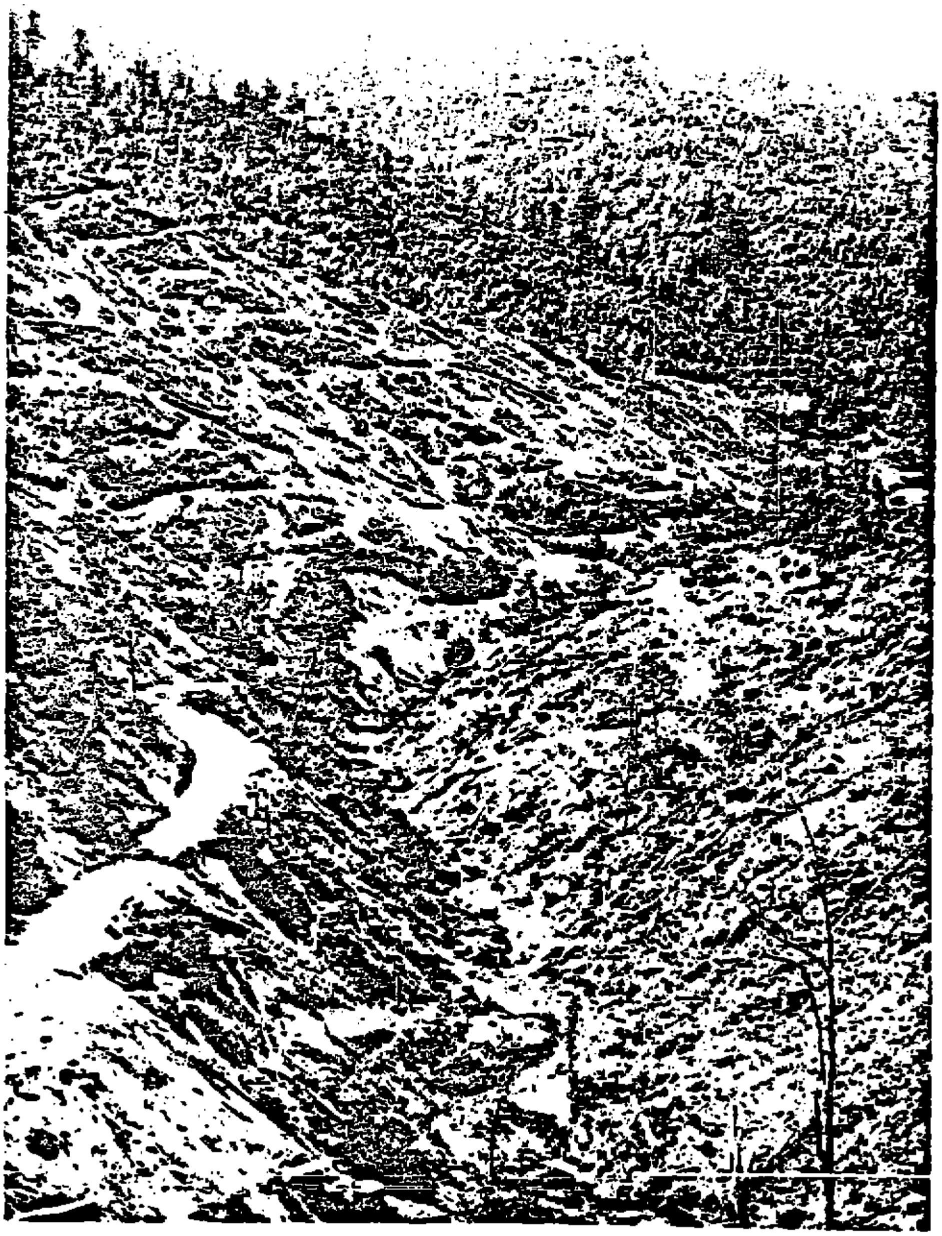
A final report entitled "Watershed Condition Inventory of the Hoopa Valley Indian Reservation Utilizing Landsat Digital Data" (Mayer and Fox, 1979) has been completed by FWS in conjunction with the Remote Sensing and Technology Transfer Project at Humboldt State University in Arcata, California and the National Aeronautics and Space Administration. The report can be used by BIA and the tribes in reviewing existing watershed conditions on the reservation and relating existing conditions to logging practices.

3. The Trinity River Division - Central Valley Project

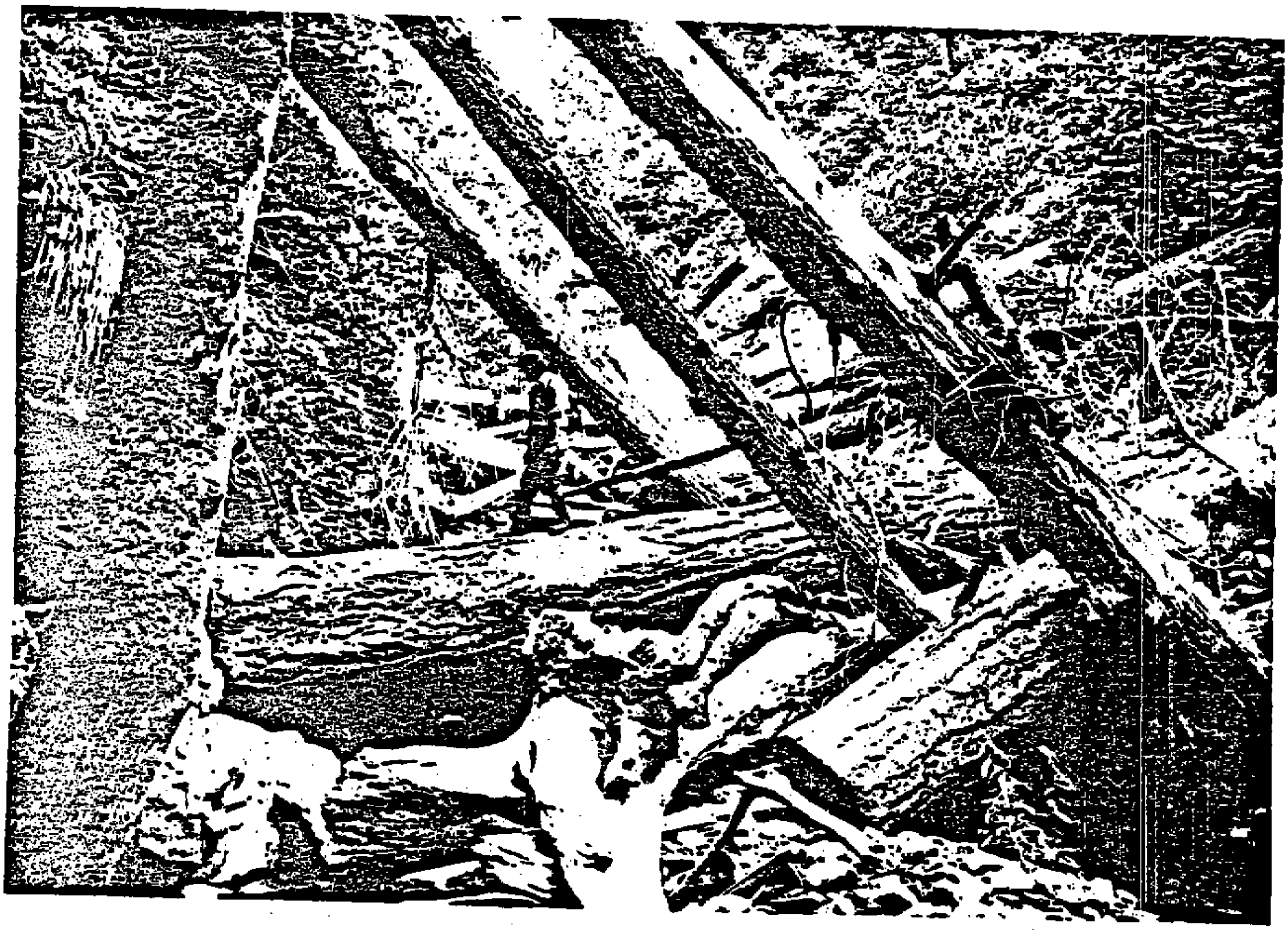
The Trinity River project resulted in the direct loss of 59 miles of chinook salmon habitat, 109 miles of steelhead habitat and an undetermined amount of coho salmon habitat located above the project site. In addition, the reduction in Trinity River flow below Lewiston Dam has led to a modified water temperature regimen, increased sedimentation, riparian vegetation encroachment, loss of gravel recruitment, narrowed channels, filled pools and compacted gravels resulting in a considerable loss of spawning and nursery habitat below Lewiston Dam. Reduced flows may also have had a negative impact on tributary spawning by restricting spawner access into various streams.

4. Irrigation Diversions

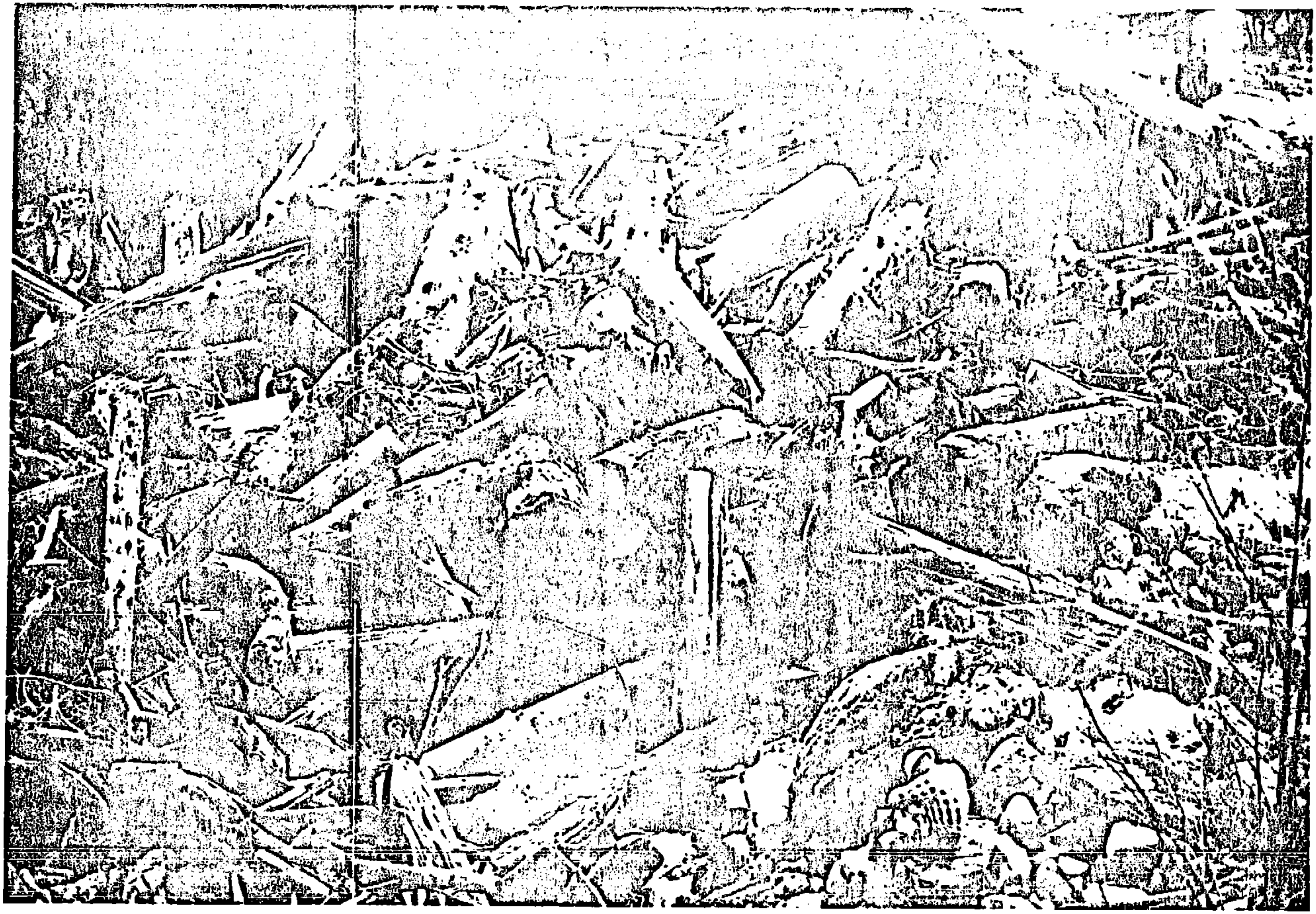
Next to the Trinity River, the Shasta and Scott Rivers are probably the most important salmon spawning streams in the Klamath River drainage. Each of these streams has the potential of producing as many fish as a large hatchery. Unfortunately, these streams have been adjudicated so that available water is apportioned for irrigation uses with little or no control by CDFG. Irrigation diversions, many of which are unscreened, also occur on smaller streams located on the reservation resulting in the loss of unknown numbers of fish each year to irrigated fields.



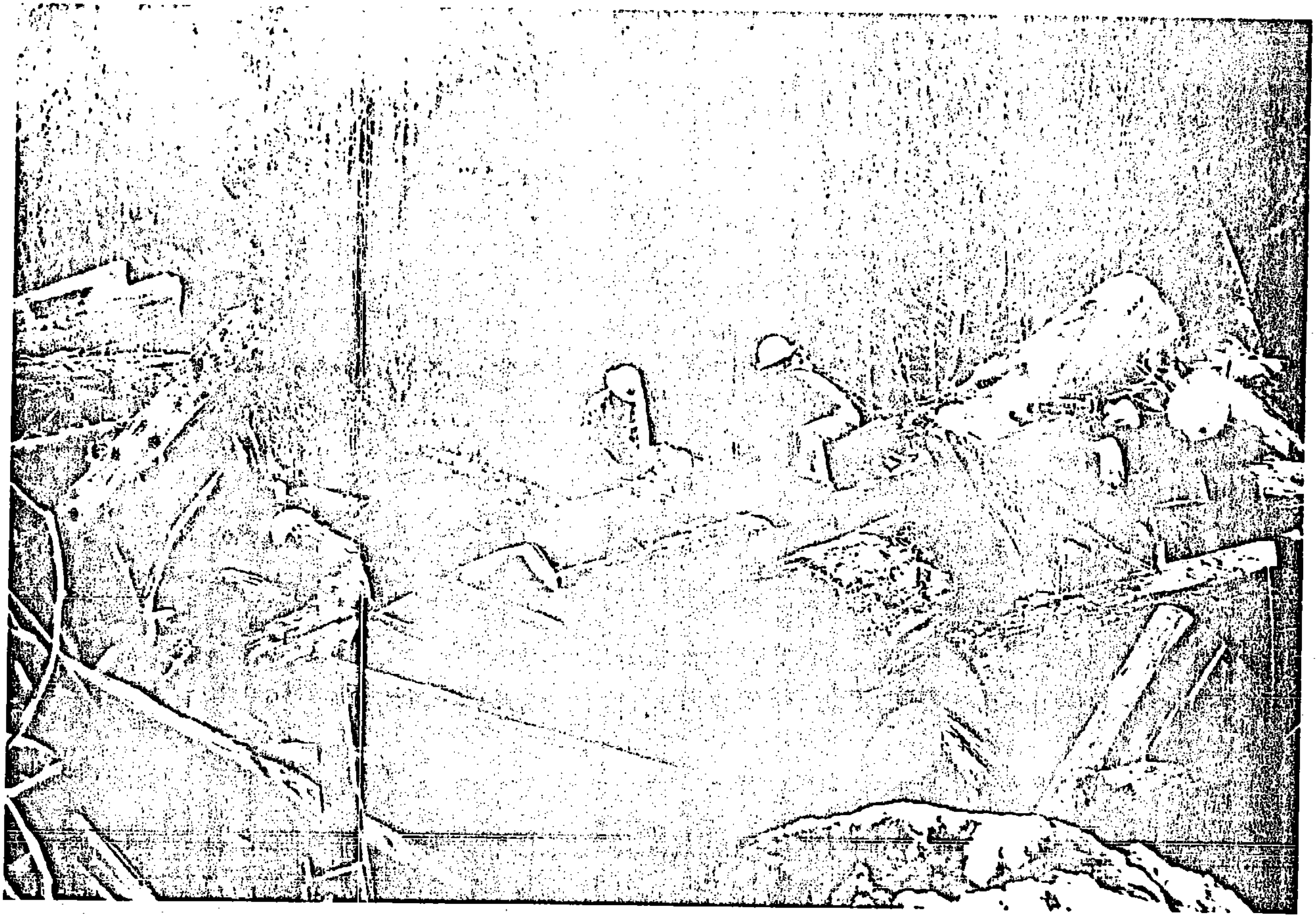
Photograph 8. Aftermath of a logging operation on the Hoopa Valley Indian Reservation.



Photograph 9. Debris barrier on Bear Creek, Hoopa Valley Indian Reservation.



Photograph 10. Debris barrier on Little Pine Creek, Hoopa Valley Indian Reservation.



Photograph 11. Debris barrier removal operations conducted by enrollees of the Young Adult Conservation Corps on the Hoopa Valley Indian Reservation.

5. The 1964 Flood

The December, 1964 flood apparently caused large-scale changes in fish habitat located in the Klamath River basin and may have resulted in the virtual loss of one or more year classes of salmon and steelhead. Resultant habitat changes may have had an adverse impact on anadromous fish production for several years. Negative impacts from the flood still occur in the form of currently-existing migration barriers created as a result of the high water. The 1964 flood resulted in streambed elevation rises of up to 13 feet in the Trinity River basin and caused noticeable changes in channel morphology of the Trinity River. Other major floods, such as those which occurred in 1955, 1970 and 1974, also resulted in habitat damage.

6. The 1976-77 Drought

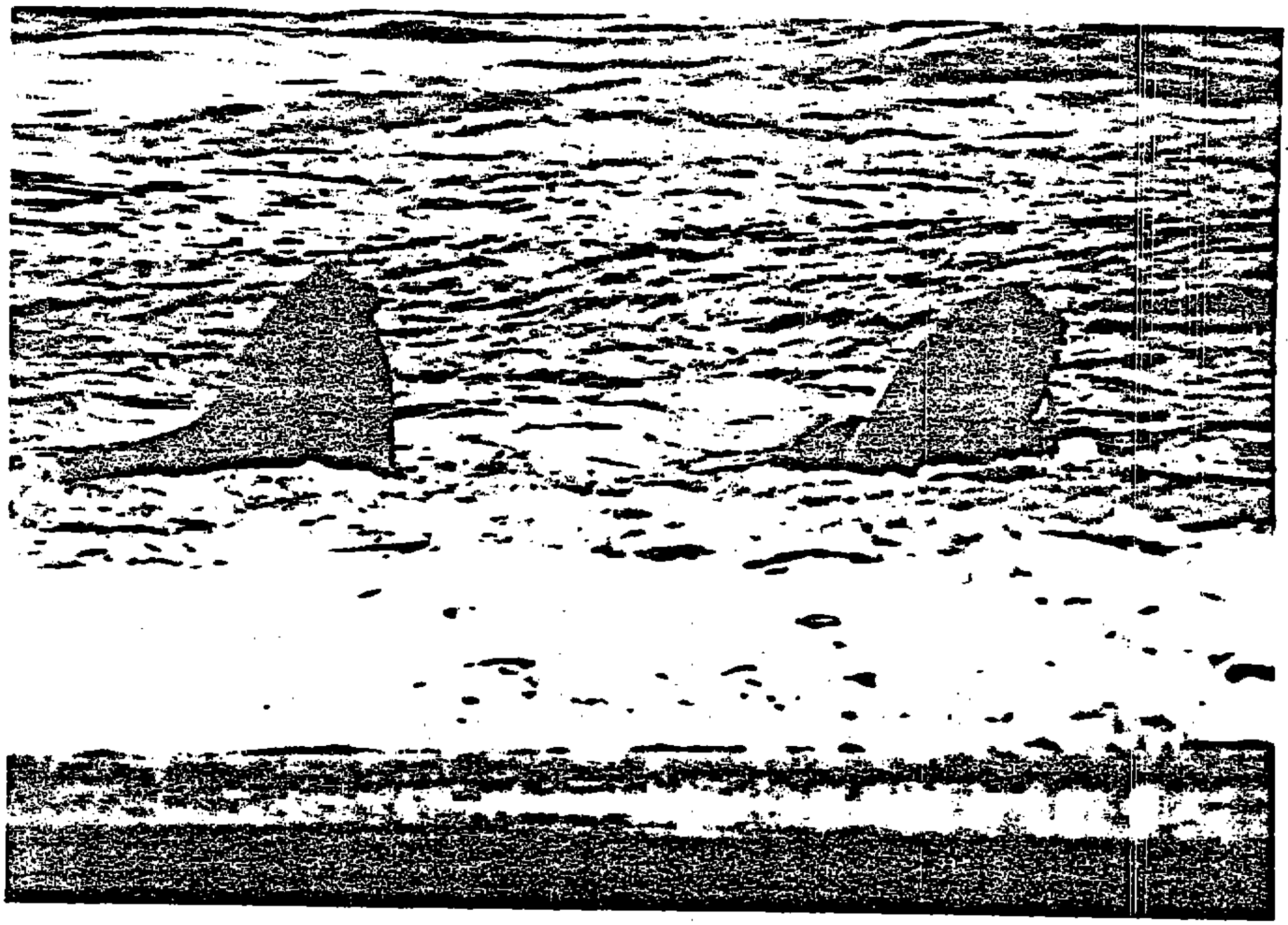
The 1976 and 1977 drought, the third driest and driest years respectively, in recorded California history, will probably affect the abundance of those year classes of salmon and steelhead and result in low runs in the years 1979-81. Flows of tributary streams were so low that fish experienced great difficulty in ascending them to spawn. Fish also experienced greater difficulty in negotiating Grays Falls and Burnt Ranch Falls on the Trinity River and many reportedly died or were snagged in these areas according to a number of fishermen and local residents.

7. Sea Lion Predation

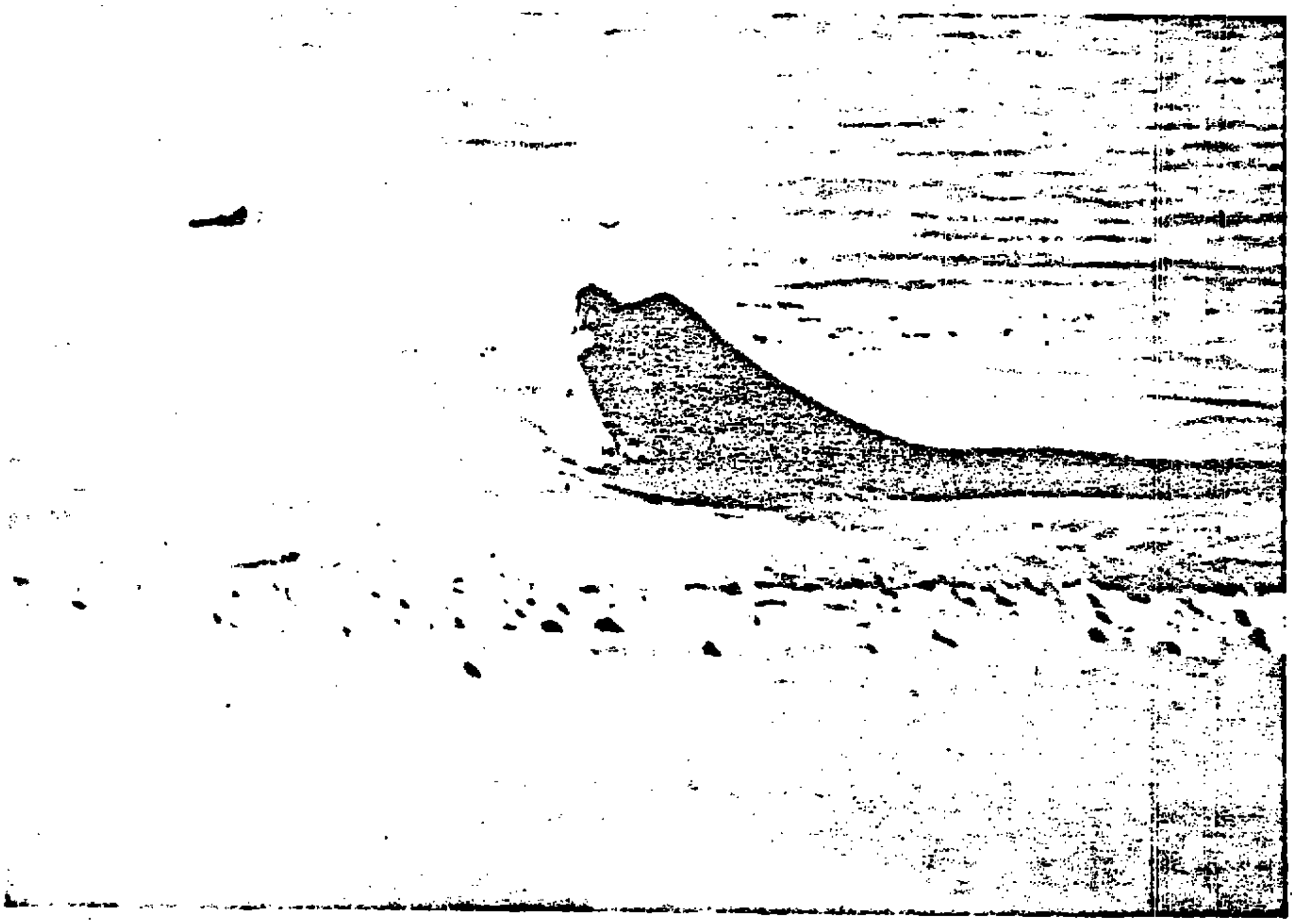
A number of graduate biology students at Humboldt State University in Arcata, California have been studying the three pinnipeds which commonly inhabit the Klamath River: the California sea lion (Zalophus californianus), Stellar's sea lion (Eumetopias jubata) and harbor seal (Phoca vitulina). During April and May, 1978, Bowlby (personal communication) observed that the great majority of fish captured by California and Stellar's sea lions near the mouth of the river consisted of lampreys (Photographs 12 and 13). During the period, September 29, to October 5, 1978, Bowlby (1978) observed harbor seal activity near the CDFG tagging site located below Highway 101 bridge and estimated that approximately 35 percent of the tagged salmonids released were eaten by these predators. Based on repeated reports by Indian net fishermen and the experiences of FWS biologists last summer, it appears that harbor seals are also effective predators on net-caught fish. Based on reports, observations and experiences to date, it appears that harbor seals and sea lions are effective predators upon net-caught and stressed salmonids but that they probably do not consume large numbers of normal, healthy salmon and steelhead.

8. Brown Trout Predation

The large resident brown trout population existing in the Trinity River below Lewiston Dam supports a popular fishery. The fish reside in that portion of the river which receives salmon and steelhead released from the Trinity River Hatchery. The nature and extent to which these trout interact with fish released from the hatchery is unknown but concern has been expressed with regard to the potential competition and predation problems. In commenting on the brown trout population in the Trinity River, CDFG (Letter Report, March 24, 1978) acknowledged the predation and competition problems and suggested that steps be taken to reduce the brown trout population or to reduce predation on hatchery reared fish through downstream hauling.



Photograph 12. Sea lions near the mouth of the Klamath River (courtesy of Ed Bowlby, Humboldt State University).



Photograph 13. Sea lion feeding on lamprey eel near the mouth of the Klamath River (courtesy of Ed Bowlby, Humboldt State University).

Fish Restocking Programs in the Klamath River Basin

Two large salmon and steelhead hatcheries are located in the Klamath River basin: the Iron Gate Hatchery at the base of Iron Gate Dam on the Klamath River and the Trinity River Hatchery at the foot of Lewiston Dam on the Trinity River. A small fish trapping facility and hatchery recently constructed on the Hoopa Valley Indian Reservation will be used to trap and restock salmon and steelhead in reservation waters (Photographs 14 and 15). The Hoopa, Yurok and Karok people are interested in large-scale hatchery development on their respective portions of the reservation.

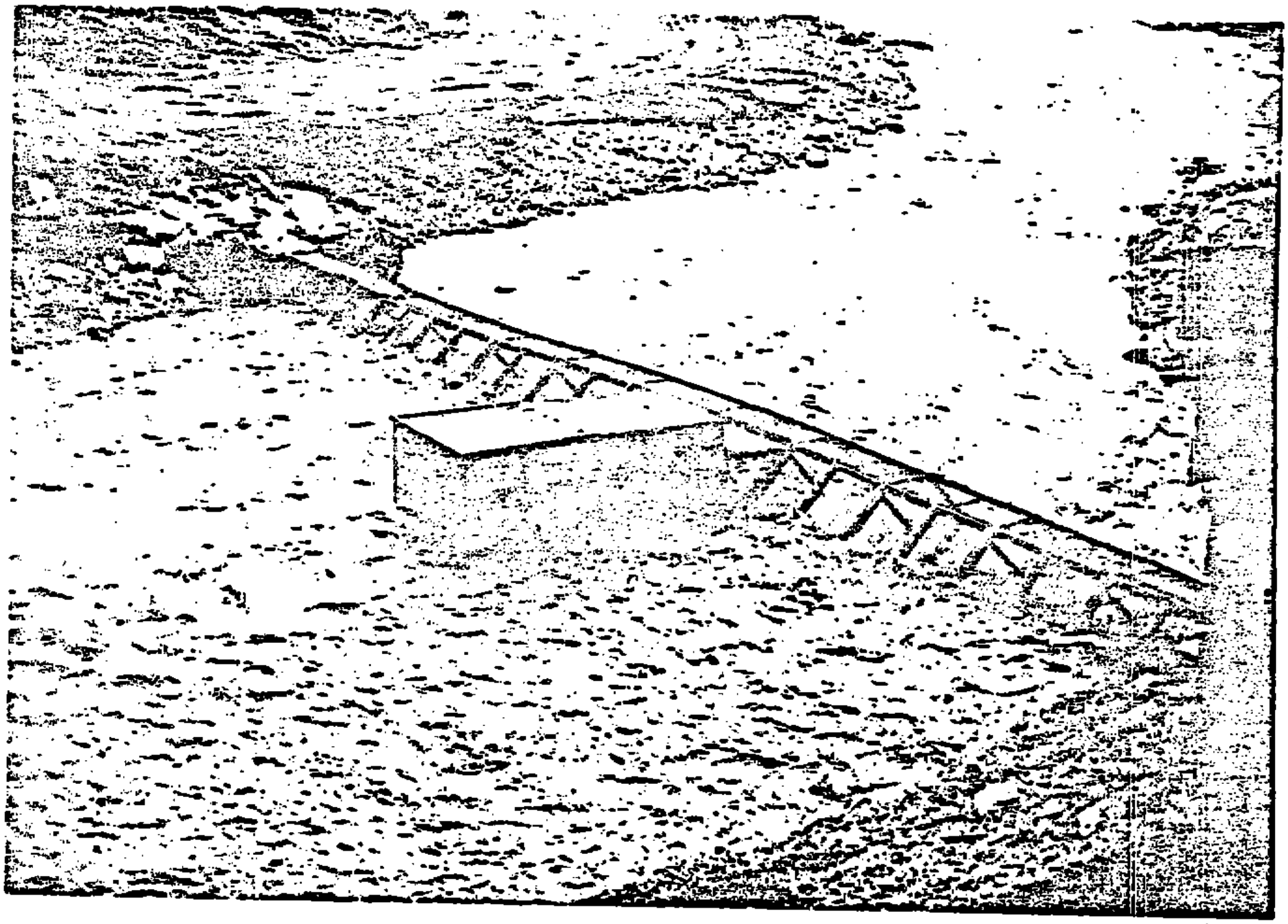
Kramer, Chin and Mayo, Inc. (1977) listed past fish and fish egg importations to the Klamath River basin. In recommending a future production program for Trinity River Hatchery, they stated that stock importation may be desirable in the case of Trinity River steelhead and coho salmon to hasten the run rebuilding program. Kerstetter and Keeler (1976) reported that steelhead trout in the Trinity River Hatchery exhibited an asynchronous smolting pattern and had reduced levels of gill ATPase as compared to the wild Trinity River strain. Previously described studies on Manzanita Creek indicate that considerable numbers of fish of hatchery origin wander into tributary streams where they could spawn with wild fish. The continued importation of fish from outside the Klamath River system should be viewed with caution in light of the potential impacts upon the genetic integrity of wild stocks and their poor performance compared to the native stocks.

Ongoing Fisheries Enhancement Programs

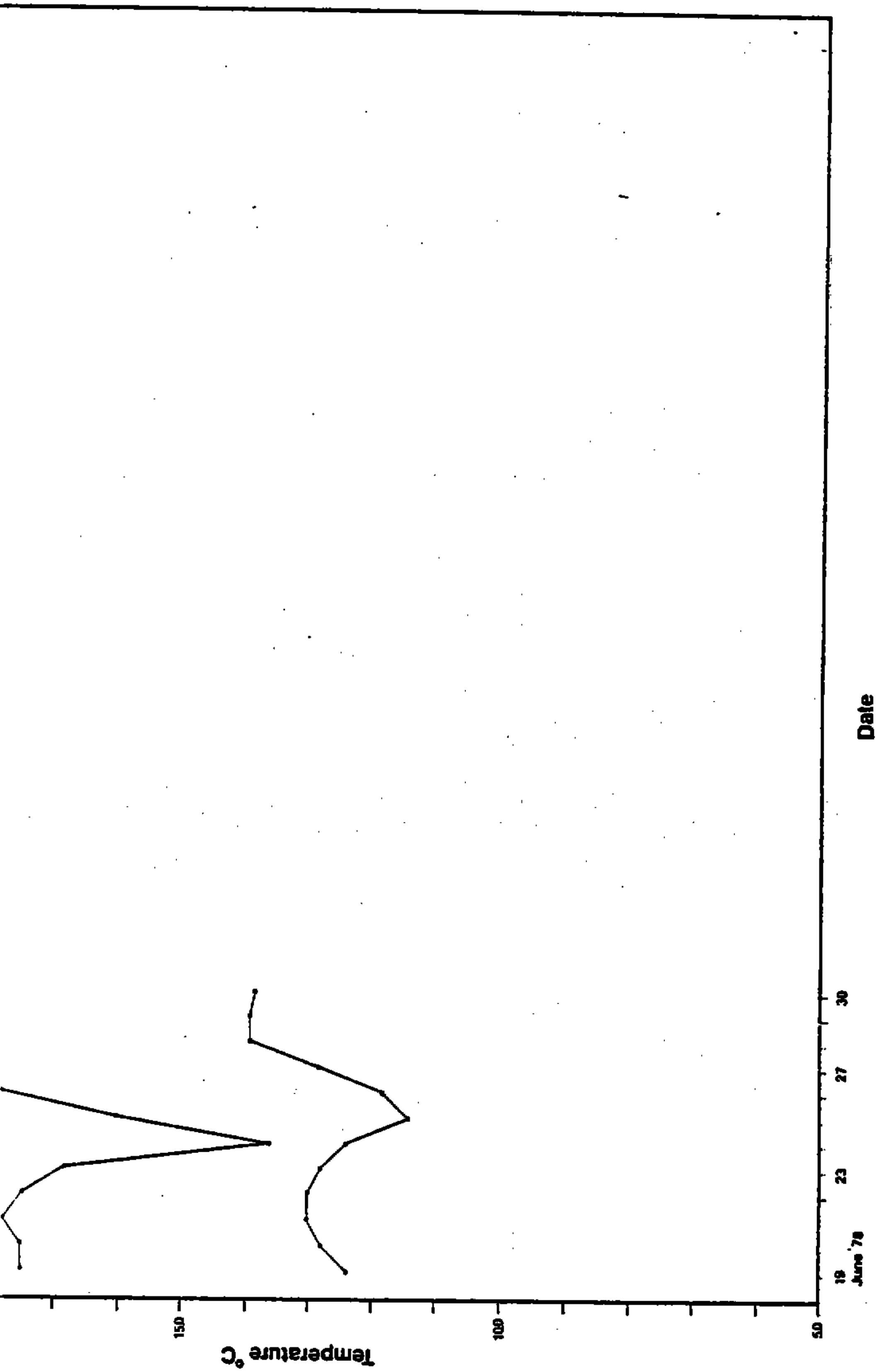
Ongoing fisheries enhancement activities have been conducted through the Trinity River Basin Fish and Wildlife Task Force (TRBFWTF) and in conjunction with the program carried out by the California Department of Fish and Game. The TRBFWTF, which was expanded and reorganized in 1974 to resolve fish and wildlife problems in the basin, initiated an Interim Action Program in 1976 to define problems and develop methodologies to resolve them. The Task Force consists of three levels, each composed of representatives from eleven federal, state and local agencies or entities: U.S. Bureau of Reclamation, U.S. Soil Conservation Service, U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, U.S. Bureau of Indian Affairs, Hoopa Valley Business Council, California Department of Fish and Game, California Department of Water Resources, Trinity County and Humboldt County.

The goals of the Trinity River Task Force include definition and correction of fish and wildlife resource declines in the Trinity River basin attributable to the Trinity River Division of the Central Valley Project and other non-project related causes. Specific objectives include development and implementation of concerted programs of investigations and actions to define and correct population declines involving wildlife and anadromous fish, identification of important fish and wildlife habitat including formulation of recommendations and guidelines for their protection and conservation, and enhancement of the resource management capabilities of agencies operating in the Trinity River basin by providing management guidelines for the long-range protection and conservation of fish and wildlife resources.

Objectives involved in the program designed to define and correct anadromous fishery declines in the Trinity River system include (1) identification and control of factors contributing to the destruction of fish habitat throughout the



Photograph 14. The fish trapping facility constructed by the Hoopa Valley Tribe on Supply Creek in 1977.



Hoopa Valley

basin, (2) restoration of spawning habitat between Lewiston Dam and the North Fork-Trinity River, (3) development of new fish habitat as possible, (4) identification of water temperatures, water quality and flows required to support a healthy and stable anadromous fishery in the Trinity River with formulation of appropriate recommendations, (5) evaluation and improvement of the Trinity River Hatchery as necessary and (6) identification and implementation of remedial fishery management measures as needed.

A program designed to identify causes of salmon and steelhead declines in the Trinity River basin and develop recommendations for remedying these causes (Hubbell, 1973), submitted by the California Department of Fish and Game to the Task Force in 1973, contains four major study segments: (1) an adult harvest and escapement study attempting to describe salmon and steelhead runs in the basin, determine contributions of Trinity River fish to the various fisheries and monitor adult populations to evaluate the Trinity Hatchery program and habitat management techniques, (2) juvenile life history and emigration studies attempting to determine life history parameters of juvenile salmon and steelhead and assess relationships between these parameters and various environmental variables, (3) a hatchery evaluation program and (4) a habitat study.

Other projects comprising the Trinity River Action Program which pertain to anadromous fisheries enhancement include: (1) the restocking program conducted by the U.S. Fish and Wildlife Service on the Hoopa Valley Indian Reservation, (2) erosion control and sediment removal operations on Grass Valley Creek by the U.S. Soil Conservation Service and California Department of Water Resources, respectively, (3) pool and riffle restoration of the upper Trinity River by the U.S. Bureau of Reclamation, (4) erosion control of the South Fork-Trinity River by the California Department of Water Resources, (5) sediment transport studies in the Trinity River by the California Department of Water Resources, (6) Trinity Hatchery evaluation by the U.S. Fish and Wildlife Service, (7) water quality control investigations at Trinity and Lewiston Reservoirs, (8) a barrier removal program on streams tributary to the Trinity River by the U.S. Forest Service, (9) restoration of Indian and Reading Creeks by the U.S. Bureau of Land Management, (10) cooperative studies involving assessing instream flow needs in the Trinity River and (11) an evaluation of riparian vegetation encroachment in the Trinity River by the U.S. Forest Service.

STREAM INVENTORY

HOOPA VALLEY INDIAN RESERVATION

INTRODUCTION

The field inventory of reservation waters consisted of an assessment of the status of natural tributary-spawning stocks of salmon and steelhead and a fish habitat evaluation, including surveys of fish migration obstacles and unscreened water diversions. A GS/9 Fishery Biologist and three temporary biological technicians were hired to conduct field investigations, create a river mile index and develop a number of computer programs to store and retrieve data collected. The study was funded at $42,000 in 1977 and 1978. Major equipment purchased included a jet boat and motor, 35 mm camera and two backpack electrofishing units.

The stream inventory was conducted in light of reported large declines of salmon and steelhead trout runs in recent decades to assess the current status of tributary-spawning stocks and fish habitat and to recommend measures to prevent further decimation of fish stocks. Many on-reservation streams which supported spawning populations in the past now contain few anadromous fish and the situation seems to be getting worse each year. Whatever native gene pools still exist should be inherently more adapted to prevailing environmental conditions and should exhibit higher survival than stocks of hatchery origin. Natural tributary-spawning stocks should be protected through habitat expansion and improvement measures with the intent of maximizing production from reservation waters.

The nature and extent of available fish habitat had not been previously assessed on the entire reservation and little information was available on locations and potential impacts of fish migration obstacles and unscreened water diversions on salmonid populations. Through the inventory, obstacles and diversions were ranked according to their relative impact so that barrier removal and diversion screening programs could be initiated. To hasten the run-rebuilding process, streams should be reseeded in conjunction with habitat improvement measures.

METHODS

Spawning Ground Surveys

As part of the evaluation of salmonid usage of reservation waters, spawning ground surveys were conducted to observe adult salmon and steelhead as they migrated and spawned in the tributaries. These surveys, within certain limitations, can be used for quantifying the populations of salmonids in an area, but are primarily useful for determining suitable and accessible areas of successful reproduction. Similar surveys have been conducted throughout the Pacific Northwest from California to Alaska. They are necessarily subjective, being influenced by water visibility, weather conditions, stream size and observer experience, among other factors.

The method of conducting the survey is fairly straightforward and involves walking a tributary, normally in an upstream direction, and watching for adult fish. After some experience. most fish could be identified to species by their coloration. size and behavior and by considering the time of year and run timing. Chinook salmon are relatively large, often dark brown when seen from above, and will hold, when spawning, on or very near the spawning redds. Coho salmon are smaller, reddish with a dark head, and are more elusive, hiding under cut banks or in deep holes rather than staying on spawning grounds. Steelhead are similar in size to coho salmon, are steely gray or silver, and are very rarely seen on the spawning grounds since they spawn late in the year during high water and are very elusive. Polarized glasses were worn to minimize glare and facilitate seeing fish underwater. All carcasses observed were examined for tags, marks or unusual characteristics. All pertinent data were recorded and later entered on a computer storage program.

In the initial stages of the survey, all tributaries were assumed to be capable of supporting any species since little was known about the likelihood of encountering a particular species. The schedule was adjusted during the season according to stream conditions and as knowledge of particular tributaries and species utilization was acquired.

Electrofishing

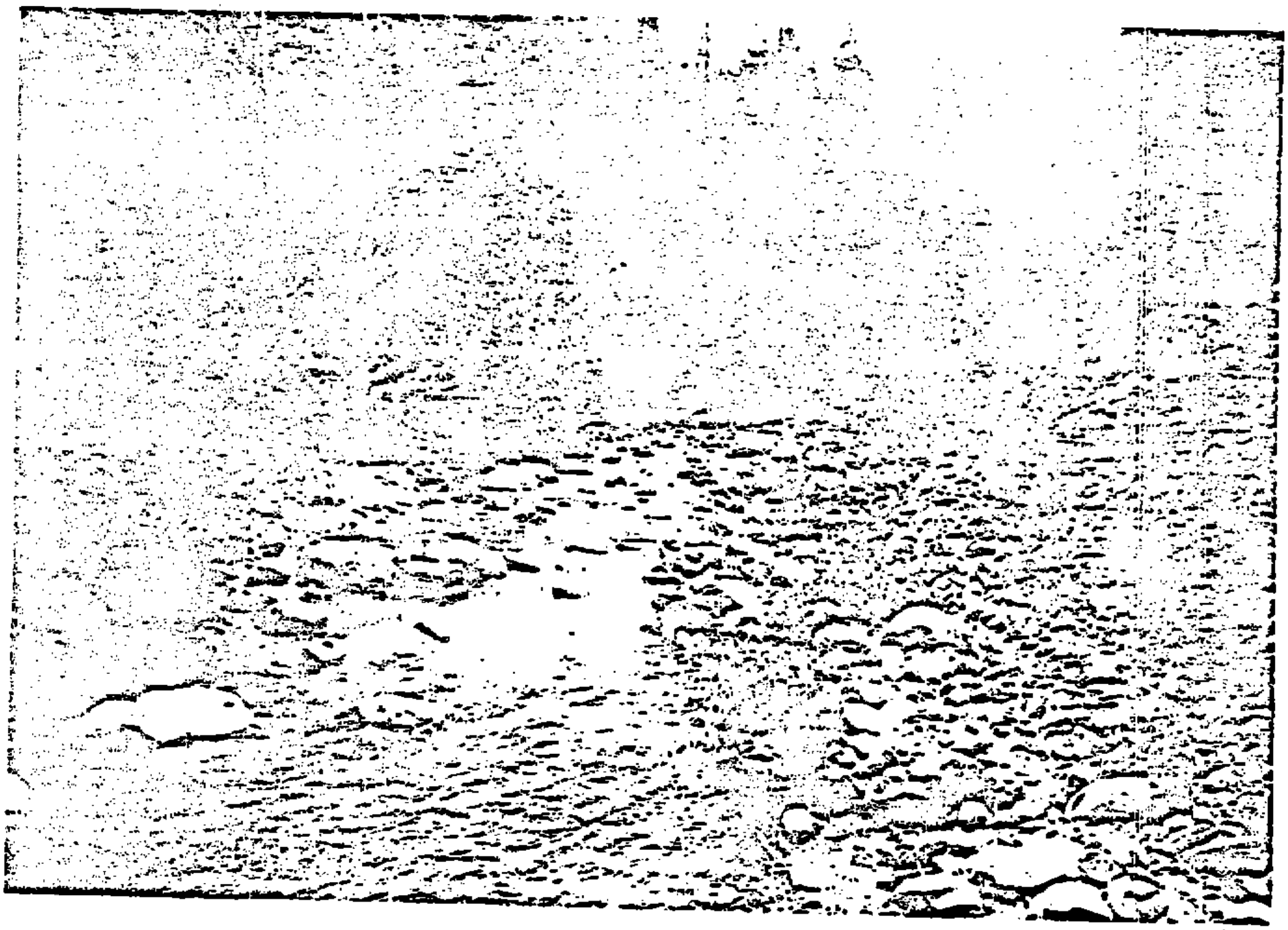
During the spring and early summer months most streams on the reservation considered usable by anadromous salmonids were electrofished to capture young-of-the-year fish. Electrofishing was conducted with a Coffelt BP-2 backpack battery-powered shocker. Electrofishing crews consisted of three persons, one operating the shocker, one holding a small downstream block net and one carrying a dip net and live-bucket for captured specimens. All fish were identified, measured to the nearest centimeter and released near where they were taken. Areas sampled were chosen on the basis of appearing representative of the stream but unusual or outstanding areas were also checked. Sampling was continued until either a significant number of fish had been captured or a considerable length of stream had been covered.

Stream Habitat Inventory

The primary objective of the stream habitat inventory was to determine the suitability of reservation waters to support the production of anadromous and resident salmonids. Data collection procedures were geared to the physical requirements of these species, including water flow, stream size, gravel size, gradient and accessibility, and were patterned after methodologies described in Flood, et al (1977), Herrington and Dunham (1967), and Platts (1974).

Each significant tributary flowing through the reservation (Photograph 16) was divided into quarter-mile transect segments based on the latest available U.S. Geological Survey (USGS) maps. Every transect station, road crossing, barrier, diversion, or other significant feature of each tributary surveyed was photographed with a Nikon FM 35mm camera using Kodachrome 64 film and a 28mm lens and filed for reference. Locations of all sites photographed were obtained from the USGS maps using a 1/32" map wheel and an updated river mile index for all tributaries. Each named tributary was also assigned a code number for computer coding and reference.

The locations of all barriers and diversions are identified on the computer summaries, along with height, type, passability, screening information, and amount of water diverted. Priorities were also assigned with regard to correcting barrier and diversion problems on the basis of amount of habitat lost,



Photograph 16. Bear Creek is typical of many tributary streams flowing through the Hoopa Valley Indian Reservation.

amount of flow diverted, and overall impact on salmonid production.

Computer Storage and Retrieval Program

Computer tape files were created to store and retrieve inventory information on native fish stock abundance, stream habitat conditions, and barriers and water diversions affecting anadromous fish in streams of the Hoopa Valley Indian Reservation. Four inventory files have been designed, constructed and implemented for use at Humboldt State University Computer Center in Arcata, California. All processing is conducted on a CDC 3150 computer.

Field survey information corresponding to each inventory file collected by field personnel was transformed to specially designed coding forms (Appendix 1). Data was keypunched onto cards and transferred to magnetic tape for computer storage and retrieval. All inventory tape files are maintained, updated and corrected with tape management software available at the Humboldt State Computer Center. Tape files have a three generation back-up, making recovery of human and computer errors simple and efficient.

Inventory tape files are accessed for data retrieval by specially designed programs written in FORTRAN and COBOL. These programs are capable of listing, in report-form, a complete inventory file or selected parts of an inventory file based on key-selecting characteristics.

Currently, four inventory tape files are available at the Humboldt State Computer Center; 1) the Spawning Ground Survey - Salmonid Habitat File, 2) the Stream Habitat File, 3) the Barrier-Diversion File and 4) the Stream Code File. The Spawning Ground Survey-Salmonid Habitat Inventory File was modified from a file developed by the Washington State Department of Fisheries to include stream name, stream code, date, river mile, species of fish, live count, dead count, redd count, survey methods, water condition, water temperature, viewing conditions, weather conditions, comments, agency codes, spawning ground survey results and electrofishing survey results. A detailed description of spawning ground survey data entered onto inventory records is included in Appendix 2.

The Stream Habitat Inventory File was designed for the storage of stream survey information used in evaluating the number of river miles of suitable rearing and spawning habitat in streams within the Klamath River system. Each inventory record contains information regarding stream name, date, river mile, channel width, flow, pool-riffle composition and quality, sediment composition, vegetative cover, bank stability and stream gradient. A more complete description of stream survey data entered onto inventory records can be found in Appendix 2.

The Stream Code Inventory File contains a complete list of streams and tributaries flowing through reservation land (Appendix 3). This file can readily be expanded to cover the entire Klamath River drainage and other river systems. Streams are categorized by a river basin code, stream code and stream name (Appendix 2). This inventory file is used in conjunction with other inventory files for labeling stream names on reports.

Two data retrieval programs have been written to access information on the four inventory tape files. The "Program Salmon" was modified from a program prepared by the Washington State Department of Fisheries to accomodate the needs of this project and the limitations of the computer system used to process information. The program was converted and modified to run in ANSI COBOL on a CDC 3150 computer. Information from the Spawning Ground Survey-Salmon Habitat Inventory File and the Stream Code Inventory File was accessed by Program Salmon. Survey data was selected and outputted for the designated time period and the type of fish desired. Up to four species of fish may be selected by any life history phase, fry to adult. More complete documentation for Program Salmon and sample output is found in Appendix 4.

The "Program Stream" was designed to extract information from the Stream Habitat Inventory File and the Barrier-Diversion Inventory File. The program was written in ANSI FORTRAN to run on a CDC 3150 computer. Inventory data may be retrieved and outputted in two forms based on the option chosen by the user. Option 1 outputs a list of barriers and diversions inventoried and includes data concerning river mile of obstacle, type of obstacle, a code relating ease of passage and a removal priority code. Option 2 outputs all information available for both inventory files in ascending order by river mile. The user may select one or more streams to be searched and listed. More complete documentation on "Program Stream" and sample output may be found in Appendix 4.

Another tape file has just been developed to record data on barriers and diversions which have been or will be removed or corrected. The file contains all information found on the Barrier-Diversion Inventory Records along with the date the barrier or diversion was corrected, the number of river miles opened to anadromous fish after the correction, the agencies involved in making the correction, the methods used to make the correction and the estimated amount of effort expended (man-days) in making the correction.

The Computer Storage and Retrieval Program is currently limited to on-reservation tributaries but can be expanded to cover the entire Klamath River System. It is suggested that related information collected by other agencies working in the basin be incorporated into this program so that a centralized basin-wide program can be developed.

RESULTS

Detailed computer printouts containing results of fish population surveys (spawning ground and electrofishing) on respective streams, conducted in accord with "Program Salmon", appear in Appendix 5. Detailed computer printouts containing results of stream surveys (including habitat surveys and an accounting of fish migration barriers and unscreened water diversions), conducted in conjunction with "Program Stream", appear in Appendix 6. Appendix 7 contains computer printouts for migration barriers and water diversions removed or corrected. Appendix 8 contains a set of maps of reservation streams which detail stream miles at one-half mile intervals and access roads.

Twenty-nine streams flowing through the Hoopa Valley Indian Reservation were judged important enough as potential anadromous salmonid producers to warrant habitat surveys, fish population surveys and descriptive narratives. Fish population surveys were conducted on other streams as well. The 29 streams are enumerated below (beginning at the lower end and proceeding to the upper end of the reservation) followed by the descriptive narratives and a general summary.

1. Salt Cr.
2. Hunter Cr.
3. Mynot Cr.
4. Richardson Cr.
5. Terwer Cr.
6. McGarvey Cr.
7. Tarup Cr.
8. Omagar Cr.
9. Blue Cr.
10. Ah Pah Cr.
11. N. Fk. Ah Pah Cr.
12. Bear Cr.
13. Surpur Cr.
14. Tectah Cr.
15. Johnson Cr.
16. Pecwan Cr.
17. Mettah Cr.
18. Roach Cr.
19. Morek Cr.
20. Tully Cr.
21. Pine Cr.
22. Little Pine Cr.
23. Soctish Cr.
24. Mill Cr.
25. Hostler Cr.
26. Supply Cr.
27. Hospital Cr.
28. Campbell Cr.
29. Tish-Tang-a-Tang Cr.

SALT CREEK 01-0002

Habitat Description

Salt Creek drains 4.4 square miles and enters the Klamath River at river mile 1.1 within the tidal influences of the ocean and the Klamath estuary. The stream was surveyed on July 6, 1978. Tidal effects and shallow stream gradient have formed a deep, extensive slough that reaches a quarter-mile upstream and changes width and depth with tidal cycles. Above the slough, the stream flows through flat agricultural land confined to a well-defined channel covered with dense riparian vegetation. Streambanks are soil and clay and are very unstable. Livestock graze nearby, trampling streambanks and walking through the creek. From stream mile 0.65 to 1.00, the stream takes on the appearance of a swamp with stagnant, tea-colored water laden with sand, silt and debris and replete with mosquito larvae. Beavers which utilize this area have backed up the stream into pools with a barely perceptible flow.

An unscreened diversion pipe is located at stream mile 0.65 but no noticeable flow was being diverted. No log jams or barriers other than low beaver dams were observed.

Salmonid Utilization

Electrofishing surveys conducted on April 7, and May 25, 1978, yielded only four salmonids: two rainbow/steelhead and two cutthroat trout. Large numbers of prickly sculpin were collected along with some sticklebacks, speckled dace and suckers.

General Appraisal and Recommendations

Salt Creek is generally unsuitable for use by anadromous salmonids due to its silty substrate, organic debris and overall swampy characteristics.

HUNTER CREEK 01-0005

Habitat Description

Hunter Creek is a relatively large tributary to the lower Klamath River, draining 23.8 square miles and entering the Klamath River at river mile 1.1 within the tidal influence of the Klamath River estuary. The stream was surveyed on June 21, 1978. The lower portion of the stream flows across the Klamath River floodplain and has a very low gradient and high sand-silt content. Above the Highway 101 bridge, the stream winds through a wide valley and runs underground for most of the summer but contains good spawning gravels accessible during the winter and spring. The headwaters of Hunter Creek are presently being logged and their condition is unknown. A small obstacle exists just below Highway 101 at stream mile 0.80 that appears to be passable. Beaver activity in the area could possibly make the obstacle impassable in the future if it is not removed.

Salmonid Utilization

Spawning ground surveys conducted on November 29, 1977 and on October 13, November 24, and December 2, 1978 resulted in the sighting of five chinook salmon adults. Electrofishing surveys conducted on April 7, and May 25, 1978, turned up some rainbow/steelhead and cutthroat trout.

General Appraisal and Recommendations

Hunter Creek, considering the size of the drainage, could be a good producer of chinook salmon and other species. The gravels in the valley area have a relatively high percentage of silt which may reduce spawning success, but the overall habitat appears to be adequate. The headwaters area should be surveyed for accessibility and habitat quality and the barrier at stream mile 0.80 should be removed.

MYNOT CREEK 01-0007

Habitat Description

Mynot Creek is an intermittent tributary to lower Hunter Creek, joining with the principal tributary stream at stream mile 0.58 and draining 4.9 square miles of watershed. The lower mile of Mynot Creek was surveyed on June 21, 1978. The lower one-half mile of the creek is primarily riffles and shallow pools with a considerable amount of spawning gravel and dense, overhanging vegetation. Bank stability is moderate and the stream has a shallow gradient of about 1.5 percent. Above stream mile 0.50 the stream habitat changes to more deep, sheltered pools and undercut streambanks but retains the shallow gradient. This section of the stream has few good spawning areas because the streambed consists of rubble and gravel containing significant amounts of sand, silt and clay packed between rock interstices. Mynot Creek flows underground for a considerable distance during the summer months. No water diversions or barriers (other than a poorly constructed highway bridge at stream mile 0.25) exist on the surveyed portion of the stream but a number of log jams reportedly occur higher in the drainage.

Salmonid Utilization

According to local residents, Mynot Creek supported runs of salmon, steelhead and cutthroat trout as late as 1969. During electrofishing surveys conducted on April 7, and May 25, 1978, only rainbow/steelhead trout were captured including one smolt. Numerous prickly sculpins were also taken.

General Appraisal and Recommendations

Mynot Creek has the potential for producing some steelhead and cutthroat trout and possibly some chinook or coho. Production would be enhanced if the upper watershed is stabilized and the stream is allowed to rehabilitate by flushing out its spawning gravels.

RICHARDSON CREEK 01-0022

Habitat Description

Richardson Creek was surveyed on July 6, 1978. It drains 1.8 square miles of the headland bluffs within Redwood National Park and enters the Klamath River at river mile 2.8. The major feature of the creek is an artificial pond created by an earthen dam near the mouth. The pond is shallow, overgrown with aquatic vegetation and provides habitat for many pond-dwelling animals and plants. The outlet from the pond is narrow, choked with debris for a quarter-mile and flows under a roadway through a culvert which is several feet above the Klamath River at low water and covered at high water.

Upper Richardson Creek is composed mainly of small gravels and sand-silt and is heavily overgrown with alder and brush. Very few pools or resting areas are present even though the creek has a moderate gradient.

Salmonid Utilization

Electrofishing surveys of Richardson Creek conducted on May 4, and May 25, 1978, found mostly cutthroat trout and only a single example each of rainbow/steelhead and chinook salmon. The stream appears to be utilized by cutthroat trout to a considerable extent.

General Appraisal and Recommendations

The potential of Richardson Creek to produce salmon and steelhead is limited by its small size, the condition of the spawning gravels, the culvert at the mouth, the debris in the stream and the presence of the impoundment. It is recommended that the culvert be modified to permit better fish passage.

TERWER (TURWAR) CREEK 01-0031

Habitat Description

Terwer Creek is one of the larger tributaries to the lower Klamath River draining 32.8 square miles and entering the river at river mile 5.3. A habitat survey of the stream was conducted on June 14, 1978. The lower mile of the creek is mostly flood plain composed of wide gravel bars and a few deep pools. The stream has a shallow gradient and little streamside cover. Gravel removal operations are very active in this area resulting in the removal of large quantities of rock during the summer when the stream flows underground. The streambed is highly porous and even though the summer flow is substantial in the middle sections of the creek, the lower section goes dry for a considerable distance. Upper Terwer Creek is reportedly still in an unlogged condition but the area has been involved in a land exchange for the Redwood National Park and can be expected to be clearcut in the near future. There are presently no barriers or significant water diversions in the lower 4.75 miles of the creek.

Salmonid Utilization

Spawning ground surveys conducted on November 29, 1977 and December 2, 1978 and spot surveys conducted on December 6, 1977 and November 30, 1978 resulted in the sighting of only one chinook salmon adult. Electrofishing surveys conducted on March 13, April 20, and May 11, 1978 resulted in the capture of numerous young-of-the-year chinook salmon. On one occasion, over 650 chinook salmon smolts were found in a backwater area which had been isolated from the stream. The smolts were electrofished and returned to the stream. Even though our spawning ground surveys resulted in the sighting of one adult, it appears that chinook salmon utilize Terwer Creek to a considerable extent. Coho salmon and rainbow/steelhead trout were also captured in the stream.

General Appraisal and Recommendations

Terwer Creek appears to be one of the streams on the reservation least impacted by logging activities, primarily due to the lack of clearcutting in the upper watershed. There is not much debris in the creek and the gravel areas are not high in sand-silt content. Gravel removal operations and channelization activities should be more closely monitored. Terwer Creek has the potential of supporting a good chinook salmon run if habitat quality can be maintained.

McGARVEY CREEK 01-0049

Habitat Description

McGarvey Creek has a small drainage (8.6 square miles) and enters the Klamath River near Klamath Glen (river mile 6.6). Like several other small drainages in the area, the McGarvey Creek watershed has been clearcut extensively and large amounts of silt and slash occur in the streambed. Our habitat survey is incomplete because it proved almost impossible to negotiate the stream in its lower sections. The first quarter-mile of the creek is backwater slough that cannot be walked or floated. This is followed by a stretch of very dense underbrush and log jams. A short section of McGarvey Creek between stream mile 1.00 and 1.25 is negotiable - the bottom is mostly small gravels with a high percentage of sand and silt.

Salmonid Utilization

Despite the poor habitat conditions in McGarvey Creek, electrofishing surveys conducted on May 4, and May 25, 1978 turned up a number of chinook salmon, rainbow/steelhead and cutthroat trout juveniles. Only one small accessible stretch of McGarvey Creek, located between stream mile 0.46 and 0.49, was sampled.

General Appraisal and Recommendations

McGarvey Creek has little potential as an anadromous salmonid production stream. The creek needs considerable stream clearance work done to restore it to a semblance of a productive stream. Logging in the watershed has severely impacted stream quality by adding slash and debris and by removing mature overstory and allowing dense underbrush growth.

TARUP CREEK 01-0053

Habitat Description

Tarup Creek, a small tributary of the Klamath River entering at river mile 7.8, was surveyed on June 13, 1978. The stream has a drainage area of 4.9 square miles. Most of Tarup Creek drainage has been clearcut and cat logged resulting in a stream choked with debris in numerous areas. Because of the stream's low gradient and a scarcity of boulders, fish migration barriers are not present in the lower two-mile stretch. Above stream mile 2.3, however, several impassable obstacles were found. Stream substrate consists primarily of gravel with considerable amounts of sand and silt. The lower mile stretch of the creek flows underground every summer and the upper areas are devoid of vegetation.

Salmonid Utilization

Despite poor habitat conditions existing in Tarup Creek, electrofishing surveys conducted on March 29, and May 12, 1978 revealed the presence of chinook salmon, cutthroat trout and rainbow/steelhead juveniles. It is likely that salmon spawning occurred shortly after the first large rainfalls which rendered the stream accessible to spawners.

General Appraisal and Recommendations

The lower section of Tarup Creek should be cleared of debris to prevent barrier formation and to insure access for the existing run of chinook salmon. Few chinook salmon utilize lower tributaries for spawning but those which do may constitute native gene pools which deserve protection. Clearing of the entire drainage and planting alder or other cover in the upper areas could improve the productivity of Tarup Creek for all salmonids.

OMAGAR CREEK 01-0060

Habitat Description

Omagar Creek is a small tributary draining 2.5 square miles and entering the Klamath River at river mile 10.5. The lower one-half mile of the creek flows across a wide gravel bar but drys up in the early summer. Between the gravel bar and headwaters regions, the stream has been devastated by clear cutting and roadbuilding. Sixteen log jams, ten of which are impassable, occur in the lower two miles of stream and sand-silt levels are very high. Vegetation has recovered somewhat since most of the logging occurred but hillside erosion and debris will be a problem for many years.

Salmonid Utilization

An electrofishing survey conducted on Omagar Creek on April 28, 1978, turned up chinook salmon young-of-the-year and rainbow/steelhead juveniles. The rainbow/steelhead were large and no young-of-the-year were found indicating that the fish were native rainbow and not steelhead.

General Appraisal and Recommendation

Omagar Creek has very limited potential as an anadromous salmonid production stream. The fact that this stream contains chinook salmon, however, does show that even very small streams can contribute to overall production even when those streams have been severely degraded. It is recommended that all barriers and debris be removed from the stream.

BLUE CREEK 01-0069

Habitat Description

Blue Creek is the largest tributary flowing through the Hoopa Valley Reservation, draining 127.1 square miles and entering the Klamath River at river mile 16.4. The creek has long been known for its clean water and large numbers of spawning fish, but clearcutting and road building in the watershed are contributing to its rapid deterioration. Blue Creek was surveyed on October 12, 1977.

Most of lower Blue Creek is composed of gravel bars which shift with each high water and a few deep holes near rocky bluffs. High flows and a large amount of gravel transport have prevented any stable growth of brush or alders along the banks. There are no barriers or diversions in the lower 10 miles of the stream.

Salmonid Utilization

Numerous spawning ground surveys conducted on Blue Creek in 1977 and 1978 revealed the presence of considerable numbers of chinook salmon adults as well as steelhead adults and "half-pounders". The annual run of chinook salmon in Blue Creek may approximate 500 fish which is probably considerably less than runs of former years but probably considerably more than runs existing in other tributary streams flowing through the reservation.

Electrofishing surveys conducted on Blue Creek on March 17, April 28, and May 24, 1978 turned up several chinook salmon and rainbow/steelhead juveniles. Two juvenile cutthroat trout were also captured.

General Appraisal and Recommendations

Blue Creek has the greatest potential to support anadromous fish of any tributary on the reservation. Logging guidelines should be strictly followed to prevent any further degradation such as that which occurred on the West Fork of Blue Creek. The entire drainage should be surveyed for habitat suitability and existing or potential barriers.

AH PAH CREEK 01-0164

Habitat Description

Ah Pah Creek drains 16.3 square miles and enters the Klamath River at river mile 17.2. The stream was surveyed on October 27, 1977. The lower two miles of the creek is characterized by a low gradient, few deep pools, no boulders and numerous riffles with moderate sand-silt content. Logging operations have removed much of the overstory and left large amounts of slash in the stream which have formed several log jams.

Salmonid Utilization

Spawning ground surveys conducted on Ah Pah Creek on October 27, and December 1, 1977, and on November 30, 1978, revealed no adult salmon. Electrofishing surveys were conducted on January 27, March 13, April 20, and May 12, 1978. Numerous coho salmon, in various stages of development, were captured from Ah Pah Creek, possibly a result of previous stocking by the California Department of Fish and Game. During the January survey, numerous "half-pounder" steelhead trout were also captured.

General Appraisal and Recommendations

The Ah Pah drainage has been detrimentally affected by poor logging practices and will not fully recover for many years. Log jams should be removed and future logging operations should be managed so as to reduce habitat degradation.

NORTH FORK AH PAH CREEK 01-0165

Habitat Description

North Fork Ah Pah Creek drains 6.9 square miles and enters Ah Pah Creek near the mouth at stream mile 0.30. The stream was surveyed on June 7, 1978. The lower three-quarters mile of the creek is relatively flat with a high percentage of gravel and rubble. Remnants of an old slide at stream mile 0.70 have stopped several large logs and formed a series of cascades that appears to be impassable. Immediately above the cascades is a large log jam that stops all migration to good spawning and rearing habitat located near the headwaters. The North Fork flows underground in its lower sections for much of the summer months.

Salmonid Utilization

Small numbers of coho salmon and rainbow/steelhead trout were captured during an electrofishing survey on May 4, 1978.

General Appraisal and Recommendations

The North Fork of Ah Pah Creek could support limited numbers of salmon and steelhead, but like Ah Pah Creek and many other streams on the reservation, it is much underutilized at this time. Removal of the barriers at stream miles 0.7, 0.8 and 1.1 would open up a considerable amount of habitat.

BEAR CREEK 01-0178

Habitat Description

Bear Creek drains 19.3 square miles of watershed and enters the Klamath River at river mile 18.6. It is similar to other relatively large lower river tributaries in that gravel is very abundant in lower stream sections which remain dry during summer months. The stream was surveyed on June 19, 1978. The lower stream mile of Bear Creek contained abundant spawning gravels but few deep pools. Gradient increased along the second stream mile and deep pools were more numerous. Good spawning gravels were also common. The third stream mile was characterized by large boulders, deep pools, suitable spawning gravels and log jams.

Bear Creek contains 13 log jams ranging in height to 20-feet between stream miles 1.90 and 2.95, only three of which were judged passable. A 20-foot rock cascade falls at stream mile 3.00 forms a natural barrier to fish migration. A large landslide is present at stream mile 2.92 and the creek courses around this obstacle. The watershed has been logged extensively in the past and the majority of log jams and debris in the stream have undoubtedly resulted from felled timber.

Salmonid Utilization

During electrofishing surveys of Bear Creek on March 29, and May 5, 1978, several rainbow/steelhead trout and one cutthroat trout were collected. Interestingly, three "half-pounder" steelhead, ranging in length from 30cm to 36cm, were also collected on March 29, 1978. No fish were observed during a spawning ground survey on December 4, 1978.

General Appraisal and Recommendations

The lower three miles of Bear Creek provides excellent habitat for anadromous salmonids. It would be desirable to remove the log jams and debris from the stream to increase its utility.

SURPUR CREEK 01-0186

Habitat Description

Surpur Creek drains 5.7 square miles of watershed and enters the Klamath River at river mile 20.5. The creek was surveyed on June 22, 1978. The stream was characterized by gravel-rubble substrates containing low sand-silt levels and good quality pools which increased in frequency above stream mile 0.25. Good streamside vegetation cover was also present.

Six log jams were located below stream mile 1.0. Two of these, located at stream miles 0.84 and 0.85, were judged impassable and assigned a number two removal priority. Considerable logging activity appears to have occurred many years ago.

Salmonid Utilization

Electrofishing surveys conducted on Surpur Creek on April 21, and May 24, 1978, yielded large numbers of rainbow/steelhead trout. Four chinook salmon, ranging in length from 4cm to 5 cm were also collected during the April 21 survey, indicating that chinook salmon can effectively utilize relatively small streams for spawning. One steelhead trout smolt was identified.

General Appraisal and Recommendations

Surpur Creek is a small stream capable of supporting limited numbers of anadromous salmonids including chinook salmon. Productivity of the stream would be enhanced through the removal of all log jams, especially the two impassable barriers located at stream miles 0.84 and 0.85.

TECTAH CREEK 01-0192

Habitat Description

Tectah Creek drains 19.9 square miles and enters the Klamath River at river mile 22.1. The stream was surveyed on October 19, 1978. The lower sections of the drainage have been clearcut down to the creek bed leaving the water exposed to the sun most of the time. Alders are growing back quickly but it will be some time before the canopy fully recovers. From the mouth to stream mile 1.50 there are very few boulders or good quality pools and rearing habitat is limited. Above stream mile 1.50 the stream is characterized by a moderate gradient (4-5%), more large boulders, good softwood canopy and many deep pools. There are no barriers to fish migration in the lower two miles of the creek.

Salmonid Utilization

Spawning ground surveys conducted on October 19, and December 1, 1977, and on December 4, 1978, yielded no adult salmon. Electrofishing surveys performed on February 23, April 21, and May 24, 1978, turned up considerable numbers of rainbow/steelhead trout young-of-the-year and juveniles, two chinook salmon young-of-the-year and on one occasion (February 23, 1978), eight "half-pounder" steelhead trout. The "half-pounders" apparently moved out of the stream during March, since they were not encountered on subsequent surveys. Stomach analyses revealed that these fish were not feeding.

General Appraisal and Recommendations

It seems that Tectah Creek should contain more chinook salmon than it does since it is accessible, has adequate flow, the gravels appear fairly clean and there are already a few spawners. Like many other streams on the reservation, Tectah Creek is considerably under-utilized.

JOHNSON CREEK 01-0212

Habitat Description

Johnson Creek, a tributary to the Klamath River entering at river mile 24.3, was surveyed on June 22, 1978. At the time of the survey, no water was flowing at the mouth and flow ranged from 2 to 3 cfs between stream miles 0.25 and 1.27. Most of the surveyed section had a moderate gradient and was characterized by shallow pools and riffles with large amounts of rubble and gravel suitable for spawning. Pools capable of holding adults were uncommon except for the section between stream miles 0.49 and 0.71 where gradient increased to as high as 18 percent. Sand and silt levels in the stream were low and stream banks were well vegetated and appeared stable. Several log and rock obstacles were present, some of which were judged impassable.

Salmonid Utilization

Numerous juvenile salmonids were observed during the June 22, 1978 habitat survey, especially in the lower portion of Johnson Creek. Electrofishing surveys conducted on April 21, and June 2, 1978 turned up several rainbow/steelhead, one chinook salmon juvenile and three cutthroat trout. A spawning ground survey conducted on December 4, 1978 turned up no adult salmon or steelhead.

General Appraisal and Recommendations

It would be desirable to remove the rock and log barriers from Johnson Creek to open up more of the stream to steelhead trout. Salmon spawning is probably limited to the lower one-quarter mile of stream.

PECWAN CREEK 01-0214

Habitat Description

Pecwan Creek drains 27.7 square miles and enters the Klamath River at river mile 25.3. It consists of two major forks with the East Fork joining the main stem at stream mile 0.65. The lower 1.25 miles of Pecwan Creek and lower one-half mile of the East Fork were surveyed on July 11, 1978. Most of the lower stream crosses an alluvial plain of boulders, rubble and gravel that was probably deposited during the 1964 flood and is still eroding, creating an unstable habitat. Very little of the lower stream contains suitable spawning gravels. The stream gradient becomes pronounced at stream mile 0.78 where a series of cascades formed by numerous large boulders create an apparent barrier to adult salmon. At stream mile 1.0, the creek becomes quite precipitous with stream gradient averaging about 20 percent.

The East Fork of Pecwan Creek is moderately steep throughout the lower one-half mile with numerous small falls and deep pools. Little riffle area is present. A series of cascades located at stream mile 0.68 probably represents the upper limit of anadromous salmonid accessibility. Sand and silt levels are relatively low in both forks. Logging debris is evident in the forks but no barriers were seen.

Salmonid Utilization

A spawning ground survey conducted on the lower three-quarter mile section of Pecwan Creek and the lower one-quarter mile of the East Fork-Pecwan Creek on December 1, 1977 revealed no fish. Electrofishing surveys conducted on April 21, May 2, and June 1, 1978, revealed considerable numbers of juvenile steelhead/rainbow trout but no coho or chinook salmon. Considerably more juveniles were observed in the section of the stream below the cascades located at stream mile 0.78 than above the cascades. Juveniles were uncommon in the East Fork except for the lower 100-yard section.

General Appraisal and Recommendations

As an anadromous salmonid stream, Pecwan Creek does not have great potential for supporting large runs of salmon and steelhead. Only about one mile of suitable spawning habitat exists in both forks combined.

METTAH CREEK 01-0248

Habitat Description

Mettah Creek drains 10.7 square miles of watershed and enters the Klamath River at river mile 28.8. The stream was surveyed on June 23, 1978. The lower one-half mile of Mettah Creek is characterized by rubble and boulder substrates and unstable stream banks devoid of vegetation. Above stream mile 0.5, stream gradient increased and the creek was characterized by numerous deep pools, good stream-side cover and gravels low in sand and silt. Logging activity near the stream appears to have been minimal in recent years as evidenced by dense canyon vegetation and low levels of debris. Two barriers are located at stream miles 1.15 and 1.35, both formed of rock with a few impacted logs. Other rock obstacles were common but appeared passable.

Salmonid Utilization

During the habitat survey on June 23, 1978, numerous salmonids were observed in the lower stream but none were seen above the barrier located at stream mile 1.35. Electrofishing surveys conducted on April 21, and June 2, 1978 yielded numerous rainbow/steelhead trout but no salmon. One steelhead smolt was identified and the young-of-the-year had a wide size range indicating that steelhead and native rainbow trout utilize the stream.

General Appraisal and Recommendations

Mettah Creek is in relatively good condition and has the potential for producing good numbers of steelhead trout and possibly some salmon. The barriers to migration located at stream miles 1.15 and 1.35 should be removed to permit spawner access to upstream gravels.

ROACH CREEK 01-0261

Habitat Description

Roach Creek has a drainage area of 29.5 square miles and enters the Klamath River at river mile 31.5. The stream was surveyed on June 23, 1978. Near the mouth, the stream averaged about 15 feet wide, had a flow of approximately 10 cfs and contained few pools. Between stream miles 0.25 and 1.00, pool-riffle ratios commonly ranged up to 9:1 primarily because of an abundance of boulders in the stream which created numerous pools. Riffle areas frequently contained as much as 50 percent boulders with large amounts of rubble and gravel. Spawning gravels containing low silt levels were fairly abundant. It appears that streamflow remains adequate throughout the year.

Stream gradients generally ranged from three to five percent but increased to eleven percent for a short distance at stream mile 1.00. Stream banks comprised largely of bedrock and boulders appeared fairly stable. Steep, heavily vegetated hillsides bordered the stream. An impassable rock barrier located at stream mile 0.35 was assigned a removal priority of Number 1.

Salmonid Utilization

Salmonids were observed in Roach Creek only below the rock barrier located at stream mile 0.35. No fish were observed above the barrier despite an abundance of suitable habitat. Crayfish were abundant in some areas above the barrier. Electrofishing surveys conducted on May 5, and June 2, 1978, revealed considerable numbers of steelhead/rainbow trout but no coho or chinook salmon present in the lower reaches of Roach Creek. Non-salmonid species captured included speckled dace, stickle-back and numerous prickly sculpin.

General Appraisal and Recommendations

Stream conditions in Roach Creek are suitable for salmonid spawning and rearing. The rock barrier at stream mile 0.35 should be removed to open up considerable additional habitat. Logging of the hills bordering Roach Creek is not recommended because the slopes are very steep while boulders in the stream would encourage the formation of log jams.

MOREK CREEK 01-0293

Habitat Description

Morek Creek is a small tributary stream draining 4.0 square miles and entering the Klamath River at river mile 32.5. The stream was surveyed on June 15, 1978. The creek is very steep over most of its length with several series of rock falls, cascades and log jams. Small amounts of spawning gravels are present in scattered areas but most of the creek is inaccessible to migrating fish. Flow seems adequate throughout the year and there are good quality pools in many places. The first impassible barrier is a rock and log cascade located at stream mile 0.45.

Salmon Utilization

Electrofishing surveys conducted on May 5, and June 2, 1978, revealed the presence of considerable numbers of rainbow/steelhead trout but no salmon.

General Appraisal and Recommendation

The removal of several barriers on Morek Creek would open up at least one-half mile of steelhead spawning habitat. Coho salmon could possibly utilize the creek but chinook salmon would be inhibited by the steep gradient.

TULLY CREEK 01-0322

Habitat Description

Tully Creek drains 17.3 square miles of watershed and enters the Klamath River at river mile 38.5. The stream was surveyed on July 13, 1978. Near the mouth, the stream averaged about 25 feet in width and had a flow of 6 cfs while at stream mile 1.00 - 1.25, stream width averaged 10-15 feet with a flow of 5 cfs. Stream gradient increased from an average of four to six percent in the lower mile of stream to 10-12 percent between stream miles 1.00 and 1.25.

Unlike the typical flat flood plains of other tributaries, stream banks along the lower section of Tully Creek are steep and very unstable. Bank stability increased considerably upstream. Large boulders are prevalent in the creek but considerable quantities of suitable spawning gravel are also present. The stream substrate appeared relatively free of silt and algae. A 16-foot rock and log barrier located at stream mile 0.72 was judged impassable and given a removal priority of Number 2. No known diversions of stream water occur in the watershed.

Salmonid Utilization

During an electrofishing survey of Tully Creek on March 14, 1978, several juvenile rainbow/steelhead were collected but no coho or chinook salmon were seen. No salmonids were observed above the barrier located at stream mile 0.72. No adult salmon or steelhead were observed during a spawning ground survey conducted on November 25, 1978.

General Appraisal and Recommendations

Because of its relatively good flow and clean gravels, Tully Creek has good potential for producing considerable numbers of steelhead and some salmon. The rock and log barrier located at stream mile 0.72 should be removed to allow for spawner access upstream.

PINE CREEK 01-0343

Habitat Description

Pine Creek is one of the larger tributary streams on the Hoopa Valley Indian Reservation draining 47.8 square miles and entering the Klamath River at river mile 40.9. The stream was surveyed on September 27, 1977 and on October 31, and November 6, 1978. Most of the creek has a shallow to moderate gradient with large amounts of bedrock and boulder. Narrow canyon walls coupled with high runoff from the large watershed have created deep holes interspersed with pockets of spawning gravels. Only a few areas of Pine Creek contain more than moderate amounts of gravels and they have all been affected by logging activities. The upper Pine Creek watershed has been seriously impacted by logging practices including cat logging on steep slopes, clear cutting to the waterline, indiscriminate road building and leaving logs and debris in the stream. Several very large log jams have formed along Pine Creek and a continuous removal effort will be necessary to allow the stream to flow freely and be accessible to anadromous fish.

Salmonid Utilization

Numerous spawning ground surveys conducted on Pine Creek during 1977 and 1978 resulted in the sighting of only four chinook salmon. Several electrofishing surveys conducted in 1978 turned up numerous rainbow/steelhead trout but no salmon. Several juvenile rainbow/steelhead captured had skin eruptions indicative of the parasite, Myxosoma squamalis.

General Appraisal and Recommendations

Pine Creek has the potential to support significant numbers of salmonids if the habitat can be improved and then maintained. All log jams should be removed, buffer strips should be left along the creek and natural vegetation should be encouraged to regenerate along the streambanks and slopes. There are many areas along Pine Creek which should not be logged at all primarily because of the steep and unstable nature of the hillsides. After log jam removal, restocking of salmon and steelhead in areas long inaccessible to migrating fish would speed the establishment of reproducing populations. Road building and road maintenance should be closely regulated to limit slope failure and reduce sediment load into the stream.

LITTLE PINE CREEK 01-0352

Habitat Description

Little Pine Creek, the major tributary to Pine Creek, drains 12.3 square miles of watershed and enters Pine Creek at stream mile 4.56. The habitat is very similar to Pine Creek, including a moderate gradient (3-6%), steep and unstable canyon walls, large amounts of boulders, and a number of good quality pools. Spawning gravels are readily available and appeared to be relatively low in sand-silt content (10-15%). Logging has occurred in the watershed and has contributed significantly to habitat changes by removing overstory near the creek and adding logs and debris to the bedload. Most of Little Pine Creek is inaccessible to migrating salmonids because of a 20-foot log jam located at stream mile 0.73.

Salmonid Utilization

Electrofishing surveys conducted on February 15, April 25, and May 30, 1978, revealed large numbers of juvenile and young-of-the-year rainbow/steelhead trout. Several lampreys were also captured but no speckled dace, small scale suckers or prickly sculpins were seen.

General Appraisal and Recommendations

Little Pine Creek is a good quality tributary that has the potential for producing large numbers of steelhead trout and possibly chinook and coho salmon. The log jam at stream mile 0.73 must be removed to allow spawner access to the remainder of the superior habitat in the stream.

SOCTISH CREEK 02-0019

Habitat Description

Soctish Creek, a tributary of the Trinity River entering approximately 8.5 miles above the Trinity River-Klamath River confluence, was surveyed on July 10, 1978. The stream has a drainage area of 9.3 square miles. The stream channel ranges in width from about eight feet between miles 2.5 to 3.0 to 15-20 feet in the lower 0.75 mile. Flow at the mouth of the stream averaged approximately 2 cfs. About 3 cfs of streamflow was being diverted through structures located at stream miles 0.55 and 0.58. Five log and rock obstructions were observed below stream mile 1.3 with the uppermost one considered impassable and assigned a removal priority of Number 2.

The first one-half mile of Soctish Creek is characterized by shallow pools and riffles with minimal fish cover. Pools predominate above stream mile 0.5 and adequate spawning gravels exist throughout the stream. Sand and silt levels are relatively low.

Salmonid Utilization

Electrofishing surveys conducted on April 10, April 27, and May 31, 1978, turned up considerable numbers of rainbow/steelhead trout but no salmon. No adult fish were observed during a spawning ground survey conducted on October 23, 1978.

General Appraisal and Recommendations

Soctish Creek is a small but suitable stream for anadromous salmonids. It is recommended that the log-rock obstacles at stream mile 1.21 and 1.30 be removed and that the water diversions located at stream mile 0.55 and 0.58 be screened.

MILL CREEK 02-0027

Habitat Description

Mill Creek is the second largest drainage on "the square" portion of the reservation (49.2 square miles). The stream was surveyed during October, 1977. The large majority of the creek flows through relatively unstable terrain and is characterized by large riffle areas with few deep pools except in some canyon areas where high flows have created pools among large boulders between steep canyon walls. Gravel bars and good spawning sites are abundant throughout the length of Mill Creek. A large unscreened water diversion is located at stream mile 1.63.

Salmonid Utilization

Chinook salmon utilize Mill Creek in significant numbers as compared to most other reservation streams. Several spawning ground surveys conducted in 1977 and 1978 resulted in the sighting of chinook salmon adults as well as steelhead adults. Five electrofishing surveys conducted in 1978 turned up considerable numbers of chinook salmon and rainbow/steelhead young. No adult winter-steelhead or coho salmon were observed.

General Appraisal and Recommendations

Mill Creek shows greater potential than many other reservation tributaries to produce large numbers of anadromous salmonids. It has good flow, shallow gradient, adequate spawning gravels and abundant rearing areas. The two most serious problems preventing Mill Creek from reaching its potential are continued detrimental logging practices and the large unscreened water diversion at stream mile 1.63. The diversion has filtered fish from one-half to two-thirds of the flow of the creek for several years and should be corrected immediately. Log jams appear and disappear along the creek with the winter rains, but at present there are no impassable barriers until near the headwaters.

HOSTLER CREEK 02-0054

Habitat Description

Hostler Creek drains 9.4 square miles of "the square" portion of the reservation and enters the Trinity River at river mile 9.9. The stream was surveyed on September 30, 1977. Most of the creek is quite consistent in gradient, cover and composition, with adequate flow year-round. Pools are abundant, although mostly of Class 3 and 4, and provide large amounts of rearing habitat. Water temperatures can be very high at times near the mouth, probably attributable in part to a dam and water diversion located at stream mile 0.42 which takes as much as half of the flow of the creek. The dam also serves as a migration barrier. Logging has intensified near the headwaters recently and may soon contribute to increasing silt loads and temperatures. A large section of the creek above the dam is presently clean with good gravels, pools and shelter for rearing salmonids.

Salmonid Utiliztion

A spawning ground survey conducted on September 30, 1977 revealed no adult salmon. Electrofishing surveys conducted on April 10, and May 10, 1978, turned up large numbers of rainbow/steelhead trout but no salmon. A large population of native rainbow trout exists above the dam.

General Appraisal and Recommendations

Hostler Creek is an excellent producer of rainbow/steelhead trout and has excellent potential if the dam located at stream mile 0.42 is removed. Such removal would open up at least four miles of good habitat and the steelhead trout population could be substantially improved. It appears that Hostler Creek could also support a good run of coho salmon and some chinook salmon.

SUPPLY CREEK 02-0062

Habitat Description

Supply Creek drains 14.4 square miles of the southwest portion of "the square" part of the reservation and is one of the larger tributaries to the Trinity River on the reservation. The stream was surveyed on several occasions during September, 1977 and June, 1978. The lower one-half mile crosses the alluvial plain of the Trinity River and is fairly shallow in gradient (2.0-3.0%). Beyond this point the creek ascends at a higher rate and becomes quite steep (8.0-18.0%). The stream is characterized by deep pools and large boulders throughout its length with moderate amounts of spawning gravels. Logging and road building as well as natural slides and windfalls have impacted the creek to some extent but high winter flows have kept sand-silt content to reasonable levels. The debris, however, has resulted in the formation of several migration barriers, particularly near stream miles 3.0, 4.0 and the headwaters region. A large unscreened water diversion located at stream mile 0.90 results in the annual diversion of large quantities of water.

Salmonid Utilization

A number of spawning ground surveys conducted on Supply Creek in 1977 and 1978 resulted in the sighting of ten chinook salmon and two steelhead trout adults. Six electrofishing surveys conducted during 1978 resulted in the capture of numerous rainbow/steelhead trout juveniles and young-of-the-year and a number of chinook and coho salmon young.

General Appraisal and Recommendations

Supply Creek has the potential to be a large producer of all three anadromous salmonid species. It has good gravels for chinook salmon in the lower mile, deep holding pools throughout its length and gravels for steelhead or coho spawning. It also has adequate flows during the entire year for rearing purposes. Major drawbacks to full development of the creek are past logging practices which have contributed silt and debris to the creek and created migration barriers and the proximity of the creek to population areas which makes overfishing of spawners relatively easy. A major unscreened irrigation diversion at river mile 0.90 should be corrected to prevent loss of downstream migrants.

HOSPITAL CREEK 02-0072

Habitat Description

Hospital Creek is a small tributary of the Trinity River draining 2.3 square miles of the southwest corner of "the square" portion of the reservation. The stream was surveyed on September 9, 1977. Flow in the creek during the summer months is restricted to a one-half mile section located below a landslide at stream mile 1.15 and is less than 1 cfs. This section of the stream contains several pools and some spawning gravels. The lower section of the stream is characterized by boulders and rubble. The slide at stream mile 1.15 forms a natural migration barrier.

Salmonid Utilization

Electrofishing surveys conducted on February 15, April 6, and May 10, 1978, turned up small numbers of rainbow/steelhead trout, including a few smolts.

General Appraisal and Recommendations

Because of its small size, intermittent flow and lack of good spawning gravels, Hospital Creek has a very limited potential for anadromous fish production.

CAMPBELL CREEK 02-0075

Habitat Description

Campbell Creek, a tributary to the Trinity River entering 15.7 miles above the Trinity River-Klamath River confluence, was surveyed on June 6, 1978. The creek drains approximately 16.5 square miles and flows all year. Only the lower 0.86 mile of the stream flows through reservation land and this section is characterized by large boulders, rubble and considerable gravel. Gravels contain little sand and silt but are quite unstable and sloughing gravel banks are common, probably a result of the 1964 flood. Gradient is moderate, averaging four percent. A series of falls and log jams which occurs about three miles above the mouth probably represent the natural limits of upstream fish migration. A culvert located under Highway 96 which crosses Campbell Creek at stream mile 0.24 may cause fish passage problems.

Salmonid Utilization

Electrofishing surveys conducted on February 21, April 27, and May 31, 1978, turned up a number of steelhead smolts and rainbow trout juveniles while a spawning ground survey conducted on April 27, 1978 resulted in the sighting of two steelhead spawners. Brown trout were observed by CDFG biologists during 1968 and 1969 surveys but were not seen during our investigations. No young-of-the-year rainbow/steelhead trout were observed above the road culvert located at stream mile 0.24.

General Appraisal and Recommendations

Baffles should be installed in the road culvert located at stream mile 0.24 so that steelhead trout can better utilize upper Campbell Creek. The moderate gradient of the lower stream section suggests the possibility of chinook salmon utilization.

TISH-TANG-A-TANG CREEK 02-0077

Habitat Description

Tish-Tang-a-Tang Creek is a large tributary of the Trinity River draining approximately 29.6 square miles of the southwestern portion of "the square" part of the reservation. The stream was surveyed on October 20, 1978. A 40-foot high falls located at stream mile 2.80 forms a natural migration barrier which would be difficult to remove or correct. The stream is characterized by narrow canyons, chutes and a boulder-rubble substrate. The drainage is generally quite steep. Extensive logging activities have occurred throughout the watershed.

Salmonid Utilization

Five spawning ground surveys conducted on Tish-Tang-a-Tang Creek in 1977 and 1978 resulted in the sighting of one chinook salmon and two steelhead trout adults. Electrofishing surveys conducted on January 30, March 15, April 28, and May 18, 1978, turned up small numbers of rainbow/steelhead trout and one chinook salmon.

General Appraisal and Recommendations

Tish-Tang-a-Tang Creek is a large, swiftly flowing stream which has a very limited potential for producing salmon and steelhead. Despite a very adequate water supply, the gradient, stream substrate characteristics and the impassable barrier located at stream mile 2.80 are not conducive to successful salmonid production. The area below the falls, however, could support many more salmonids than is currently the case.

SUMMARY EVALUATION - ALL STREAMS

Habitat Description

Virtually every stream on the Hoopa Valley Indian Reservation has experienced some degree of alteration through man's activities (notably logging-related) and natural processes (namely the 1964 flood). Some streams have been affected to such a degree that they are almost totally unsuitable for anadromous salmonid utilization. The habitat survey did not cover all tributary streams to their headwaters so it is impossible to assess the true magnitude of habitat alteration. Of the 29 streams surveyed, however, all had been partially or extensively clearcut, fourteen had impassable log jams near their mouths (a direct result of improper logging practices), five had major unscreened water diversions and five had other man-made obstructions including impassable dams and culverts. It appears that seven streams (Salt, Richardson, McGarvey, Tarup, Omagar, Bear and Hostler Creeks) have undergone major alterations affecting stream productivity, fifteen streams(Hunter, Mynot, Ah Pah, N.Fk. Ah Pah, Surpur, Tectah, Johnson, Mettah, Morek, Tully, Pine, Little Pine, Soctish, Mill and Supply Creeks) have undergone moderate alterations affecting stream productivity, and only seven streams (Terwer, Blue, Pecwan, Roach, Hospital, Campbell and Tish-Tang-a-Tang Creeks) have undergone minor alterations to date.

Salmonid Utilization

Utilization of reservation streams by anadromous salmonids has declined concurrently with habitat degradation and increased fishing pressure. Not a single reservation stream currently supports a salmon or steelhead run anywhere near reported historical or potential levels. Numbers of fish observed in most streams through spawning ground and electrofishing surveys revealed critically low populations.

Of all streams sampled, four contained coho salmon fry, thirteen had chinook salmon fry and twenty-three had rainbow/steelhead fry. Of the four streams which contained coho salmon (Ah Pah, Supply, Terwer and Hoppaw Creeks), Ah Pah Creek was the only one which supported considerable numbers. Of the thirteen streams in which chinook salmon were found (Richardson, Hoppaw, Terwer, McGarvey, Tarup, Omagar, Blue, Surpur, Tectah, Johnson, Mill, Supply and Tish-Tang-a-Tang Creeks), Blue, Mill, Supply and Terwer Creeks had relatively greater concentrations. Streams which contained relatively dense concentrations of rainbow/steelhead trout included Tectah, Pecwan, Mettah, Roach, Morek, Cappell, Pine, Hostler and Supply Creeks. Streams in which cutthroat trout were found included Salt, Hunter, Richardson, Hoppaw, Saugep, Waukell, McGarvey, Tarup, Blue, Ah Pah, Bear, Johnson, Pecwan and Miners Creeks with the densest concentrations occurring in Richardson, Saugep and Waukell Creeks.

General Appraisal and Recommendations

Logging activity has been a significant cause of habitat alteration on the Hoopa Valley Indian Reservation. Utilizing LANDSAT imagery, the U.S. Fish and Wildlife Service, in conjunction with the National Aeronautics and Space Administration, has completed an evaluation of watershed conditions on the reservation. It is recommended that the Bureau of Indian Affairs, in conjunction with the tribes, consider the data presented in the final report in developing and implementing logging guidelines and procedures which will afford a greater degree of habitat protection in the future. In addition, an organized program involving stream cleanup, diversion screening and habitat restoration should be implemented as soon as possible. A five-year study proposal including such a program has already been submitted.

In summarizing the relative value or potential value to anadromous salmonids of streams included within the Hoopa Valley Indian Reservation, Blue Creek, by far, is most important. Pine and Mill Creeks rank next in importance as salmon and steelhead production streams with Roach, Supply and Terwer Creeks considered to have somewhat less value. Ten streams (Hunter, Ah Pah, Pecwan, Mettah, Surpur, Tully, Tectah, Soctish, Hostler and Tish-Tang-a-Tang Creeks) might be considered as reasonably good steelhead trout streams but only fair salmon streams. Nine streams (McGarvey, Omagar, Tarup, Bear, Morek, Johnson, Beaver, Hospital and Campbell Creeks) have fair to good value as steelhead production streams but are considered as fair to poor salmon streams. Salt and Richardson Creeks rank last in importance as salmon and steelhead production streams.

STREAM SURFACE AREA SUMMARIZATION

Crude surface acreage estimations involving most of the tributary streams flowing through the Hoopa Valley Indian Reservation were made utilizing U-2 flight transparencies from the May 8, 1978 fly-over (Flight #78-054) at an altitude of 65,000 feet. The transparencies were obtained from the National Aeronautics and Space Administration and each frame represents 81.92 square miles.

Using a light table, stream lengths and widths were measured with a micrometer and total surface acres of each main stem tributary were roughly estimated (Table 6). Many streams were not visible over their entire lengths because of the vegetative canopy, thereby preventing accurate surface area determinations. Ten streams (Mynot, Richardson, Saugep, Waukell, McGarvey, Ha Amar, Morek, Cappell, Beaver and Campbell Creeks) were covered to such a degree that area estimates could not be made. Drainage area and stream length measurements are considered quite accurate but estimates of stream surface area are crude. Further refinement of surface area measurements, if desired, should occur through examination of low-level aerial photography shot during the winter.

Taking into account streams not visible and small primary and subsidiary streams not included in the analysis but capable of supporting some steelhead trout, it appears that streams flowing through the reservation have a combined surface area of approximately 1,000 acres and that approximately 30 percent or 300 acres are included within the boundaries of the reservation. It is also roughly estimated that of the 300 acres on the reservation, approximately 40 percent or 120 acres are located on "the square" portion.

Approximately 50 percent and 90 percent of the stream surface area is considered desirable production habitat for chinook salmon and steelhead trout, respectively. Unfortunately, much of the area is inaccessible to anadromous salmonids because of natural and man-made fish migration barriers. Nearly all of the inaccessible habitat could be opened up through barrier removal operations.

Table 6. Drainage areas, stream lengths and stream surface acreages of principal tributary streams flowing through the Hoopa Valley Indian Reservation as measured from 15-minute USGS quadrangle maps and estimated from the May 8, 1978 U-2 overflight transparencies.

Stream	Drainage Area (sq. mi)	Total Main Stem Miles	Visible Main Stem Miles	Visible Surface Acres	Estimated Total Acres	Estimated On-Reservation Acres
Blue	127.1	25.5	7.1	77.0	277.0	21.5
Mill	49.2	14.8	8.0	34.1	63.2	42.0
Pine	47.8	18.5	7.0	28.1	74.2	54.1
Terwer	32.8	16.9	4.6	23.0	84.0	7.5
Tish-Tang-a-Tang	29.6	12.0	5.8	19.8	40.7	25.9
Roach	29.5	9.8	3.1	13.3	41.4	4.4
Pecwan	27.7	17.6 1/	12.9	34.0	46.5	8.4
Hunter	23.8	7.1	5.0	18.1	25.7	4.1
Tectah	19.9	12.7	5.8	15.5	34.0	3.9
Bear	19.3	4.9	3.5	6.7	9.2	5.6
Tully	17.3	8.8	5.7	20.7	32.0	6.3
Campbell	16.5	7.8	—	—	—	—
Ah Pah	16.3	5.5	4.6	6.6	7.8	3.5
Supply	14.4	8.9	5.3	16.1	26.9	20.5
W. Fk. Blue	—	5.6	5.1	15.0	16.5	0
Little Pine	12.3	6.1	1.2	3.8	19.0	4.3
Mettah	10.7	7.3	3.2	5.6	12.7	3.2
Hostler	9.4	8.3	4.0	5.0	10.3	9.4
Soctish	9.3	4.8	3.1	4.7	7.3	7.1
McGarvey	8.6	4.8	—	—	—	—
Cappell	8.3	4.3	—	—	—	—
N. Fk. Ah Pah	6.9	5.2	1.5	2.7	9.2	2.0
Surpur	5.7	4.5	2.3	2.7	5.4	1.4
Tarup	4.9	5.5	2.6	3.5	7.2	2.9
Mynot	4.9	3.0	—	—	—	—
Hoppaw	4.5	4.6	1.8	2.1	5.3	3.0
Salt/High Prairie	4.4	7.8	3.6	6.4	13.9	1.7
Morek	4.0	3.3	—	—	—	—
Waukell	3.8	1.8	—	—	—	—
Beaver	3.1	2.8	—	—	—	—
S. Fk. Ah Pah	2.7	3.3	0.5	0.7	4.5	2.2
Omagar	2.5	2.9	1.7	2.2	3.9	3.9
Hospital	2.3	3.7	3.4	3.3	3.6	3.7
Richardson	1.8	1.5	—	—	—	—
Saugep	0.9	1.4	—	—	—	—
Ha Amar	0.4	0.9	—	—	—	—
Totals					881.4	252.5

1/ Include East Fork-Pecwan Creek.

FISH REARING FEASIBILITY STUDIES

HOOPA VALLEY INDIAN RESERVATION

INTRODUCTION

A Fish Rearing Feasibility Study involving the Hoopa Valley Indian Reservation, funded at $25,000, was conducted to assess the potential for rebuilding anadromous salmonid runs utilizing reservation streams and through various types of hatchery development. The Hupa and Yurok people have frequently expressed concern about the dwindling salmon and steelhead runs in the Klamath and Trinity Rivers which have historically provided the mainstay of Indian economy in the area. Generations of Indians have utilized traditional fishing grounds on the reservation and have smoke cured and stored salmon for subsistence and ceremonial purposes. In recent years, a number of Indian commercial fishermen have sold enough salmon to make good livings. Also, in recent years, many upriver Indians have reported difficulty in capturing enough fish to satisfy their consumptive and ceremonial needs. Indians of the reservation have repeatedly expressed the desire to initiate run rebuilding programs involving hatchery development and stream improvement.

While not a hatchery feasibility report, this section outlines important considerations in exploring hatchery development on the reservation and presents an overview of alternatives which should be considered in developing a fish production program involving reservation waters. It contains the results of a demonstration fish rearing project utilizing ground water in the Hoopa Valley, an accounting of land ownership patterns along major streams, a review and evaluation of water source characteristics of reservation streams, an evaluation of the natural fish rearing potential of reservation waters and a review of considerations in assessing large-scale hatchery development on the reservation.

DEMONSTRATION FISH REARING PROJECT

The feasibility of rearing fish in reservation waters was demonstrated at a newly established hatchery located in the Hoopa Valley which was constructed with the assistance of the Hoopa Valley Tribe and funded through the Trinity River Basin Fish and Wildlife Task Force. The hatchery building is of plywood construction, sits on a concrete slab which measures 13 feet by 32 feet and is divided into an incubator room, rearing room and storage-standby generator room.

A 62-foot deep well was drilled immediately next to the hatchery building and a five horsepower, single phase submersible pump was installed. A pump test of the well for a one-hour period at the maximum rate of 120 gpm resulted in lowering the 22-foot water column by five inches. Two 250-gallon storage tanks were installed which maintain water pressure in the hatchery at 35-40 PSI. Well water entering the hatchery remains a nearly constant 51^{o}F with a dissolved oxygen level of 9.0-9.5 mg/l. Results of a water quality analysis conducted by Winzler and Kelly Water Laboratory of Eureka, California are presented in Table 7.

Table 7. Water quality analysis report of groundwater located at the 40 to 60-foot level in the Hoopa Valley as reported by Winzler and Kelly Water Laboratory in Eureka, California.

Water Quality Parameter	Units	Level	
pH	—	7.15	
Carbon dioxide	mg/1	14	1/
Alkalinity ($CaCo_3$)	mg/1	82	2/
Conductivity	µmhos/cm	190	
Hardness (EDTA)	mg/1	150	
Turbidity	NTU	0.4	
Nitrate nitrogen	mg/1	0.8	
Phosphate	mg/1	< 0.01	
Calcium	mg/1	26	
Chloride	mg/1	< 1	2/
Zinc	mg/1	< 0.04	
Copper	mg/1	< 0.04	3/
Lead	mg/1	< 0.01	
Mercury	mg/1	< 0.0005	3/
Arsenic	mg/1	< 0.01	
Sodium	mg/1	4.1	
Potassium	mg/1	1.6	
Iron	mg/1	< 0.1	

1/ Calculated assuming a temperature of 12C and a TDS of 120 mg/1.

2/ Average of quality assurance duplicates.

3/ Further testing to define levels should be conducted.

Two backup systems were installed in the hatchery to insure continued water flow in the event of electrical outages or pump failure. An 18 kw, propane powered backup power generation system was installed to provide power to the well pump, lights and food storage freezer in the event of an electrical power outage. An independent backup water supply, regulated by pressure and check valves, was also installed to provide an uninterrupted flow in the event of pump failure.

All plumbing lines and valves from the well and within the hatchery are of polyvinyl chloride. Incubation and rearing equipment include two 16-tray Heath incubators, one eight-foot rearing trough and four six-foot circular rearing tanks.

Fish rearing activities were conducted during the spring of 1978. Approximately 42,000 fertilized green steelhead trout eggs were obtained from the Iron Gate hatchery on April 18. The eggs were incubated at 3 gpm to the eyed stage in 20 days and 414 temperature units (TU) and to hatching in 32 days and 621 TU's. Fish were completely "buttoned-up" in 49 days and 932 TU's at which time they were transferred to the circular tanks.

Steelhead were fed Oregon Moist Starter Mash until June 30, a mixture of two-thirds starter mash and one-third Oregon Moist Pellets from June 30 to July 10, a mixture of two-thirds pellets and one-third starter mash from July 10 to July 15, and 100 percent pellets thereafter. The steelhead grew to 440 per pound by August 13, 1978 at which time a pump failure resulted in the loss of most of the fish.

According to Larmoyeux, Piper and Chenoweth (1973), production potential of the four six-foot circular tanks, assuming a 20 gpm inflow at 30 PSI into each and a loading factor of 1.2, is approximately 200,000 steelhead to 500 per pound or 36,000 salmon to 90 per pound. Salmon and steelhead trout could be reared in the same year for utilization in any future stream reseeding efforts.

The fish rearing project demonstrated the feasibility of rearing salmonids in a hatchery environment utilizing ground water on the Hoopa Valley Indian Reservation. The major factors limiting the amount of production possible are water supply and rearing space, both of which could be expanded appreciably on the reservation to accomodate stream restocking programs.

CHARACTERISTICS AND FISH REARING POTENTIAL OF SURFACE WATERS

Further development of fish rearing facilities on the Hoopa Valley Indian Reservation could be accomplished utilizing ground-water, surface-water or a combination of both. Thirteen tributary streams on the reservation maintain comparatively high minimum summer flows (generally in excess of five cubic feet per second) and should be considered first if surface-water rearing is contemplated: Blue Creek, Pine Creek, Mill Creek, Tish-Tang-a-Tang Creek, Supply Creek, Roach Creek, Terwer Creek, Hunter Creek, Salt Creek, Pecwan Creek, Cappell Creek, Tully Creek and Campbell Creek. Blue Creek, by far, possesses the best fish rearing potential from water quality and water quantity standpoints.

BLUE CREEK

Water Flow and Temperature Data

Blue Creek has a drainage area of approximately 127 square miles and contains about 25.5 miles of main stem, the lower 2.5 miles of which lie within the reservation boundary. U.S. Geological Survey water discharge records indicate large seasonal flow variations ranging from a low of 43 cfs on November 1, 1965 to 33,000 cfs on March 2, 1972. Minimum water flows during water years 1975, 1976 and 1977 were 48 cfs, 66 cfs and 51 cfs, respectively. Mean May and June flows during water years 1975-78 ranged from 145 cfs to 948 cfs. Minimum and mean daily water temperatures of Blue Creek rarely exceeded 19°C (66°F) and 20°C (68°F) respectively, during the summers of water years 1976-78 (Table 8).

Fish Rearing Potential

Of all streams located on the Hoopa Valley Indian Reservation, Blue Creek has the best water source to support a sizeable hatchery operation. It has a dependable supply of good quality water with a temperature regimen suitable for salmon rearing. Dewitt (1951), in a letter to the California Department of Fish

Table 8. Maximum (second columns), minimum (third columns) and mean (fourth columns) daily water temperatures of Blue Creek during the summers of water years 1975-78 as presented in U.S. Geological Survey records (^{o}C).

September 1975

4	--	--	20.0
10	--	--	18.5
24	--	--	16.0
25	17.0	15.5	16.25
26	17.0	15.5	16.25
27	16.5	16.0	16.25
28	16.5	15.5	16.0
29	16.5	15.5	16.0
30	16.5	15.5	16.0

August 1976

25	--	--	18.0
26	20.0	16.0	18.0
27	20.0	15.0	17.5
28	21.0	15.0	18.0
29	22.5	15.0	18.75
30	22.0	15.0	18.5
31	22.0	15.5	18.75

September 1976

1	20.5	16.0	18.25
2	21.0	15.5	18.25
3	21.5	16.5	19.0
4	21.0	15.5	18.25
5	20.0	16.0	18.0
6	20.5	16.0	18.25
7	20.5	15.5	18.0
8	20.5	16.0	18.0
9	21.5	16.0	18.75
10	21.0	16.5	18.75
11	19.0	16.0	17.5
12	19.5	16.0	17.75
13	20.0	16.0	18.0
14	19.0	16.0	17.5
15	20.0	16.0	17.5
16	17.0	16.0	16.5
17	20.0	16.0	17.5
18	20.5	16.5	18.5
19	21.5	17.5	19.5
20	19.0	18.0	18.5
21	21.5	17.5	19.5
22	21.0	18.0	19.5
23	21.5	17.5	19.5

September 1976

24	21.0	17.5	19.25
25	19.5	18.0	18.75
26	20.0	19.0	19.5
27	20.5	19.0	19.75
28	21.5	19.0	20.25
29	22.5	20.0	21.25
30	22.0	18.5	20.25

August 1977

4	19.0	19.0	19.0
19	18.0	17.0	17.5
20	17.0	17.0	17.0
21	17.0	16.5	16.75
22	18.5	16.5	17.5
23	18.5	16.5	17.5
24	17.5	17.0	17.25
25	17.5	16.5	17.0
26	17.5	16.0	16.75
27	17.5	16.5	17.0
28	17.5	16.5	17.0
29	18.5	16.5	17.5
30	18.0	17.0	17.5
31	18.0	16.5	17.25

July 1978

1	16.0	16.0	16.0
2	16.0	16.0	16.0
3	16.5	15.5	16.0
4	17.0	16.0	16.5
5	17.0	16.0	16.5
6	17.5	16.0	16.75
7	18.0	16.5	17.25
8	18.5	16.5	17.5
9	18.0	17.0	17.5
10	18.0	17.0	17.5
11	18.0	16.5	17.5
12	18.0	17.0	17.5
13	18.0	17.0	17.5
14	19.5	17.0	18.25
15	18.5	18.5	18.50
16	19.5	18.0	18.75
17	20.5	18.5	19.50
18	20.5	18.0	19.25

July 1978

19	21.0	18.5	19.75
20	20.5	18.5	19.5
21	21.5	19.0	20.25
22	21.0	19.0	20.0
23	21.0	19.0	20.0
24	21.0	19.0	20.0
25	20.0	19.0	19.5
26	20.0	19.0	19.5
27	19.0	18.0	18.5
28	19.0	17.5	18.25
29	19.5	18.0	18.5
30	19.0	18.0	18.5
31	19.0	18.0	18.5

August 1978

1	19.0	19.0	18.5
2	19.0	18.0	18.5
3	19.0	18.0	18.5
4	19.0	18.0	18.5
5	19.0	18.0	18.5
6	19.5	18.5	19.0
7	19.5	17.5	18.5
8	20.0	17.5	18.75
9	19.5	19.0	18.75
10	19.0	18.0	18.5
11	18.5	17.5	18.0
12	18.5	18.0	18.25
13	18.5	17.0	17.75
14	18.0	16.5	17.25
15	18.5	17.5	18.0
16	18.0	17.0	17.5
17	18.0	16.5	17.25
18	18.0	16.5	17.25
19	18.0	16.5	17.25
20	17.0	17.0	17.0
21	17.0	17.0	17.0
22	17.5	17.0	17.25
23	17.5	17.0	17.25
24	17.0	15.5	16.25
25	15.5	15.0	15.25
26	17.0	16.0	16.25
27	17.5	16.0	16.75
28	17.0	16.5	16.75
29	17.0	16.5	16.75
30	17.5	16.5	17.0
31	17.5	16.5	17.0

and Game dated August 25, 1951, estimated a chinook salmon spawner escapement level of 5,000 to 10,000 in Blue Creek. Currently, it is estimated that only a few hundred salmon spawners utilize the stream. A potential hatchery site comprising approximately eight acres is located near the reservation boundary at stream mile 2.5. The property is located above the flood plain and is owned by Simpson Timber Company. Water supply would have to be by gravity feed since there is no electrical power in the area.

PINE CREEK

Water Flow and Temperature Data

Pine Creek has a drainage area of approximately 47.8 square miles and a main stem length of 18.5 miles, all of which lie within the confines of the Hoopa Valley Indian Reservation. Next to Blue Creek, with a drainage area of 127 square miles and Mill Creek, with a drainage area of about 49.2 square miles, Pine Creek is the largest stream flowing through the reservation. It also contains far more on-reservation water than any other stream.

Continuous flow records are not available for Pine Creek. Summer flows were recorded at 4.6 cfs on September 17, 1973, 9.6 cfs on July 19, 1974 and 6.3 cfs on October 11, 1978. Maximum flows during normal water years are probably somewhat more than the 5,000 cfs recorded on Willow Creek (a nearby stream with a drainage area of 41 square miles).

Maximum and minimum water temperatures of Pine Creek recorded with a Ryan self-recording thermograph during the periods December 2, 1977 to January 6, 1978 and June 14, to August 6, 1978, are presented in Figures 13 and 14, respectively.

Fish Rearing Potential

Pine Creek and Mill Creek rank far below Blue Creek but far above other on-reservation tributary streams with regard to fish rearing potential. Pine Creek has a dependable source of good quality water but low summer flows of 4 to 6 cfs coupled with high summer water temperatures exceeding 22°C would limit production. A sub-gravel water supply intake and/or the blending of surface-water with cool well-water might be considered to alleviate the water temperature problem.

Hatchery development sites on Pine Creek are limited. Perhaps the most likely site is an area of approximately two acres located at stream mile 5.2. No power is available at this site and ownership is by the Hoopa Valley Tribe.

MILL CREEK

Water Flow and Temperature Data

Mill Creek has a drainage area of approximately 49.2 square miles and a main stem length of 14.75 miles, the lower 9.5 miles of which lie within the boundaries of the Hoopa Valley Indian Reservation. Next to Blue Creek, with a drainage area of 127 square miles, Mill Creek is the largest stream flowing through the reservation.

Figure [illegible]. Maximum and minimum daily water temperatures of Pine Creek during the period December 2, 1977 to January 6, 1978.

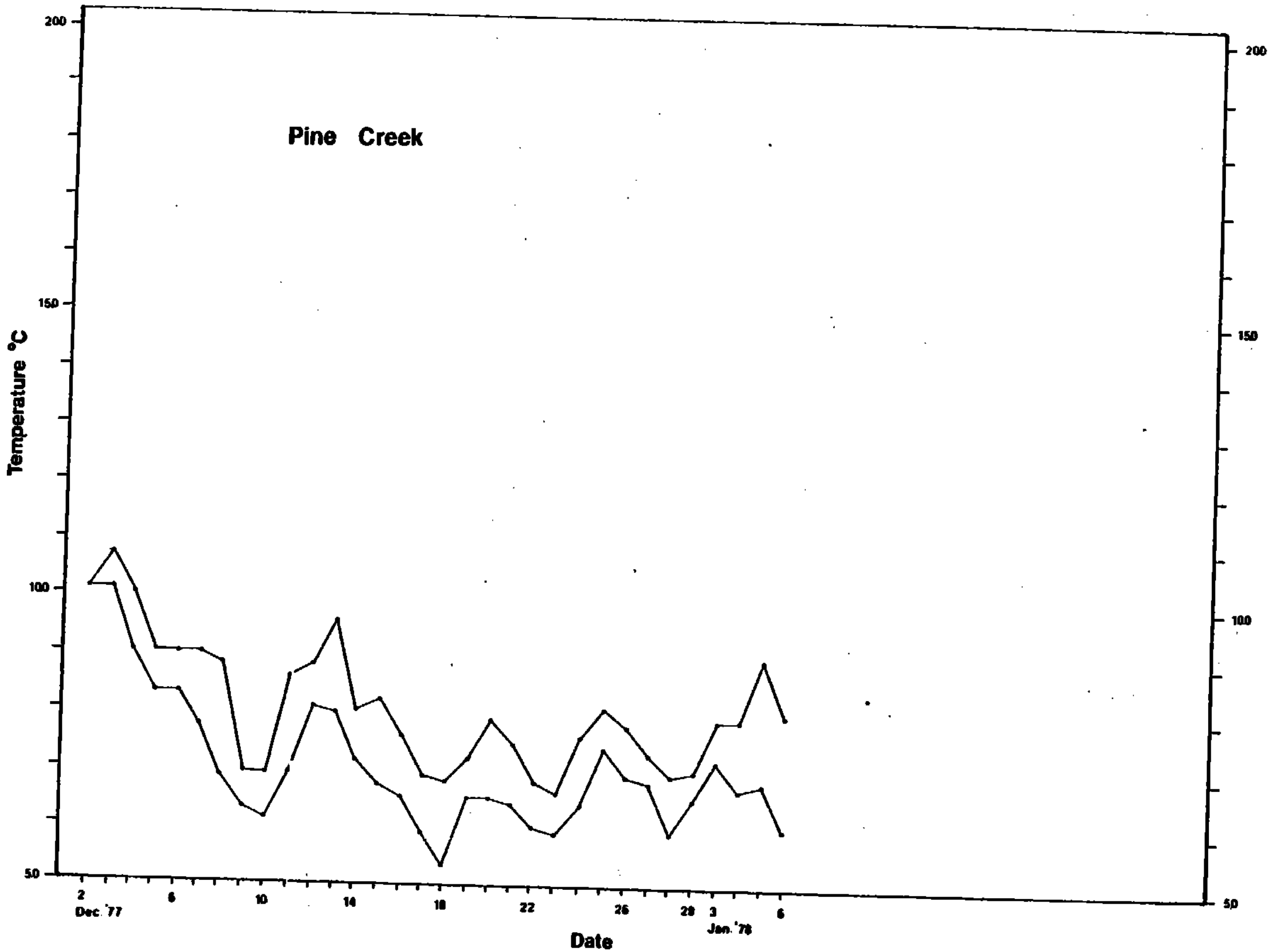
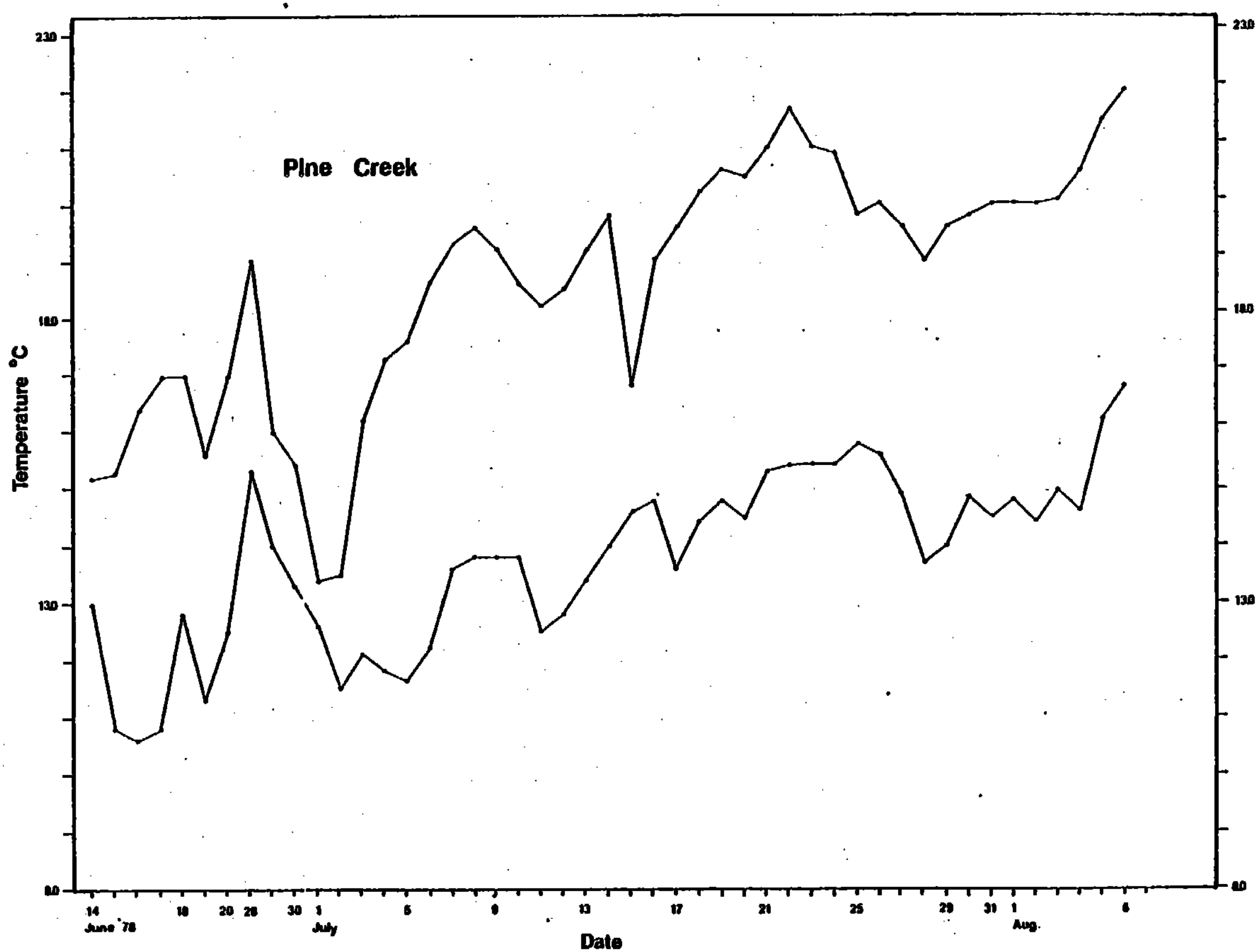


Figure 14. Maximum and minimum daily water temperatures of Pine Creek during the period June 14, to August 6, 1978.



Continuous flow records are not available for Mill Creek. Summer flows were recorded at 19 cfs on September 17, 1973, 40.5 cfs on July 26, 1974, 32.8 cfs on August 22, 1974, 22.1 cfs on September 20, 1974 and 29.2 cfs on October 2, 1978. Maximum flows during normal water years probably are somewhat more than the 5,000 cfs recorded on Willow Creek (a nearby stream with a drainage area of 41 square miles). A large unscreened water diversion located at stream mile 1.61 diverts up to 80 percent of flow for irrigation during summer months.

A thermograph installed in Mill Creek was lost during the high water of Janurary, 1978 and no continuous temperature data is available. Temperature checks during the summers of 1974, 1977 and 1978, indicate that maximum daily water temperature of lower Mill Creek frequently exceeds 18.5°C and at times reaches 26.5°C.

Fish Rearing Potential

Along with Pine Creek, Mill Creek ranks far below Blue Creek but far above other on-reservation streams with regard to fish rearing potential. Mill Creek has a dependable source of good quality water but low summer flows of 20-30 cfs coupled with high summer temperatures exceeding 26°C would limit fish production. A sub gravel intake and/or cool well-water might be utilized to help alleviate water temperature problems.

Suitable rearing sites exist along the lower mile of Mill Creek and approximately five acres of suitable land is located at stream mile 1.62 and is in the ownership of the Hoopa Valley Tribe. Commercial power is available to the site which could allow for well-water mixing during summer months. The water diversion located at stream mile 1.61 must be screened or otherwise modified.

TISH-TANG-A-TANG CREEK

Water Flow and Temperature Data

Tish-Tang-a-Tang Creek has a drainage area of approximately 29.6 square miles and a main stem length of about 12 miles, the lower seven miles of which flow through reservation land. An impassable natural falls approximately 60 feet high is located at stream mile 2.80. Summer flow data is incomplete but included values of 10 cfs on September 17, 1973, 32 cfs on July 25, 1974, 21.5 cfs on August 20, 1974, 14 cfs on September 20, 1974 and 17.6 cfs on October 12, 1978. Mean daily water temperature of Tish-Tang-a-Tang Creek during the summers of 1974 and 1975 usually ranged between 17°C and 19°C with maximum daily water temperature seldom exceeding 21°C (Table 9). Maximum-minimum temperature profiles of Tish-Tang-a-Tang Creek between February 20, and June 30, 1978 are presented in Figures 15, 16 and 17.

Fish Rearing Potential

Tish-Tang-a-Tang Creek has a dependable source of good quality water which could be utilized for fish rearing purposes. The migration barrier located at stream mile 2.80 limits the natural production capacity of the stream for anadromous salmonids thereby rendering the stream more suitable for hatchery development from the standpoint of minimizing impacts on native stocks.

A large developed site suitable for hatchery construction is located near the mouth of the creek on the Tish-Tang-a-Tang Campgrounds. Electrical power is available and ownership is by the Hoopa Valley Tribe. Since this area is approximately 300 feet above stream level, the biggest problem would involve getting water to the site. This might be accomplished through a long, gravity-feed conduit or with the existing shallow well and pump located near the mouth of the stream.

Table 9. Maximum (second columns), minimum (third columns) and mean (fourth columns) water temperatures (^{o}C) of Tish-Tang-a-Tang Creek on various dates (first columns) during the summers of 1974 and 1975.

July 1974

8	21.1	15.6	18.3
9	21.1	15.6	18.3
10	22.2	16.7	19.4
25	22.2	17.8	20.0
26	23.3	17.8	20.6
27	22.2	17.2	19.7
28	22.8	17.8	20.3
29	23.3	18.3	20.8
30	23.3	18.3	20.8
31	22.8	17.2	20.0

August 1974

1	22.2	16.7	19.4
2	22.2	17.8	20.0
3	21.1	16.1	18.6
4	19.4	15.6	17.5
5	19.4	16.1	17.8
6	18.9	15.6	17.2
20	19.4	16.1	17.8
21	21.1	16.7	18.9
22	21.7	16.7	18.9
23	21.1	17.8	19.4
24	20.6	17.8	19.2
25	20.6	17.8	19.2
26	20.6	17.8	19.2
27	20.0	17.2	18.6
28	19.4	17.2	18.6
29	19.4	16.7	18.1
30	19.4	16.7	18.1
31	19.4	16.7	18.1

September 1974

1	18.3	16.1	17.2
2	18.3	16.1	17.2
3	18.3	16.1	17.2
4	18.3	16.1	17.2

July 1975

23	20.0	18.9	19.4
24	19.4	17.2	18.3

July 1975

25	20.0	17.2	18.6
26	20.6	17.8	19.2
27	20.0	18.3	19.4
28	20.6	18.3	19.4
29	20.0	17.8	18.9
30	18.3	16.1	17.2
31	19.4	16.1	17.8

August 1975

1	19.4	16.7	18.1
2	19.4	17.2	18.3
3	20.0	17.2	18.6
4	20.0	17.2	18.6
5	19.4	17.2	18.3
6	19.4	17.2	18.3
7	18.3	16.1	17.2
8	19.4	16.1	17.8
9	19.4	17.2	18.3
10	20.0	17.2	18.6
11	20.0	17.2	18.6
12	20.0	18.3	19.2
13	20.0	18.3	19.2
14	20.0	17.8	18.9
15	19.4	17.2	18.3
16	18.9	17.2	17.8
17	18.3	17.2	17.8
18	—	—	—
19	18.3	16.1	17.2
20	18.3	16.1	17.2
21	18.9	17.2	18.1
22	18.3	17.2	17.8
23	17.8	17.2	17.5
24	19.4	17.2	18.3
25	18.3	16.7	17.5
26	18.3	16.7	17.5
27	17.8	16.7	17.2
28	16.7	16.1	16.4
29	16.7	15.0	15.8
30	16.1	15.6	15.8

Figure 15. Maximum and minimum daily water temperatures of Tish-Tang-a-Tang Creek during the period February 20, 1978 to April 27, 1978.

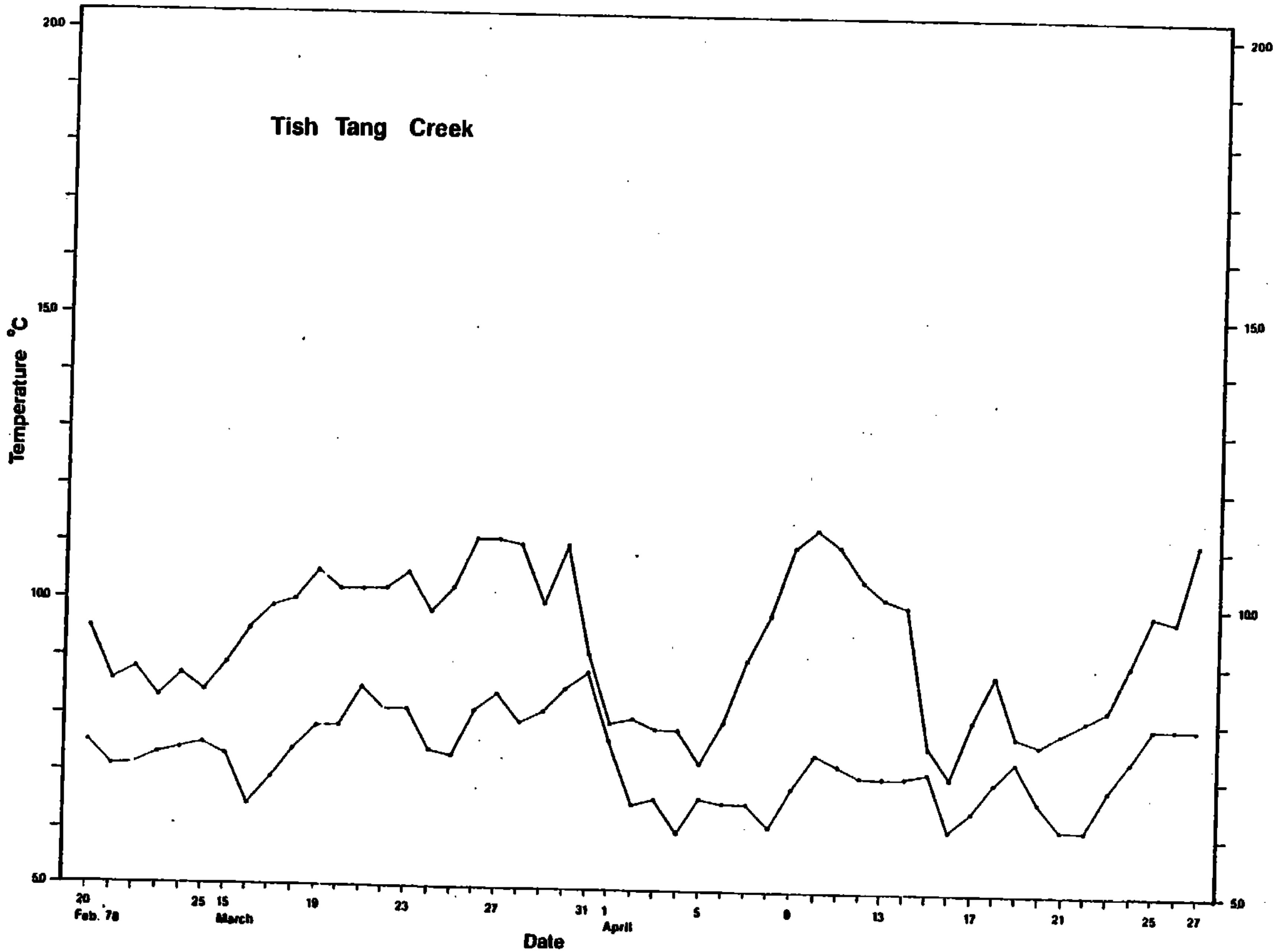


Figure 16. Maximum and minimum daily water temperatures of Tish-Tang-a-Tang Creek during the period April 28, 1978 to June 18, 1978.

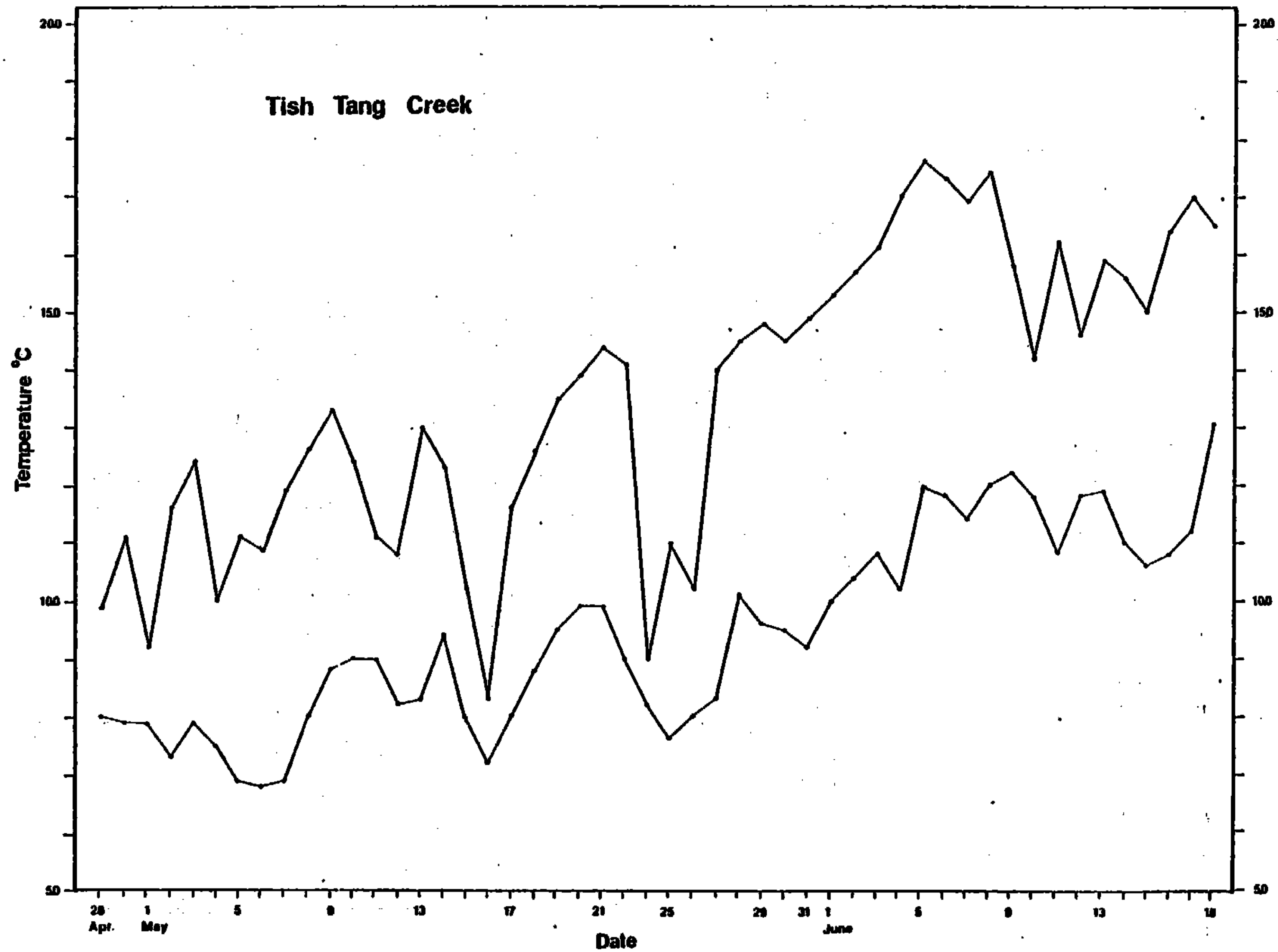
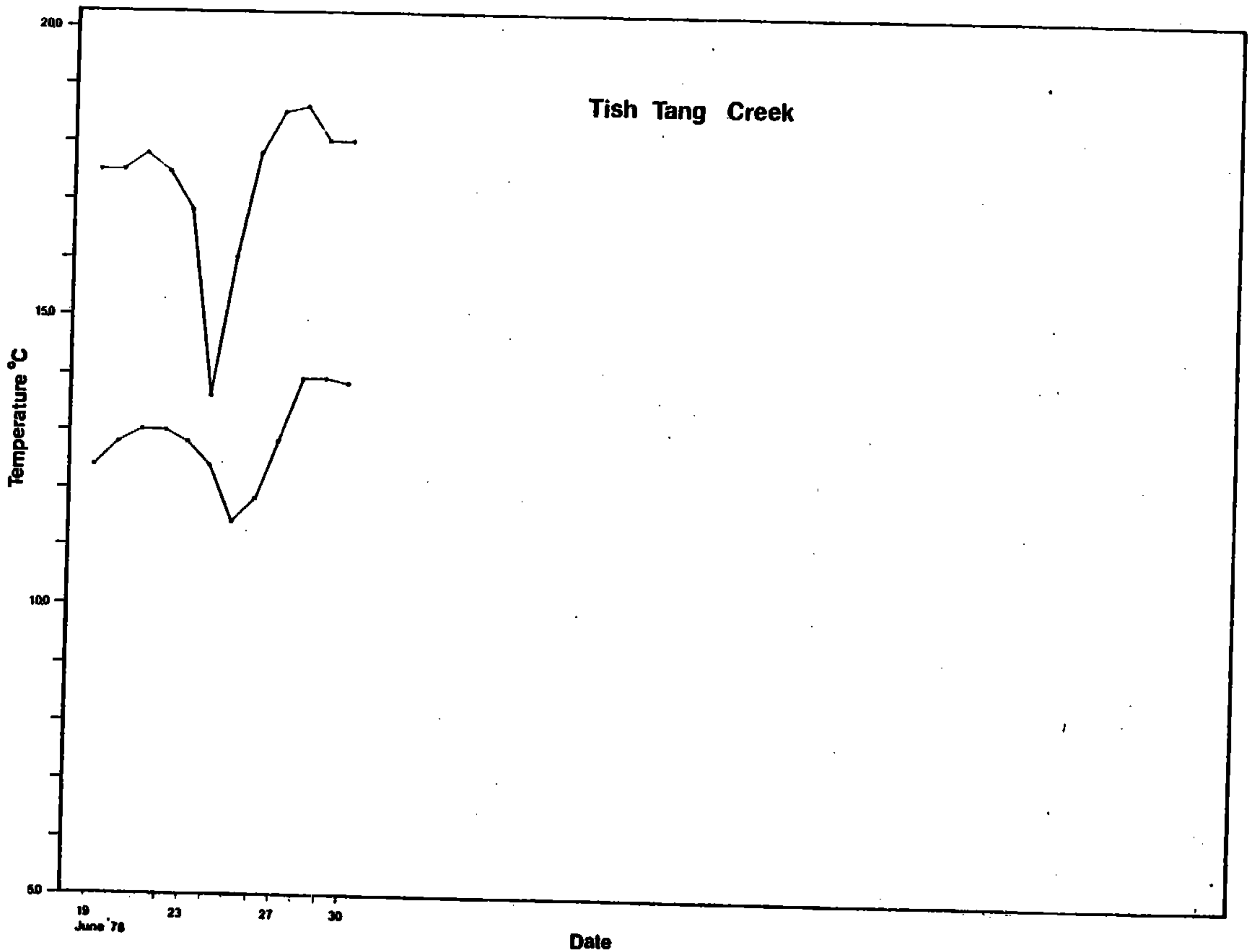


Figure 17. Maximum and minimum daily water temperatures of Tish-Tang-a-Tang Creek during the period June 19, 1978 to June 30, 1978.



SUPPLY CREEK

Water Flow and Temperature Data

Supply Creek has a drainage area of approximately 14.4 square miles and a main stem length of 8.9 miles, the lower 6.8 miles of which are located on the reservation. Four unscreened water diversions exist on the creek the largest of which, located at stream mile 0.9, diverts approximately 2 cfs during summer months.

Maximum-minimum flow ranges of Supply Creek probably vary from approximately 2 to 600 cfs. Recorded minimum summer flows include values of 2.7 cfs on August 15, 1973, 5.4 cfs on September 19, 1973, 9.4 cfs on July 26, 1974, 6.6 cfs on August 22, 1974 and 8.5 cfs on October 11, 1978.

Water temperature generally ranged between 5°C and 10°C during November and December, 1977 (Figure 18). During the spring of 1978, water temperatures generally ranged between 5°C and 15°C (Figures 19 and 20) while maximum daily water temperature frequently exceeded 20°C during the summer of 1978 (Figures 21 and 22).

Fish Rearing Potential

Though considerably smaller than Blue, Pine, Mill and Tish-Tang-a-Tang Creeks, Supply Creek does have a dependable source of good quality water which could be used for fish rearing purposes. Two sites adjacent to the stream in the Hoopa Valley also possess good potential for fish hatchery development because of nearby commercial power and relatively large, flat areas existing above the flood plain. Existing water lines and storage tanks might also be incorporated into fish rearing facilities. Ownership of the area is by the Hoopa Valley Tribe.

Low summer flows and high summer water temperatures would limit the fish rearing potential of Supply Creek. An existing gravity-fed water system in operation on Supply Creek might be incorporated with a sub-gravel filter and supplementary well-water system to allow for year-around rearing.

ROACH CREEK

Water Flow and Temperature Data

Roach Creek has a drainage area of 29.5 square miles and a main stem length of approximately 9.8 miles, the lower mile of which flows through the reservation. Little data is available regarding flow and temperature regimes of Roach Creek. A flow of 6.8 cfs was recorded on October 18, 1978 and flows were estimated at 10 cfs and 15 cfs, respectively, on July 25, 1961 and August 22, 1961. Because of the steep-sided canyon drainage and abundant stream-side cover, it is anticipated that Roach Creek may remain somewhat cooler during the summer than other streams on the reservation.

Fish Rearing Potential

Roach Creek has a dependable source of water which, because of the steep-

Figure 18. Maximum and minimum daily water temperatures of Supply Creek during the period November 10, 1977 to December 21, 1977.

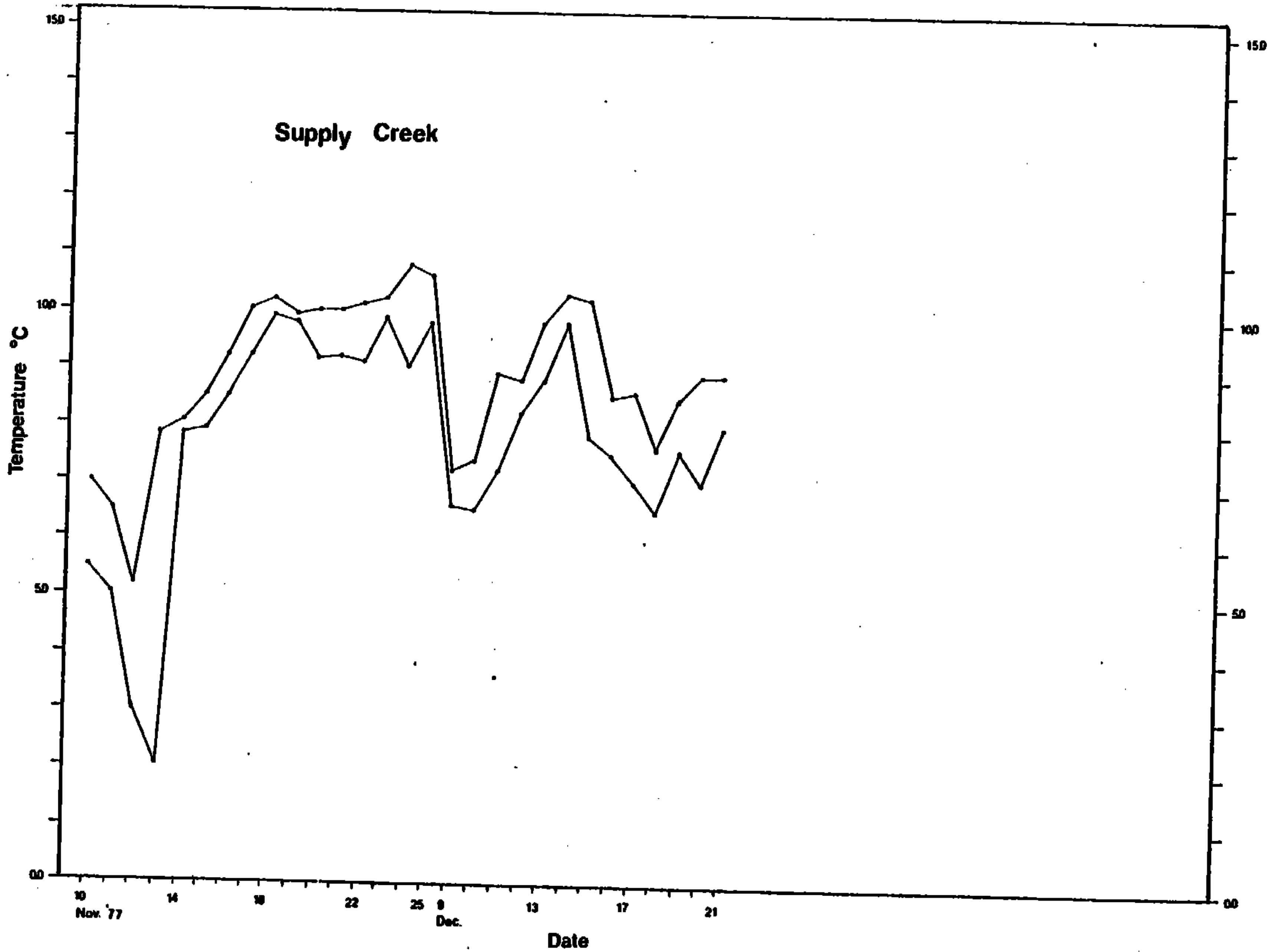


Figure 19. Maximum and minimum daily water temperatures of Supply Creek during the period March 6,1978 to April 24, 1978.

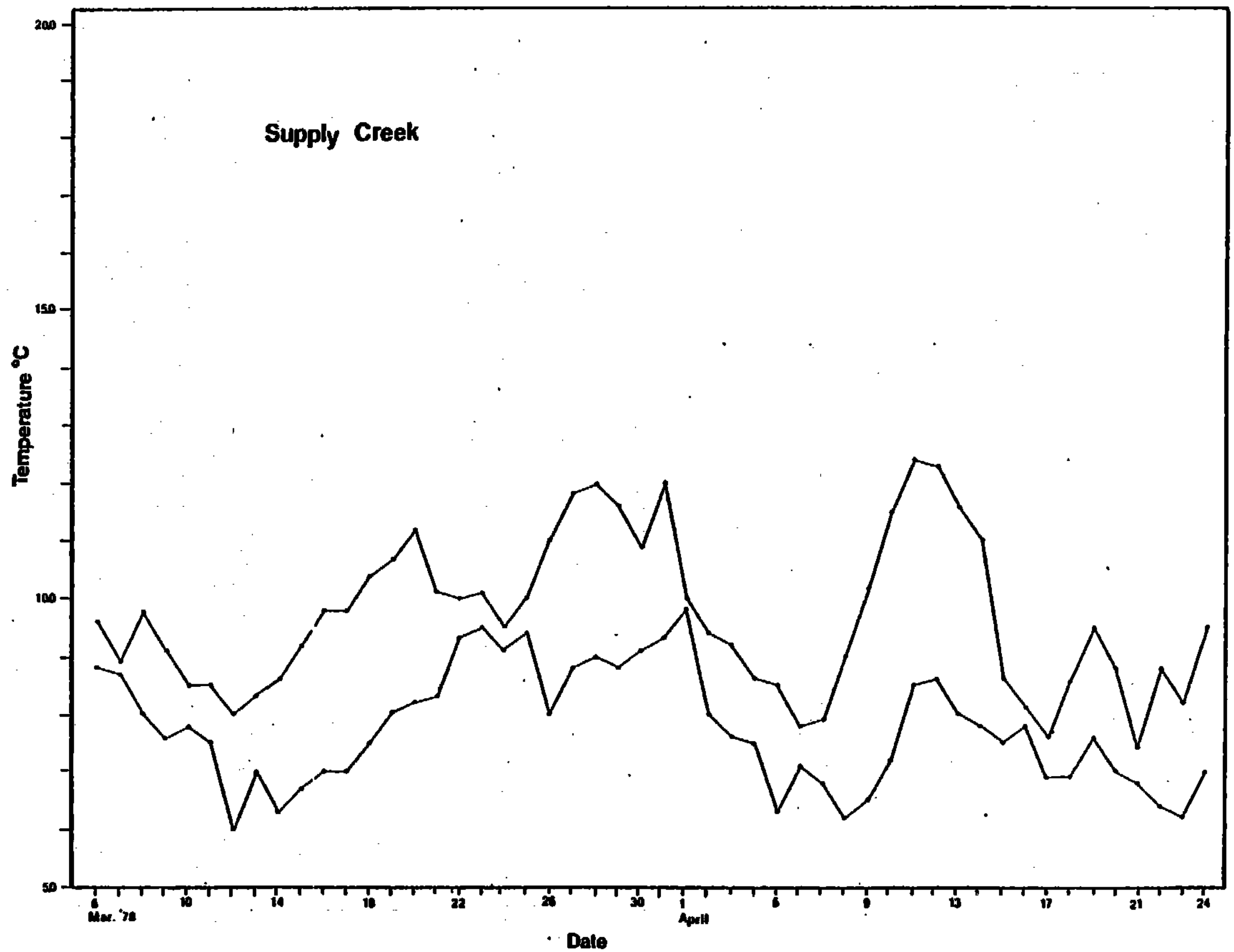


Figure 20. Maximum and minimum daily water temperatures of Supply Creek during the period April 25, 1978 to June 15, 1978.

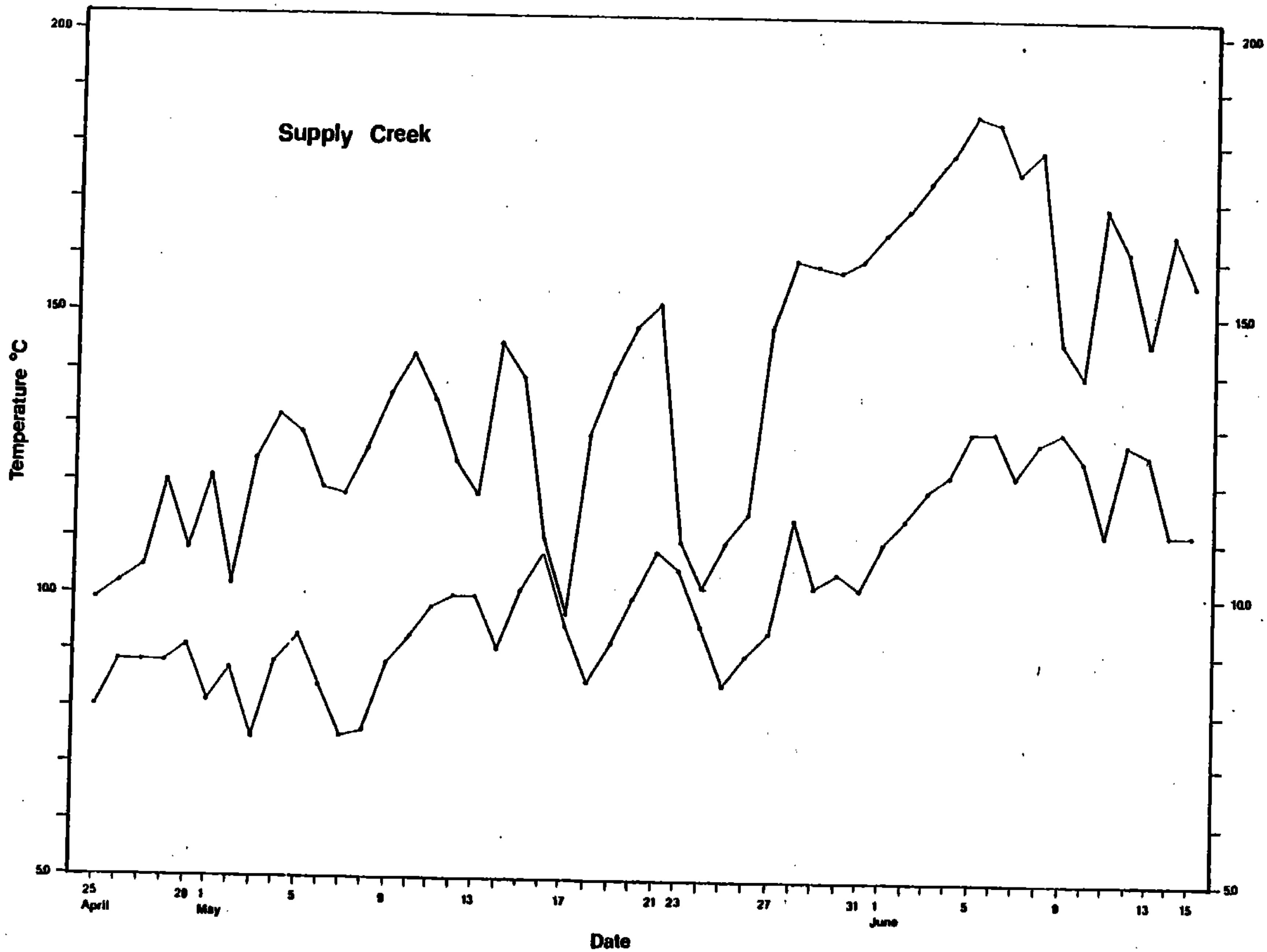


Figure 21. Maximum and minimum daily water temperatures of Supply Creek during the period July 1, 1978 to August 18, 1978.

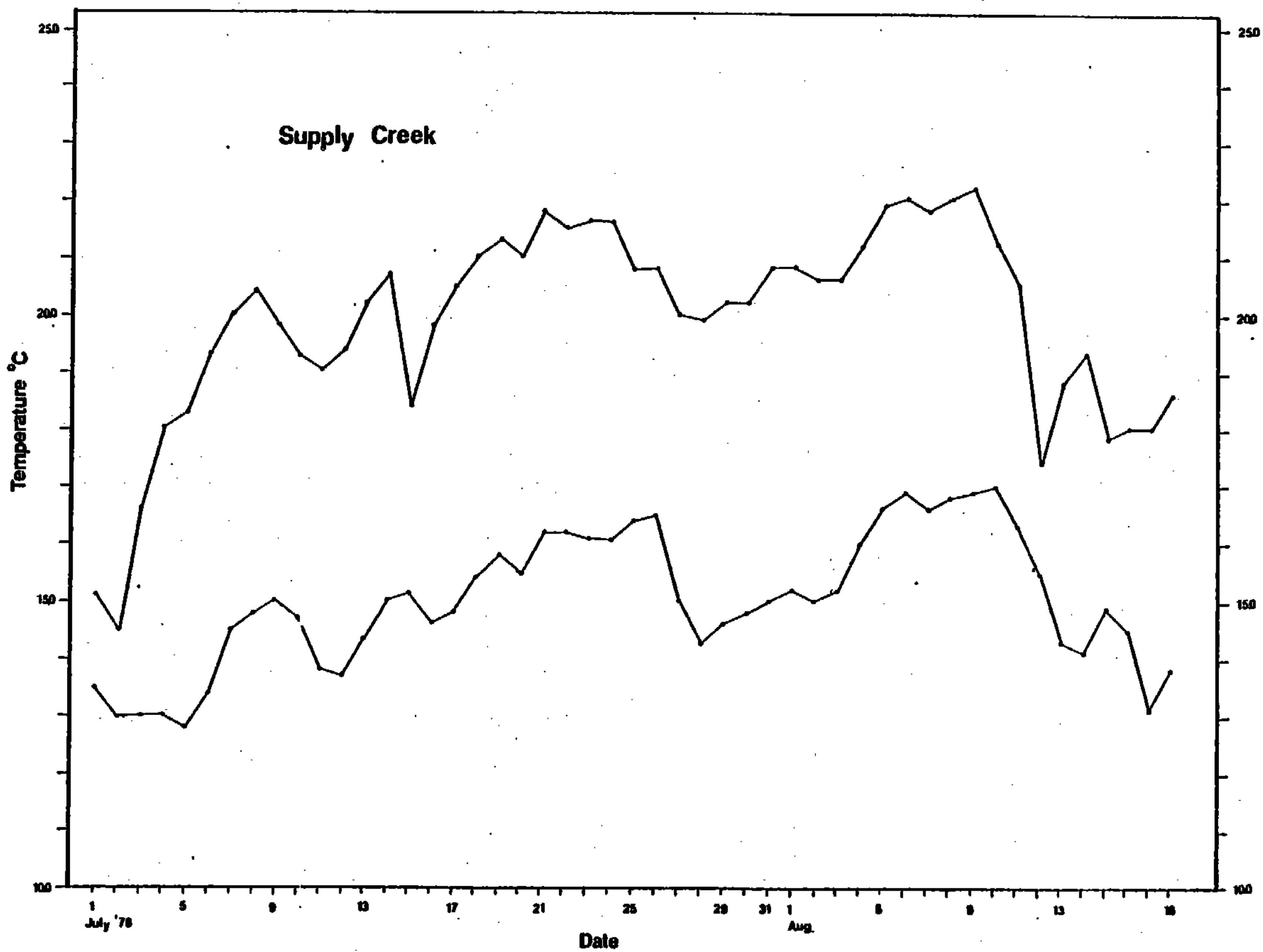
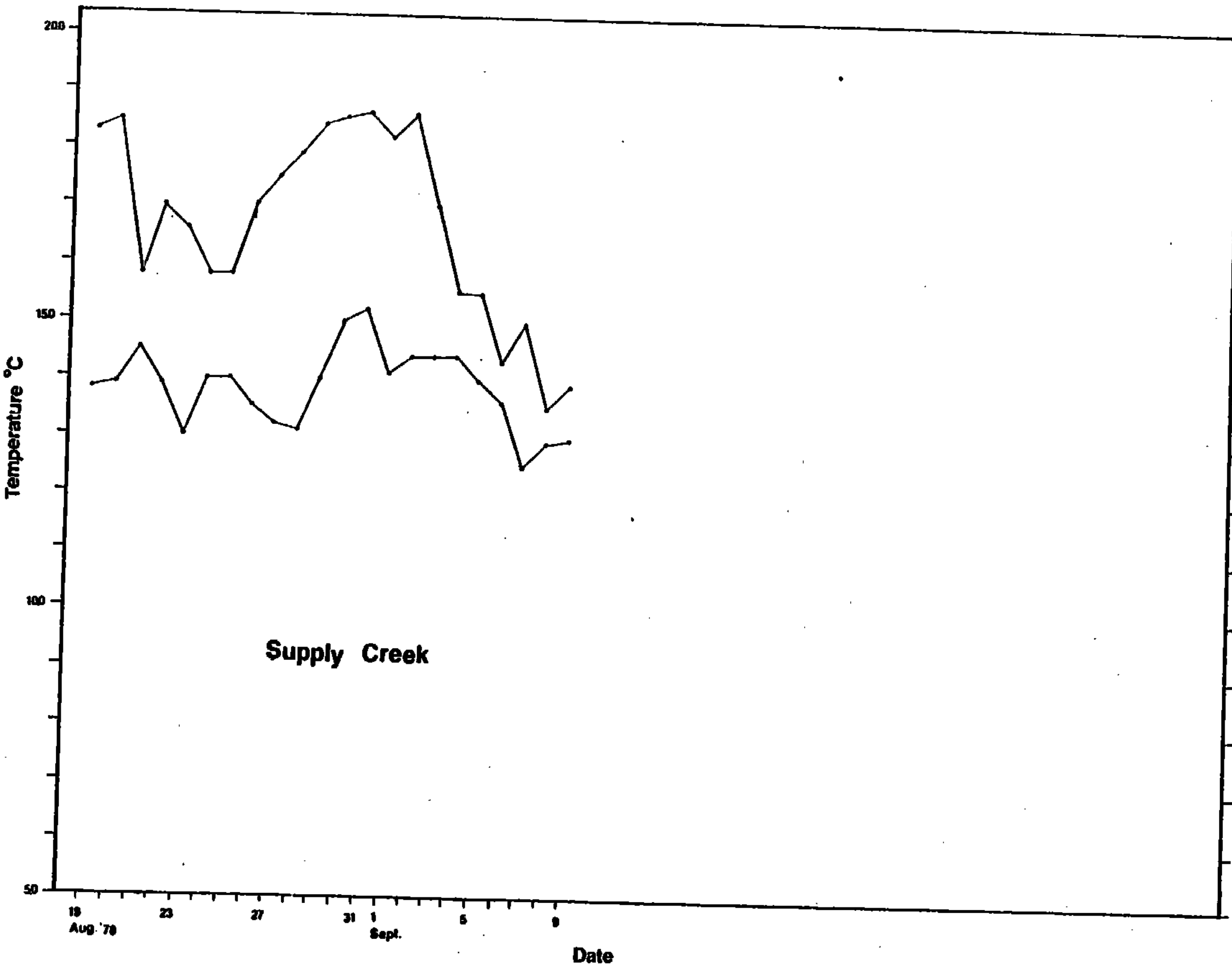


Figure 22. Maximum and minimum daily water temperatures of Supply Creek during the period August 19, 1978 to September 9, 1978.



sided drainage and relatively low logging activity in the area, may possess good fish rearing characteristics. Dense algal growths were observed covering the stream substrate during early spring months of 1978.

No commercial power is available along Roach Creek and the only access is by boat via the Klamath River. Property ownership along the lower mile of Roach Creek is by the Simpson Timber Company, Big Flat Timber Company and Champion International Corporation.

TERWER (TURWAR) CREEK

Flow and Temperature Data

Terwer Creek has a drainage area of 32.8 square miles and a combined main stem and south fork length of approximately 16.9 miles. The lower mile of the main stem flows through the reservation. Maximum discharge of Terwer Creek probably approaches 2,000 cfs but during the summer months, the lower mile to mile and one-half is dry, probably a result of highly porous gravels. In 1978, the lower portion of the stream dried up around mid-June and remained in this condition through October. In October, 1978, however, flow at stream mile 2.8 ranged between 20 cfs and 25 cfs. It is likely that considerable sub-gravel flows occur along the lower portion of the stream.

A maximum-minimum daily water temperature profile of Terwer Creek from December 6, 1977 to June 16, 1978 when the stream went dry is presented in Figures 23, 24, and 25. Temperatures of the sub-gravel water during summer months may be considerably cooler than other surface waters in the area.

Fish Rearing Potential

Of all the streams tributary to the lower Klamath River which are conveniently accessible, Terwer Creek probably possesses the best fish rearing potential. It is likely that a considerable volume of cool sub-gravel water exists along the Terwer Creek floodplain and that this water could be tapped with relative ease for fish rearing purposes. Good rearing sites exist along the east bank between stream miles 0.75 to 1.0. Commercial power is available and year-around access is via a good paved road. Ownership of the land adjacent to the lower 0.81 miles of Terwer Creek is by the U.S. Government.

HUNTER CREEK

Water Flow and Temperature Data

Hunter Creek, a conveniently accessible tributary to the lower Klamath River, has a drainage area of 23.8 square miles and a main stem length of 7.1 miles, the lower 1.3 miles of which lie within the reservation. Water flow and temperature data for Hunter Creek is not well known but a flow of 14.9 cfs was recorded on October 13, 1978. Like Terwer Creek, portions of lower Hunter Creek dry up during the summer, probably a result of porous gravels.

Figure 23. Maximum and minimum daily water temperatures of Terwer Creek during the period December 6, 1977 to March 3, 1978.

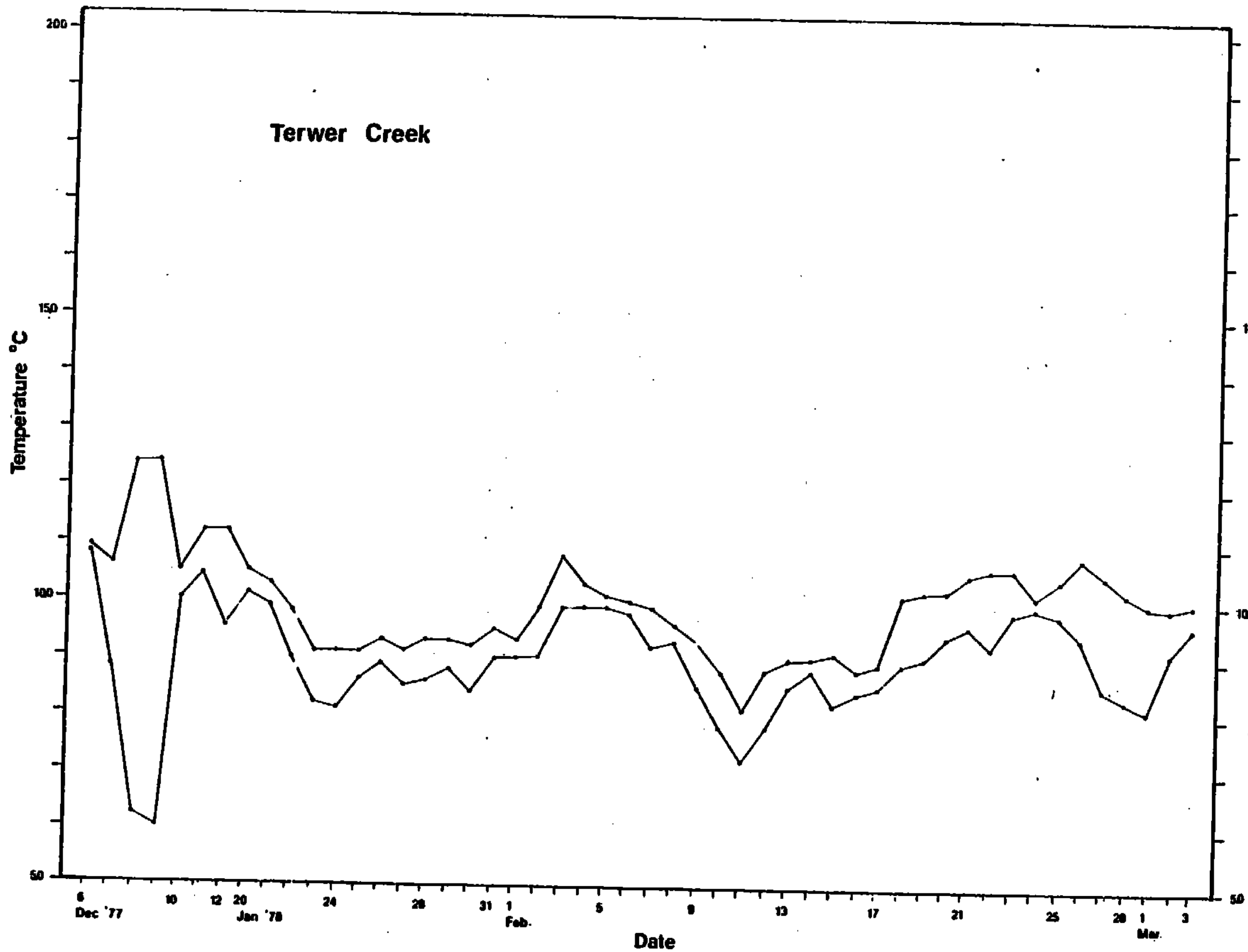


Figure 24. Maximum and minimum daily water temperatures of Terwer Creek during the period March 3, 1978 to April 21, 1978.

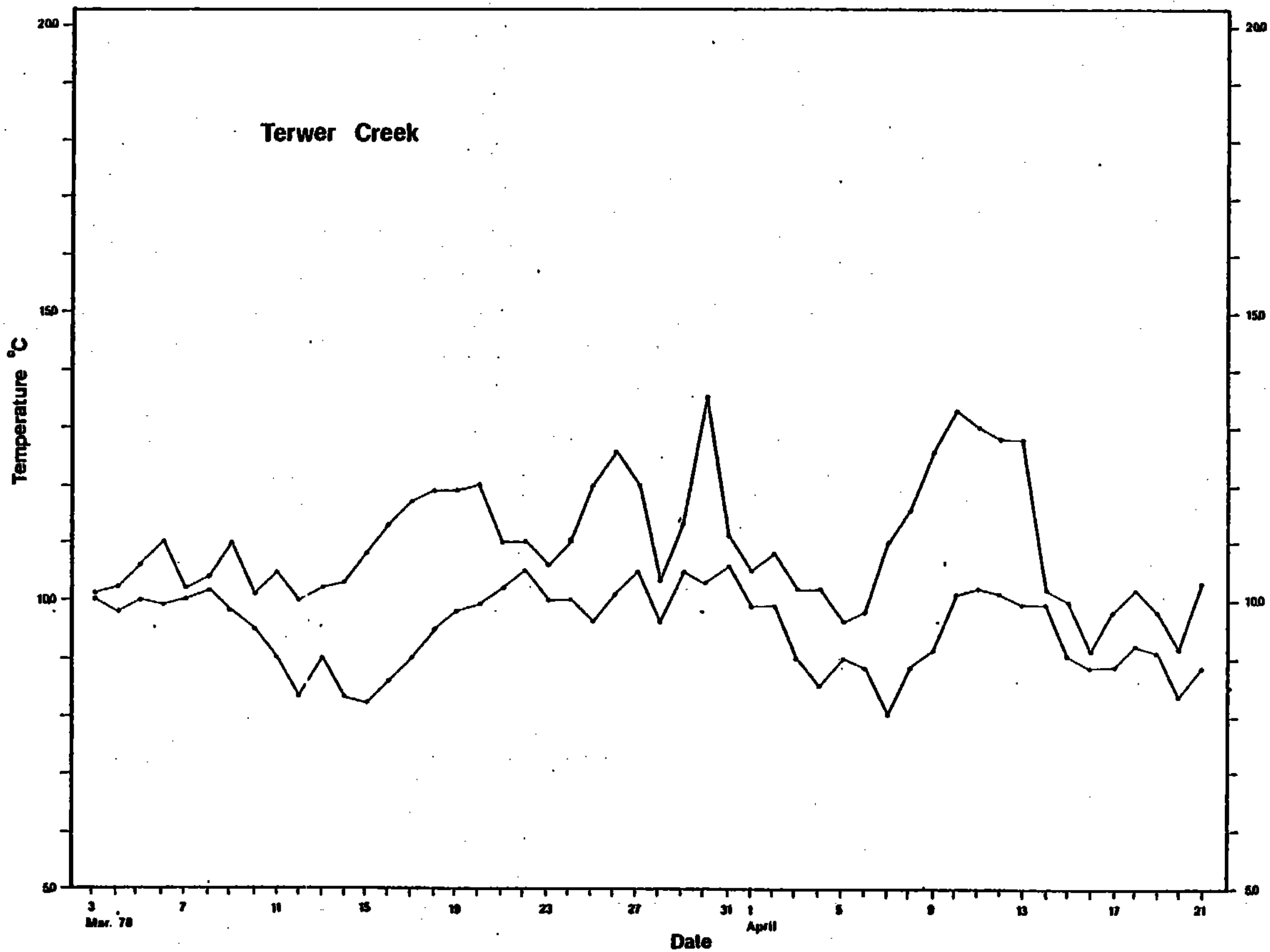
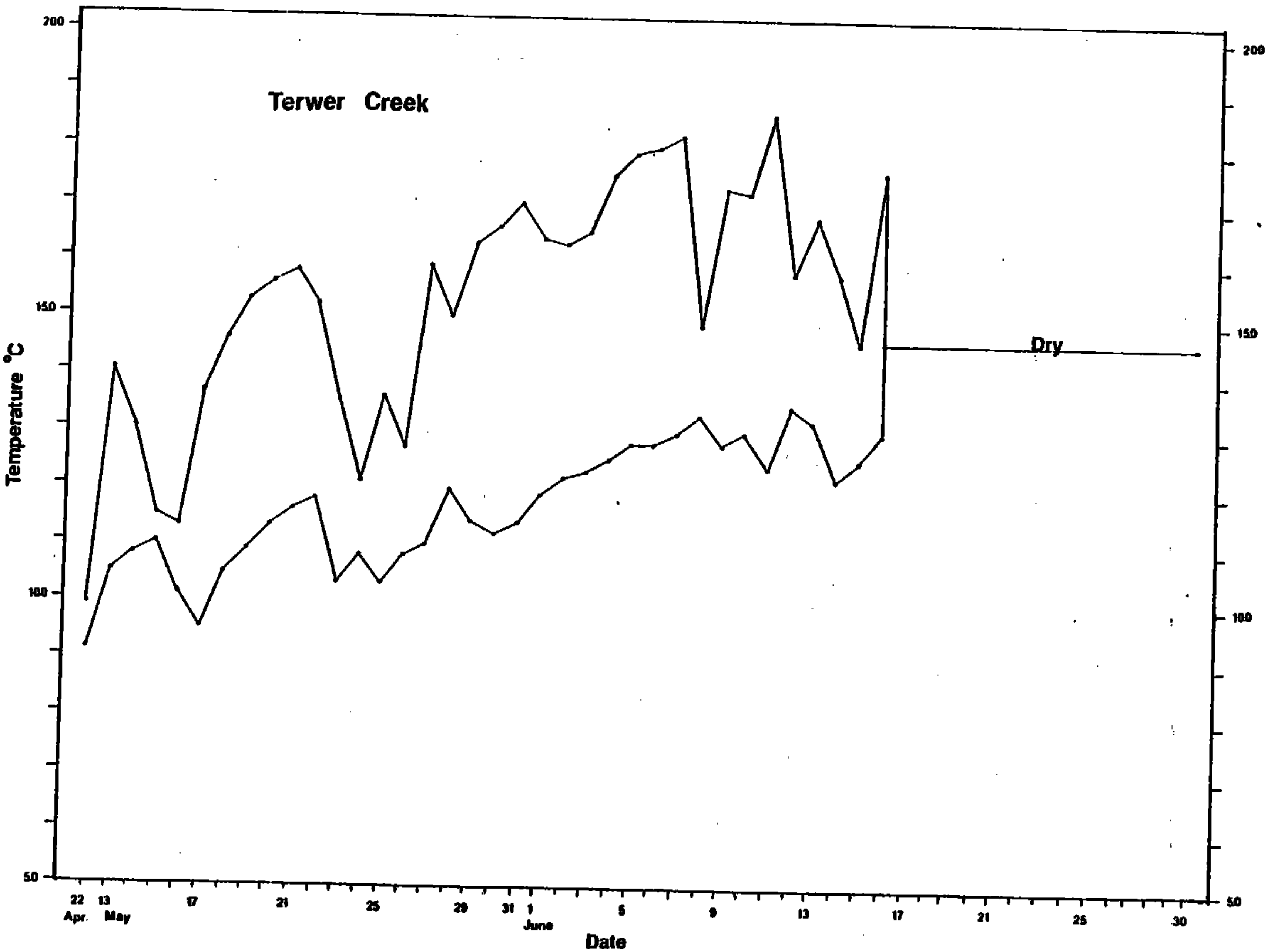


Figure 2?. Maximum and minimum daily water temperatures of Terwer Creek during the period April 22, 1978 to June 16, 1978 when the stream went dry.



Fish Rearing Potential

It is likely that during the summer months, a considerable volume of cool sub-gravel water exists in the Hunter Creek floodplain and that this water could be tapped with relative ease for fish rearing purposes. Potential rearing sites exist along the lower portion of the stream and commercial power and convenient access is available. Land ownership is by a number of private individuals.

SALT CREEK

Water Flow and Temperature Data

The Salt Creek - High Prairie Creek drainage includes approximately 4.4 square miles and is located immediately adjacent to the Hunter Creek drainage. Salt Creek has a main stem length of 3.3 miles while High Prairie Creek, a major tributary, has a main stem length of 4.5 miles. The lower 1.3 miles of Salt Creek flows through the reservation and enters the Klamath River within 100 yards of the mouth of Hunter Creek. A flow of 6.2 cfs was measured on Salt Creek on October 13, 1978. Water temperature profiles for Salt Creek are unavailable.

Fish Rearing Potential

The Salt Creek drainage has been heavily impacted and water quality is questionable. If hatchery development is considered on the adjacent Hunter Creek drainage, Salt Creek might be utilized as a supplementary water source.

PECWAN CREEK

Water Flow and Temperature Data

Pecwan Creek has a drainage area of approximately 27.7 square miles and a main stem length of 6.6 miles, the lower 1.3 miles of which flow through the reservation. Water flow and temperature data for Pecwan Creek are incomplete. A flow of 4.3 cfs was measured on October 18, 1978 and maximum-minimum daily water temperature profiles were recorded during the 1977-1978 winter period (Figures 26 and 27).

Fish Rearing Potential

Pecwan Creek is probably the most conveniently accessible, relatively large tributary stream in the Johnson's Settlement area. There is no commercial power in the area but a good rearing area site is located at stream mile 0.13 which could be served by gravity-fed water. Land ownership of the lower 0.14 miles adjacent to Pecwan Creek is by the U.S. Government.

Figure 26. Maximum and minimum daily water temperatures of Pecwan Creek during the period December 1, 1977 to January 18, 1978.

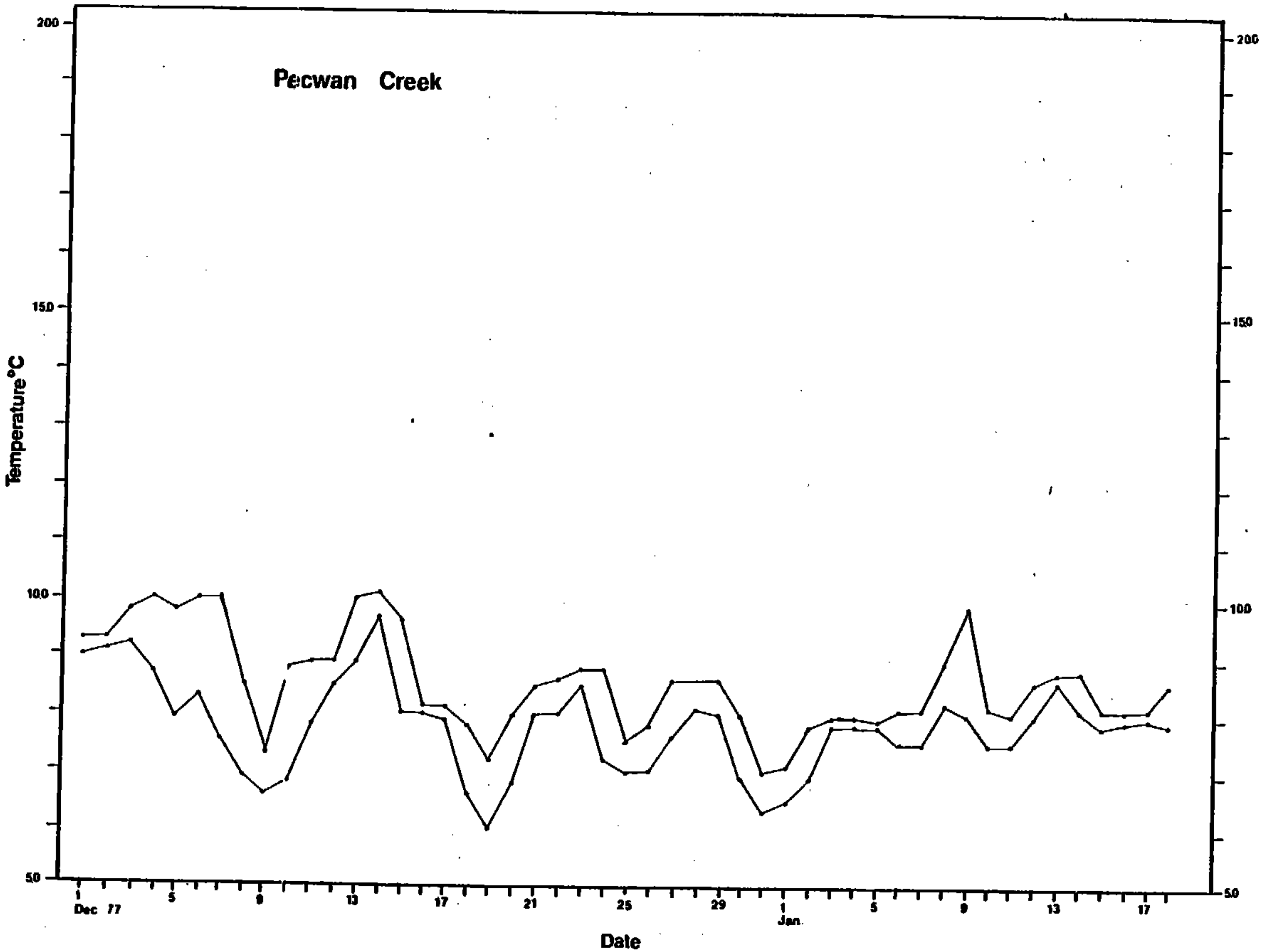
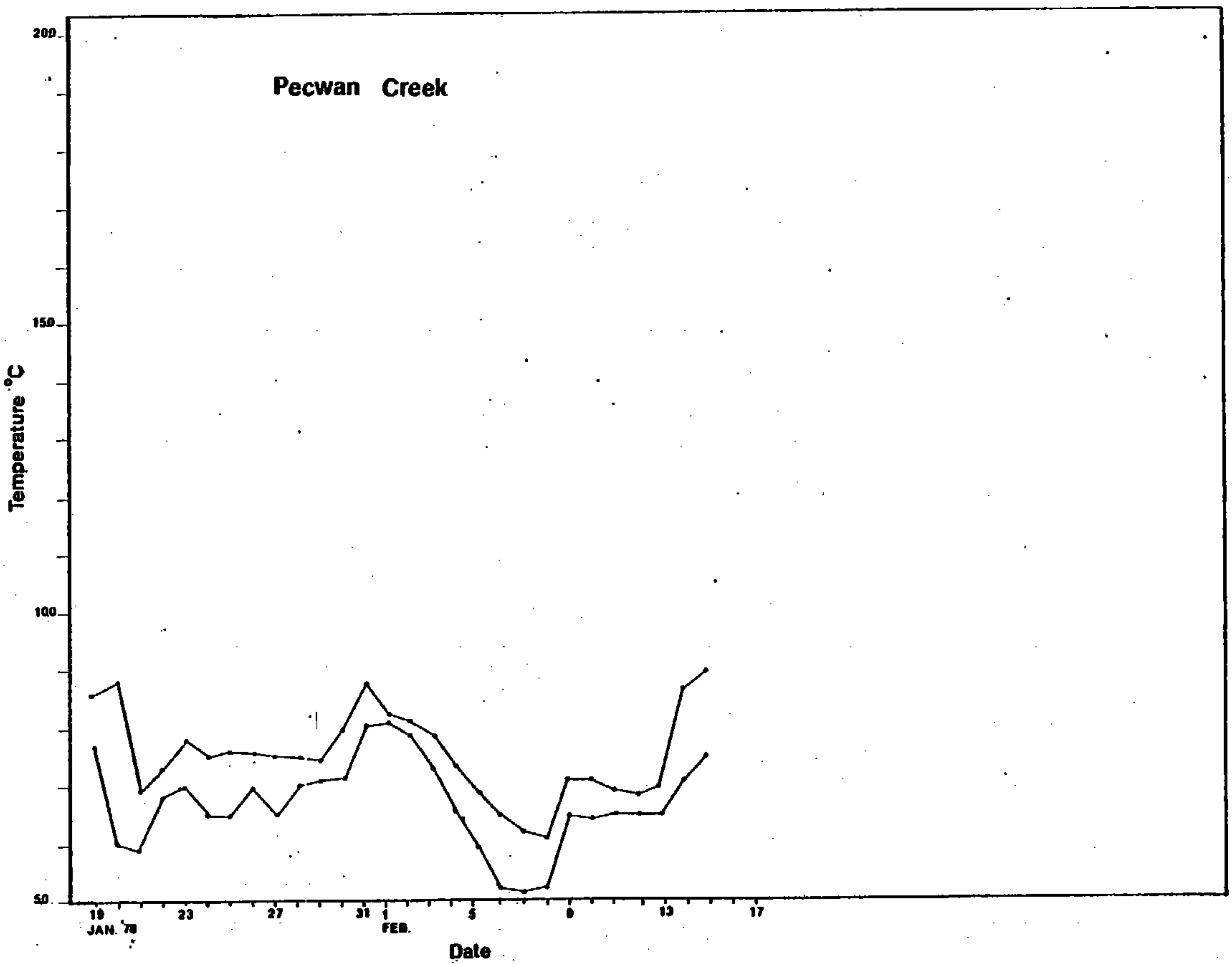


Figure 27. Maximum and minimum daily water temperatures of Pecwan Creek during the period January 19, 1978 to February 17, 1978.



CAPPELL CREEK

Water Flow and Temperature Data

Cappell Creek has a drainage area of approximately 8.30 square miles and a main stem length of 4.3 miles, the lower mile of which lies within the reservation boundary. A flow of 6.1 cfs was measured on October 17, 1978 and it appears that minimum summer flows usually exceed 5 cfs. A maximum-minimum daily water temperature profile for Cappell Creek is not available.

Fish Rearing Potential

Like Roach Creek, Cappell Creek flows through a steep-sided drainage which allows for minimum sunlight exposure. The stream-side area is also characterized by an abundant vegetative canopy. Because of these conditions, it is possible that Cappell Creek remains somewhat cooler during the summer months as compared to other surface waters in the area.

No commercial power is available in the area and access is by the Johnson's Settlement road. A possible fish rearing site about one-half acre in size is located below the Johnson's Settlement road overpass. Land ownership is by the Simpson Timber Company.

TULLY CREEK

Water Flow and Temperature Data

Tully Creek has a drainage area of approximately 17.3 square miles and a main stem length of 8.8 miles, the lower 1.3 miles of which flow through reservation land. Stream flow was measured at 6.9 cfs on October 17, 1978. Water temperature profiles are not known.

Fish Rearing Potential

It appears that minimum summer flows in Tully Creek generally exceed 5 cfs. High summer water temperatures may limit the fish rearing potential of the water source. No commercial power is available in the area. Year-around access is available to the stream via a gravel road leading from the Martins Ferry bridge. A potential rearing site is located near the mouth of the stream. A number of individuals own land along the stream.

CAMPBELL CREEK

Water Flow and Temperature Data

Campbell Creek has a drainage area of approximately 16.5 square miles and a main stem length of 7.8 miles. Only the lower 0.86 miles of the stream flow through the reservation. Low summer flow measurements include values of 5.3 cfs on July 26, 1974, 4.5 cfs on August 22, 1974, 3.2 cfs on September 20, 1974 and 5.5 cfs on October 11, 1978. Water temperature profiles for Campbell Creek are not known but it is likely that summer water temperatures frequently exceed 20°C.

Fish Rearing Potential

Despite low summer flows and probable high summer water temperatures, Campbell Creek may be considered for small-scale fish rearing development because of its good accessibility, commercial power availability, potential rearing area sites and favorable land ownership status (Hoopa Valley Tribe).

HOSTLER and AH PAH CREEKS

Hostler and Ah Pah Creeks do not have a high potential for hatchery development as compared to the previously described streams. They probably do, however, exhibit water temperature regimens which are representative of the many small streams which flow through the Reservation. Recording thermographs were placed in these streams in 1977 and 1978 to establish daily maximum and minimum water temperature profiles which are presented in Figures 28 through 35.

KLAMATH RIVER

The Klamath and Trinity Rivers, themselves, should not be ignored as potential water sources in future hatchery development studies. Recordings of four thermographs placed in the Klamath River below the Highway 101 bridge, two of which measured surface temperature and two of which recorded temperatures at the 15-20 foot level, showed considerable temperature differences between upper and lower levels of the water column during the summer of 1978 (Figures 36 through 39). Cooler bottom waters of the Klamath and Trinity Rivers could be pumped up to assist in summer fish rearing programs.

LOW FLOW SUMMARIZATION - ALL STREAMS

During the period, October 11, to October 18, 1978, flows on most of the tributary streams on the Hoopa Valley Indian Reservation were measured (Table 10). These flows are assumed to be near-minimum summer flows for 1978 and probably approximate minimum summer flows during most years.

Figure 28. Maximum and minimum daily water temperatures of Ah Pah Creek during the period December 9, 1977 to January 27, 1978.

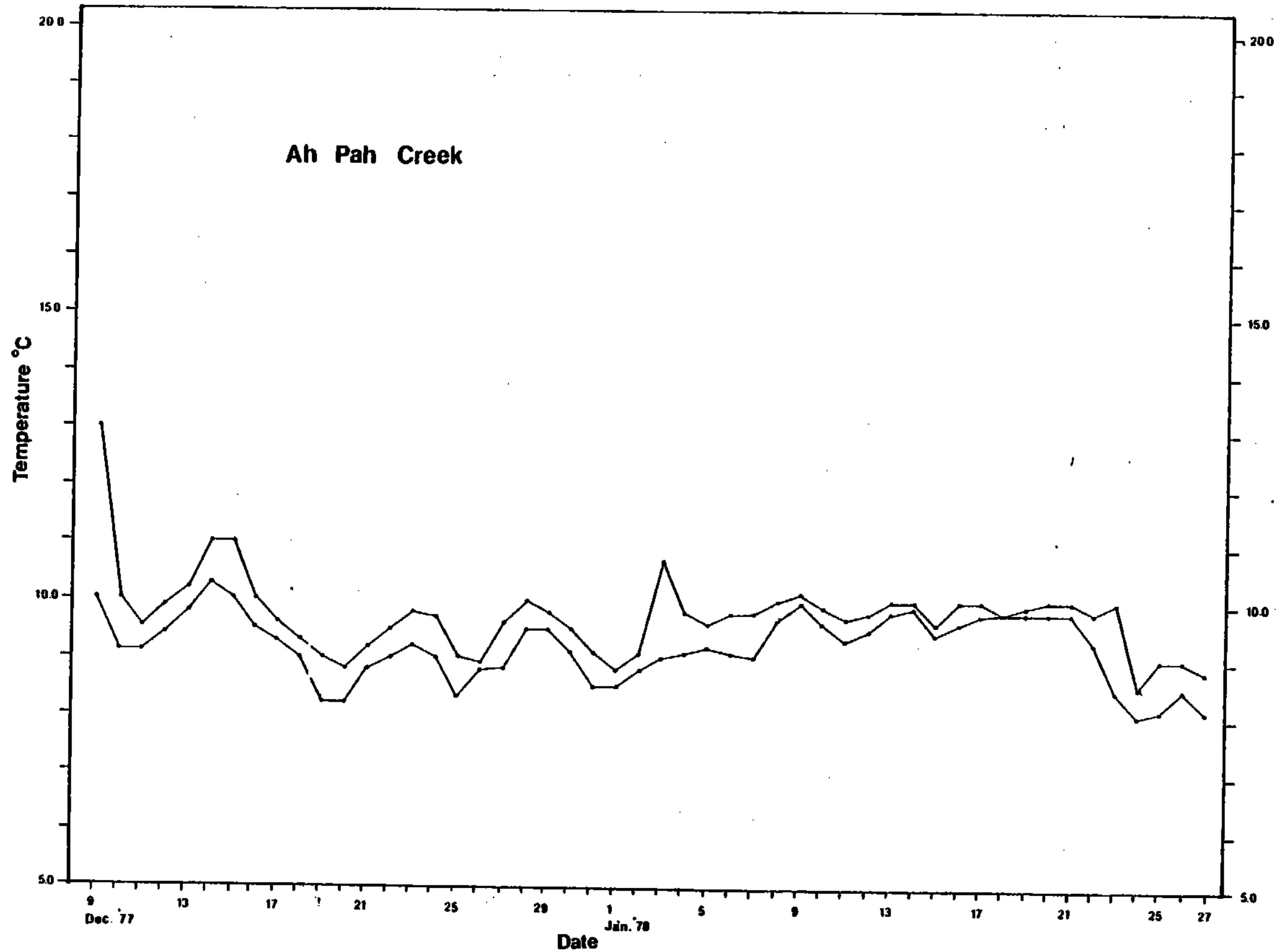


Figure 29. Maximum and minimum daily water temperatures of Ah Pah Creek during the period January 28, 1978 to March 28, 1978.

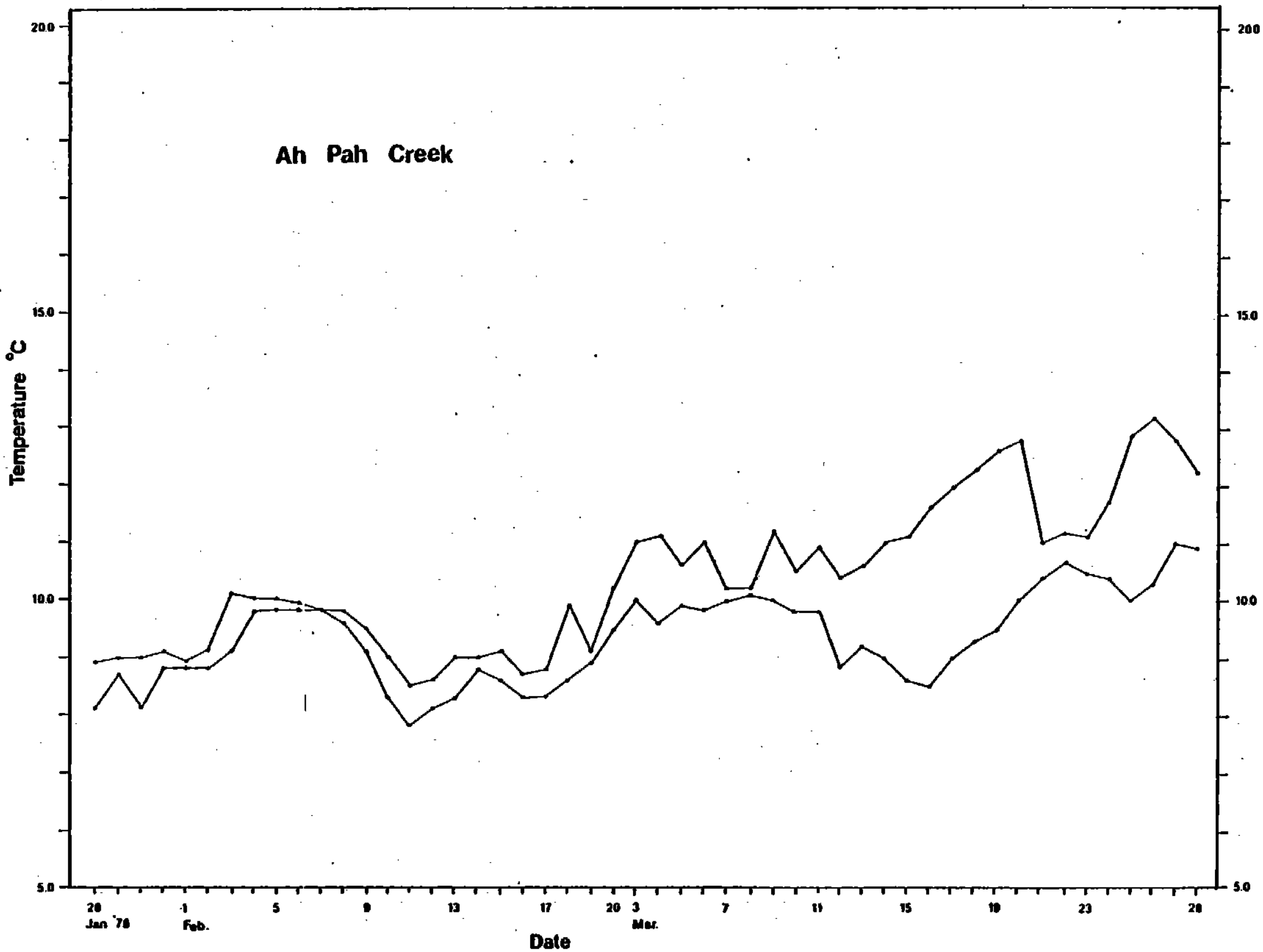


Figure 30. Maximum and minimum daily water temperatures of Ah Pah Creek during the period March 29, 1978 to May 18, 1978.

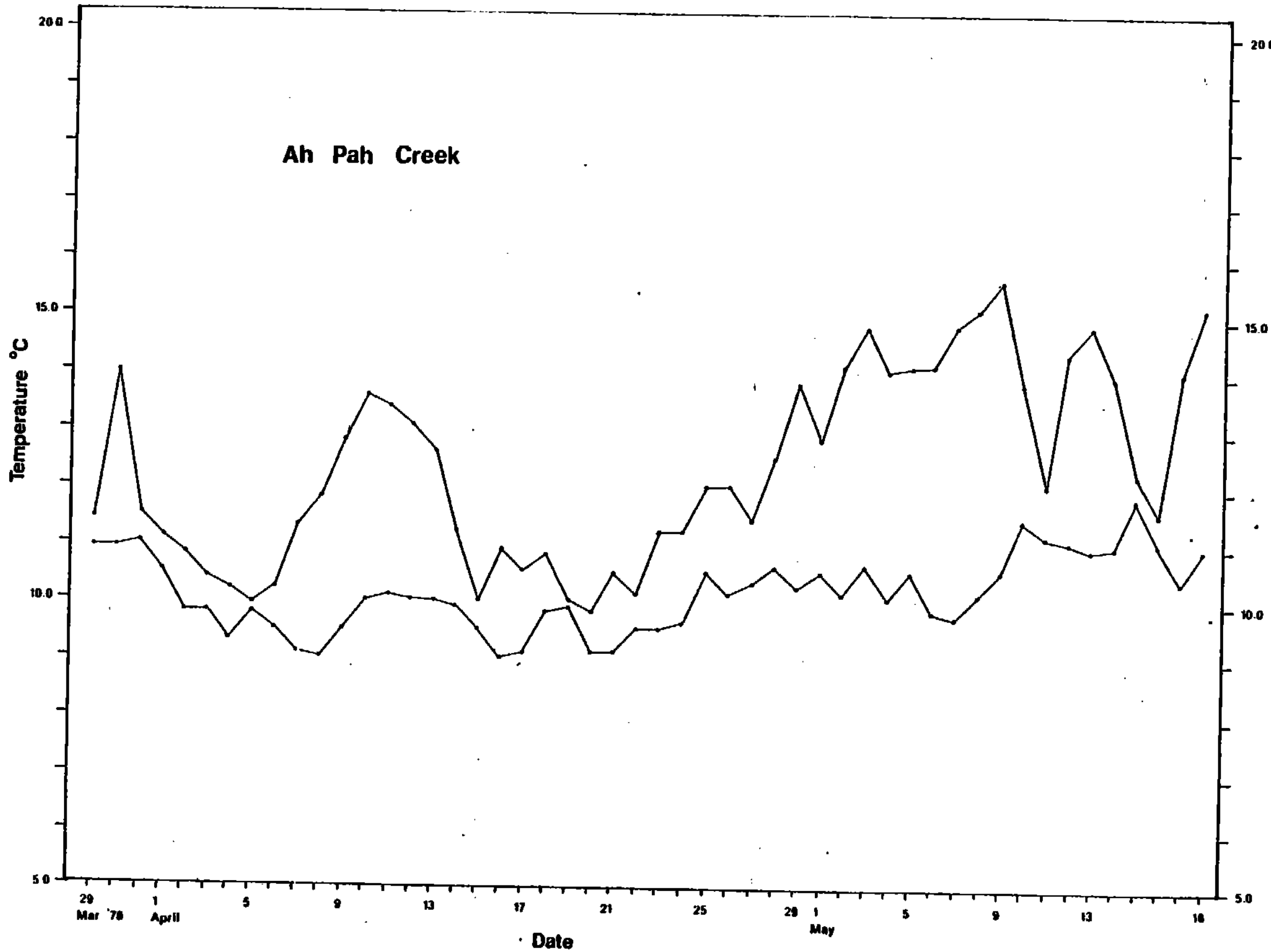


Figure 31. Maximum and minimum daily water temperatures of Ah Pah Creek during the period May 19, 1978 to July 7, 1978.

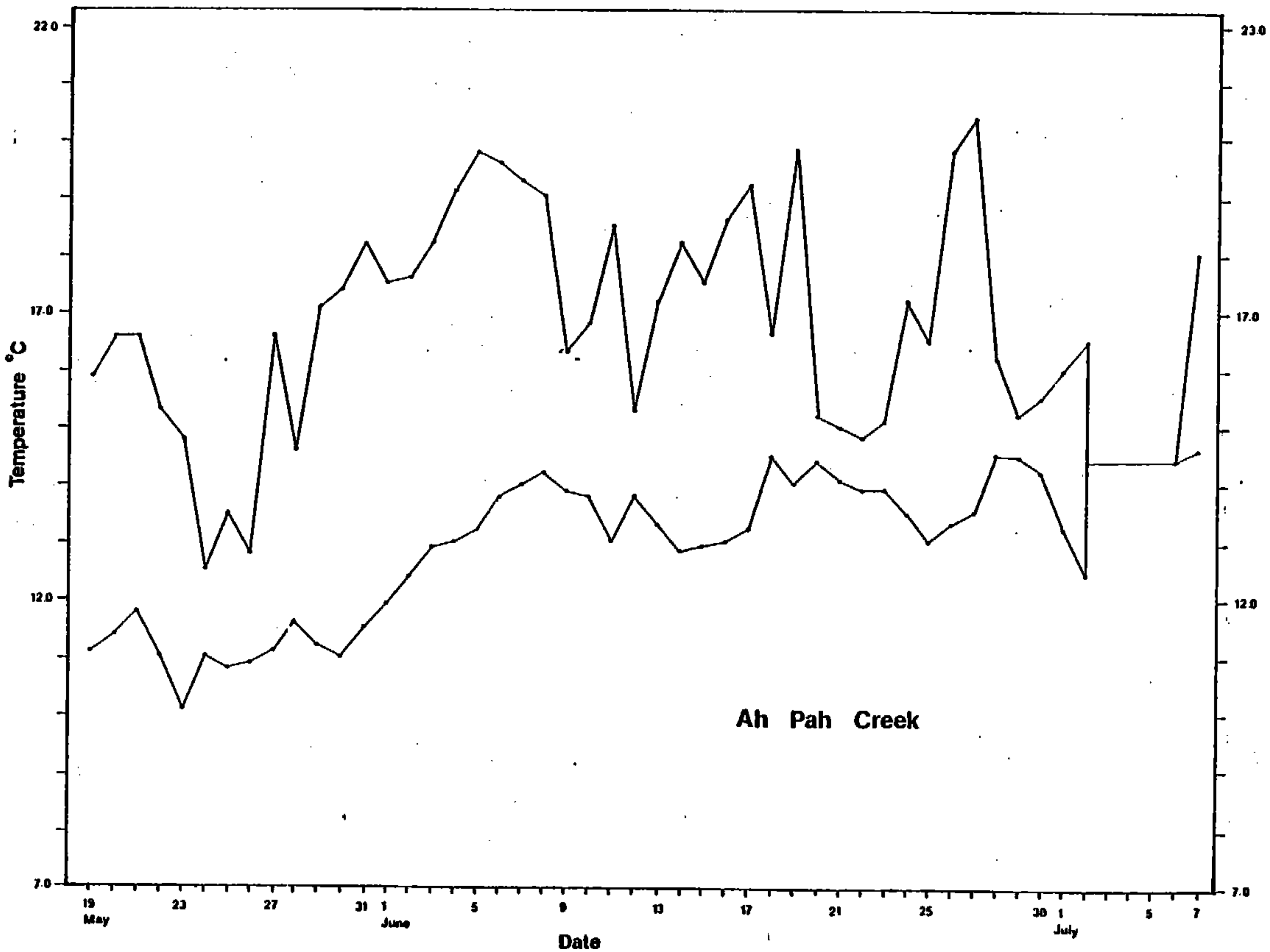


Figure 32. Maximum and minimum daily water temperatures of Ah Pah Creek during the period July 8, 1978 to August 1, 1978.

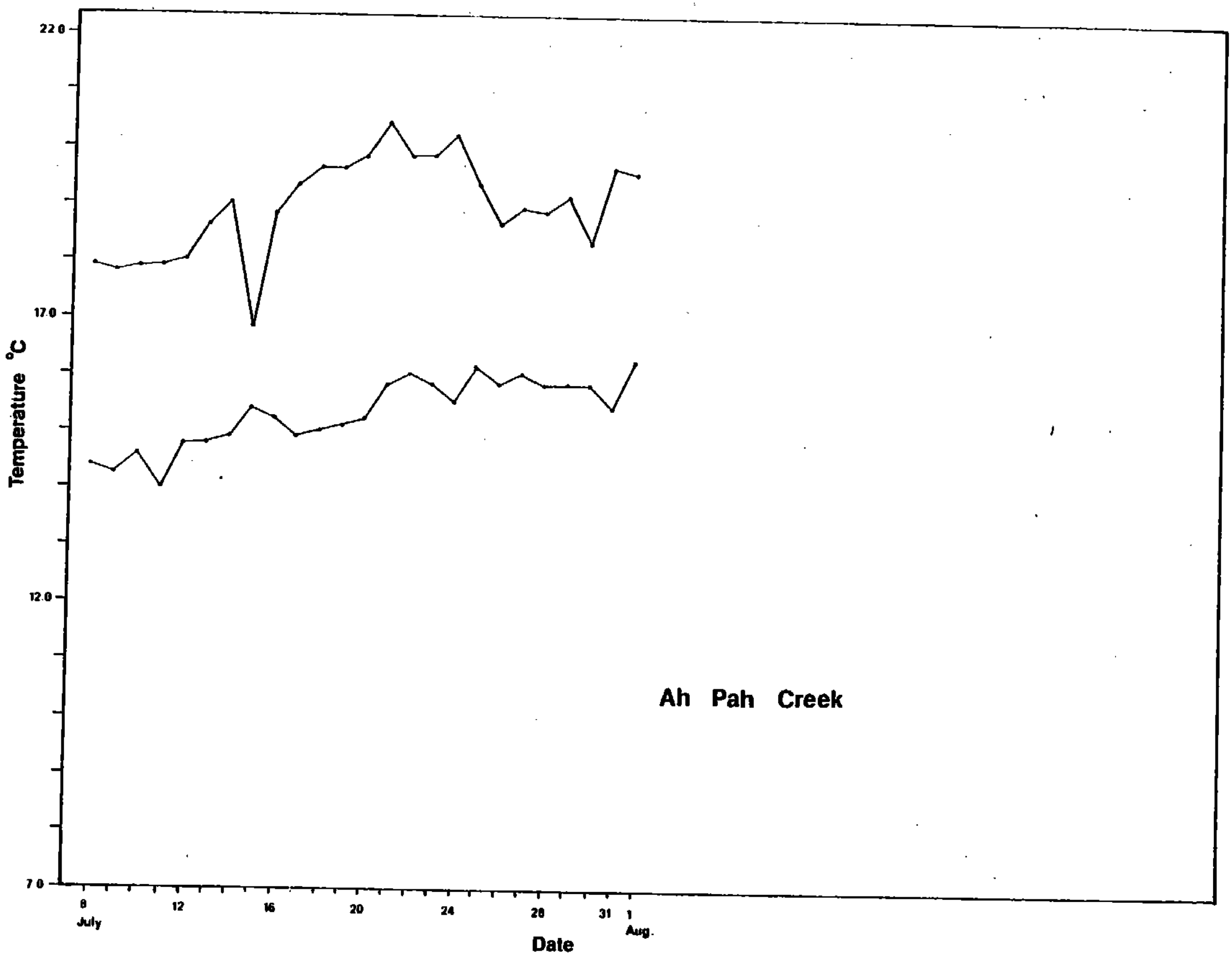


Figure 33. Maximum and minimum daily water temperatures of Hostler Creek during the period November 18, 1977 to January 6, 1978.

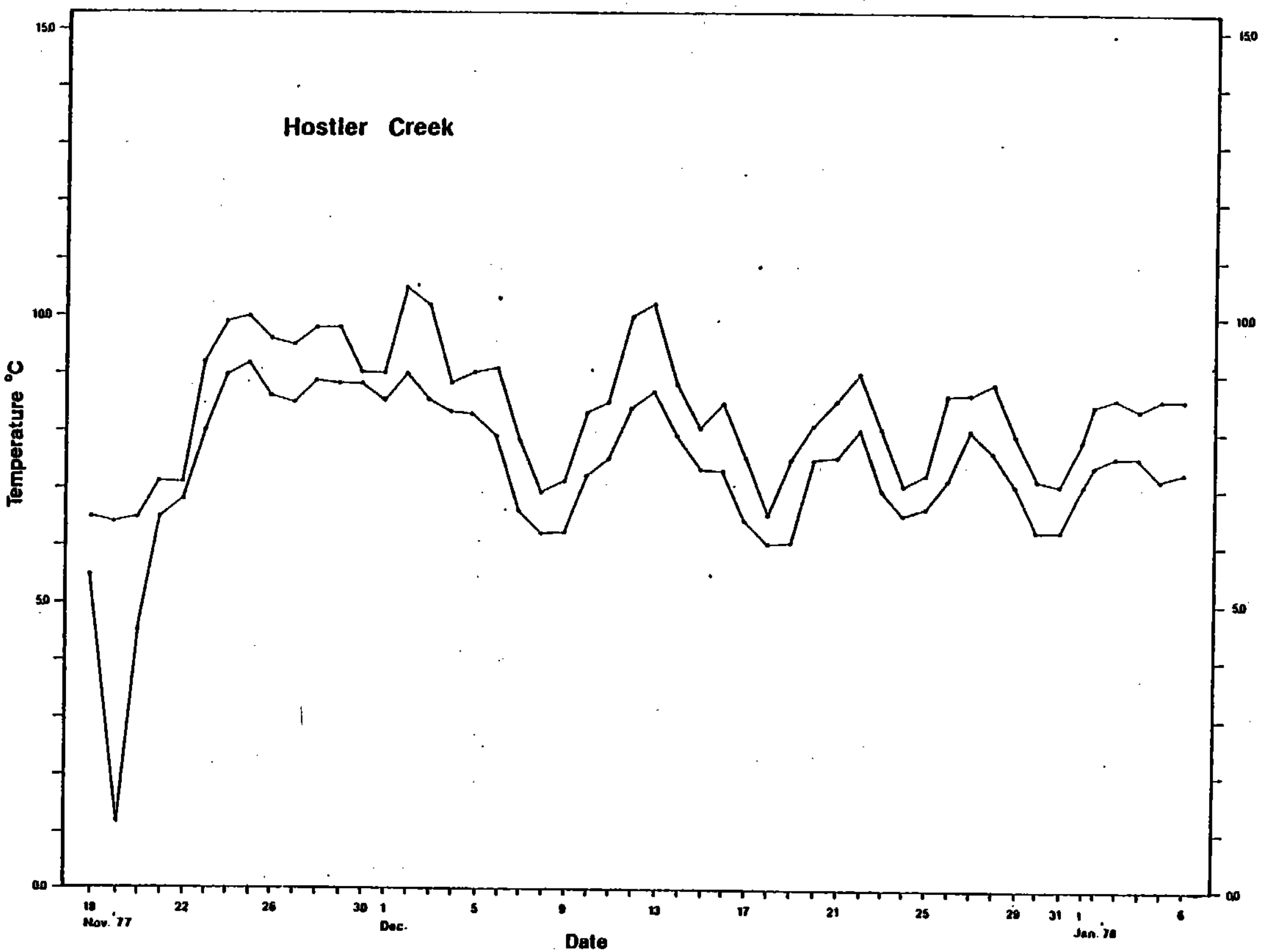


Figure 34. Maximum and minimum daily water temperatures of Hostler Creek during the period January 7, 1978 to February 24, 1978.

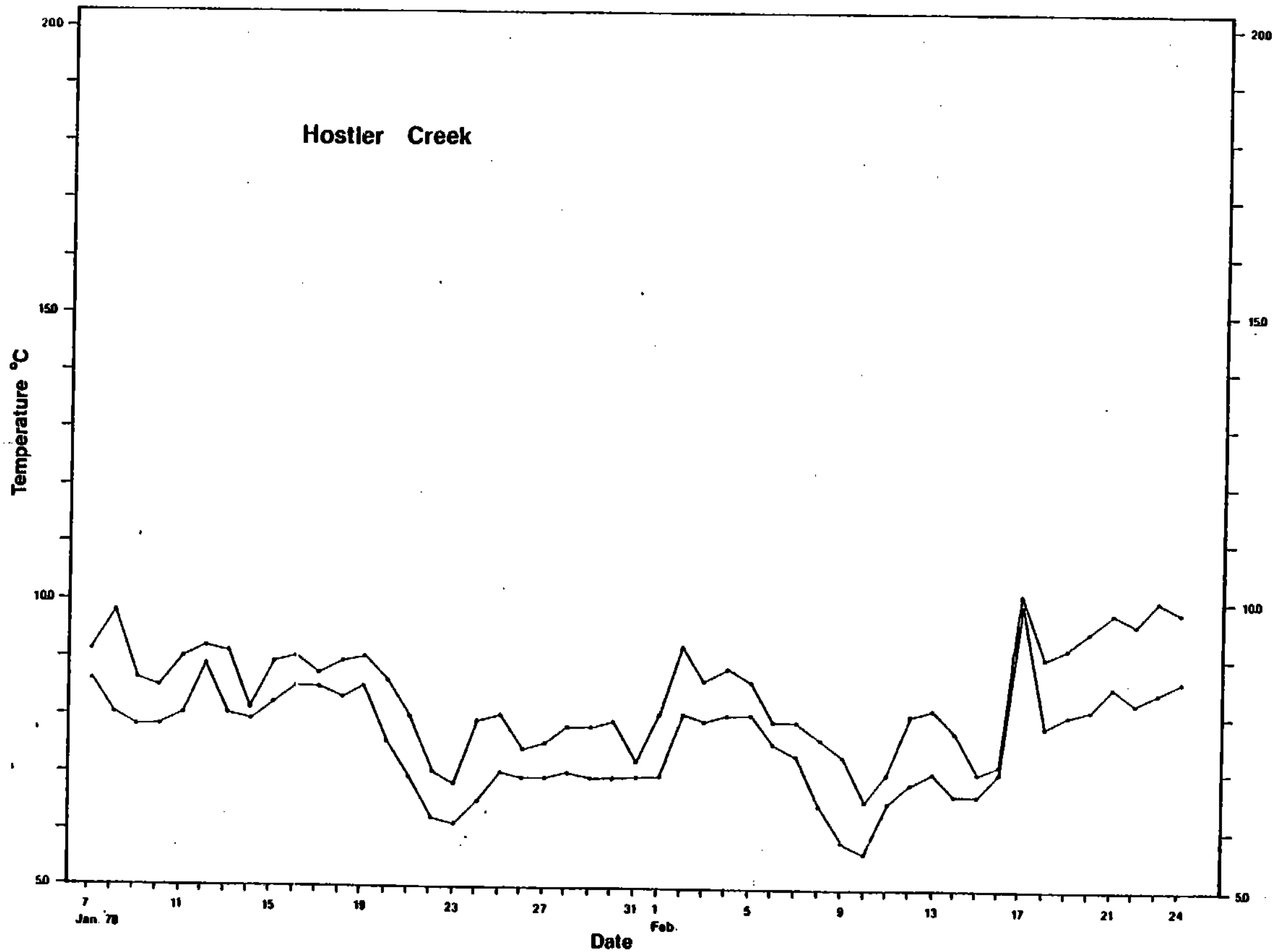


Figure 35. Maximum and minimum daily water temperatures of Hostler Creek during the period February 25, 1978 to April 9, 1978.

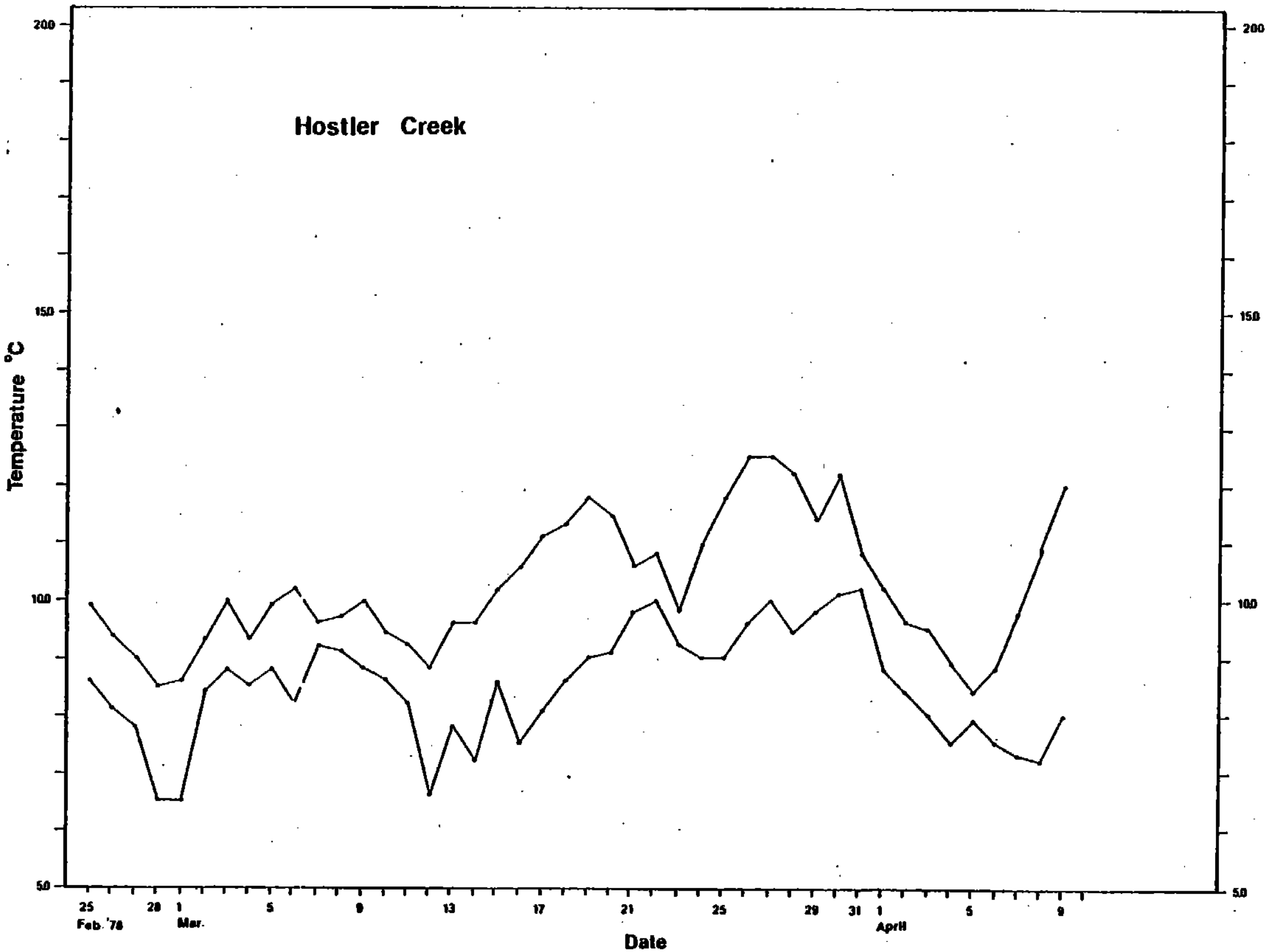


Figure 36. Maximum and minimum daily water temperatures of the surface and bottom (15-20 foot level) of the Klamath River near Requa during the period August 10, 1978 to September 18, 1978.

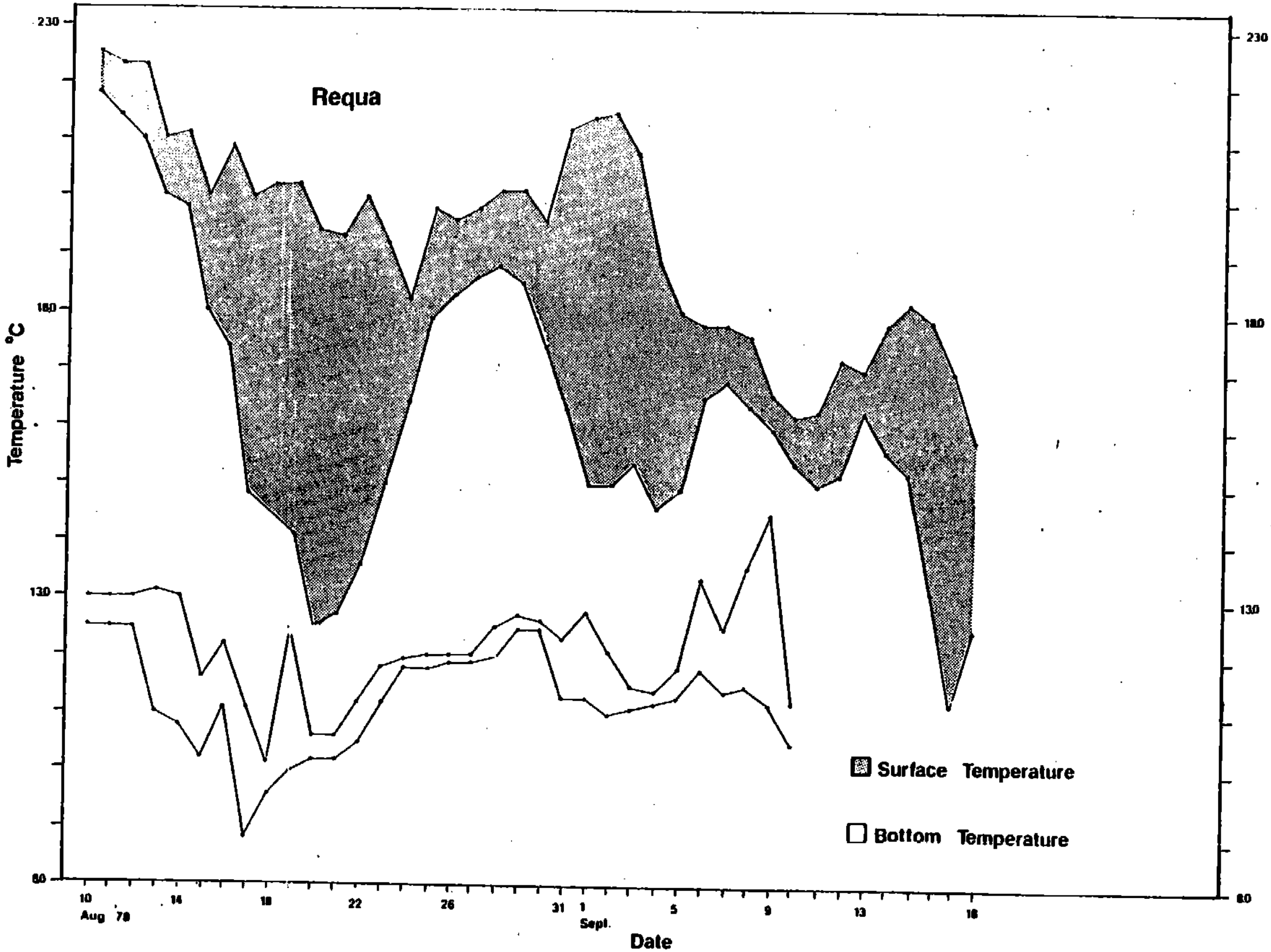


Figure 37. Maximum and minimum daily water temperatures of the surface and bottom (15-20 foot level) of the Klamath River near Requa during the period September 19, 1978 to October 21, 1978.

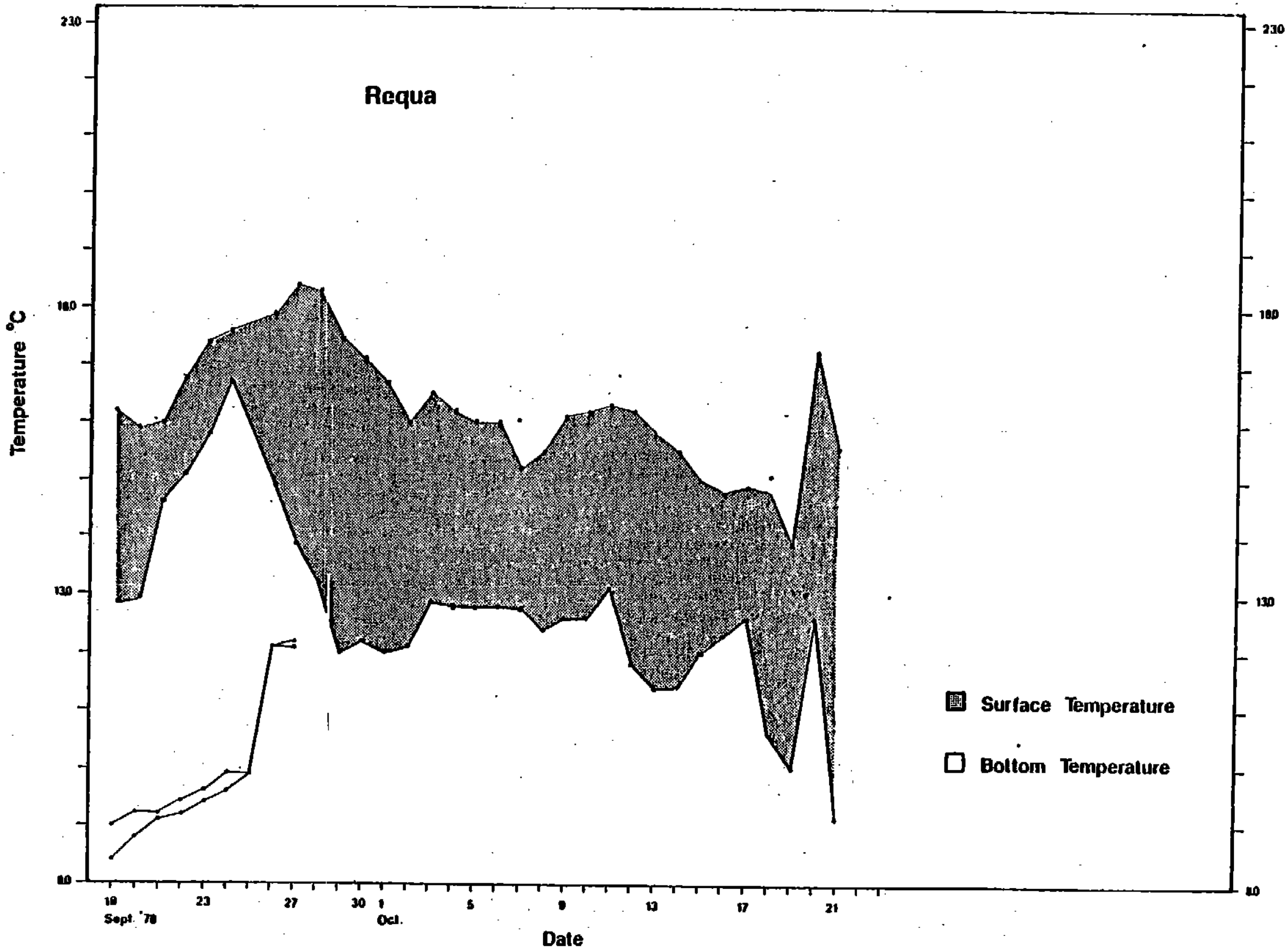


Figure 38. Maximum and minimum daily water temperatures of the surface and bottom (15-20 foot level) of the Klamath River near Sportsman's Camper Park during the period August 24, 1978 to October 12, 1978.

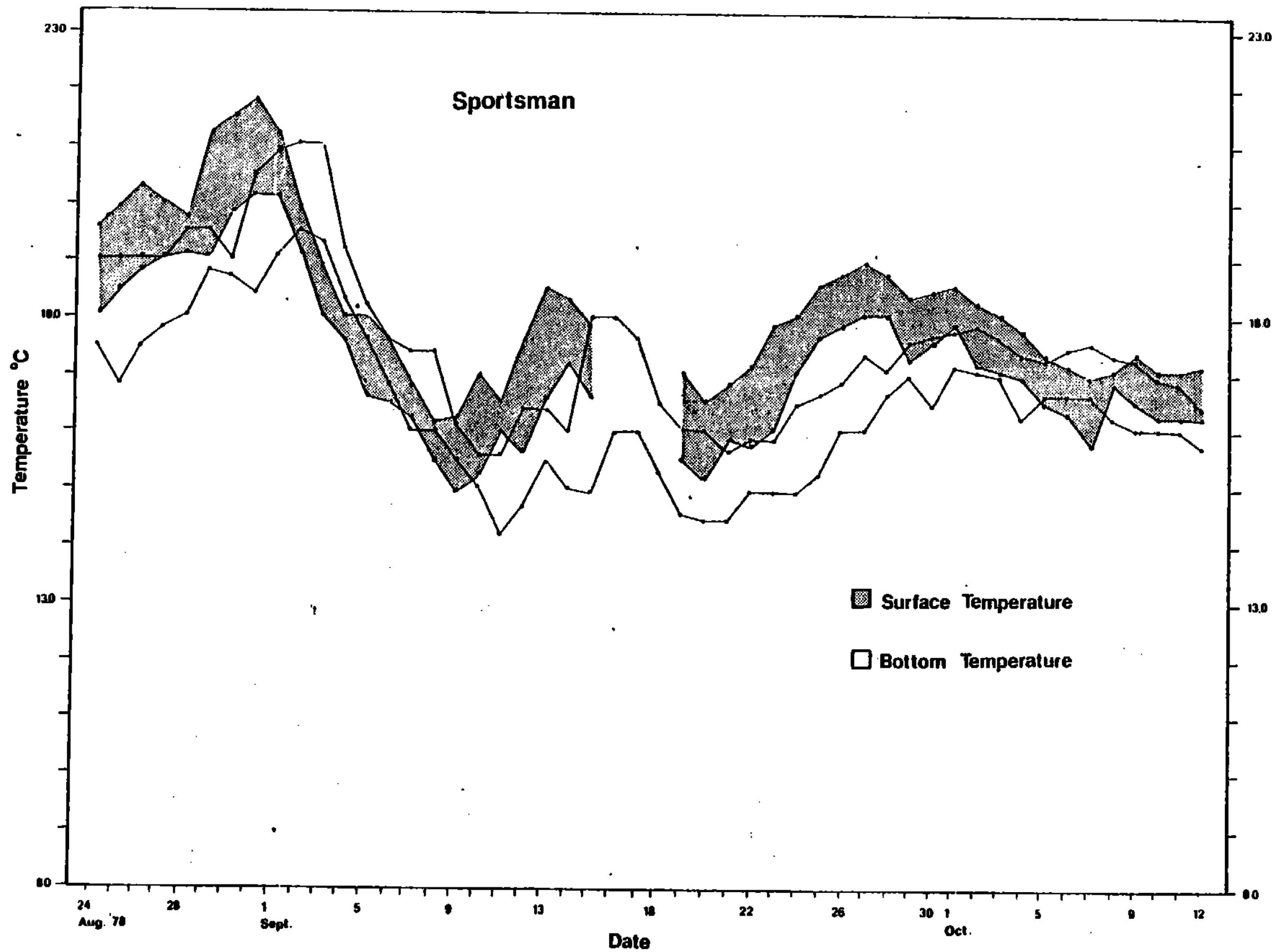


Figure 39. Maximum and minimum daily water temperatures of the surface and bottom (15-20 foot level) of the Klamath River near Sportsman's Camper Park during the period October 13, 1978 to November 16, 1978.

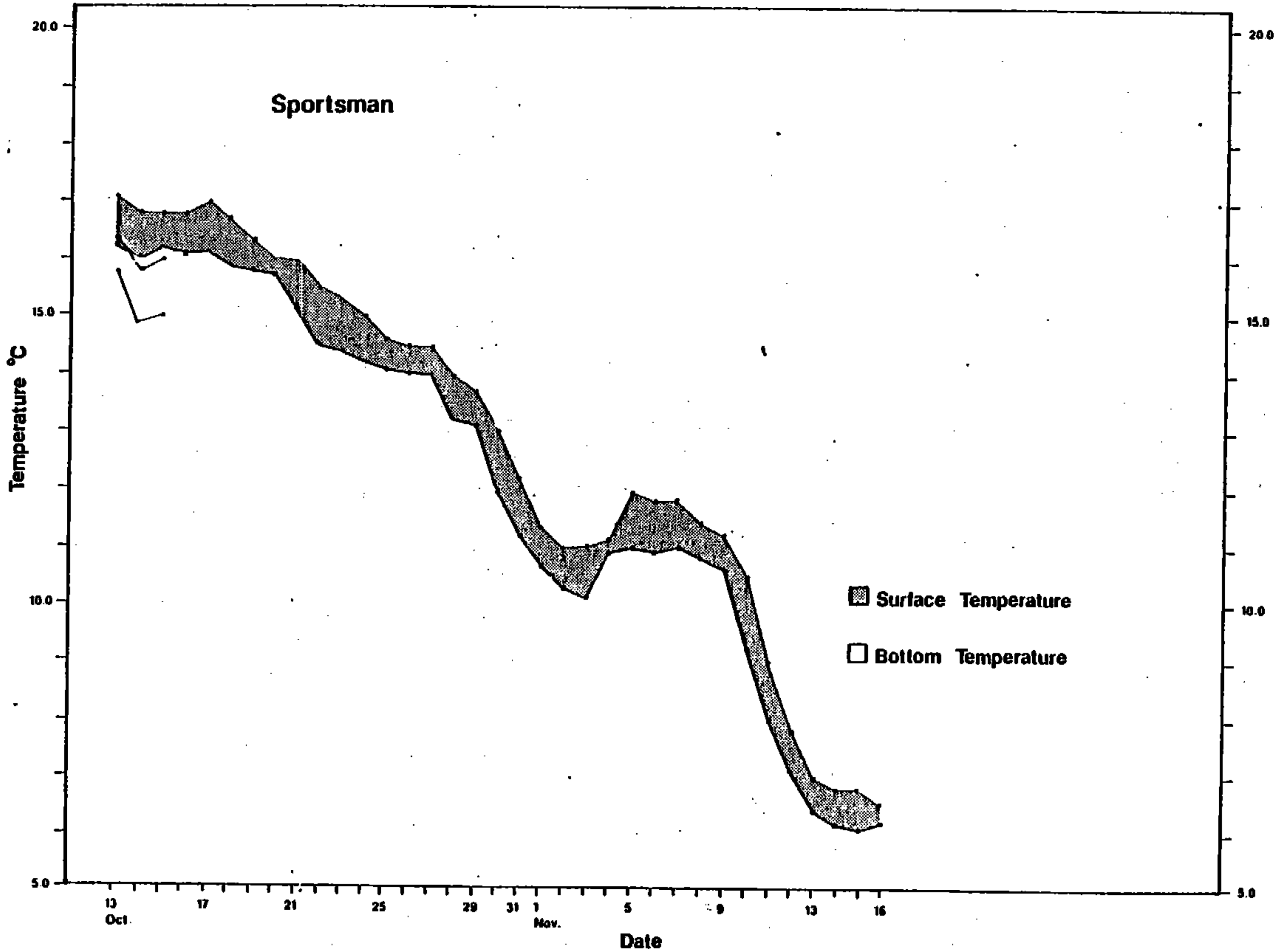


Table 10. Approximate minimum summer flows during 1978 of tributary streams on the Hoopa Valley Indian Reservation.

Stream	Stream Code	Flow (cfs)	Stream	Stream Code	Flow (cfs)
Ah Pah	01 0164	0.1	Mynot	01 0007	0.5
Ah Pah-N.FK.	01 0165	Dry	Omager	01 0060	Dry
Ah Pah-S.FK.	01 0173	Pools	Pecwan	01 0214	4.3
Bear	01 0178	Dry	Pine	01 0343	6.3
Beaver	02 0018	0.5	Richardson	01 0022	Dry
Campbell	02 0075	5.5	Roach	01 0261	6.9
Cappell	01 0296	6.1	Salt	01 0002	6.2
High Prairie	01 0003	0.2	Saugep	01 0027	0.4
Hoppaw	01 0024	Dry	Soctish	02 0019	1.9
Hospital	02 0072	Dry	Supply	02 0062	8.5
Hostler	02 0054	4.3	Tarup	01 0053	Dry
Hunter	01 0005	14.9	Tectah	01 0192	Dry
McGarvey	01 0049	1.8	Terwer	01 0031	Dry
Mettah	01 0248	2.7	Tish-Tang	02 0077	17.6
Mill	02 0027	29.2	Tully	01 0322	6.9
Morek	01 0293	3.4	Waukell	01 0029	0.7

LAND OWNERSHIP PATTERNS

Approximately 99 percent of "the square" portion of the Hoopa Valley Indian Reservation consists of land held in trust by the federal government or is otherwise controlled by the Bureau of Indian Affairs or the Hoopa Valley Business Council. Consequently, private ownership should not be a serious concern when considering hatchery development on reservation streams tributary to the Trinity River (Code 02 streams) or on most of Pine Creek. Conversely, nearly all of "the strip" portion of the reservation is in private ownership with Simpson Timber Company being the largest land holder.

Within "the strip", ownership of lands adjacent to all major and some minor tributary streams was determined by contacting the Humboldt and Del Norte County Tax Assessors Offices located in Eureka, California and Cresent City, California, respectively. Personnel in the Cresent City office provided coded maps and index listings for owners of parcels adjacent to tributary streams flowing through the Del Norte County portion of the reservation (Table 11). Stream miles beginning at respective tributary confluences with the Klamath River were measured using a map wheel and stream intersects of each parcel were recorded. Stream miles of secondary tributary streams were measured beginning at respective confluences with primary tributary streams. From the Eureka office, maps were obtained which illustrated tributary streams and respective ownership parcels within the Humboldt County portion of the reservation (Table 12).

Table 11. Ownership patterns of lands adjacent to tributary streams flowing through the Del Norte County portion of the Hoopa Valley Indian Reservation.

Tributary	Parcel Number	Assessors Book and Page No.	Land Owner	Stream Intersect Points (miles) of Property Boundaries
Salt Creek	15	140-01	Doty	0.20
	29	140-01	Garret	0.22
	31	140-01	Van Dusen	0.65
	22	127-09	Flanigan	1.31
	2	127-09	McCracken	1.42
	10	127-09	McMillian	1.74
	4	127-09	Simpson Timber Co.	2.00
	20	127-09	Fausey	2.42
High Prairie Creek	22	127-09	Flanigan	0.06
	2	127-09	McCracken	0.55
	9	127-20	Fausey	1.08
	14	127-07	U.S.A.	1.59
	1	127-07	U.S.A.	2.73
Hunter Creek	14	140-01	Galet	0.23
	31	140-01	Garret	0.49
	8	127-24	Peine-Flanigan	0.74
	--	127-24	State (Hwy 101)	0.80
	1	127-24	Peine-Flanigan	0.92
	22	127-09	Flanigan	0.96
	1	127-24	Peine-Flanigan	1.07
	5	127-28	Rode	1.19
	3	127-09	Maydaleno	1.28
	12	127-08	Peine-Flanigan	1.66
	21	127-08	Miller Timber Co.	1.79
	12	127-08	Peine-Flanigan	2.26
Mynot Creek	14	140-01	Galet	0.26
	--	140-01	State (Hwy 101)	0.32
	14	140-01	Galet	0.36
	15	127-08	Bravo	0.38
	17	127-08	Simpson Timber Co.	0.49
	16	127-08	Klamath Unified School Dist.	0.75
	14	127-08	Simpson Timber Co.	0.90
	5	127-25	Menary-Murphy	1.01
	3	127-25	Russ	1.03
	4	127-25	Horn	1.05
	15	127-08	Bravo	1.18
	14	127-08	Simpson Timber Co.	1.24
	4	127-08	Arcata National Corp.	2.20

Table 11. Ownership patterns of lands adjacent to tributary streams flowing through the Del Norte County portion of the Hoopa Valley Indian Reservation (continued).

Tributary	Parcel Number	Assessors Book and Page No.	Land Owner	Stream Intersect Points (miles) of Property Boundaries
Richardson Creek	--	--	National Park Service	1.00
Hoppaw Creek	5	140-11	Thompson	0.28
	12	140-15	McDonald	0.31
	--	140-15	State (Hwy 101)	0.35
	4	140-15	Del Ponte	0.50
	1	140-15	Simpson Timber Co.	0.64
	24	140-04	Simpson Timber Co.	1.11
	14	140-04	Simpson Timber Co.	1.34
	23	140-04	Simpson Timber Co.	1.53
	14	140-04	Simpson Timber Co.	1.62
	15	140-04	Simpson Timber Co.	1.66
	17	140-04	Peterson	1.70
	15	140-04	Simpson Timber Co.	1.76
Saugep Creek	--	140-13	U.S.A.	0.23
	12	140-13	Arcata National Corp.	0.44
	11	140-13	Del Norte Co. (Dump)	0.63
	20	140-13	Simpson Timber Co.	0.82
	10	140-13	Simpson Timber Co.	1.25
	20	140-13	Simpson Timber Co.	1.44
Waukell Creek	--	140-13	State (Hwy 101)	0.47
	14	140-13	Simpson Timber Co.	0.53
	--	140-13	State (Hwy 101)	2.13
Terwer Creek	29	140-13	U.S.A.	0.81
	12	140-13	Shafer	1.01
	14	41-02	Parks	3.51
	13	41-02	Simpson Timber Co.	6.01

Table 12. Ownership patterns of lands adjacent to tributary streams flowing through the Humboldt County portion of the Hoopa Valley Indian Reservation.

Tributary	Assessor's No.	Land Owner	Stream Intersect Points (miles) of Property Boundaries
Blue Creek	533-141-04	Fletcher	0.14
	533-141-05	Ward	0.42
	533-142-02	Ward	0.85
	533-142-03	Strong	1.80
	533-142-04	Simpson Timber Co.	1.94
	533-175-03	Simpson Timber Co.	2.51
Ah Pah Creek	533-146-03	U.S.A.	0.26
	533-154-09	Simpson Timber Co.	0.35
	533-154-02	Simpson Timber Co.	1.18
	533-154-05	Simpson Timber Co.	1.35
	533-154-06	Simpson Timber Co.	1.52
North Fork Ah Pah Creek	533-146-03	U.S.A.	0.09
	533-154-09	Simpson Timber Co.	0.14
	533-153-04	Simpson Timber Co.	1.04
South Fork Ah Pah Creek	533-154-02	Simpson Timber Co.	0.09
	533-154-04	Simpson Timber Co.	0.37
	533-103-02	Simpson Timber Co.	0.65
	533-103-07	Simpson Timber Co.	1.45
	533-104-02	Simpson Timber Co.	1.50
Bear Creek	533-111-06	Fletcher	0.09
	533-111-05	Fletcher	0.28
	533-111-10	Kahn	0.37
	533-112-01	Simpson Timber Co.	0.46
	533-112-04	Fletcher	0.55
	533-112-03	Simpson Timber Co.	1.17
	533-115-01	Simpson Timber Co.	1.24
	533-115-10	Simpson Timber Co.	1.90
	533-114-06	Simpson Timber Co.	2.54
	533-114-04	U.S.A.	2.87
	533-114-05	U.S.A.	3.44
Surpur Creek	533-115-03	Simpson Timber Co.	0.09
	533-115-04	Simpson Timber Co.	0.35
	533-116-02	Simpson Timber Co.	0.85
	533-116-03	Simpson Timber Co.	0.87
	533-081-02	Simpson Timber Co.	0.99

Table 12. Ownership patterns of lands adjacent to tributary streams flowing through the Humboldt County portion of the Hoopa Valley Indian Reservation (continued).

Tributary	Assessor's No.	Land Owner	Stream Intersect Points (miles) of Property Boundaries
Tectah Creek	533-083-04	Simpson Timber Co.	0.28
	533-084-01	Simpson Timber Co.	0.66
	533-084-07	Simpson Timber Co.	1.16
	533-084-06	Simpson Timber Co.	1.47
Johnson Creek	533-061-10	Crutchfield	0.21
	533-061-11	McKnight & William	0.40
	533-061-19	Simpson Timber Co.	0.73
	533-061-24	Bodeker	0.92
	533-064-12	U.S.A.	0.97
Pecwan Creek	534-091-26	U.S.A.	0.14
	534-091-25	Reed	0.50
	534-091-09	Jake	0.59
	534-091-01	Dickson	0.87
	534-091-12	Simpson Timber Co.	1.06
	534-091-16	Simpson Timber Co.	1.13
East Fork Pecwan Creek	534-091-09	Jake	0.26
	534-091-04	Simpson Timber Co.	0.50
	534-091-10	Reed	0.76
	534-091-07	Fellom	1.00
Mettah Creek	533-011-13	U.S.A.	0.24
	533-011-14	U.S.A.	0.60
	533-011-15	U.S.A.	0.88
	533-023-07	U.S.A.	1.07
	533-024-02	Russell	1.40
	533-024-01	Kahn	1.71
Roach Creek	532-144-04	Simpson Timber Co.	0.09
	532-144-05	Big Flat Timber Co.	0.45
	532-144-06	Big Flat Timber Co.	0.73
	532-144-02	Champion Intl. Corp.	1.04
	532-092-02	Kahn	1.16
	532-092-03	Simpson Timber Co.	1.28

Table 12. Ownership patterns of lands adjacent to tributary streams flowing through the Humboldt County portion of the Hoopa Valley Indian Reservation (continued).

Tributary	Assessor's No.	Land Owner	Stream Intersect Points (miles) of Property Boundaries
Morek Creek	532-143-11	Simpson Timber Co.	0.28
	534-161-03	Simpson Timber Co.	0.30
	534-162-21	Champion Intl. Corp.	0.39
	534-162-22	Simpson Timber Co.	0.51
	534-161-08	Simpson Timber Co.	0.87
	534-171-02	Berg	1.23
Cappell Creek	534-132-15	U.S.A.	0.02
	534-132-22	Simpson Timber Co.	0.42
	534-132-14	Emmerson & Son	0.44
	534-132-03	Simpson Timber Co.	0.63
	534-132-02	Simpson Timber Co.	0.65
	534-132-21	U.S.A.	0.77
	534-132-20	U.S.A.	0.86
Tully Creek	531-076-21	James	0.24
	531-076-03	Quinn	0.52
	531-076-19	Emmerson	0.83
	531-076-09	State of California	1.09
	531-076-02	Simpson Timber Co.	1.40
Pine Creek	531-084-09	Champion Intl. Corp.	0.12
	531-084-08	Walsh	0.40
	531-084-17	Champion Intl. Corp.	0.61
	531-085-10	Simpson Timber Co.	0.87
	531-112-09	Champion Intl. Corp.	1.13

CONSIDERATIONS IN DEVELOPING A FISH PRODUCTION PROGRAM ON THE HOOPA VALLEY INDIAN RESERVATION

A fish production program on the Hoopa Valley Indian Reservation could incorporate efforts designed to maximize natural production from reservation waters through habitat improvement and stream reseeding measures, could include the development of artificial hatching and rearing facilities or could involve a combination of both of these activities. Whether or not artificial propagation facilities are developed, it is recommended that stream clearance and reseeding programs be continued so that the natural productive capacity of reservation waters can be realized and wild stocks can be allowed to reestablish themselves.

In an attempt to gain an insight concerning productive (carrying capacity) levels of reservation waters for salmonids, surface acreages of tributary streams were computed (Table 6) and salmonid standing crops in two streams were estimated through an electrofishing sampling program. Electrofishing stations were established on Supply and Pine Creeks at locations which were considered representative of respective stream sections. Population and standing crop estimates obtained for each station were expanded to arrive at estimates for each of the stream sections which, in turn, were totaled and averaged to obtain overall estimates for each stream. Salmonid populations at each electrofishing station were assessed at the 95 percent confidence level through the "Two Pass Method" described by Seber and Le Cren (1976) and, in some cases, through the "Moran-Zippin" procedure (Zippin, 1956; Zippin 1958). Salmonids captured were weighed to the nearest one-tenth of a gram.

During the late July-early August, 1978 time period, Supply Creek contained an estimated 6,840 ± 1,715 salmonids per hectare and 22.8g ± 5.6g of salmonid tissue per square meter of water (Table 13). Pine Creek, during early November, supported an estimated 2,810 ± 969 salmonids per hectare and 8.2g ± 3.4g of salmonid tissue per square meter (Table 13). Mean weight of fish captured and standing crop estimates on Supply Creek dropped considerably from the late July to early November sampling periods. Assuming that the Supply Creek data is representative of all of the approximately 300 surface acres of tributary streams on the reservation, it can by hypothesized that reservation streams supported approximately 830,000 salmonids and 28,000 kg of salmonid tissue during July, 1978. Assuming that the Pine Creek data is representative of approximately 200 acres of tributary streams which may have existed on the reservation during the early November, 1978 low-flow period, it can be hypothesized that reservation streams contained approximately 227,000 salmonids and 6,600 kg of salmonid tissue during this period.

It is believed that native rainbow trout comprise the majority of salmonids existing in reservation waters. Further population analyses beginning in 1979, after Supply and Pine Creek have been stocked with chinook salmon fry, may provide some insight into resultant interactions between resident trout and introduced anadromous salmonid populations.

Table 13. Salmonid population and standing crop estimates for Supply and Pine Creeks in 1978.

Stream	Sampling Date	Transect Location (Stream Mile)	Mean Weight of Fish Captured (g)	Transect Population and (Standing Crop in Kg) Estimates	Expanded Stream Section Population and (Standing Crop in Kg) Estimates	Estimated No. of Fish Per Hectare and (Standing Crop in g/m^2)
Supply Creek	8-02-78	1.75	33.3	186 (6.20)	9,821 (327.3)	6,531 (21.8)
	7-27-78	2.50	33.3	320 (10.67	16,896 (563.1)	7,868 (26.2)
	7-26-78	5.88	33.3	141 (4.70)	9,306 (310.2)	7,089 (23.6)
	7-25-78	6.75	33.3	89 (2.97)	1,958 (65.3)	3,333 (11.1)
						$\overline{X}$ = 6,840 (22.8) 1/
Supply Creek	11-03-78	1.75	6.9	113 (0.78)	10,848 (74.9)	4,589 (3.2)
	11-02-78	6.75	10.9	34 (0.37)	1,224 (13.3)	2,617 (2.8)
Pine Creek	11-13-78	0.25	8.3	24 (0.20)	4,332 (36.0)	635 (0.7)
	11-08-78	5.88	12.4	94 (1.17)	24,127 (299.2)	2,343 (2.9)
	11-08-78	13.88	51.1	70 (3.58)	22,265(1,137.3)	7,826 (40.0)
						$\overline{X}$ = 2,810 (8.2) 1/

1/ Estimated mean numbers of salmonids and standing crops of salmonids for entire streams.

Hupa and Yurok people generally favor some type of hatchery development on the reservation. Many downriver Indians would like to see a fish processing plant established on the lower Klamath River in conjunction with a hatchery complex. Most Indian people believe that hatchery development would lead to increased future fish runs, create badly needed jobs and result in economic benefits to the tribe. Many of the considerations which must be taken into account in assessing the nature and extent of future hatchery development on the reservation are enumerated below.

1. Cost/Benefit Analysis

Benefits of the hatchery product to Indian, offshore and inland sport fisheries should be greater than hatchery operation costs expressed in terms of capital investment, fish production and maintenance and replacement of physical facilities. Benefits of hatchery and/or processing plant development to the local Indian economy and potential benefits of utilizing hatchery effluent for agricultural purposes should also be considered.

2. Hatchery Site Selection

Suitable hatchery development sites should: (1) be located adjacent to adequate and unpolluted water sources, (2) be located adjacent to dependable downstream water avenues, (3) consist of areas large enough to accomodate necessary rearing ponds, settling ponds and hatchery buildings, (4) consist of areas with suitable topographic features to minimize site preparation costs, (5) be accessible by improved roads, (6) be located above the floodplain to avoid flooding and (7) be located near commercial power. The water supply must not contain toxic elements and water temperature should generally fall within the 45°F to 65°F range. Temperatures lower than 45°F result in slow growth rates while temperatures which exceed 65°F for extended periods of time can cause fish cultural problems related to diseases and metabolism. Downstream water avenues should be free of obstructions and water diversions and downstream fisheries must be regulated to insure adequate spawner escapements. A "once-through" gravity-feed water supply system is most economical and convenient but can be supplemented by pumping to help adjust water temperature.

With regard to selecting between alternative hatchery sites on the reservation, it should be remembered that Blue Creek by far, is the best water source but that hatchery development on Blue Creek or other lower river tributary streams would exclude upriver Indians from benefiting from the hatchery product. Development of a single hatchery on the upper portion of the reservation on the other hand, may cause problems with regard to establishing a lower river fish processing plant. Establishment of a single hatchery complex on either the downriver, mid-river or upriver portion of the reservation would probably not be as well-received by Indian communities located far from the site as it would by the community located nearby. Consequently, hatchery development at two or more sites should be considered.

3. The Hatchery Product(s)

Hatchery operations could be geared to rear steelhead trout, coho salmon and/or spring-run or fall-run chinook salmon. A sturgeon production program might also be explored. Indian fishermen in general prefer to harvest chinook salmon for subsistence and commercial purposes because of their relatively large size, excellent marketability and flesh which is suitable for drying and storing for winter use. Relatively more intense fishing pressure is directed toward the fall-run fish because netting efficiency is greatly increased during the low flow period of late summer-early fall when these fish move up the river. Fall-run chinook salmon are harvested intensively in the offshore troll and sport fisheries and any hatchery production program involving this strain must take ocean harvest into account. Spring-run chinook salmon are not as heavily harvested in the offshore fisheries but production programs directed toward this strain require extremely large quantities of cold water to hold adult fish through the summer months.

4. Environmental Factors

Any type of hatchery development must take into consideration potential environmental impacts with regard to water quality, air quality, animal life, vegetation, land and visual and audio esthetics. Of special concern is the potential impact of hatchery development on native salmonid stocks in the drainage.

5. Hatchery Design Concepts

In formulating preliminary hatchery design concepts to accomodate anticipated fish production requirements, consideration must be given to water availability and quality and site characteristics. If a single site cannot be found which possesses all of the desirable characteristics to support a hatchery complex, individual hatchery functions might be located at different sites, e.g., egg incubation activities might be conducted at a relatively small site while rearing and processing functions might occur at larger sites in different areas.

6. Processing Plant Feasibility and Design Concepts

One of the first steps required in assessing the feasibility of establishing a fish processing plant on the reservation involves cost-benefit and market analyses to ascertain annual poundages of salmon which would have to be sold to achieve desired profit margins. Equally important initial considerations include selection of a suitable site and an evaluation of numbers of salmon which could be removed from the Klamath River system each year without threatening spawner escapement needs.

Basic considerations involved in contemplating processing plant design include requirements for a fresh fish holding area, a cold storage room, a processing-packaging area, a sharp freezer and a workshop. Other considerations include types of refrigeration and waste disposal systems desired. A processing plant should be located in an area where commercial power is available and an auxiliary power system is a must.

Preliminary investigations into water availability, water quality and potential construction sites indicate that hatchery development on the Hoopa Valley Indian Reservation is a feasible alternative. The next step in further exploring such development involves a detailed hatchery feasibility study and report which includes a recommended hatchery development program with regard to facilities required and sites selected and a review of potential funding sources, captial investment requirements, projected operation and maintenance cost, staffing requirements and a recommended Indian training program. Despite the good groundwater supply associated with the Hoopa Valley Hatchery, many wells in the Hoopa Valley area are dry and the availability of large sources of groundwater is questionable (Rocky Beach, CDWR, personal communication). If groundwater supplies are seriously considered as water sources for proposed hatcheries, a number of test wells would probably have to be drilled on the reservation to determine groundwater availability and quality at selected locations.

LITERATURE CITED

Anon. 1960. A preliminary survey of fish and wildlife resources of northwestern California. U.S. Fish and Wildlife Service. Portland, Oregon. 104 p.

Anon. 1977. A study of Trinity River steelhead emigration. Calif. Dep. of Fish and Game, Anad. Fish Admin. Rep. 77-5. 38 p.

Bowlby, C.E. 1978. Mortality of tagged salmonids due to harbor seal predation. Unpublished Rep. Humboldt St. Univ., Arcata, CA. 7 p.

Boydstun, L.B. 1977. Adult harvest and escapement study - lower Klamath River tagging study. Performance Rep. Cal. Dep. of Fish and Game. 28 p.

Boydstun, L.B. and J.S. Hopelain. 1978. Fall runs of king salmon and silver salmon in the Klamath River in 1976 - Preliminary draft. Cal. Dep. of Fish and Game. 19 p.

Burton, T.S., Richard Haley and T.B. Stone. 1977. Potential effects of sediment control operations and structures on Grass Valley Creek and Trinity River fish and wildlife. Cal. Dep. of Fish and Game, Memorandum Rep. 38 p.

California Dep. of Water Res. 1960. Klamath River Basin Investigation. CDWR Bull. No. 83. 198 p.

Coots, Millard. 1967. Anglers guide to the Klamath River. Cal. Dep. of Fish and Game. Sacramento, Cal. 1 p.

DeWitt, John W. 1951. Personal letter from Head, Fisheries Dep., Humboldt St. Univ., Arcata, Cal. to Cal. Div. of Fish and Game, Aug. 25, 1951. 1 p.

Flood, B.S., M.E. Sangster, R.D. Sparrowe and T.S. Baskett. 1977. A handbook for habitat evaluation procedures. U.S. Fish and Wildlife Service, Resource Publication No. 132. 77 p.

Fry, Donald H., Jr. 1973. Anadromous fishes of California. Cal. Dep. of Fish and Game. 111 p.

Fullerton, E.C. 1978. Letter from Director, Cal. Dep. of Fish and Game to Regional Director, U.S. Fish and Wildlife Service with attachment, Mar. 24, 1978. 10 p.

Gray, Walter L. 1963. Estimate of salmon taken by Indian netting, Cal. Dep. of Fish and Game Memorandum, Jan. 16, 1969. 2 p.

Hallock, R.J., D.E. Pelgen and L.O. Fisk. 1960. Fish, game and recreation in the Klamath River basin of California. Cal. Dep. of Water Res. Bull. No. 83. 149-165 p.

Healey, Terrance P., Jr. 1973. Studies of steelhead and salmon emigration in the Trinity River. Cal. Dep. of Fish and Game, Anad. Fish Admin. Rep. 73-1. 37 p.

Herrington, R.B. and D.K. Dunham. 1967. A technique for sampling general fish habitat characteristics of streams. U.S. Forest Service Research Paper INT-41. 12 p.

Holmberg, Joseph J. 1972. Salmon in California. U.S. Bureau of Reclamation. Sacramento, Cal. 73 p.

Hubbell, Paul M. 1972. A review of investigations relating to the anadromous salmonid resources of the Trinity River basin, California (Draft). Cal. Dep. of Fish and Game. Sacramento, Cal. 92 p.

Hubbell, Paul M. 1973. Program to identify and correct salmon and steelhead problems in the Trinity River Basin. Cal. Dep. of Fish and Game report to the Trinity River Basin Fish and Wildlife Task Force. Sacramento, Cal. 70 p.

Kerstetter, T.H. and Michael Keeler. 1976. Smolting in steelhead trout (Salmo gairdneri): A comparative study of populations in two hatcheries and the Trinity River, northern California, using gill Na, K, ATPase assays. Humboldt St. Univ. - SG - 9. 26 p.

Kesner, William D. 1977. An economic evaluation of the salmon and steelhead fisheries attributable to Klamath National Forest. U.S.D.A. Forest Service. Klamath National Forest. 17 p.

Kramer, Chin and Mayo, Inc. 1977. Facilities and operations study - Trinity River Salmon and Steelhead Hatchery. Seattle, Wash. 113 p.

LaFaunce, D.A. 1967. A king salmon spawning survey of the South Fork Trinity River, 1964. Cal. Dep. Fish and Game, Marine Res. Admin. Rep. 67-10. 13 p.

Lahr. Leslie E. 1964. Indian gill netting fishing on the Klamath River. Cal. Dep. of Fish and Game Memorandum, Jan. 7, 1964. 3 p.

Larmoyeux, J.D., R.G. Piper and H.H. Chenoweth. 1973. Evaluation of circular tanks for salmonid production. Prog. Fish Cult. : 35 (3) : 122-131.

Mayer, K.E. and L. Fox III. 1979. Watershed Condition inventory of the Hoopa Valley Indian Reservation utilizing Landsat digital data. Unpubl. Rep. Humboldt St. Univ. Arcata, Cal. 46 p.

Moffett, J.W. and S.H. Smith. 1950. Biological investigation of the fishery resources of Trinity River, California. U.S. Fish and Wildlife Service - Spec. Sci. Rep. - Fisheries No. 12. Wash., D.C. 71 p.

Moyle, Peter B. 1976. Inland fishes of California. Univ. of Cal. Press. Berkeley, Cal. 405 p.

Murphy, G.I. and Leo Shapovalov. 1951. A preliminary analysis of northern California salmon and steelhead runs. Cal. Fish and Game, 37(4) :497-507.

Newhouse, H.W. and J.A. Barnes. 1972. Salmonid habitat study of Manzanita Creek, Trinity County, California. Progress rep. 1971-72. Cal. Coop. Fish Unit. Arcata, Cal. 14 p.

Newhouse, Henry W. 1973. Salmonid habitat study of Manzanita Creek, Trinity County, California. Progress rep. 1972-73. Cal. Coop. Fish. Unit. Arcata, Cal. 13 p.

Pacific Fishery Management Council. 1978. Supplement to the final environmental impact statement/fishery management plan for commercial and recreational salmon fisheries off the coasts of Washington, Oregon and California commencing in 1978 including proposed amendment for 1979 and an assessment of 1978 commercial and recreational salmon fisheries off the coasts of Washington, Oregon and California. Portland, Oregon. 48 p.

Pacific Northwest Regional Commission. 1976. Investigative reports of Columbia River fisheries project. Vancouver, Washington. 618 p.

Platts, W.S. 1974. Geomorphic and aquatic conditions influencing salmonids and stream classification. Surface Environment and Mining Program, U.S. Forest Service. 199 p.

Radovich, John. 1967. Salmon resource of the Klamath River system. Cal. Dep. of Fish and Game Memorandum, May 24, 1967. 2 p.

Rankel, Gary L. 1978. Anadromous fishery resources and resource problems of the Klamath River basin and Hoopa Valley Indian Reservation with a recommended remedial action program. U.S. Fish and Wildl. Serv., Internal Publ. 98 p.

Ricker, W.E. 1976. Review of the rate of growth and mortality of Pacific salmon in salt water, and noncatch mortality caused by fishing. J. Fish. Res. Board Can. 33:1483-1524.

Seber, G. and E. LeCren. 1967. Estimating population parameters from catches large relative to the population. J. Animal Ecol. 36(3):631-643.

Smith, Dean C. 1978. The economic value of anadromous fisheries for Six Rivers National Forest. U.S. Forest Service. Region 5. 47 p.

Snyder, J.O. 1931. Salmon on the Klamath River, California. Cal. Div. of Fish and Game, Fish Bull. No. 34. 129 p.

Van Kirk, Robert R. 1977. Klamath River fishery - An introductory study. Humboldt St. Univ., Arcata, Cal. 29 p.

Young, Jim. 1969. Indian fishery - lower Trinity River Division, North Coast Project. U.S. Fish and Wildlife Service Memorandum, Jan. 16, 1969. 1 p.

Zippin, C. 1956. An evaluation of the removal method of estimating animal populations. Biometrics. 12:163-189.

Zippin, C. 1958. The removal method of population estimation. J. of Wildl. Mgmt. 22(1):82-90.

APPENDIX 1

INVENTORY FILE CODING FORMS

U. S. FISH AND WILDLIFE SERVICE

16-CHARACTER ID CODE (K01 VALUE)

SALMON HABITAT (SPAWNING GROUND SURVEY) INVENTORY FILE

CODING FORM

AS- CODE	STREAM CODE	SP CODE	DATE YR	DATE MO	DATE DY	RIVER MILE LOW END	RIVER MILE UPPER END	RIVER LENGTH		SPECIES NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER COND	WATER TEMP.	VIEWING CONDITION	WEATHER CONDITION	COMMENTS 1 2 3	
2	3 4 5 6	7	8 9	10 11	12 13	14 15 16 17	18 19 20 21	22 23 24 25	26	27 28 29 30	31 32 33 34 35	36 37 38 39 40	41 42 43 44 45	46 47 48 49	50 51 52 53 54 55	56 57	58 59 60 61	62 63 64 65 66	67 68 69 70 71 72	73 74 75 76 77 78	79 80

U. S. FISH AND WILDLIFE SERVICE

16-CHARACTER ID CODE (K01 VALUE)

STREAM HABITAT INVENTORY FILE

CODING FORM

CARD	BASIN CODE	STREAM CODE	RIVER MILE	DATE YR	DATE MO	DATE DY	A.C.W. (Est)	FLOW (Est)	POOL/RIFFLE RATIO POOL	POOL/RIFFLE RATIO RIFFLE	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	C	S-S	O		BANK STAB L	BANK STAB R	GRADIENT (PERCENT) UP	DN	AVE	
1	2 3	4 5 6 7	8 9 10 11 12	13 14	15 16	17 18	19 20 21	22 23 24 25	26 27 28	29 30 31	32 33	34 35	36 37	38 39	40 41	42 43	44 45	46 47	48 49	50 51	52	53	54	55 56	57 58	59 60	61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
2																											

U. S. FISH AND WILDLIFE SERVICE

BARRIER AND DIVERSION INVENTORY FILE

16-CHARACTER ID CODE (K01 VALUE) CODING FORM

TYPE	BASIN CODE	STREAM CODE	RIVER MILE	DATE			BARRIERS				DIVERSIONS			
				YR	MO	DY	R P	TYPE	HEIGHT	P/IMP	PIPE SIZE	SCREEN SIZE	FLOW DIVERTED	
1	2 3	4 5 6 7	8 9 10 11 12	13 14	15 16	17 18	19	20	21 22	23	24 25 26 27	28 29 30 31	32 33 34 35	36–80

U. S. FISH AND WILDLIFE SERVICE

STREAM CODE FILE

CODING FORMS

6 CHARACTER ID CODE

TABLE NO. 100	CARD TYPE 2	BASIN CODE	STREAM CODE		STREAM NAME OR DESCRIPTION
2 3 4	5 6	7 8	9 10 11 12 13	14–25	26–80

APPENDIX 2

DATA ENTRY DOCUMENTATION FORMS FOR INVENTORY FILES

SPAWNING GROUND SURVEY
SALMON HABITAT INVENTORY FILE
DOCUMENTATION FOR DATA ENTRY
(CODING FORM)

Columns 1-2 BASIN CODE NUMBER
01 - KLAMATH RIVER BASIN
02 - TRINITY RIVER BASIN

Columns 3-6 STREAM CODE NUMBER
(SEE STREAM CODE MASTER FOR CODES)

Column 7 SPECIES CODE
1 - CHINOOK ADULT
2 - CHINOOK YOUNG-OF-THE-YEAR
3 - COHO ADULT
4 - COHO YOUNG-OF-THE-YEAR
5 - COHO SMOLT
6 - STEELHEAD ADULT
7 - STEELHEAD/RAINBOW YOUNG-OF-THE-YEAR
8 - STEELHEAD/RAINBOW JUVENILE
9 - STEELHEAD SMOLT
0 - RAINBOW TROUT

Columns 8-9 YEAR
10-11 MONTH — DATE OF OBSERVATION
12-13 DAY

Columns 14-17 RIVER MILE LOW END
18-21 RIVER MILE UPPER END — HUNDREDTHS OF MILES ASSUMED DECIMAL
22-25 RIVER LENGTH-DISTANCE

Column 26 BLANK

Columns 27-30 SPECIES NAME
CH1A - CHINOOK ADULT
CH1Y - CHINOOK YOUNG-OF-THE-YEAR
COHA - COHO ADULT
COHY - COHO YOUNG-OF-THE-YEAR
COHS - COHO SMOLT
STHA - STEELHEAD ADULT
STHY - STEELHEAD/RAINBOW YOUNG-OF-THE-YEAR
STHJ - STEELHEAD/RAINBOW JUVENILE
STHS - STEELHEAD SMOLT
RNBW - RAINBOW TROUT

Columns 31-35 LIVE COUNT (RJ)

Columns 36-40 DEAD COUNT (RJ)

Columns 41-45 TOTAL COUNT (RJ)

Columns 46-49 REDD COUNT (RJ)

Columns 50-55 SURVEY METHOD (LJ)
AERIAL ELCTRO
FOOT BOAT

SPAWNING GROUND SURVEY page 2

Columns	56-57	WATER CONDITIONS HT - HIGH, TURBID HM - HIGH, MEDIUM HC - HIGH, CLEAR MT - MEDIUM, TURBID MM - MEDIUM, MEDIUM MC - MEDIUM, CLEAR LT - LOW TURBID LM - LOW, MEDIUM LC - LOW, CLEAR
Columns	58-60	<u>WATER TEMPERATURE</u> (TENTHS OF DEGREES, ASSUMED DECIMAL)
Columns	61	<u>SCALE</u> USED C - CENTIGRADE F - FARENHEIT
Columns	62-66	<u>VIEWING CONDITIONS</u> (VISIBILITY) (RJ) CLEAR WINDY POOR FAIR GLARE DARK TURBID
Columns	67-72	<u>WEATHER CONDITIONS</u> (LJ) CLOUDY CLEAR SNOW RAIN PTLYCD
Columns	73-74 75-76 77-78	COMMENT CODE COMMENT CODE SEE COMMENT CODE MASTER COMMENT CODE
Columns	79-80	AGENCY CODE FW - U.S. FISH & WILDLIFE SERVICE FS - U.S. FOREST SERVICE FG - CALIF. DEPT. FISH & GAME CF - CALIF. DIV. OF FORESTRY BR - BUREAU OF RECLAMATION

RJ - RIGHT JUSTIFY
LJ - LEFT JUSTIFY

COMMENT CODE MASTER

SPAWNING GROUND SURVEY (page 3)

AREA SURVEYED
00 Partial index survey
01 Intertidal
02 Includes tributary in index
03 Holes not surveyed
04 Right bank side channel
05 Left bank side channel
06 Includes area above index
07 Includes area below index
08 Right bank survey
09 Left bank survey

SURVEY TIMING
10 Peak survey
11 Survey too early - before peak
12 Survey too late - after peak
13 Early run
14 Late run
15 Middle run
16 Redds observed - after peak
17
18
19

STREAM CONDITIONS
40 Needs SI work
41 Impassable log jam
42 Passable log jam
43 Man-made block
44 Damaging channel work
45 Damaging bank work
46 Damaging diversion
47 Passable beaver dam
48 Impassable beaver dam
49 Evidence of scouring

FACTORS AFFECTING FISH ABUNDANCE
50 Heavy poaching
51 Light poaching
52 Heavy predation
53 Light predation
54 Stream dry
55 Stream frozen
56 Fish kill
57 Stream too low
58 Illegal set netting
59 Recent habitat alteration

CARD INFORMATION
60 See card for additional comments
61 Count breakdown available on card
62 Summary card
63 Escapement estimate survey
64 Area surveyed unknown
65 Spot observation (F/M count not applicable)
66 Live tagged fish observed
67 Dead tagged fish observed
68 Tag recovered
69

MISCELLANEOUS
70 Most carcasses have been washed out
71 Heavy siltation
72 Count in holes estimated
73 Partial count
74 Holes rocked
75 Redd count only
76 Dead count only
77 Live count only
78
79
80 Juvenile electrofishing survey
81 Count for young-of-the-year fish
82 Count for juvenile fish
83 RBT/STHD not distinguishable
84 Fish probably native rainbow
85 Count for smolting fish
86 Steelhead half-pounders
87
88
89

STREAM HABITAT INVENTORY FILE

DOCUMENTATION FOR DATA ENTRY (CODING FORMS)

Column 1 — CD TYPE (Card Type) Always 2; indicates stream habitat data card.

Columns 2-3 — BASIN CODE NUMBER
01 - Klamath River Basin
02 - Trinity River Basin

Columns 4-7 — STREAM CODE NUMBER
(See STREAM CODE MASTER for codes)

Columns 8-12 — RIVER MILE Point on stream where stream survey was conducted (include hundredths of a mile) (RJ)

ex.	8	9	10	11	12	Columns
	1	0	0 ^	5	5	

^ implied decimal.

Columns 13-14 YR Sample year
15-16 MO Sample month — DATE
17-18 DY Sample day

Columns 19-21 — AWC - Average Channel Width in feet (RJ)

Columns 22-25 — FLOW - Stream Flow in CFS. (Cubic Feet Per Second) (RJ)

Columns 26-28 — POOL - Percentage of survey area which is pool (RJ)
RIFFLE - Percentage of survey area which is riffle (RJ) — POOL/RIFFLE RATIO

Columns 32-33 1 Pool Quality 1 (RJ)
34-35 2 Pool Quality 2 (RJ)
36-37 3 Pool Quality 3 (RJ) — POOL COMPOSITION
38-39 4 Pool Quality 4 (RJ)
40-41 5 Pool Quality 5 (RJ)

Qualities 1 thru 5 are the percentage of pool area with the following Characteristics:

QUALITY	LENGTH or WIDTH	DEPTH (ft)	EXPOSURE
1	> ACW	> 3	EXPOSED
2	> ACW	~2	EXPOSED
3	= ACW	~2	IMTERMEDIATE
4	< ACW	< 2	INTERMEDIATE
5	< ACW	< 1	EXPOSED

Columns 42-43 B % Boulder (B 12") (RJ)
44-45 R % Rubble (3" R 12") (RJ)
46-47 G % Gravel (0.1" G 3") (RJ) — RIFFLE COMPOSITION
48-49 S-S % Sand-Silt (RJ)
50-51 O % Other (Logs, trash, etc.) (RJ)

STREAM HABITAT INVENTORY FILE page 2

Column 52 COVER - Bank cover
1 = FORESTED SOFTWOODS, COMPLETE CANOPY
2 = BRUSH, ALDER, GRASS
3 = EXPOSED

STREAM BANK CONDITIONS

Column 53 L - Left Bank Stability
54 R - Right Bank Stability
1 = Stable & solid
2 = Partially unstable & Eroding
3 = Unstable & Sloughing

GRADIENT

Columns 55-56 UP - Percent upward gradient
DN - Percent downward gradient
AVE - Average percent gradient

* RJ = Right Justify.

BARRIER AND DIVERSION INVENTORY FILE
DOCUMENTATION FOR DATA ENTRY
(CODING FORM)

Column	1	CD TYPE (CARD TYPE) ALWAYS 1 (INDICATES BARRIER DIVERSION DATA CARD)
Columns	2-3	BASIN CODE NUMBER 01 - Klamath River Basin 02 - Trinity River Basin
Columns	4-7	STREAM CODE NUMBER (SEE STREAM CODE MASTER FOR CODES)
Columns	8-12	RIVER MILE - POINT OF BARRIER OR DIVERSION (HUNDREDTH OF MILES, ASSUMED DECIMAL) BARRIERS AND DIVERSIONS MUST BE SEPARATED BY AT LEAST 0.01 MILES.
Columns	13-14 15-16 17-18	YEAR MONTH DATE OF OBSERVATION DAY
Column	19	RP - REMOVAL PRIORITY CODE 1 - REMOVAL CRITICAL FOR GOOD HABITAT ACCESS 2 - REMOVAL NECESSARY FOR HABITAT ACCESS 3 - REMOVAL DESIRABLE FOR HABITAT ACCESS 4 - REMOVAL HELPFUL FOR HABITAT ACCESS 5 - REMOVAL NOT HELPFUL OR REMOVAL IMPOSSIBLE
Column	20	TYPE - TYPE OF BARRIER CODE 1 - LOG JAM, LOGS ONLY 2 - LOG JAM, LOGS AND ROCKS 3 - NATURAL FALLS 4 - NATURAL CASCADES 5 - MAN-MADE DAM 6 - MAN-MADE CULVERT 7 - DRY 8 - BEAVER DAM 9 - 0 - OR BLANK - DIVERSION
Columns	21-22	HEIGHT (HEIGHT OF BARRIER IN FEET)
Column	23	P/IMP - BARRIER PASSABILITY CODE 1 - PASSABLE BARRIER 2 - IMPASSABLE BARRIER
Columns	24-27	PIPE SIZE (HUNDREDTHS OF INCHES, ASSUMED DECIMAL)
Columns	28-31	SCREEN SIZE (HUNDREDTHS OF INCHES, ASSUMED DECIMAL)
Columns	32-35	FLOW DIVERTED (HUNDREDTHS OF CUBIC FEET PER SECOND, ASSUMED DECIMAL)

STREAM CODE FILE

DOCUMENTATION FOR DATA ENTRY
(CODING FORM)

Columns	1-4	TABLE (FILE) IDENTIFICATION NUMBER This will always be 5100.
Column	5	CARD TYPE - Punch 1 for a header card or punch 2 for a data card. A header card is used for describing the file. A data card contains basin file information (name, code etc.).
Column	6	Blank
Columns	7-8	BASIN CODE NUMBER (See attached list for code numbers).
Column	13	EXTENSION FOR STREAM CODE FOR PERSONAL USE (i.e. 0012A) (0013B). This column is not used by the program for selecting streams.
Columns	14-25	Blank
Columns	26-80	STREAM NAME or description.

APPENDIX 3

STREAM CODE INDEX

STREAM CODE MASTER

Achelth Creek	01 0211
Ah Pah Creek	01 0164
Ah Pah Creek, North Fork	01 0165
Ah Pah Creek, South Fork	01 0173
Bear Creek	01 0178
Beaver Creek	02 0018
Bens Creek	01 0384
Big Creek	02 0014
Bigtree Creek	02 0008
Blue Creek	01 0069
Blue Creek, Crescent City Fork	01 0118
Blue Creek, East Fork	01 0143
Blue Creek, West Fork	01 0074
Bluff Creek	01 0401
Bret Creek	02 0091
Brown Creek	02 0060
Bull Creek	02 0003
Bunchgrass Creek	02 0035
Burnt Ranch Creek	01 0366
Burrill Creek	01 0342
Buzzard Creek	01 0239
Campbell Creek	02 0075
Cappell Creek	01 0296
Captain John Gulch	02 0073
Cavanaugh Creek	01 0391
China Creek	01 0307
Chqui Creek	01 0313
Clearwater Creek	01 0399
Clirliah Creek	01 0257
Coon Creek	01 0314
Corral Creek	02 0090
Coyote Creek, One	01 0089
Coyote Creek, Two	02 0010
Deerhorn Creek	02 0004
Devil Creek	01 0304
Dry Gulch	01 0318
Ferry Gulch	02 0061
Gist Creek	01 0385
Ha Amar Creek	01 0244
Halagow Creek	01 0210
Heck Creek	02 0074
High Prairie Creek	01 0003
Hog Ranch Creek	01 0368
Hopkins Creek	01 0392
Hoppaw Creek	01 0024
Hospital Creek	02 0072
Hostler Creek	02 0054
Hunter Creek	01 0005
Hunter Creek, West Fork	01 0010
Indian Creek, One	01 0094
Indian Creek, Two	01 0400
Joe Marine Creek	01 0398
Johnson Creek	01 0212
Klamath River	01 0001
Knulthkarn Creek	01 0243
Lewis Gulch	01 0315
Limb Camp Creek	02 0013
Little Pine Creek	01 0352
Mareep Creek	01 0308
Marshall Crossing Creek	02 0032
Mawah Creek	01 0312
McGarvey Creek	01 0049
Mettah Creek	01 0248
Mill Creek	02 0027
Mill Creek, Middle Fork	02 0048
Mill Creek, North Fork	02 0041
Mill Creek, South Fork	02 0049
Miners Creek	01 0319
Monkey Gulch	02 0007
Morek Creek	01 0293
Muddy Creek	01 0387
Mynot Creek	01 0007
Nickowitz Creek	01 0104
Nixon Creek	02 0015

STREAM CODE MASTER (page 2)

Norton Creek	02 0011
Notchkoo Creek	01 0259
Omagar Creek	01 0060
Oregon Creek	02 0092
Pecwan Creek	01 0214
Pecwan Creek, East Fork	01 0215
Pecwan Creek, West Fork	01 0233
Pine Creek	01 0343
Potato Creek	01 0076
Pularvasar Creek	01 0070
Richardson Creek	01 0022
Roach Creek	01 0261
Robbers Gulch	01 0329
Rock Creek	02 0063
Rube Creek	01 0320
Saints Rest Creek	01 0389
Salt Creek	01 0002
Saugep Creek	01 0027
Skunk Creek	02 0009
Slide Creek	01 0097
Snow Camp Creek	01 0349
Soapstone Creek	01 0106
Soctish Creek	02 0019
Soctish Creek, North Fork	02 0021
Spring Creek	02 0059
Spruce Creek	01 0006
Supply Creek	02 0062
Surpur Creek	01 0186
Tarup Creek	01 0053
Tectah Creek	01 0192
Terwer Creek	01 0031
Tish-Tang-a-Tang Creek	02 0077
Tish-Tang-a-Tang Creek, South Fork	02 0084
Trinity River	02 0001
Tully Creek	01 0322
Twomile Creek	02 0065
Waukell Creek, One	01 0029
Waukell Creek, Two	01 0316
Weitchpec Creek	01 0386
Wildcat Creek	01 0146
Woodtick Gulch	01 0113

APPENDIX 4

DOCUMENTATION AND SAMPLE OUTPUT FOR

"PROGRAM SALMON" AND "PROGRAM STREAM"

DOCUMENTATION FOR

PROGRAM STREAM

Stream Habitat and Barrier-Diversion Data Retrieval

I GENERAL DESCRIPTION

Purpose

This program was designed to extract stream habitat survey information and barrier-diversion survey information from permanent tape inventory files for the United States Fish and Wildlife Service. The program was designed specifically to retrieve information for the streams and tributaries of the Klamath River basin and the Trinity River basin in northern California. This program requires two preconstructed inventory files which reside on permanent tape files, 1) the Barrier-Diversion Inventory Files and 2) the Stream Habitat Inventory File.

History

This program was written for the U.S. Fish and Wildlife Service by Patrick Collins in ANSI FORTRAN for use on a CDC 3150 computer at Humboldt State University, Arcata, Calif. The program was implemented for use in June 1978.

Output

Inventory data (information) is retrieved for output in two ways based on the option chosen by the user.

Option 1 outputs barrier-diversion data only for all tributaries of the Klamath and Trinity River basins which are on file. River mile, barrier-diversion type, removal priority code and passage code for each stream is outputted in ascending order by river mile.

Option 2 merges the stream habitat inventory file and the barrier-diversion inventory file and outputs all information available on a stream in ascending order by river mile. The user may select one or more streams to be searched and listed.

Limitations

This program was designed to run with permanent tape files maintained and updated by the GAME SYSTEM at HSU. However, each permanent tape file must be transferred to disk by the GAME SYSTEM (Program HG17) prior to Program Stream execution. This tape file has a specific format from which it is updated by cards and maintained by the GAME SYSTEM (Program HG16). Input information for the Barrier-Diversion Inventory File and the Stream Habitat Inventory File can be found on the data entry documentation form for each file.

Current Limitations:

Under option 1 - no more than 1200 barrier-diversion surveys per river basin, and no more than 120 barrier-diversion surveys per stream.

Under option 2 - no more than 200 stream habitat surveys and barrier-diversion surveys in combination on any one stream. The user may request as many streams to be searched as desired (no-limit).

*****IMPORTANT*****

THIS PROGRAM WAS SPECIFICALLY DESIGNED FOR THE U.S. FISH AND WILDLIFE SERVICE AND CONSEQUENTLY WAS NOT INTENDED FOR USE BY THE GENERAL PUBLIC. HOWEVER, ANYONE WISHING TO USE PROGRAM STREAM MAY, BUT A COMPETENT PROGRAMMER SHOULD BE CONSULTED TO ADAPT THE PROGRAM TO YOUR PARTICULAR NEEDS. THE PROGRAM CAN EASILY BE ADAPTED TO READ INPUT DATA FROM DISK OR TAPE, BUT THE USER IS RESPONSIBLE FOR CREATING THE PROPER INFORMATION FILES ON THESE DEVICES IN THE CORRECT FORMAT FOR PROGRAM STREAM. INFORMATION ON FILE STRUCTURE CAN BE FOUND ON THE DATA ENTRY DOCUMENTATION FORMS FOR THE BARRIER-DIVERSION INVENTORY FILE AND THE STREAM HABITAT INVENTORY FILE.

II ORDER OF CARDS IN THE JOB DECK

(STARRED NUMBERS (*) INDICATE CARDS WHICH YOU MUST PREPARE)

CARD NUMBER

* 1	SPECIAL JOB CARD 1
2	$JOB CARD
3	$EQUIP, 01 = MTCOEU01
4	$AUXLOAD, 12, HG17, HG17A
5	CONTROL CARD 1
6	CONTROL CARD 2
7	CONTROL CARD 3
8	** END OF CONTROL CARDS
9	EOF
10	EOF
11	EOJ
*12	SPECIAL JOB CARD 2
13	$JOB CARD
14	$EQUIP, 01 = MTCOEU01
15	$AUXLOAD, 12, HG17, HG17A
16	CONTROL CARD 1
17	CONTROL CARD 2
18	CONTROL CARD 3
19	** END OF CONTROL CARDS
20	EOF
21	EOF
22	EOJ
23	$JOB CARD
24	$FET, USFWS, BARRIER-INVENT, 88
25	$OPEN, 10
26	$FET, USFWS, STREAM-HABITAT, 88
27	$OPEN, 15
28	$AUXLOAD, 12, STREAM
*29	OPTION CARD
*30	STREAM CODE CARD(S) (OPTIONAL)
31	EOF
32	EOF
33	EOJ
34	JOB CARD
35	$FET, USFWS, BARRIER-INVENT, 88
35	$RELEASE, ALL
36	$FET, USFWS, STREAM-HABITAT, 88
37	EOF
38	EOF
39	EOJ

III CARD PREPARATION

Cards numbered 1,2,29 and 30 are the only cards which the user must prepare. All other cards are pre-punched for the U.S. Fish and Wildlife Service.

CARD 1 SPECIAL JOB CARD 1

The special job card must be filled out as follows so the computer operator knows which permanent tape files you need. In this case SPECIAL JOB CARD 1 indicates that you need version 3 of the Barrier-Diversion Inventory File which is on reel number 277 for owner 803 known as BARR to the tape filing system. This information should be recorded by the user for all update runs on the inventory files (See Update Forms and Documentation).

SPECIAL JOB CARD

DATE: 15 June 78 TIME: 1200

JOB NAME: HG-17

EST RUN TIME: 2 min DISK # 12

USER NAME: USFWS

EXT._____ # OF PUNCHED CARDS:____

SPECIAL INSTRUCTIONS:	REEL #	LU #	I	O	FILE NAME	TP	ED #	OWNER #
	277	01	X		Barr 003			803
_COSY # ____								
__AUXBUILD # ____								

CARD 12 SPECIAL JOB CARD 2

This SPECIAL JOB CARD is filled out in the same manner as card number 1, except you are indicating that you need version 5 of the Stream Habitat Inventory file on reel number 1203 for owner 805 known as STRM to the tape filing system.

SPECIAL JOB CARD

DATE: 15 June 78 TIME: 1200

JOB NAME: HG-17

EST RUN TIME: 2 min DISK # 12

USER NAME: USFWS

EXT._____ # OF PUNCHED CARDS:____

SPECIAL INSTRUCTIONS:	REEL #	LU #	I	O	FILE NAME	TP	ED #	OWNER #
	1203	01	X		STRM 005			805
_COSY # ____								
_AUXBUILD # ____								

CARD 29 OPTION CARD

This card requires either a 1 or a blank in Card Column 1. If a 1 is punched in column 1, option 1 of Program Stream is executed. If column 1 is left blank, option 2 of Program Stream is executed (See Output in GENERAL DESCRIPTION SECTION for description of options).

CARD 30 STREAM CODE CARD(S) (OPTIONAL)

These card(s) are included only if option 2 is indicated on the OPTION CARD by a blank in column one. These cards contain the name and code number of the streams the user wishes inventory data on. There is no limit to the number of streams requested by the user to be searched. These cards are read in the same format as the Stream Code Inventory File (therefore, stream code inventory cards may be used to chose streams to be searched). Cards are punched as follows:

Columns	7- 8	Basin code number of the stream to be searched
Columns	9-12	Stream code number of the stream to be searched
Columns	26-80	Name or description of the stream to be searched

IV NOTE ON PROCESSING OF JOB DECK

CARDS 1-11

These cards activate the GAME SYSTEM Program HG17 to write the permanent Barrier-Diversion Inventory Tape File to disk so Program Stream can access this information.

CARDS 12-22

These cards also activate Program HG17, and writes the permanent Stream Habitat Inventory Tape File to disk so Program Stream can access this information.

CARDS 23-39

These cards activate Program Stream to search the inventory files on disk for the desired information requested by the user, to output this information, and to close the disk files once the job is completed.

DOCUMENTATION FOR

PROGRAM SALMON

Salmon Spawning Ground Inventory File Data Retrieval

I GENERAL DESCRIPTION

Purpose:

This program was designed to extract salmon spawning ground survey information from permanent tape files for the United States Fish and Wildlife Service. The program was designed specifically to retrieve salmon spawning ground information (such as the number of live and dead salmon, redd counts, water temperature, weather conditions, etc.) for the streams and tributaries of the Klamath River basin and Trinity River basin in northern California. This program requires two preconstructed inventory files which reside on permanent tape files, 1) the Salmon Spawning Ground Inventory File and 2) the Stream Code Inventory file.

History:

This program was originally written by the Washington State Department of Fisheries in COBOL for use on a IBM computer. A copy of the program (480RE21RPT) was sent to the U.S. Fish and Wildlife Service for use in a pilot research project to assess stream habitat conditions on the Klamath and Trinity River basins in northern California. The program was converted and modified by Patrick Collins to run in ANSI COBOL on a CDC 3150 computer at Humboldt State University, Arcata, California. Basin array tables (Klamath and Trinity River Basins only) were hard copied into the program and information on survey methods, water conditions, water temperature, viewing conditions and weather conditions replaced other variables in the original program not needed in the current research project. Stream code numbers were reduced from a 5 to 4 character number, and the species code number was repositioned in the coding form for data entry to make the inventory file compatible with the GAME SYSTEM at HSU. Species codes were expanded from 5 to 10 codes (0 through 9) so information on juveniles, smolts and young of the year fish could be extracted separately from ADULTS. The program was implemented for use in June 1978.

Output:

The program retrieves and outputs salmon spawning ground information from permanent inventory files for the date and the species of salmon requested by the user. The output is in a report form for inclusion in technical reports.

Limitations:

This program was designed to run with information from permanent tape files maintained and updated by the GAME SYSTEM at HSU. However, each permanent tape file must be transferred to disk by the GAME SYSTEM (Program HG17) prior to Program Salmon execution. This saves computer time in sorting inventory files. Each inventory tape file has a specific format from which it is updated by cards and maintained by the GAME SYSTEM (Program HG16). Input information and format for the Salmon Spawning Ground Inventory File and the Stream Code Inventory file can be found on the Data Entry Documentation Form for each file.

Current limitations:

The Stream Code Inventory File must not exceed 1000 streams.

*****IMPORTANT*****

THIS PROGRAM WAS SPECIFICALLY DESIGNED FOR THE U.S. FISH AND WILDLIFE SERVICE AND CONSEQUENTLY WAS NOT INTENDED FOR USE BY THE GENERAL PUBLIC. HOWEVER, ANYONE WISHING TO USE PROGRAM SALMON MAY, BUT A COMPETENT PROGRAMMER SHOULD BE CONSULTED TO ADAPT THE PROGRAM TO YOUR PARTICULAR NEEDS. THE PROGRAM CAN EASILY BE ADAPTED TO READ INPUT DATA FROM DISK OR TAPE, BUT THE USER IS RESPONSIBLE FOR CREATING THE PROPER INFORMATION FILES ON THESE DEVICES IN THE CORRECT FORMAT FOR PROGRAM SALMON. INFORMATION ON FILE STRUCTURE CAN BE FOUND ON THE DATA ENTRY DOCUMENTATION FORMS FOR THE SALMON SPAWNING GROUND INVENTORY FILE AND THE STREAM CODE INVENTORY FILE.

II ORDER OF CARDS IN THE JOB DECK

(STARRED NUMBERS (*) INDICATE CARDS WHICH YOU MUST PREPARE)

CARD NO.	
* 1	SPECIAL JOB CARD 1
2	$JOB CARD
3	$EQUIP, 01 = MTCOEU01
4	$AUXLOAD, 12, HG17, HG17A
5	CONTROL CARD 1
6	CONTROL CARD 2
7	** END OF CONTROL CARDS
8	EOF
9	EOF
10	EOJ
*11	SPECIAL JOB CARD 2
12	$JOB CARD
13	$EQUIP, 01 = MTCOEU01
14	$AUXLOAD, 12, HG17, HG17A
15	CONTROL CARD 1
16	CONTROL CARD 2
17	** END OF CONTROL CARDS
18	EOF
19	EOF
20	EOJ
21	$JOB CARD
22	$AUXLOAD, 12, SALMON
*23	CONTROL CARD
24	EOF
25	EOF
26	EOJ

III CARD PREPARATION

Cards numbered 1, 11 and 23 are the only cards which the user must prepare. All other cards are pre-punched for the U.S. Fish and Wildlife Service.

CARD 1 SPECIAL JOB CARD 1

The special job card must be filled out as follows so the computer operator knows which permanent tape files you need. In this case SPECIAL JOB CARD 1 indicates that you need version 3 of the Stream Code Inventory File which is on reel number 277 for owner 803 known as STRC to the tape filing system. This information should be recorded by the user for all update runs on the inventory files (See Update forms and documentation).

SPECIAL JOB CARD

DATE: 15 June 78 TIME: 12ØØ

JOB NAME: HG-17

EST RUN TIME: 2 min. DISK # 12

USER NAME: USFWS

EXT. ______ # OF PUNCHED CARDS: ______

SPECIAL INSTRUCTIONS:	REEL #	LU #	I	O	FILE NAME	T P	ED #	OWNER #
	277	Ø1	X		STRC ØØ3			8Ø3
_COSY # ______								
_AUXBUILD # ______								

CARD 11 SPECIAL JOB CARD 2

This SPECIAL JOB CARD is filled out in the same manner as card number 1, except you are indicating that you need version 5 of the Salmon Habitat Inventory File on reel number 1203 for owner 805 known as SALM to the tape filing system.

SPECIAL JOB CARD

DATE: 15 June 78 TIME: 12ØØ

JOB NAME: HG-17

EST RUN TIME: 2 min. DISK # 12

USER NAME: USFWS

EXT. ______ # OF PUNCHED CARDS: ______

SPECIAL INSTRUCTIONS:	REEL #	LU #	I	O	FILE NAME	T P	ED #	OWNER #
	12Ø3	Ø1	X		SALM ØØ5			8Ø5
_COSY # ______								
_AUXBUILD # ______								

CARD 23 CONTROL CARD

This card contains all the necessary information for Program Salmon to extract and output information desired by the user. Information is selected by date and by species of fish. Fish have the following code numbers:

1 = CHINOOK SALMON ADULTS
2 = CHINOOK SALMON YOUNG OF THE YEAR
3 = COHO SALMON ADULTS
4 = COHO SALMON YOUNG OF THE YEAR
5 = COHO SALMON SMOLTS
6 = STEELHEAD ADULTS
7 = STEELHEAD YOUNG OF THE YEAR
8 = STEELHEAD JUVENILES
9 = STEELHEAD SMOLTS
0 = RAINBOW TROUT

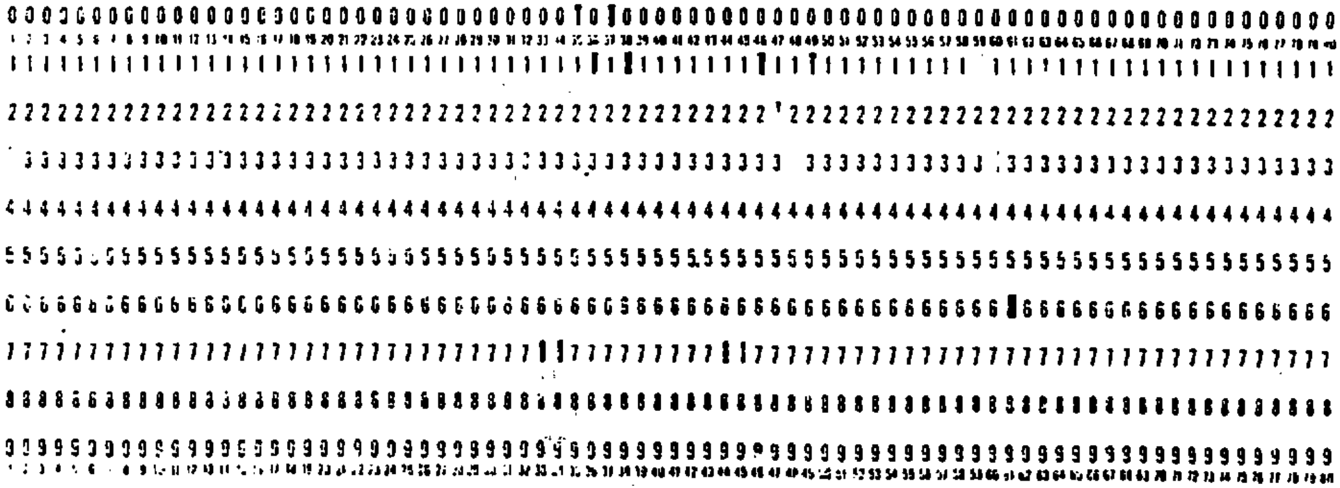
Any combination of fish may be selected for any one search. If desired all fish may be searched at one time. To extract desired information enter the control card parameters as follows:

Column	1	Punch a "C" to indicate this is a control card to the program
Columns	34-35	YEAR you want search to begin
Columns	36-37	MONTH you want search to begin
Columns	38-39	DAY you want search to begin
Columns	44-45	YEAR you want search to end
Columns	46-47	MONTH you want search to end
Columns	48-49	DAY you want search to end
Column	59	CODE NUMBER of fish you want information on
Column	60	CODE NUMBER of next fish
Column	61	CODE NUMBER of next fish
Column	62	CODE NUMBER of next fish
Column	63	CODE NUMBER of next fish
Column	64	CODE NUMBER of next fish
Column	65	CODE NUMBER of next fish
Column	66	CODE NUMBER of next fish
Column	67	CODE NUMBER of next fish
Column	68	CODE NUMBER of next fish

All fish may be searched at one time by punching the key word "ALL" in columns 59 thru 61. The following examples will illustrate the control card.

EXAMPLE 1

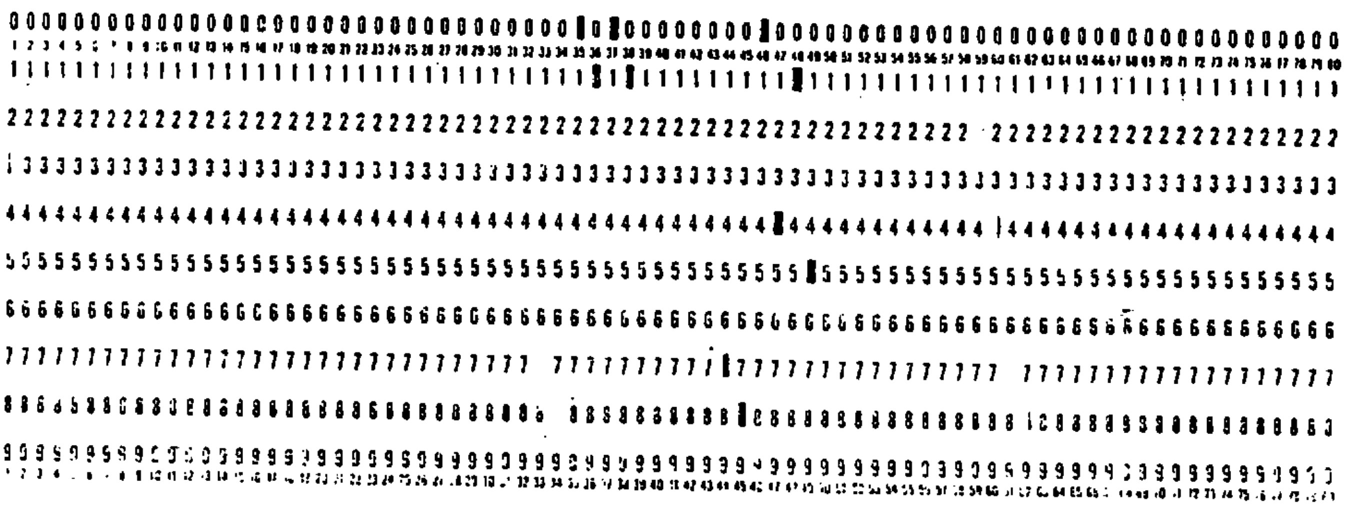
C	770101	771231	136



This card requests information on chinook, coho and steelhead adults from January 1, 1977 to December 31, 1977.

EXAMPLE 2

C	780101	780415	2478



This card requests information on young of the year chinook, coho and steelhead and juvenile steelhead from January 1, 1978 to April 15, 1978.

IV NOTE ON PROCESSING OF JOB DECK

CARDS 1-10

These cards activate the GAME SYSTEM Program HG17 to write the permanent Stream Code Inventory Tape File to disk so Program Salmon can access this information.

CARDS 11-20

These cards also activate Program HG17, and writes the permanent Salmon Habitat Inventory Tape File to disk so Program Stream can access this information.

CARDS 21-26

These cards activate Program Salmon to search the inventory files on disk for the desired information requested by the user, to output this information, and to close the disk files once the job is completed.

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1 2 3	A C G O C D Y E
KLAMATH RIVER BASIN																	
SALT CREEK																	
00001	0002	78/11/24	0.25	0.50	0.25	CHIA	0	0	0	0	FOOT	LM	00.0	CLEAR	CLEAR	57 71	
00001	0002	78/04/07	0.55	0.58	0.03	CHIY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	83	
00001	0002	78/05/05	0.55	0.58	0.03	CHIY	0	0	0	0	ELCTRO	LC	56.0F	CLEAR	PTLYCD	80	
00001	0002	78/04/07	0.55	0.58	0.03	COHY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80	
00001	0002	78/05/05	0.55	0.58	0.03	COHY	0	0	0	0	ELCTRO	LC	56.0F	CLEAR	PTLYCD	80	
00001	0002	78/04/07	0.55	0.58	0.03	STHY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80	
00001	0002	78/05/05	0.55	0.58	0.03	STHJ	2	0	2	0	ELCTRO	LC	56.0F	CLEAR	PTLYCD	80 82 83	
HUNTER CREEK																	
00001	0005	77/11/29	0.00	0.59	0.59	CHIA	0	0	0	0	FOOT	MT	55.0F	POOR	CLOUDY	45	
00001	0005	78/10/13	0.94	0.94	0.00	CHIA	1	0	1	0	FOOT	LC	54.0F	CLEAR	CLEAR	65 11	
00001	0005	78/11/24	0.00	1.00	1.00	CHIA	0	5	5	5	FOOT	LC	00.0	CLEAR	CLEAR	42 71 52	
00001	0005	78/12/01	4.50	4.50	0.00	CHIA	0	0	0	0	SPOT	HT	00.0	TURBD	CLOUDY		
00001	0005	78/12/02	1.00	2.00	1.00	CHIA	0	0	0	0	FOOT	MM	00.0	FAIR	CLEAR		
00001	0005	78/12/02	3.50	4.50	1.00	CHIA	0	0	0	0	FOOT	MM	00.0	FAIR	CLEAR		
00001	0005	78/04/07	0.59	0.62	0.03	CHIY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80	
00001	0005	78/05/25	0.59	0.65	0.06	CHIY	0	0	0	0	ELCTRO	LC	55.0F	CLEAR	PTLYCD	80	
00001	0005	78/04/07	0.59	0.62	0.03	COHY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80	
00001	0005	78/05/25	0.59	0.65	0.06	COHY	0	0	0	0	ELCTRO	LC	55.0F	CLEAR	PTLYCD	80	
00001	0005	78/04/07	0.59	0.62	0.03	STHJ	2	0	2	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80 82 83	
00001	0005	78/05/25	0.59	0.65	0.06	STHJ	5	0	5	0	ELCTRO	LC	55.0F	CLEAR	PTLYCD	80 82 83	

DOCUMENTATION FOR

PROGRAM STREAM

Stream Habitat and Barrier-Diversion Data Retrieval

I GENERAL DESCRIPTION

Purpose

This program was designed to extract stream habitat survey information and barrier-diversion survey information from permanent tape inventory files for the United States Fish and Wildlife Service. The program was designed specifically to retrieve information for the streams and tributaries of the Klamath River basin and the Trinity River basin in northern California. This program requires two preconstructed inventory files which reside on permanent tape files, 1) the Barrier-Diversion Inventory File and 2) the Stream Habitat Inventory File.

History

This program was written for the U.S. Fish and Wildlife Service by Patrick Collins in ANSI FORTRAN for use on a CDC 3150 computer at Humboldt State University, Arcata, Calif. The program was implemented for use in June 1978.

Output

Inventory data (information) is retrieved for output in two ways based on the option chosen by the user.

Option 1 outputs barrier-diversion data only for all tributaries of the Klamath and Trinity River basins which are on file. River mile, barrier-diversion type, removal priority code and passage code for each stream is outputted in ascending order by river mile.

Option 2 merges the stream habitat inventory file and the barrier-diversion inventory file and outputs all information available on a stream in ascending order by river mile. The user may select one or more streams to be searched and listed.

Limitations

This program was designed to run with permanent tape files maintained and updated by the GAME SYSTEM at HSU. However, each permanent tape file must be transferred to disk by the GAME SYSTEM (Program HG17) prior to Program Stream execution. This saves computer time in sorting inventory files. Each inventory tape file has a specific format from which it is updated by cards and maintained by the GAME SYSTEM (Program HG16). Input information for the Barrier-Diversion Inventory File and the Stream Habitat Inventory File can be found on the data entry documentation form for each file.

Current Limitations:

Under option 1 - no more than 1200 barrier-diversion surveys per river basin, and no more than 120 barrier-diversion surveys per stream.

Under option 2 - no more than 200 stream habitat surveys and barrier-diversion surveys in combination on any one stream. The user may request as many streams to be searched as desired (no-limit).

*****IMPORTANT*****

THIS PROGRAM WAS SPECIFICALLY DESIGNED FOR THE U.S. FISH AND WILDLIFE SERVICE AND CONSEQUENTLY WAS NOT INTENDED FOR USE BY THE GENERAL PUBLIC. HOWEVER, ANYONE WISHING TO USE PROGRAM STREAM MAY, BUT A COMPETENT PROGRAMMER SHOULD BE CONSULTED TO ADAPT THE PROGRAM TO YOUR PARTICULAR NEEDS. THE PROGRAM CAN EASILY BE ADAPTED TO READ INPUT DATA FROM DISK OR TAPE, BUT THE USER IS RESPONSIBLE FOR CREATING THE PROPER INFORMATION FILES ON THESE DEVICES IN THE CORRECT FORMAT FOR PROGRAM STREAM. INFORMATION ON FILE STRUCTURE CAN BE FOUND ON THE DATA ENTRY DOCUMENTATION FORMS FOR THE BARRIER-DIVERSION INVENTORY FILE AND THE STREAM HABITAT INVENTORY FILE.

II ORDER OF CARDS IN THE JOB DECK

(STARRED NUMBERS (*) INDICATE CARDS WHICH YOU MUST PREPARE)

<u>CARD NUMBER</u>

```
* 1     SPECIAL JOB CARD 1
  2     $JOB CARD
  3     $EQUIP, 01 = MTCOEUO1
  4     $AUXLOAD, 12, HG17, HG17A
  5      CONTROL CARD 1
  6      CONTROL CARD 2
  7      CONTROL CARD 3
  8     ** END OF CONTROL CARDS
  9     EOF
 10     EOF
 11     EOJ

*12     SPECIAL JOB CARD 2
 13     $JOB CARD
 14     $EQUIP, 01 = MTCOEUO1
 15     $AUXLOAD, 12, HG17, HG17A
 16      CONTROL CARD 1
 17      CONTROL CARD 2
 18      CONTROL CARD 3
 19     ** END OF CONTROL CARDS
 20     EOF
 21     EOF
 22     EOJ

 23     $JOB CARD
 24     $FET, USFWS, BARRIER-INVENT, 88
 25     $OPEN, 10
 26     $FET, USFWS, STREAM-HABITAT, 88
 27     $OPEN, 15
 28     $AUXLOAD, 12, STREAM
*29      OPTION CARD
*30      STREAM CODE CARD(S) (OPTIONAL)
 31     EOF
 32     EOF
 33     EOJ

 34     JOB CARD
 35     $FET, USFWS, BARRIER-INVENT, 88
 35     $RELEASE, ALL
 36     $FET, USFWS, STREAM-HABITAT, 88
 37     EOF
 38     EOF
 39     EOJ
```

III CARD PREPARATION

Cards numbered 1, 2, 29 and 30 are the only cards which the user must prepare. All other cards are pre-punched for the U.S. Fish and Wildlife Service.

CARD 1 SPECIAL JOB CARD 1

The special job card must be filled out as follows so the computer operator knows which permanent tape files you need. In this case SPECIAL JOB CARD 1 indicates that you need version 3 of the Barrier-Diversion Inventory File which is on reel number 277 for owner 803 known as BARR to the tape filing system. This information should be recorded by the user for all update runs on the inventory files (See Update Forms and Documentation).

SPECIAL JOB CARD DATE: 15 June 78 TIME: 12ØØ

JOB NAME: HG-17 EST RUN TIME: 2 min. DISK # 12

USER NAME: USFWS EXT.____ # OF PUNCHED CARDS:____

SPECIAL INSTRUCTIONS:	REEL #	LU #	I	O	FILE NAME	T P	ED #	OWNER #
	277	Ø1	X		BARR ØØ3			8Ø3
_COSY # ____								
__AUXBUILD # ____								

CARD 12 SPECIAL JOB CARD 2

This SPECIAL JOB CARD is filled out in the same manner as card number 1, except you are indicating that you need version 5 of the Stream Habitat Inventory file on reel number 1203 for owner 805 known as STRM to the tape filing system.

SPECIAL JOB CARD DATE: 15 June 78 TIME: 12ØØ

JOB NAME: HG-17 EST RUN TIME: 2 min. DISK # 12

USER NAME: USFWS EXT.____ # OF PUNCHED CARDS:____

SPECIAL INSTRUCTIONS:	REEL #	LU #	I	O	FILE NAME	T P	ED #	OWNER #
	12Ø3	Ø1	X		STRM ØØ5			8Ø5
_COSY # ____								
__AUXLOAD # ____								

CARD 29 OPTION CARD

This card requires either a 1 or a blank in Card Column 1. If a 1 is punched in column 1, option 1 of Program Stream is executed. If column 1 is left blank, option 2 of Program Stream is executed (See Output in GENERAL DESCRIPTION SECTION for description of options).

CARD 30 STREAM CODE CARD(S) (OPTIONAL)

These card(s) are included only if option 2 is indicated on the OPTION CARD by a blank in column one. These cards contain the name and code number of the streams the user wishes inventory data on. There is no limit to the number of streams requested by the user to be searched. These cards are read in the same format as the Stream Code Inventory File (therefore, stream code inventory cards may be used to chose streams to be searched). Cards are punched as follows:

Columns	7- 8	Basin code number of the stream to be searched.
Columns	9-12	Stream code number of the stream to be searched.
Columns	26-80	Name or description of the stream to be searched.

IV NOTE ON PROCESSING OF JOB DECK

CARDS 1-11

These cards activate the GAME SYSTEM Program HG17 to write the permanent Barrier-Diversion Inventory Tape File to disk so Program Stream can access this information.

CARDS 12-22

These cards also activate Program HG17, and writes the permanent Stream Habitat Inventory Tape File to disk so Program Stream can access this information.

CARDS 23-39

These cards activate Program Stream to search the inventory files on disk for the desired information requested by the user, to output this information, and to close the disk files once the job is completed.

PROGRAM: STREAM

DATE: 09/05/78

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

OPTION 1

SHORT LIST OF BARRIERS AND DIVERSIONS
CURRENTLY FOUND ON ALL STREAMS FOR EACH BASIN

RESULTS FOR: KLAMATH RIVER BASIN

STREAM CODE	RIVER MILE	BARRIER-DIVERSION TYPE	BARRIER-DIVERSION REMOVAL PRIORITY CODE	PASSAGE CODE
STREAM CODE: 5.	Hunter Creek			
	0.80	(1) LOG JAM-LOGS ONLY	(2) NECESSARY	(1) PASSABLE
STREAM CODE: 53.	Tarup Creek			
	0.65	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	0.76	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	0.80	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	0.90	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	0.95	(1) LOG JAM-LOGS ONLY	(2) NECESSARY	(1) PASSABLE
	1.05	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	1.10	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	1.30	(1) LOG JAM-LOGS ONLY	(2) NECESSARY	(1) PASSABLE
	1.32	(8) BEAVER DAM	(2) NECESSARY	(1) PASSABLE
	1.45	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	1.46	(8) BEAVER DAM	(4) HELPFUL	(1) PASSABLE
	1.60	(8) BEAVER DAM	(2) NECESSARY	(1) PASSABLE
	1.65	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	1.78	(1) LOG JAM-LOGS ONLY	(2) NECESSARY	(1) PASSABLE
	2.20	(2) LOG JAM-LOGS AND ROCKS	(4) HELPFUL	(1) PASSABLE
	2.30	(1) LOG JAM-LOGS ONLY	(1) CRITICAL	(2) IMPASSABLE
	2.35	(2) LOG JAM-LOGS AND ROCKS	(1) CRITICAL	(2) IMPASSABLE
	2.40	(1) LOG JAM-LOGS ONLY	(2) NECESSARY	(1) PASSABLE
	2.45	(5) MAN-MADE DAM	(2) NECESSARY	(2) IMPASSABLE
	2.52	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
STREAM CODE: 60.	Omagar Creek			
	1.49	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	1.50	(6) MAN-MADE CULVERT	(3) DESIRABLE	(1) PASSABLE
	1.52	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	1.54	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	1.60	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	1.65	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	1.70	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(2) IMPASSABLE
	1.72	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(2) IMPASSABLE
	1.80	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(2) IMPASSABLE
	1.87	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(1) PASSABLE
	1.90	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(2) IMPASSABLE
	2.05	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(2) IMPASSABLE
	2.13	(1) LOG JAM-LOGS ONLY	(3) DESIRABLE	(2) IMPASSABLE

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

OPTION 2

KLAMATH RIVER BASIN

RESULTS FOR: TARUP CREEK
STREAM CODE: 53.

STREAM HABITAT INVENTORY / BARRIER-DIVERSION INVENTORY

	RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COVER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
	0.00	78/ 6/13	15	0.0	20/ 80	0	0	10	30	60	0	15	75	10	0	3	3	3	1	1	1.0							
	0.25	78/ 6/13	25	0.0	20/ 80	0	0	10	30	60	0	35	45	20	0	3	3	3	1	1	1.0							
	0.50	78/ 6/13	20	1.0	70/ 30	0	10	10	40	40	0	0	60	40	0	2	2	2	1	1	1.0							
1	0.65	78/ 6/13																				3	1	2	1			
	0.75	76/ 6/13	15	2.0	70/ 30	0	25	25	25	25	0	5	65	25	5	1	2	2	1	1	1.0							
1	0.76	78/ 6/13																				3	1	2	1			
1	0.80	78/ 6/13																				3	1	2	1			
1	0.90	78/ 6/13																				3	1	2	1			
1	0.95	78/ 6/13																				2	1	4	1			
	1.00	78/ 6/13	10	3.0	70/ 30	10	20	30	20	20	0	0	70	25	5	1	2	2	1	1	1.0							
1	1.05	78/ 6/13																				3	1	2	1			
1	1.10	78/ 6/13																				3	1	2	1			
	1.25	78/ 6/13	15	2.0	70/ 30	10	20	30	20	20	5	10	55	25	5	2	2	2	1	1	1.0							
1	1.30	78/ 6/13																				2	1	3	1			
1	1.32	78/ 6/13																				2	8	2	1			
1	1.45	78/ 6/13																				3	1	2	1			
1	1.46	78/ 6/13																				4	8	1	1			
	1.50	78/ 6/13	15	2.0	40/ 60	5	10	30	30	25	0	10	75	15	0	2	2	2	1	1	1.0							
1	1.60	78/ 6/13																				2	8	3	1			
1	1.65	78/ 6/13																				3	1	3	1			
	1.75	78/ 6/13	12	3.0	50/ 50	10	30	30	15	15	0	20	65	15	0	1	2	2	1	1	1.0							
1	1.78	78/ 6/13																				2	1	3	1			
	2.00	78/ 6/13	8	3.0	40/ 60	10	20	30	20	20	0	40	50	10	0	2	2	2	2	2	2.0							
1	2.20	78/ 6/13																				4	2	6	1			
	2.25	78/ 6/13	10	3.0	60/ 40	20	30	20	20	10	15	25	45	10	5	2	2	2	4	4	4.0							
1	2.30	78/ 6/13																				1	1	12	2			
1	2.35	78/ 6/13																				1	2	25	2			
1	2.40	78/ 6/13																				2	1	6	1			
1	2.45	78/ 6/13																				2	5	6	2			
	2.50	78/ 6/13	8	3.0	40/ 60	0	10	20	30	40	10	45	30	10	5	2	2	2	3	4	3.5							
1	2.52	78/ 6/13																				3	1	6	1			

APPENDIX 5

COMPUTER PRINTOUTS

FISH POPULATION SURVEYS

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1	COMMENTS 2	COMMENTS 3	AGCY CODE
KLAMATH RIVER BASIN																			
SALT CREEK																			
00001	0002	78/11/24	0.25	0.50	0.25	CHIA	0	0	0	0	FOOT	LM	00.0	CLEAR	CLEAR	57	71		
00001	0002	78/04/07	0.55	0.58	0.03	CHIY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80			
00001	0002	78/05/05	0.55	0.58	0.03	CHIY	0	0	0	0	FLCTRO	LC	56.0F	CLEAR	PTLYCD	80			
00001	0002	78/04/07	0.55	0.58	0.03	COHY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80			
00001	0002	78/05/05	0.55	0.58	0.03	COHY	0	0	0	0	ELCTRO	LC	56.0F	CLEAR	PTLYCD	80			
00001	0002	78/04/07	0.55	0.58	0.03	STHY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80			
00001	0002	78/05/05	0.55	0.58	0.03	STHJ	2	0	2	0	ELCTRO	LC	56.0F	CLEAR	PTLYCD	80	82	83	
HUNTER CREEK																			
00001	0005	77/11/29	0.00	0.59	0.59	CHIA	0	0	0	0	FOOT	MT	55.0F	POOR	CLOUDY	45			
00001	0005	78/10/13	0.94	0.94	0.00	CHIA	1	0	1	0	FOOT	LC	54.0F	CLEAR	CLEAR	65	11		
00001	0005	78/11/24	0.00	1.00	1.00	CHIA	0	5	5	5	FOOT	LC	00.0	CLEAR	CLEAR	42	71	52	
00001	0005	78/12/01	4.50	4.50	0.00	CHIA	0	0	0	0	SPOT	MT	00.0	TURBO	CLOUDY				
00001	0005	78/12/02	1.00	2.00	1.00	CHIA	0	0	0	0	FOOT	MM	00.0	FAIR	CLEAR				
00001	0005	78/12/02	3.50	4.50	1.00	CHIA	0	0	0	0	FOOT	MM	00.0	FAIR	CLEAR				
00001	0005	78/04/07	0.59	0.62	0.03	CHIY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80			
00001	0005	78/05/25	0.59	0.65	0.06	CHIY	0	0	0	0	ELCTRO	LC	55.0F	CLEAR	PTLYCD	80			
00001	0005	78/04/07	0.59	0.62	0.03	COHY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80			
00001	0005	78/05/25	0.59	0.65	0.06	COHY	0	0	0	0	ELCTRO	LC	55.0F	CLEAR	PTLYCD	80			
00001	0005	78/04/07	0.59	0.62	0.03	STHJ	2	0	2	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80	82	83	
00001	0005	78/05/25	0.59	0.65	0.06	STHJ	5	0	5	0	ELCTRO	LC	55.0F	CLEAR	PTLYCD	80	82	83	

SALMON-SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1	2	3	AGCY	CODE
KLAMATH RIVER BASIN																				
TERWER CREEK																				
00001	0031	77/11/29	0.20	1.20	1.00	CHIA	0	0	0	0	FOOT	MT	52.5F	POOR	PTLYCD					
00001	0031	77/12/06	1.00	1.00	0.00	CHIA	1	0	1	0	SPOT	MT	00.0	POOR	CLOUDY	65				
00001	0031	78/11/30	0.50	0.50	0.00	CHIA	0	0	0	0	SPOT	LT	00.0	TURBD	CLOUDY					
00001	0031	78/12/02	0.00	1.00	1.00	CHIA	0	0	0	0	FOOT	MM	00.0	FAIR	CLEAR					
00001	0031	78/03/13	1.10	1.20	0.10	CHIY	2	0	2	0	ELCTRO	MC	00.0	CLEAR	PTLYCD	80	81			
00001	0031	78/04/20	1.15	1.20	0.05	CHIY	1	0	1	0	ELCTRO	MT	00.0	TURBD	CLOUDY	80	81			
00001	0031	78/05/11	1.20	1.40	0.20	CHIY	9	0	9	0	ELCTRO	MC	12.0C	CLEAR	PTLYCD	80	81			
00001	0031	78/03/13	1.10	1.20	0.10	COHY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	PTLYCD	80				
00001	0031	78/04/20	1.15	1.20	0.05	COHY	0	0	0	0	ELCTRO	MT	00.0	TURBD	CLOUDY	80				
00001	0031	78/05/11	1.20	1.40	0.20	COHY	3	0	3	0	ELCTRO	MC	12.0C	CLEAR	PTLYCD	80	81			
00001	0031	78/05/11	1.20	1.40	0.20	STHY	3	0	3	0	ELCTRO	MC	12.0C	CLEAR	PTLYCD	80	81	83		
00001	0031	78/03/13	1.10	1.20	0.10	STHJ	4	0	4	0	ELCTRO	MC	00.0	CLEAR	PTLYCD	80	82	83		
00001	0031	78/04/20	1.15	1.20	0.05	STHJ	2	0	2	0	ELCTRO	MT	00.0	TURBD	CLOUDY	80	82	83		
00001	0031	78/05/11	1.20	1.40	0.20	STHJ	2	0	2	0	ELCTRO	MC	12.0C	CLEAR	PTLYCD	80	82	83		

SALMON SPAWNING GROUND DATA RETRIEVAL

KLAMATH RIVER BASIN

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1	2	3	AGCY	CODE
MYNOT CREEK																				
00001	0007	78/04/07	0.00	0.05	0.05	CHIY	0	0	0	0	FLCTRO	HC	10.5C	CLEAR	CLEAR	80				
00001	0007	78/05/25	0.00	0.04	0.04	CHIY	0	0	0	0	FLCTRO	LC	53.0F	CLEAR	PTLYCD	80				
00001	0007	78/04/07	0.00	0.05	0.05	COHY	0	0	0	0	ELCTRO	HC	10.5C	CLEAR	CLEAR	80				
00001	0007	78/05/25	0.00	0.04	0.04	COHY	0	0	0	0	ELCTRO	LC	53.0F	CLEAR	PTLYCD	80				
00001	0007	78/04/07	0.00	0.05	0.05	STHJ	1	0	1	0	ELCTRO	HC	10.5C	CLEAR	CLEAR	80	82	83		
00001	0007	78/05/25	0.00	0.04	0.04	STHJ	14	0	14	0	ELCTRO	LC	53.0F	CLEAR	PTLYCD	80	82	83		
00001	0007	78/04/07	0.00	0.05	0.05	STHS	1	0	1	0	ELCTRO	HC	10.5C	CLEAR	CLEAR	80		85		
RICHARDSON CREEK																				
00001	0022	78/05/04	0.02	0.08	0.06	CHIY	1	0	1	0	ELCTRO	LC	16.0C	CLEAR	CLEAR	80	81			
00001	0022	78/05/25	0.02	0.08	0.06	CHIY	0	0	0	0	ELCTRO	LC	58.0F	CLEAR	PTLYCD	80				
00001	0022	78/05/04	0.02	0.08	0.06	COHY	0	0	0	0	ELCTRO	LC	16.0C	CLEAR	CLEAR	80				
00001	0022	78/05/25	0.02	0.08	0.06	COHY	0	0	0	0	ELCTRO	LC	58.0F	CLEAR	PTLYCD	80				
00001	0022	78/05/25	0.02	0.08	0.06	STHY	0	0	0	0	ELCTRO	LC	58.0F	CLEAR	PTLYCD	80				
00001	0022	78/05/04	0.02	0.08	0.06	STHJ	1	0	1	0	ELCTRO	LC	16.0C	CLEAR	CLEAR	80	82	83		
HOPPAW CREEK																				
00001	0024	78/03/17	0.34	0.35	0.01	CHIY	0	0	0	0	ELCTRO	LC	15.0C	CLEAR	CLEAR	80				
00001	0024	78/05/04	0.34	0.35	0.01	CHIY	2	0	2	0	ELCTRO	LC	15.5C	CLEAR	CLEAR	80	81			
00001	0024	78/03/17	0.34	0.35	0.01	COHY	2	0	2	0	ELCTRO	LC	15.0C	CLEAR	CLEAR	80	81			
00001	0024	78/05/04	0.34	0.35	0.01	COHY	0	0	0	0	ELCTRO	LC	15.5C	CLEAR	CLEAR	80				
00001	0024	78/03/17	0.34	0.35	0.01	STHJ	15	0	15	0	ELCTRO	LC	15.0C	CLEAR	CLEAR	80	82	83		
00001	0024	78/05/04	0.34	0.35	0.01	STHJ	10	0	10	0	ELCTRO	LC	15.5C	CLEAR	CLEAR	80	82	83		
SAUGER CREEK																				
00001	0027	78/04/07	0.31	0.36	0.05	CHIY	0	0	0	0	FLCTRO	HC	11.0C	CLEAR	CLEAR	80				
00001	0027	78/05/22	0.31	0.36	0.05	CHIY	0	0	0	0	ELCTRO	LC	55.0F	CLEAR	CLEAR	80				
00001	0027	78/04/07	0.31	0.36	0.05	COHY	0	0	0	0	ELCTRO	HC	11.0C	CLEAR	CLEAR	80				
00001	0027	78/05/22	0.31	0.36	0.05	COHY	0	0	0	0	ELCTRO	LC	55.0F	CLEAR	CLEAR	80				
00001	0027	78/04/07	0.31	0.36	0.05	STHJ	4	4	4	0	FLCTRO	HC	11.0C	CLEAR	CLEAR	80	82	83		
00001	0027	78/05/22	0.31	0.36	0.05	STHJ	9	0	9	0	ELCTRO	LC	55.0F	CLEAR	CLEAR	80	82	83		
WAUKELL CREEK, ONE																				
00001	0029	78/04/07	1.31	1.36	0.05	CHIY	0	0	0	0	ELCTRO	HC	00.0	CLEAR	CLEAR	80				
00001	0029	78/05/22	1.33	1.36	0.03	CHIY	0	0	0	0	FLCTRO	LC	56.0F	CLEAR	CLEAR	80				
00001	0029	78/04/07	1.31	1.36	0.05	COHY	0	0	0	0	ELCTRO	HC	00.0	CLEAR	CLEAR	80				
00001	0029	78/05/22	1.33	1.36	0.03	COHY	0	0	0	0	ELCTRO	LC	56.0F	CLEAR	CLEAR	80				
00001	0029	78/05/22	1.33	1.36	0.03	STHY	0	0	0	0	ELCTRO	LC	56.0F	CLEAR	CLEAR	80				
00001	0029	78/04/07	1.31	1.36	0.05	STHJ	1	0	1	0	FLCTRO	HC	00.0	CLEAR	CLEAR	80	82	84		

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1	2	3	AGCY	CODE
KLAMATH RIVER BASIN																				
BLUE CREEK																				
00001	0069	77/10/07	0.00	0.33	0.33	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	11				
00001	0069	77/11/08	0.00	1.75	1.75	CHIA	3	0	3	0	FOOT	MC	00.0	POOR	CLEAR	74				
00001	0069	77/12/01	0.00	0.20	0.20	CHIA	0	0	0	0	FOOT	MC	00.0	FAIR	CLOUDY					
00001	0069	78/10/06	0.30	3.00	2.70	CHIA	0	0	0	0	FOOT	LC	58.0F	CLEAR	CLEAR	74	11			
00001	0069	78/10/27	7.00	8.50	1.50	CHIA	0	0	0	0	FOOT	LC	52.0F	CLEAR	CLEAR					
00001	0069	78/10/30	0.50	2.00	1.50	CHIA	1	0	1	0	DIVER	LC	52.0F	CLEAR	CLEAR					
00001	0069	78/11/18	2.50	6.50	4.00	CHIA	3	0	3	5	FOOT	LC	00.0	CLEAR	CLEAR	13	57	74		
00001	0069	78/11/22	8.00	10.00	2.00	CHIA	28	1	29	2	FOOT	LC	00.0	CLEAR	CLEAR	72				
00001	0069	78/12/08	0.00	4.00	0.00	CHIA	7	1	8	7	FOOT	MC	00.0	CLEAR	CLEAR	72	74			
00001	0069	78/03/17	1.75	1.80	0.05	CHIY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80				
00001	0069	78/04/28	0.05	0.10	0.05	CHIY	24	0	24	0	ELCTRO	MC	00.0	CLEAR	PTLYCD	80	85			
00001	0069	78/05/24	0.10	0.20	0.10	CHIY	5	0	5	0	ELCTRO	LC	55.0F	CLEAR	CLOUDY	80				
00001	0069	77/11/08	0.00	1.75	1.75	COHA	0	0	0	0	FOOT	MC	00.0	POOR	CLEAR	11	74			
00001	0069	78/03/17	1.75	1.80	0.05	COHY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80				
00001	0069	78/04/28	0.05	0.10	0.05	COHY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	PTLYCD	80				
00001	0069	78/05/24	0.10	0.20	0.10	COHY	0	0	0	0	ELCTRO	LC	55.0F	CLEAR	CLOUDY	80				
00001	0069	77/11/08	0.00	1.75	1.75	STHA	0	0	0	0	FOOT	MC	00.0	POOR	CLEAR	11	74			
00001	0069	78/10/27	7.00	8.50	1.50	STHA	1	0	1	0	FOOT	LC	52.0F	CLEAR	CLEAR					
00001	0069	78/10/30	0.50	2.00	1.50	STHA	1	0	1	0	DIVER	LC	52.0F	CLEAR	CLEAR					
00001	0069	78/10/30	0.51	2.00	1.49	STHJ	5	0	5	0	DIVER	LC	52.0F	CLEAR	CLEAR	86				
00001	0069	78/11/18	2.50	6.50	4.00	STHA	1	0	1	0	FOOT	LC	00.0	CLEAR	CLEAR	13	57	74		
00001	0069	78/05/24	0.10	0.20	0.10	STHY	2	0	2	0	ELCTRO	LC	55.0F	CLEAR	CLOUDY	80	81	83		
00001	0069	77/10/07	0.00	0.33	0.33	STHJ	3	0	3	0	FOOT	LC	00.0	CLEAR	CLEAR	86				
00001	0069	78/03/17	1.75	1.80	0.05	STHJ	12	0	12	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80	82	83		
00001	0069	78/04/28	0.05	0.10	0.05	STHJ	8	0	8	0	ELCTRO	MC	00.0	CLEAR	PTLYCD	80	82	83		
00001	0069	78/05/24	0.10	0.20	0.10	STHJ	1	0	1	0	ELCTRO	LC	55.0F	CLEAR	CLOUDY	80	82	83		
NICKOWITZ CREEK																				
00001	0104	78/11/22	0.00	1.00	1.00	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	74				
AH PAH CREEK																				
00001	0164	77/10/27	0.00	1.25	1.25	CHIA	0	0	0	0	FOOT	MC	00.0	CLEAR	CLOUDY					
00001	0164	77/12/01	0.00	0.40	0.40	CHIA	0	0	0	0	FOOTRO	MC	53.0F	FAIR	CLOUDY	42				
00001	0164	78/11/30	0.00	0.75	0.75	CHIA	0	0	0	0	FOOT	LT	00.0	TURBD	CLOUDY	42				
00001	0164	78/01/27	0.70	1.20	0.50	CHIY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80				
00001	0164	78/03/13	0.70	1.20	0.50	CHIY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	PTLYCD	80				
00001	0164	78/04/20	0.84	0.85	0.01	CHIY	0	0	0	0	ELCTRO	MT	12.0C	TURBD	RAIN	80				
00001	0164	78/05/12	0.75	1.80	0.05	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1 2 3	AGCY	CODE
KLAMATH RIVER BASIN																		
MC GARVEY CREEK																		
00001	0049	78/05/04	0.46	0.49	0.03	CHIY	1	0	1	0	ELCTRO	LC	12.0C	CLEAR	CLEAR	80 81		
00001	0049	78/05/25	0.47	0.49	0.02	CHIY	5	0	5	0	ELCTRO	LC	58.0F	CLEAR	CLOUDY	80 85		
00001	0049	78/05/04	0.46	0.49	0.03	COHY	0	0	0	0	ELCTRO	LC	12.0C	CLEAR	CLEAR	80		
00001	0049	78/05/25	0.47	0.49	0.02	COHY	0	0	0	0	ELCTRO	LC	58.0F	CLEAR	CLOUDY	80		
00001	0049	78/05/04	0.46	0.49	0.03	STHY	0	0	0	0	ELCTRO	LC	12.0C	CLEAR	CLEAR	80		
00001	0049	78/05/25	0.47	0.49	0.02	STHY	1	0	1	0	ELCTRO	LC	58.0F	CLEAR	CLOUDY	80 81 83		
00001	0049	78/05/25	0.47	0.49	0.02	STHJ	4	0	4	0	ELCTRO	LC	58.0F	CLEAR	CLOUDY	80 82 83		
TARUP CREEK																		
00001	0053	78/03/29	0.00	0.10	0.10	CHIY	1	0	1	0	ELCTRO	LC	00.0	CLEAR	CLOUDY	80 81		
00001	0053	78/05/12	1.24	1.25	0.01	CHIY	5	0	5	0	ELCTRO	LC	14.0C	CLEAR	PTLYCD	80 82 85		
00001	0053	78/03/29	0.00	0.10	0.10	COHY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLOUDY	80		
00001	0053	78/05/12	1.24	1.25	0.01	COHY	0	0	0	0	ELCTRO	LC	14.0C	CLEAR	PTLYCD	80		
00001	0053	78/03/29	0.00	0.10	0.10	STHJ	12	0	12	0	ELCTRO	LC	00.0	CLEAR	CLOUDY	80 82 83		
00001	0053	78/05/12	1.24	1.25	0.01	STHJ	6	0	6	0	ELCTRO	LC	14.0C	CLEAR	PTLYCD	80 82 83		
OMAGER CREEK																		
00001	0060	78/04/28	0.00	0.10	0.10	CHIY	6	0	6	0	ELCTRO	LC	00.0	CLEAR	PTLYCD	80 81 85		
00001	0060	78/04/28	0.00	0.10	0.10	COHY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	PTLYCD	80		
00001	0060	78/04/28	0.00	0.10	0.10	STHJ	12	0	12	0	ELCTRO	LC	00.0	CLEAR	PTLYCD	80 82 83		

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1 2 3	AGCY	CODE
KLAMATH RIVER BASIN																		
AH PAH CREEK, NORTH FORK																		
00001	0165	78/05/04	0.47	0.50	0.03	CHIY	0	0	0	0	ELCTRO	LC	12.5C	CLEAR	CLEAR	80		
00001	0165	78/05/04	0.47	0.50	0.03	COHJ	2	0	2	0	ELCTRO	LC	12.5C	CLEAR	CLEAR	80 82		
00001	0165	78/05/04	0.47	0.50	0.03	STHY	1	0	1	0	ELCTRO	LC	12.5C	CLEAR	CLEAR	80 81 83		
00001	0165	78/05/04	0.47	0.50	0.03	STHJ	1	0	1	0	ELCTRO	LC	12.5C	CLEAR	CLEAR	80 82 83		

00001	0164	77/12/01	0.00	0.40	0.40	COMA	0	0	0	0	FOOTRO	MC	53.0F	FAIR	CLOUDY	42		
00001	0164	78/01/27	0.70	1.20	0.50	COHY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80		
00001	0164	78/03/13	0.70	1.20	0.50	COHY	15	0	15	0	ELCTRO	LC	00.0	CLEAR	PTLYCD	80	81	
00001	0164	78/04/20	0.84	0.85	0.01	COHY	10	0	10	0	ELCTRO	MT	12.0C	TURBD	RAIN	80	81	
00001	0164	78/05/12	0.75	0.80	0.05	COHY	9	0	9	0	ELCTRO	LC	14.0C	CLEAR	PTLYCD	80	81	
00001	0164	78/04/20	0.84	0.85	0.01	COHS	1	0	1	0	ELCTRO	MT	12.0C	TURBD	RAIN	80	85	
00001	0164	78/05/12	0.75	0.80	0.05	COHS	1	0	1	0	ELCTRO	LC	14.0C	CLEAR	PTLYCD	80	85	
00001	0164	78/01/27	0.70	1.20	0.50	STHA	59	0	59	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80	86	
00001	0164	78/01/27	0.70	1.20	0.50	STHJ	36	0	36	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80	82	83
00001	0164	78/03/13	0.70	1.20	0.50	STHJ	24	0	24	0	ELCTRO	LC	00.0	CLEAR	PTLYCD	80	82	83
00001	0164	78/05/12	0.75	0.80	0.05	STHJ	8	0	8	0	ELCTRO	LC	14.0C	CLEAR	PTLYCD	80	82	83
00001	0164	78/04/20	0.84	0.85	0.01	STHS	1	0	1	0	ELCTRO	MT	12.0C	TURBD	RAIN	80	85	

U.S. FISH AND WILDLIFE SERVICE

12/13/78

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1 2 3	AGCY	CODE
KLAMATH RIVER BASIN																		
SURPUR CREEK																		
00001	0186	78/04/21	0.10	0.15	0.05	CHIY	4	0	4	0	FLCTRO	MC	10.5C	CLEAR	RAIN			
00001	0186	78/05/24	0.25	0.32	0.07	CHIY	0	0	0	0	ELCTRO	LC	56.0F	CLEAR	RAIN	80 81		
00001	0186	78/04/21	0.10	0.15	0.05	COHY	0	0	0	0	ELCTRO	MC	10.5C	CLEAR	RAIN	80		
00001	0186	78/05/24	0.25	0.32	0.07	COHY	0	0	0	0	FLCTRO	LC	56.0F	CLEAR	RAIN	80		
00001	0186	78/04/21	0.10	0.15	0.05	STHJ	18	0	18	0	ELCTRO	MC	10.5C	CLEAR	RAIN	80		
00001	0186	78/05/24	0.25	0.32	0.07	STHJ	12	0	12	0	ELCTRO	LC	56.0F	CLEAR	RAIN	80 82 83		
00001	0186	78/04/21	0.10	0.15	0.05	STHS	1	0	1	0	ELCTRO	MC	10.5C	CLEAR	RAIN	80 82 83		
UNKNOWN																80 85		
00001	0191	78/06/02	0.02	0.04	0.02	CHIY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80		
00001	0191	78/06/02	0.02	0.04	0.02	COHY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80		
00001	0191	78/06/02	0.02	0.04	0.02	STHY	14	0	14	0	FLCTRO	LC	00.0	CLEAR	CLEAR	80 81 83		

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1	2	3	AGCY	CODE
KLAMATH RIVER BASIN																				
BEAR CREEK																				
00001	0178	78/12/04	0.00	0.10	0.00	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	RAIN	57				
00001	0178	78/03/29	0.00	0.25	0.25	CHIY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLOUDY	80				
00001	0178	78/05/05	0.10	0.20	0.10	CHIY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80				
00001	0178	78/03/29	0.00	0.25	0.25	COHY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLOUDY	80				
00001	0178	78/05/05	0.10	0.20	0.10	COHY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80				
00001	0178	78/03/29	0.00	0.25	0.25	STHJ	26	0	26	0	ELCTRO	LC	00.0	CLEAR	CLOUDY	80	82	83		
00001	0178	78/05/05	0.10	0.20	0.10	STHJ	5	0	5	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80	82	83		

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1 2 3	AGCY	CODE
KLAMATH RIVER BASIN																		
PECWAN CREEK																		
00001	0214	78/06/01	0.07	0.10	0.03	RNBW	1	0	1	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80 82 84		
00001	0214	77/12/01	0.00	0.75	0.75	CHIA	0	0	0	0	FOOT	MC	49.0F	FAIR	CLOUDY			
00001	0214	78/01/23	0.05	0.05	0.00	CHIA	0	0	0	0	SPOT	HC	00.0	CLEAR	CLEAR	65		
00001	0214	78/04/21	0.05	0.10	0.05	CHIY	0	0	0	0	ELCTRO	MC	08.5C	POOR	PTLYCD	80 09		
00001	0214	78/05/02	0.50	0.55	0.05	CHIY	0	0	0	0	FLCTRO	MC	10.5C	FAIR	CLEAR	80		
00001	0214	78/06/01	0.07	0.10	0.03	CHIY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80		
00001	0214	78/04/21	0.05	0.10	0.05	COHY	0	0	0	0	ELCTRO	MC	08.5C	POOR	PTLYCD	80 09		
00001	0214	78/05/02	0.50	0.55	0.05	COHY	0	0	0	0	FLCTRO	MC	10.5C	FAIR	CLEAR	80		
00001	0214	78/06/01	0.07	0.10	0.03	COHY	0	0	0	0	FLCTRO	LC	00.0	CLEAR	CLEAR	80		
00001	0214	78/04/21	0.05	0.10	0.05	STHY	0	0	0	0	ELCTRO	MC	08.5C	POOR	PTLYCD	80 09		
00001	0214	78/05/02	0.50	0.55	0.05	STHY	16	0	16	0	ELCTRO	MC	10.5C	FAIR	CLEAR	80 81 83		
00001	0214	78/06/01	0.07	0.10	0.03	STHY	4	0	4	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80 81 83		
00001	0214	78/05/02	0.50	0.55	0.05	STHJ	2	0	2	0	FLCTRO	MC	10.5C	FAIR	CLEAR	80 82 83		
00001	0214	78/06/01	0.07	0.10	0.03	STHJ	4	0	4	0	FLCTRO	LC	00.0	CLEAR	CLEAR	80 82 83		

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI- BILITY	WEATHER CONDITION	COMMENTS 1	2	3	AGCY CODE
KLAMATH RIVER BASIN																			
TECTAH CREEK																			
00001	0192	77/10/19	0.00	2.00	2.00	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	11	57		
00001	0192	77/12/01	0.00	0.70	0.70	CHIA	0	0	0	0	FOOT	WW	52.0F	FAIR	PTLYCD				
00001	0192	78/12/04	0.00	1.00	1.00	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	RAIN				
00001	0192	78/02/23	0.00	0.25	0.25	CHIY	0	0	0	0	ELCTRO	WC	11.5C	CLEAR	CLOUDY	80			
00001	0192	78/04/21	0.15	0.25	0.10	CHIY	2	0	2	0	ELCTRO	WT	10.5C	TURBD	CLOUDY	80			
00001	0192	78/05/24	0.10	0.20	0.10	CHIY	0	0	0	0	ELCTRO	LC	56.0F	CLEAR	RAIN	80			
00001	0192	78/02/23	0.00	0.25	0.25	COHY	0	0	0	0	ELCTRO	WC	11.5C	CLEAR	CLOUDY	80			
00001	0192	78/04/21	0.15	0.25	0.10	COHY	0	0	0	0	ELCTRO	WT	10.5C	TURBD	CLOUDY	80			
00001	0192	78/05/24	0.10	0.20	0.10	COHY	0	0	0	0	ELCTRO	LC	56.0F	CLEAR	RAIN	80			
00001	0192	78/02/23	0.00	0.25	0.25	STHA	8	0	8	0	ELCTRO	WC	11.5C	CLEAR	CLOUDY	80	86		
00001	0192	78/04/21	0.15	0.25	0.10	STHY	10	0	10	0	ELCTRO	WT	10.5C	TURBD	CLOUDY	80	81	83	
00001	0192	78/05/24	0.10	0.20	0.10	STHY	4	0	4	0	ELCTRO	LC	56.0F	CLEAR	RAIN	80	81	83	
00001	0192	78/02/23	0.00	0.25	0.25	STHJ	9	0	9	0	ELCTRO	WC	11.5C	CLEAR	CLOUDY	80	82	83	
00001	0192	78/04/21	0.15	0.25	0.10	STHJ	5	0	5	0	ELCTRO	WT	10.5C	TURBD	CLOUDY	80	82	83	
00001	0192	78/05/24	0.10	0.20	0.10	STHJ	6	0	6	0	ELCTRO	LC	56.0F	CLEAR	RAIN	80	82	83	
JOHNSON CREEK																			
00001	0212	78/12/04	0.00	0.50	0.00	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	RAIN		54		
00001	0212	78/04/21	0.00	0.10	0.10	CHIY	1	0	1	0	ELCTRO	WC	10.0C	CLEAR	CLOUDY	80	81		
00001	0212	78/06/02	0.00	0.10	0.10	CHIY	0	0	0	0	ELCTRO		00.0		CLEAR	54			
00001	0212	78/04/21	0.00	0.10	0.10	COHY	0	0	0	0	ELCTRO	WC	10.0C	CLEAR	CLOUDY	80			
00001	0212	78/06/02	0.00	0.10	0.10	COHY	0	0	0	0	ELCTRO		00.0		CLEAR	54			
00001	0212	78/06/02	0.00	0.10	0.10	STHY	0	0	0	0	ELCTRO		00.0		CLEAR	54			
00001	0212	78/04/21	0.00	0.10	0.10	STHJ	21	0	21	0	ELCTRO	WC	10.0C	CLEAR	CLOUDY	80	82	83	

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1 2 3	AGCY CODE
KLAMATH RIVER BASIN																	
METTAH CREEK																	
00001	0248	78/04/21	0.03	0.05	0.02	CHIY	0	0	0	0	ELCTRO	MC	10.5C	CLEAR	PTLYCD	80	
00001	0248	78/06/02	0.03	0.05	0.02	CHIY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80	
00001	0248	78/04/21	0.03	0.05	0.02	COHY	0	0	0	0	ELCTRO	MC	10.5C	CLEAR	PTLYCD	80	
00001	0248	78/06/02	0.03	0.05	0.02	COHY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80	
00001	0248	78/04/21	0.03	0.05	0.02	STHY	8	0	8	0	ELCTRO	MC	10.5C	CLEAR	PTLYCD	80 81 83	
00001	0248	78/06/02	0.03	0.05	0.02	STHY	25	0	25	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80 81 83	
00001	0248	78/04/21	0.03	0.05	0.02	STHJ	8	0	8	0	ELCTRO	MC	10.5C	CLEAR	PTLYCD	80 82 83	
00001	0248	78/06/02	0.03	0.05	0.02	STHJ	3	0	3	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80 82 83	
00001	0248	78/04/21	0.03	0.05	0.02	STHS	1	0	1	0	ELCTRO	MC	10.5C	CLEAR	PTLYCD	80 85	
ROACH CREEK																	
00001	0261	78/05/05	0.05	0.10	0.05	CHIY	0	0	0	0	ELCTRO	LC	12.0C	CLEAR	CLEAR	80	
00001	0261	78/06/02	0.05	0.10	0.05	CHIY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80	
00001	0261	78/05/05	0.05	0.10	0.05	COHY	0	0	0	0	ELCTRO	LC	12.0C	CLEAR	CLEAR	80	
00001	0261	78/06/02	0.05	0.10	0.05	COHY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80	
00001	0261	78/05/05	0.05	0.10	0.05	STHY	14	0	14	0	ELCTRO	LC	12.0C	CLEAR	CLEAR	80 81 83	
00001	0261	78/06/02	0.05	0.10	0.05	STHY	14	0	14	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80 81 83	
00001	0261	78/05/05	0.05	0.10	0.05	STHJ	3	0	3	0	ELCTRO	LC	12.0C	CLEAR	CLEAR	80 82 83	
00001	0261	78/06/02	0.05	0.10	0.05	STHJ	2	0	2	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80 82 83	
MURFK CREEK																	
00001	0293	78/05/05	0.05	0.07	0.02	CHIY	0	0	0	0	ELCTRO	LC	11.0C	CLEAR	CLEAR	80	
00001	0293	78/06/02	0.05	0.06	0.01	CHIY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80	
00001	0293	78/05/05	0.05	0.07	0.02	COHY	0	0	0	0	ELCTRO	LC	11.0C	CLEAR	CLEAR	80	
00001	0293	78/06/02	0.05	0.06	0.01	COHY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80	
00001	0293	78/05/05	0.05	0.07	0.02	STHY	24	0	24	0	ELCTRO	LC	11.0C	CLEAR	CLEAR	80 81 83	
00001	0293	78/06/02	0.05	0.06	0.01	STHY	24	0	24	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80 81 83	
00001	0293	78/05/05	0.05	0.07	0.02	STHJ	21	0	21	0	ELCTRO	LC	11.0C	CLEAR	CLEAR	80 82 83	
00001	0293	78/06/02	0.05	0.06	0.01	STHJ	10	0	10	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80 82 83	
00001	0293	78/05/05	0.05	0.07	0.02	STHS	2	0	2	0	ELCTRO	LC	11.0C	CLEAR	CLEAR	80 85	
CAPPELL CREEK																	
00001	0296	78/05/02	0.05	0.06	0.01	CHIY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80	
00001	0296	78/06/01	0.04	0.06	0.02	CHIY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80	
00001	0296	78/05/02	0.05	0.06	0.01	COHY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80	
00001	0296	78/06/01	0.04	0.06	0.02	COHY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80	
00001	0296	78/05/02	0.05	0.06	0.01	STHY	23	0	23	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80 81 83	
00001	0296	78/06/01	0.04	0.06	0.02	STHY	29	0	29	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80 81 83	
00001	0296	78/05/02	0.05	0.06	0.01	STHJ	10	0	10	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80 82 83	
00001	0296	78/06/01	0.04	0.06	0.02	STHJ	4	0	4	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80 82 83	
00001	0296	78/05/02	0.05	0.06	0.01	STHS	1	0	1	0	ELCTRO	MC	11.0C	CLEAR	CLEAR	80 85	
MINERS CREEK																	
00001	0319	78/06/01	0.01	0.03	0.02	CHIY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80	
00001	0319	78/06/01	0.01	0.03	0.02	COHY	0	0	0	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80	
00001	0319	78/06/01	0.01	0.03	0.02	STHY	1	0	1	0	ELCTRO	LC	00.0	CLEAR	CLEAR	80 81 83	

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1 2 3	AGCY	CODE
KLAMATH RIVER BASIN																		
PECWAN CREEK, EAST FORK																		
00001	0215	77/12/01	0.00	0.25	0.25	CHIA	0	0	0	0	FOOT	NC	49.0F	FAIR	CLOUDY			

00001	0343	78/03/06	16.60	16.61	0.01	STHJ	8	0	8	0	ELCTRO	WC	07.5C	CLEAR	CLOUDY	80 82 84
00001	0343	78/03/14	0.47	0.52	0.05	STHJ	10	0	10	0	ELCTRO	WW	09.0C	FAIR	CLEAR	80 82 83
00001	0343	78/04/25	4.52	4.54	0.02	STHJ	4	0	4	0	ELCTRO	WC	11.0C	CLEAR	PTLYCD	80 82 83
00001	0343	78/05/30	0.47	0.53	0.06	STHJ	6	0	6	0	ELCTRO	WC	64.0F	FAIR	CLEAR	80 82 83
00001	0343	78/05/30	4.48	4.54	0.06	STHJ	6	0	6	0	ELCTRO	LC	60.0F	CLEAR	CLEAR	80 82 83

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1 2 3	AGCY	CODE
KLAMATH RIVER BASIN																		
TULLY CREEK																		
00001	0322	78/11/25	0.00	0.50	0.50	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	57		
00001	0322	78/03/14	0.16	0.26	0.10	CHIY	0	0	0	0	ELCTRO	MC	00.0	POOR	CLEAR	80		
00001	0322	78/03/14	0.16	0.26	0.10	COHY	0	0	0	0	ELCTRO	MC	00.0	POOR	CLEAR	80		
00001	0322	78/03/14	0.16	0.26	0.10	STHJ	5	0	5	0	ELCTRO	MC	00.0	POOR	CLEAR	80 82 83		
PINE CREEK																		
00001	0343	77/09/19	4.26	4.54	0.28	CHIA	0	0	0	0	FOOT	MM	00.0	TURBD	CLOUDY	11		
00001	0343	77/09/27	0.00	4.54	4.54	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLOUDY	11		
00001	0343	77/11/11	0.00	0.47	0.47	CHIA	1	0	1	0	FOOT	MM	00.0	POOR	RAIN			
00001	0343	77/11/11	0.47	4.54	4.07	CHIA	1	0	1	0	FOOT	MM	00.0	POOR	RAIN	31 74		
00001	0343	78/03/01	4.54	6.00	1.46	CHIA	0	0	0	0	FOOT	MC	00.0	CLEAR	CLEAR	74 12		
00001	0343	78/10/24	0.00	0.90	0.90	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	43 74 11		
00001	0343	78/10/24	3.67	4.54	0.87	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	42 74 11		
00001	0343	78/11/04	4.60	8.75	4.15	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR			
00001	0343	78/11/06	8.75	13.85	5.10	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR			
00001	0343	78/11/25	0.00	0.01	0.01	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR			
00001	0343	78/12/06	0.75	2.25	1.50	CHIA	2	0	2	0	FOOT	LM	00.0	TURBD	CLEAR	45 74 71		
00001	0343	78/03/06	13.85	14.00	0.15	CHIY	0	0	0	0	FOOT	MM	00.0	FAIR	CLEAR	74		
00001	0343	78/03/06	16.60	16.61	0.01	CHIY	0	0	0	0	ELCTRO	MC	09.0C	CLEAR	CLOUDY	80		
00001	0343	78/03/14	0.47	0.52	0.05	CHIY	0	0	0	0	ELCTRO	MC	07.5C	CLEAR	CLOUDY	80		
00001	0343	78/04/25	4.52	4.54	0.02	CHIY	0	0	0	0	ELCTRO	MM	09.0C	FAIR	CLEAR	80		
00001	0343	78/05/30	0.47	0.53	0.06	CHIY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	PTLYCD	80		
00001	0343	78/05/30	4.48	4.54	0.06	CHIY	0	0	0	0	ELCTRO	MC	64.0F	FAIR	CLEAR	80		
											ELCTRO	LC	60.0F	CLEAR	CLEAR	80		
00001	0343	77/09/19	4.26	4.54	0.28	COHA	0	0	0	0	FOOT	MM	00.0	TURBD	CLOUDY	11		
00001	0343	77/09/27	0.00	4.54	4.54	COHA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLOUDY	11		
00001	0343	77/11/11	0.00	0.47	0.47	COHA	0	0	0	0	FOOT	MM	00.0	POOR	RAIN	11		
00001	0343	77/11/11	0.47	4.54	4.07	COHA	0	0	0	0	FOOT	MM	00.0	POOR	RAIN	11 31 74		
00001	0343	78/03/01	4.54	6.00	1.46	COHA	0	0	0	0	FOOT	MC	00.0	CLEAR	CLEAR	74 12		
00001	0343	78/03/06	13.85	14.00	0.15	COHY	0	0	0	0	ELCTRO	MC	09.0C	CLEAR	CLOUDY	80		
00001	0343	78/03/06	16.60	16.61	0.01	COHY	0	0	0	0	ELCTRO	MC	07.5C	CLEAR	CLOUDY	80		
00001	0343	78/03/14	0.47	0.52	0.05	COHY	0	0	0	0	ELCTRO	MM	09.0C	FAIR	CLEAR	80		
00001	0343	78/04/25	4.52	4.54	0.02	COHY	0	0	0	0	ELCTRO	MC	11.0C	CLEAR	PTLYCD	80		
00001	0343	78/05/30	0.47	0.53	0.06	COHY	0	0	0	0	ELCTRO	MC	64.0F	FAIR	CLEAR	80		
00001	0343	78/05/30	4.48	4.54	0.06	COHY	0	0	0	0	ELCTRO	LC	60.0F	CLEAR	CLEAR	80		
00001	0343	77/09/19	4.26	4.54	0.28	STHA	0	0	0	0	FOOT	MM	00.0	TURBD	CLOUDY	11		
00001	0343	77/09/27	0.00	4.54	4.54	STHA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLOUDY	11		
00001	0343	77/11/11	0.00	0.47	0.47	STHA	0	0	0	0	FOOT	MM	00.0	POOR	RAIN	11		
00001	0343	77/11/11	0.47	4.54	4.07	STHA	0	0	0	0	FOOT	MM	00.0	POOR	RAIN	11 31 74		
00001	0343	78/03/01	4.54	6.00	1.46	STHA	0	0	0	0	FOOT	MC	00.0	CLEAR	CLEAR	74		
00001	0343	78/04/25	4.52	4.54	0.02	STHY	38	0	38	0	ELCTRO	MC	11.0C	CLEAR	PTLYCD	80 81 83		
00001	0343	78/05/30	0.47	0.53	0.06	STHY	1	0	1	0	ELCTRO	MC	64.0F	FAIR	CLEAR	80 [illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

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SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1 2 3	AGCY CODE
TRINITY RIVER BASIN																	
BULL CREEK																	
000 2	0003	78/05/31	0.03	0.05	0.02	CHIY	0	0	0	0	ELCTRO	LC	55.0F	CLEAR	CLEAR	80	
00002	0003	78/05/31	0.03	0.05	0.02	COHY	0	0	0	0	ELCTRO	LC	55.0F	CLEAR	CLEAR	80	
00002	0003	78/05/31	0.03	0.05	0.02	STHY	17	0	17	0	ELCTRO	LC	55.0F	CLEAR	CLEAR	80 81 83	
00002	0003	78/05/31	0.03	0.05	0.02	STHJ	8	0	8	0	ELCTRO	LC	55.0F	CLEAR	CLEAR	80 82 83	
BEAVER CREEK																	
00002	0018	78/04/05	0.00	0.13	0.13	CHIY	0	0	0	0	ELCTRO	MC	10.0C	CLEAR	CLOUDY	80	
00002	0018	78/05/10	0.13	0.18	0.05	CHIY	0	0	0	0	ELCTRO	MM	12.0C	FAIR	CLOUDY	80	
00002	0018	78/04/05	0.00	0.13	0.13	COHY	0	0	0	0	ELCTRO	MC	10.0C	CLEAR	CLOUDY	80	
00002	0018	78/05/10	0.13	0.18	0.05	COHY	0	0	0	0	ELCTRO	MM	12.0C	FAIR	CLOUDY	80	
00002	0018	78/05/10	0.13	0.18	0.05	STHY	0	0	0	0	ELCTRO	MM	12.0C	FAIR	CLOUDY	80 81	
00002	0018	78/04/05	0.00	0.13	0.13	STHJ	19	0	19	0	ELCTRO	MC	10.0C	CLEAR	CLOUDY	80 82 83	
00002	0018	78/05/10	0.13	0.18	0.05	STHJ	10	0	10	0	ELCTRO	MM	12.0C	FAIR	CLOUDY	80 82 83	
00002	0018	78/04/05	0.00	0.13	0.13	STHS	1	0	1	0	ELCTRO	MC	10.0C	CLEAR	CLOUDY	80 85	

U.S. FISH AND WILDLIFE SERVICE

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1	2	3	AGCY	CODE
KLAMATH RIVER BASIN																				
LITTLE PINE CREEK																				
00001	0352	78/02/15	0.00	0.05	0.05	CHIY	0	0	0	0	ELCTRO	MC	07.0C	CLEAR	CLOUDY	80				
00001	0352	78/04/25	0.10	0.12	0.02	CHIY	0	0	0	0	ELCTRO	MC	11.5C	CLEAR	CLOUDY	80				
00001	0352	78/05/30	0.10	0.12	0.02	CHIY	0	0	0	0	ELCTRO	LC	58.0F	CLEAR	CLEAR	80				
00001	0352	78/02/15	0.00	0.05	0.05	COHY	0	0	0	0	ELCTRO	MC	07.0C	CLEAR	CLOUDY	80				
00001	0352	78/04/25	0.10	0.12	0.02	COHY	0	0	0	0	ELCTRO	MC	11.5C	CLEAR	CLOUDY	80				
00001	0352	78/05/30	0.10	0.12	0.02	COHY	0	0	0	0	ELCTRO	LC	58.0F	CLEAR	CLEAR	80				
00001	0352	78/04/25	0.10	0.12	0.02	STHY	19	0	19	0	ELCTRO	MC	11.5C	CLEAR	CLOUDY	80	81	83		
00001	0352	78/05/30	0.10	0.12	0.02	STHY	31	0	31	0	ELCTRO	LC	58.0F	CLEAR	CLEAR	80	81	83		
00001	0352	78/02/15	0.00	0.05	0.05	STHJ	2	0	2	0	ELCTRO	MC	07.0C	CLEAR	CLOUDY	80				
00001	0352	78/04/25	0.10	0.12	0.02	STHJ	1	0	1	0	ELCTRO	MC	11.5C	CLEAR	CLOUDY	80	82	83		
00001	0352	78/05/30	0.10	0.12	0.02	STHJ	2	0	2	0	ELCTRO	LC	58.0F	CLEAR	CLEAR	80	82	83		

00002	0027	78/04/24	0.45	0.47	0.02	STHJ	2	0	2	0	ELCTRO	NC	00.0	CLEAR	CLOUDY	80 82 83
00002	0027	78/04/27	1.73	1.75	0.02	STHJ	7	0	7	0	ELCTRO	NC	13.5C	CLEAR	CLEAR	80 82 83
00002	0027	78/05/08	10.35	10.45	0.10	STHJ	32	0	32	0	ELCTRO	NC	09.5C	CLEAR	CLEAR	80 82 83
00002	0027	78/05/31	1.73	1.75	0.02	STHJ	1	0	1	0	ELCTRO	LC	61.0F	CLEAR	CLEAR	80 82 83
HOSTLER CREEK																
00002	0054	77/09/30	0.00	2.00	2.00	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	11
00002	0054	78/04/10	0.18	0.23	0.05	CHIY	0	0	0	0	ELCTRO	NC	00.0	CLEAR	CLEAR	80
00002	0054	78/05/10	0.17	0.20	0.03	CHIY	0	0	0	0	ELCTRO	NC	12.5C	CLEAR	CLOUDY	80
00002	0054	78/04/10	0.18	0.23	0.05	COHY	0	0	0	0	ELCTRO	NC	00.0	CLEAR	CLEAR	80
00002	0054	78/05/10	0.17	0.20	0.03	COHY	0	0	0	0	ELCTRO	NC	12.5C	CLEAR	CLOUDY	80
00002	0054	78/05/10	0.17	0.20	0.03	STHY	50	0	50	0	ELCTRO	NC	12.5C	CLEAR	CLOUDY	80 81 83
00002	0054	78/04/10	0.18	0.23	0.05	STHJ	17	0	17	0	ELCTRO	NC	00.0	CLEAR	CLEAR	80 82 83
00002	0054	78/05/10	0.17	0.20	0.03	STHJ	8	0	8	0	ELCTRO	NC	12.5C	CLEAR	CLOUDY	80 82 83
00002	0054	78/05/10	0.17	0.20	0.03	STHS	1	0	1	0	ELCTRO	NC	12.5C	CLEAR	CLOUDY	80 85
SUPPLY CREEK																
00002	0062	77/09/22	0.00	3.00	3.00	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	
00002	0062	77/11/07	0.00	0.50	0.50	CHIA	5	0	5	0	FOOT	NC	00.0	CLEAR	CLEAR	
00002	0062	77/11/10	0.00	0.50	0.50	CHIA	0	0	0	0	FOOT	NC	00.0	CLEAR	CLEAR	
00002	0062	77/12/05	0.00	1.00	1.00	CHIA	5	5	10	2	FOOT	NC	50.0F	CLEAR	PTLYCD	
00002	0062	78/10/16	0.00	0.90	0.90	CHIA	0	0	0	0	FOOT	LC	63.0F	CLEAR	CLEAR	57 43 11
00002	0062	78/12/06	0.00	0.90	0.00	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	74
00002	0062	78/03/06	6.70	6.75	0.05	CHIY	0	0	0	0	ELCTRO	NC	07.5C	CLEAR	PRLYCD	80
00002	0062	78/03/22	0.47	0.50	0.03	CHIY	0	0	0	0	ELCTRO	NC	00.0	CLEAR	PTLYCD	80
00002	0062	78/04/24	0.48	0.50	0.02	CHIY	7	0	7	0	ELCTRO	NC	11.5C	CLEAR	CLOUDY	80 81
00002	0062	78/05/17	0.46	0.50	0.04	CHIY	0	0	0	0	ELCTRO	NC	16.0C	CLEAR	CLEAR	80
00002	0062	78/05/18	0.75	0.77	0.02	CHIY	0	0	0	0	ELCTRO	NC	13.0C	CLEAR	CLEAR	80
00002	0062	78/05/31	0.15	0.18	0.03	CHIY	0	0	0	0	ELCTRO	LC	64.0F	CLEAR	CLEAR	80
00002	0062	78/03/06	6.70	6.75	0.05	COHY	0	0	0	0	ELCTRO	NC	07.5C	CLEAR	PTLYCD	80
00002	0062	78/03/22	0.47	0.50	0.03	COHY	3	0	3	0	ELCTRO	NC	00.0	CLEAR	PTLYCD	80 81
00002	0062	78/04/24	0.48	0.50	0.02	COHY	0	0	0	0	ELCTRO	NC	11.5C	CLEAR	CLOUDY	80
00002	0062	78/05/17	0.46	0.50	0.04	COHY	0	0	0	0	ELCTRO	NC	16.0C	CLEAR	CLEAR	80
00002	0062	78/05/18	0.75	0.77	0.02	COHY	0	0	0	0	ELCTRO	NC	13.0C	CLEAR	CLEAR	80
00002	0062	78/05/31	0.15	0.18	0.03	COHY	0	0	0	0	ELCTRO	LC	64.0F	CLEAR	CLEAR	80
00002	0062	77/12/05	0.00	1.00	1.00	STHA	0	0	0	0	FOOT	NC	50.0F	CLEAR	PTLYCD	11
00002	0062	78/02/28	0.00	1.80	1.80	STHA	0	0	0	0	FOOT	NC	00.0	CLEAR	CLEAR	74
00002	0062	78/03/14	0.50	0.50	0.00	STHA	0	1	1	0	SPOT	NC	00.0	CLEAR	CLEAR	65 51
00002	0062	78/03/19	0.50	0.50	0.00	STHA	1	0	1	0	SPOT	MM	00.0	FAIR	CLOUDY	
00002	0062	78/03/22	0.35	0.50	0.15	STHA	1	0	1	0	ELCTRO	MM	00.0	FAIR	CLOUDY	
00002	0062	78/03/27	0.20	0.50	0.30	STHA	0	0	0	0	FOOT	NC	00.0	CLEAR	CLEAR	
00002	0062	78/03/27	0.50	0.50	0.00	STHA	1	0	1	0	SPOT	NC	00.0	CLEAR	CLEAR	
00002	0062	78/04/24	0.48	0.50	0.02	STHY	19	0	19	0	ELCTRO	NC	11.5C	CLEAR	CLOUDY	80 81 83
00002	0062	78/05/17	0.46	0.50	0.04	STHY	31	0	31	0	ELCTRO	NC	16.0C	CLEAR	CLEAR	80 81 83
00002	0062	78/05/18	0.75	0.77	0.02	STHY	34	0	34	0	ELCTRO	NC	13.0C	CLEAR	CLEAR	80 81 83
00002	0062	78/05/31	0.15	0.18	0.03	STHY	8	0	8	0	ELCTRO	LC	64.0F	CLEAR	CLEAR	80 81 83
00002	0062	78/03/06	6.70	6.75	0.05	STHJ	27	0	27	0	ELCTRO	NC	07.5C	CLEAR	PTLYCD	80 82 84
00002	0062	78/03/22	0.47	0.50	0.03	STHJ	9	0	9	0	ELCTRO	NC	00.0	CLEAR	PTLYCD	80 82 83
00002	0062	78/04/24	0.48	0.50	0.02	STHJ	5	0	5	0	ELCTRO	NC	11.5C	CLEAR	CLOUDY	80 82 83
00002	0062	78/05/17	0.46	0.50	0.04	STHJ	5	0	5	0	ELCTRO	NC	16.0C	CLEAR	CLEAR	80 82 83
00002	0062	78/05/18	0.75	0.77	0.02	STHJ	2	0	2	0	ELCTRO	NC	13.0C	CLEAR	CLEAR	80 82 83
00002	0062	78/05/31	0.15	0.18	0.03	STHJ	5	0	5	0	ELCTRO	LC	64.0F	CLEAR	CLEAR	80 82 83
00002	0062	78/04/24	0.48	0.50	0.02	STHS	1	0	1	0	ELCTRO	NC	11.5C	CLEAR	CLOUDY	80 85

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1 2 3	AGCY CODE
TRINITY RIVER BASIN																	
SOCTISH CREEK																	
00002	0019	78/10/23	0.00	0.32	0.32	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	57 43 11	
00002	0019	78/04/10	0.55	0.60	0.05	CHIY	0	0	0	0	ELCTRO	MM	00.0	FAIR	CLEAR	80	
00002	0019	78/04/27	0.25	0.30	0.05	CHIY	0	0	0	0	ELCTRO	MC	14.5C	FAIR	CLEAR	80	
00002	0019	78/05/31	0.24	0.25	0.01	CHIY	0	0	0	0	ELCTRO	LC	58.0F	FAIR	CLEAR	80	
00002	0019	78/04/10	0.55	0.60	0.05	COHY	0	0	0	0	ELCTRO	MM	00.0	FAIR	CLEAR	80	
00002	0019	78/04/27	0.25	0.30	0.05	COHY	0	0	0	0	ELCTRO	MC	14.5C	FAIR	CLEAR	80	
00002	0019	78/05/31	0.24	0.25	0.01	COHY	0	0	0	0	ELCTRO	LC	58.0F	FAIR	CLEAR	80	
00002	0019	78/04/10	0.55	0.60	0.05	STHY	2	0	2	0	ELCTRO	MM	00.0	FAIR	CLEAR	80 81 83	
00002	0019	78/04/27	0.25	0.30	0.05	STHY	6	0	6	0	ELCTRO	MC	14.5C	FAIR	CLEAR	80	
00002	0019	78/05/31	0.24	0.25	0.01	STHY	21	0	21	0	ELCTRO	LC	58.0F	FAIR	CLEAR	80 81 83	
00002	0019	78/04/10	0.55	0.60	0.05	STHJ	17	0	17	0	ELCTRO	MM	00.0	FAIR	CLEAR	80 82 83	
00002	0019	78/04/27	0.25	0.30	0.05	STHJ	4	0	4	0	ELCTRO	MC	14.5C	FAIR	CLEAR	80 82 83	
00002	0019	78/05/31	0.24	0.25	0.01	STHJ	6	0	6	0	ELCTRO	LC	58.0F	FAIR	CLEAR	80 82 83	
MILL CREEK																	
00002	0027	77/10/15	1.75	4.50	2.75	CHIA	3	0	3	0	FOOT	LC	00.0	CLEAR	CLEAR	11	
00002	0027	77/11/16	4.42	4.90	0.48	CHIA	1	0	1	0	FOOT	MC	00.0	CLEAR	CLEAR		
00002	0027	77/11/30	0.20	1.75	1.55	CHIA	0	0	0	0	FOOT	MC	49.0F	POOR	PTLYCD		
00002	0027	78/10/16	0.00	1.62	1.62	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	74 11	
00002	0027	78/11/20	0.00	2.00	2.00	CHIA	1	0	1	0	FOOT	LM	00.0	FAIR	CLOUDY	74 57 10	
00002	0027	78/11/27	1.75	3.50	1.75	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLOUDY		
00002	0027	78/12/06	1.62	3.00	1.62	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	74	
00002	0027	78/03/27	1.75	1.85	0.10	CHIY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80	
00002	0027	78/04/24	0.45	0.47	0.02	CHIY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLOUDY	80	
00002	0027	78/04/27	1.73	1.75	0.02	CHIY	10	0	10	0	ELCTRO	MC	13.5C	CLEAR	CLEAR	80 81	
00002	0027	78/05/08	10.35	10.45	0.10	CHIY	0	0	0	0	ELCTRO	MC	09.5C	CLEAR	CLEAR	80	
00002	0027	78/05/31	1.73	1.75	0.02	CHIY	5	0	5	0	ELCTRO	LC	61.0F	CLEAR	CLEAR	80 81	
00002	0027	77/11/16	4.42	4.90	0.48	COHA	0	0	0	0	FOOT	MC	00.0	CLEAR	CLEAR	11	
00002	0027	78/03/27	1.75	1.85	0.10	COHY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80	
00002	0027	78/04/24	0.45	0.47	0.02	COHY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLOUDY	80	
00002	0027	78/04/27	1.73	1.75	0.02	COHY	0	0	0	0	ELCTRO	MC	13.5C	CLEAR	CLEAR	80	
00002	0027	78/05/08	10.35	10.45	0.10	COHY	0	0	0	0	ELCTRO	MC	09.5C	CLEAR	CLEAR	80	
00002	0027	78/05/31	1.73	1.75	0.02	COHY	0	0	0	0	ELCTRO	LC	61.0F	CLEAR	CLEAR	80	
00002	0027	74/08/09	5.50	5.50	0.00	STHA	6	0	6	0	SPOT	LC	59.0F	CLEAR	CLEAR	65	
00002	0027	74/09/24	5.50	5.50	0.00	STHA	0	0	0	0	SPOT	LC	00.0	CLEAR	CLEAR	65	
00002	0027	77/11/16	4.42	4.90	0.48	STHA	0	0	0	0	FOOT	MC	00.0	CLEAR	CLEAR	11	
00002	0027	78/10/04	4.83	4.83	0.00	STHA	1	0	1	0	FOOT	LC	00.0	CLEAR	CLEAR	11 65	
00002	0027	78/10/16	0.00	1.62	1.62	STHA	2	0	2	0	FOOT	LC	00.0	CLEAR	CLEAR	74 11	
00002	0027	78/04/27	1.73	1.75	0.02	STHY	6	0	6	0	ELCTRO	MC	13.5C	CLEAR	CLEAR	80 81 83	
00002	0027	78/05/08	10.35	10.45	0.10	STHY	6	0	6	0	ELCTRO	MC	09.5C	CLEAR	CLEAR	80 81 83	
00002	0027	78/05/31	1.73	1.75	0.02	STHY	34	0	34	0	ELCTRO	LC	61.0F	CLEAR	CLEAR	80 81 83	
[illegible]	[illegible]	7[illegible]/27	[illegible]5	[illegible]	0.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	F[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1	2	3	AGCY CODE
TRINITY RIVER BASIN																			
HOSPITAL CREEK																			
00002	0072	78/04/06	0.40	0.55	0.15	RNAW	3	0	3	0	ELCTRO	MC	09.0C	CLEAR	PTLYCD	80	84		
00002	0072	77/09/09	0.00	1.50	1.50	CHIA	0	0	0	0	FOOT	LC	61.0F	CLEAR	CLEAR	57			
00002	0072	78/02/15	0.00	0.05	0.05	CHIY	0	0	0	0	ELCTRO	MC	09.0C	POOR	PTLYCD	80			
00002	0072	78/04/06	0.40	0.55	0.15	CHIY	0	0	0	0	ELCTRO	MC	09.0C	CLEAR	PTLYCD	80			
00002	0072	78/05/10	0.35	0.40	0.05	CHIY	0	0	0	0	ELCTRO	LC	11.0C	CLEAR	CLOUDY	80			
00002	0072	78/02/15	0.00	0.05	0.05	COHY	0	0	0	0	ELCTRO	MC	09.0C	POOR	PTLYCD	80			
00002	0072	78/04/06	0.40	0.55	0.15	COHY	0	0	0	0	ELCTRO	MC	09.0C	CLEAR	PTLYCD	80			
00002	0072	78/05/10	0.35	0.40	0.05	COHY	0	0	0	0	ELCTRO	LC	11.0C	CLEAR	CLOUDY	80			
00002	0072	78/05/10	0.35	0.40	0.05	STHY	3	0	3	0	ELCTRO	LC	11.0C	CLEAR	CLOUDY	80	81	83	
00002	0072	78/02/15	0.00	0.05	0.05	STHJ	2	0	2	0	ELCTRO	MC	09.0C	POOR	PTLYCD	80	82	83	
00002	0072	78/04/06	0.40	0.55	0.15	STHJ	9	0	9	0	ELCTRO	MC	09.0C	CLEAR	PTLYCD	80	82	83	
00002	0072	78/05/10	0.35	0.40	0.05	STHJ	2	0	2	0	ELCTRO	LC	11.0C	CLEAR	CLOUDY	80	82	83	
00002	0072	78/04/06	0.40	0.55	0.15	STHS	2	0	2	0	ELCTRO	MC	09.0C	CLEAR	PTLYCD	80	85		
00002	0072	78/05/10	0.35	0.40	0.05	STHS	3	0	3	0	ELCTRO	LC	11.0C	CLEAR	CLOUDY	80	85		

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1 2 3	AGCY	CODE
TRINITY RIVER BASIN																		
ROCK CREEK																		
00002	0063	78/05/10	0.02	0.12	0.10	CHIY	0	0	0	0	ELCTRO	MC	11.5C	CLEAR	CLOUDY	80		
00002	0063	78/05/10	0.02	0.12	0.10	COHY	0	0	0	0	ELCTRO	MC	11.5C	CLEAR	CLOUDY	80		
00002	0063	78/05/10	0.02	0.12	0.10	STHJ	9	0	9	0	ELCTRO	MC	11.5C	CLEAR	CLOUDY	80 82 83		

SALMON U.S. FISH AND WILDLIFE SERVICE 12/13/78

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI- BILITY	WEATHER CONDITION	COMMENTS 1 2 3	AGCY CODE
TRINITY RIVER BASIN																	
TISH TANG A TANG CREEK																	
00002	0077	77/11/14	0.00	1.00	1.00	CHIA	1	0	1	0	FOOT	LC	00.0	CLEAR	CLEAR		
00002	0077	78/01/30	0.00	0.30	0.30	CHIA	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLEAR	03	
00002	0077	78/10/23	0.00	0.50	0.50	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLEAR	74 11	
00002	0077	78/10/26	0.00	2.80	2.80	CHIA	0	0	0	0	FOOT	LC	52.0F	CLEAR	CLEAR	11 74	
00002	0077	78/11/27	0.00	2.75	2.75	CHIA	0	0	0	0	FOOT	LC	00.0	CLEAR	CLOUDY		
00002	0077	78/03/15	0.00	0.20	0.20	CHIY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80	
00002	0077	78/04/28	0.10	0.12	0.02	CHIY	0	0	0	0	ELCTRO	MC	10.0C	CLEAR	CLOUDY	80	
00002	0077	78/05/18	0.12	0.15	0.03	CHIY	1	0	1	0	ELCTRO	MC	13.5C	CLEAR	CLEAR	80	
00002	0077	78/03/15	0.00	0.20	0.20	COHY	0	0	0	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80	
00002	0077	78/04/28	0.10	0.12	0.02	COHY	0	0	0	0	ELCTRO	MC	10.0C	CLEAR	CLOUDY	80	
00002	0077	78/05/18	0.12	0.15	0.03	COHY	0	0	0	0	ELCTRO	MC	13.5C	CLEAR	CLEAR	80	
00002	0077	78/03/30	2.80	2.80	0.00	STHA	1	0	1	0	SPOT	MC	00.0	CLEAR	CLEAR	14	
00002	0077	78/10/26	0.00	2.80	2.80	STHA	1	0	1	0	FOOT	LC	52.0F	CLEAR	CLEAR	11 74	
00002	0077	78/05/18	0.12	0.15	0.03	STHY	4	0	4	0	ELCTRO	MC	13.5C	CLEAR	CLEAR	80 81 83	
00002	0077	78/03/15	0.00	0.20	0.20	STHJ	3	0	3	0	ELCTRO	MC	00.0	CLEAR	CLEAR	80 82 83	
00002	0077	78/04/28	0.10	0.12	0.02	STHJ	3	0	3	0	ELCTRO	MC	10.0C	CLEAR	CLOUDY	80 82 83	
00002	0077	78/05/18	0.12	0.15	0.03	STHJ	4	0	4	0	ELCTRO	MC	13.5C	CLEAR	CLEAR	80 82 83	
00002	0077	78/04/28	0.10	0.12	0.02	STHS	1	0	1	0	ELCTRO	MC	10.0C	CLEAR	CLOUDY	80 85	
UNKNOWN																	
00002	5000	78/11/13	11.00	11.50	0.50	CHIA	0	0	0	1	FOOT	LC	00.0	CLEAR	CLEAR	10	
00002	5000	78/11/14	28.00	30.00	2.00	CHIA	7	6	13	4	FOOT	LC	00.0	CLEAR	CLOUDY	10	
00002	5000	78/11/15	24.75	28.00	3.25	CHIA	6	11	17	18	FOOT	LC	00.0	CLEAR	CLOUDY	10	
00002	5000	78/11/16	7.00	11.00	4.00	CHIA	2	3	5	5	FOOT	LC	00.0	CLEAR	CLOUDY	10	
00002	5000	78/11/28	26.00	30.00	4.00	CHIA	3	3	6	21	FOOT	LC	00.0	CLEAR	CLOUDY	12 16 59	
00002	5000	78/11/29	30.00	32.00	2.00	CHIA	0	2	2	14	FOOT	LC	00.0	CLEAR	CLOUDY	70	
00002	5000	78/11/16	9.00	11.00	2.00	COHA	0	1	1	0	FOOT	LC	00.0	CLEAR	CLOUDY	76 10	
00002	5000	78/11/15	24.75	28.00	3.25	STHA	2	0	2	0	FOOT	LC	00.0	CLEAR	CLOUDY	11	
00002	5000	78/11/16	7.00	19.00	12.00	STHA	1	0	1	0	FOOT	LC	00.0	CLEAR	CLOUDY	10	
00002	5000	78/11/28	26.00	30.00	4.00	STHA	2	0	2	0	FOOT	LC	00.0	CLEAR	CLOUDY		
UNKNOWN																	
00002	5001	78/11/14	0.00	1.50	0.00	CHIA	3	3	6	0	FOOT	LC	00.0	CLEAR	CLOUDY	10	

SALMON SPAWNING GROUND DATA RETRIEVAL

WRIA NO.	STRM NO.	DATE YR MO DY	RIVER MILE LOW END	RIVER MILE UPPER END	LNGTH	SPEC NAME	LIVE COUNT	DEAD COUNT	TOTAL COUNT	REDD COUNT	SURVEY METHOD	WATER CONDITION	WATER TEMP.	VISI-BILITY	WEATHER CONDITION	COMMENTS 1	2	3	AGCY	CODE
TRINITY RIVER BASIN																				
CAPTAIN JOHN GULCH																				
00002	0073	78/05/18	0.05	0.15	0.10	CHIY	0	0	0	0	ELCTRO	LC	14.5C	CLEAR	CLEAR	80				
00002	0073	78/05/18	0.05	0.15	0.10	COHY	0	0	0	0	ELCTRO	LC	14.5C	CLEAR	CLEAR	80				
00002	0073	78/05/18	0.05	0.15	0.10	STHJ	1	0	1	0	ELCTRO	LC	14.5C	CLEAR	CLEAR	80	82	84		
CAMPBELL CREEK																				
00002	0075	78/02/21	0.10	0.15	0.05	CHIY	0	0	0	0	ELCTRO	MC	00.0	POOR	CLEAR	80				
00002	0075	78/04/27	0.20	0.30	0.10	CHIY	0	0	0	0	ELCTRO	MC	11.5C	CLEAR	CLEAR	80				
00002	0075	78/05/31	0.19	0.20	0.01	CHIY	0	0	0	0	ELCTRO	LC	62.5F	CLEAR	CLEAR	80				
00002	0075	78/02/21	0.10	0.15	0.05	COHY	0	0	0	0	ELCTRO	MC	00.0	POOR	CLEAR	80				
00002	0075	78/04/27	0.20	0.30	0.10	COHY	0	0	0	0	ELCTRO	MC	11.5C	CLEAR	CLEAR	80				
00002	0075	78/05/31	0.19	0.20	0.01	COHY	0	0	0	0	ELCTRO	LC	62.5F	CLEAR	CLEAR	80				
00002	0075	78/04/27	0.00	0.24	0.24	STHA	2	0	2	0	FOOT	MC	00.0	CLEAR	CLEAR	14				
00002	0075	78/04/27	0.20	0.30	0.10	STHA	2	0	2	0	ELCTRO	MC	11.5C	CLEAR	CLEAR	14	80			
00002	0075	78/04/27	0.20	0.30	0.10	STHY	7	0	7	0	ELCTRO	MC	11.5C	CLEAR	CLEAR	80	81	83		
00002	0075	78/05/31	0.19	0.20	0.01	STHY	20	0	20	0	ELCTRO	LC	62.5F	CLEAR	CLEAR	80	81	83		
00002	0075	78/02/21	0.10	0.15	0.05	STHJ	5	0	5	0	ELCTRO	MC	00.0	POOR	CLEAR	80	82	83		
00002	0075	78/04/27	0.20	0.30	0.10	STHJ	9	0	9	0	ELCTRO	MC	11.5C	CLEAR	CLEAR	80	82	83		
00002	0075	78/05/31	0.19	0.20	0.01	STHJ	5	0	5	0	ELCTRO	LC	62.5F	CLEAR	CLEAR	80	82	83		

APPENDIX 6

COMPUTER PRINTOUTS

STREAM HABITAT, MIGRATION BARRIER AND WATER DIVERSION SURVEYS

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: SALT CREEK
STREAM CODE: 2.

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/RIFFLE RATIO	STREAM HABITAT INVENTORY: POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) R	R	G	S-S	O	COV FR	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER-DIVERSION INVENTORY: BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 7/ 6	30	2.0	100/ 0	99	0	0	0	0	0	0	5	90	5	3	2	2	C	0	0.0							
0.25	78/ 7/ 6	30	2.0	100/ 0	99	0	0	0	0	0	0	5	90	5	2	2	2	0	0	0.0							
0.50	78/ 7/ 6	15	2.0	80/ 20	0	10	20	35	35	0	5	75	20	0	2	2	2	0	0	0.0							
0.75	78/ 7/ 6	20	2.0	100/ 0	10	35	35	10	10	0	0	0	99	0	1	2	2	1	1	1.0							
1.00	78/ 7/ 6	15	2.0	100/ 0	10	35	35	10	10	0	0	0	99	0	1	2	2	0	0	0.0							

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: MYNOT CREEK
STREAM CODE: 7.

STREAM HABITAT INVENTORY / BARRIER-DIVERSION INVENTORY

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) R	P	G	S-S	O	COV FR	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE.	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 6/21	6	1.0	40/ 60	0	0	5	40	55	0	30	60	10	0	3	2	2	2	2	2.0							
0.25	78/ 6/21	12	0.0	50/ 50	0	0	5	40	55	0	35	50	15	0	1	2	2	1	2	1.5							
0.50	78/ 6/21	6	0.0	60/ 40	20	20	30	15	15	0	40	40	20	0	1	2	2	1	1	1.0							
0.75	78/ 6/21	6	0.0	60/ 40	20	20	30	15	15	0	30	50	20	0	1	2	2	2	2	2.0							
1.00	78/ 6/21	8	0.0	60/ 40	20	20	30	15	15	5	40	40	15	0	2	2	2	2	2	2.0							

PROGRAM: STREAM

DATE: 12/12/78

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

****

KLAMATH RIVER BASIN

RESULTS FOR: HUNTER CREEK
STREAM CODE: 5.

					STREAM HABITAT INVENTORY																BARRIER-DIVERSION INVENTORY					
		ACW	FLOW	POOL/	POOL COMPOSITION (PERCENT)					RIFFLE COMPOSITION (PERCENT)					COV	BANK STAB.		GRADIENT (PERCENT)			R	BARRIER			DIVERSION		
RIVER MILE	DATE YR MO DY	EST. FEET	EST. CFS	RIFFLE RATIO	1	2	3	4	5	B	R	G	S-S	O	ER	L	R	UP	DN	AV	P	TYPE	HT	PASS /IMP	PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 6/21	25	5.0	80/ 20	20	25	25	15	15	0	0	60	40	0	2	3	3	1	1	1.0							
0.25	78/ 6/21	30	5.0	70/ 30	15	20	25	20	20	0	0	60	40	0	3	3	3	1	1	1.0							
0.50	78/ 6/21	30	5.0	40/ 60	10	15	15	30	30	0	5	60	35	0	3	2	2	1	1	1.0							
0.75	78/ 6/21	25	5.0	90/ 10	10	30	30	15	15	0	10	40	50	0	1	2	2	1	1	1.0							
0.80	78/ 6/21																				2	1	3	1			
1.00	78/ 6/21	20	5.0	80/ 20	15	15	30	20	20	0	5	55	40	0	2	2	2	1	1	1.0							
1.25	78/ 6/21	20	5.0	65/ 35	15	15	30	20	20	0	5	75	20	0	2	2	2	1	1	1.0							
1.50	78/ 6/21	15	2.0	70/ 30	15	15	30	20	20	0	5	75	20	0	2	3	2	1	1	1.0							
1.75	78/ 6/21	15	0.0	70/ 30	10	15	25	25	25	0	10	80	10	0	3	2	2	1	1	1.0							

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: TERWER CREEK
STREAM CODE: 31.

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COV ER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 6/14	40	4.0	0/100	0	0	0	0	0	5	30	50	15	0	3	3	3	1	1	1.0							
0.25	78/ 6/14	40	6.0	20/ 80	0	0	0	40	60	5	10	70	15	0	3	2	2	1	1	1.0							
0.50	78/ 6/14	60	3.0	10/ 90	10	0	0	0	90	5	10	70	15	0	3	2	2	1	1	1.0							
0.75	78/ 6/14	40	1.0	5/ 95	0	0	0	5	95	5	10	70	15	0	3	2	2	1	1	1.0							
1.00	78/ 6/14	25	0.0	10/ 90	10	0	0	0	90	5	10	70	15	0	3	2	2	1	1	1.0							
1.25	78/ 6/14	25	0.0	50/ 50	20	0	0	40	40	5	10	70	15	0	2	2	2	1	1	1.0							
1.50	78/ 6/14	25	4.0	50/ 50	40	0	0	40	20	5	20	60	15	0	2	2	2	1	1	1.0							

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: RICHARDSON CREEK
STREAM CODE: 22.

					STREAM HABITAT INVENTORY																	BARRIER-DIVERSION INVENTORY					
		ACW	FLOW	POOL/	POOL COMPOSITION (PERCENT)					RIFFLE COMPOSITION (PERCENT)						BANK		GRADIENT (PERCENT)				BARRIER			DIVERSION		
RIVER MILE	DATE YR MO DY	EST. FEET	EST. CFS	RIFFLE RATIO	1	2	3	4	5	B	R	G	S-S	O	COV FR	STAB. L	R	UP	DN	AV	R P	TYPE	HT	PASS /IMP	PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 7/ 6	9	1.0	10/ 90	0	0	0	25	75	0	0	70	30	0	1	3	3	2	2	2.0							

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: TARUP CREEK
STREAM CODE: 53.

	RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COVER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
	0.00	78/ 6/13	15	0.0	20/ 80	0	0	10	30	60	0	15	75	10	0	3	3	3	1	1	1.0							
	0.25	78/ 6/13	25	0.0	20/ 80	0	0	10	30	60	0	35	45	20	0	3	3	3	1	1	1.0							
	0.50	78/ 6/13	20	1.0	70/ 30	0	10	10	40	40	0	0	60	40	0	2	2	2	1	1	1.0							
1	0.65	78/ 6/13																				3	1	2	1			
	0.75	78/ 6/13	15	2.0	70/ 30	0	25	25	25	25	0	5	65	25	5	1	2	2	1	1	1.0							
1	0.76	78/ 6/13																				3	1	2	1			
1	0.80	78/ 6/13																				3	1	2	1			
1	0.90	78/ 6/13																				3	1	2	1			
1	0.95	78/ 6/13																				2	1	4	1			
	1.00	78/ 6/13	10	3.0	70/ 30	10	20	30	20	20	0	0	70	25	5	1	2	2	1	1	1.0							
1	1.05	78/ 6/13																				3	1	2	1			
1	1.10	78/ 6/13																				3	1	2	1			
	1.25	78/ 6/13	15	2.0	70/ 30	10	20	30	20	20	5	10	55	25	5	2	2	2	1	1	1.0							
1	1.30	78/ 6/13																				2	1	3	1			
1	1.32	78/ 6/13																				2	8	2	1			
1	1.45	78/ 6/13																				3	1	2	1			
1	1.46	78/ 6/13																				4	8	1	1			
	1.50	78/ 6/13	15	2.0	40/ 60	5	10	30	30	25	0	10	75	15	0	2	2	2	1	1	1.0							
1	1.60	78/ 6/13																				2	8	3	1			
1	1.65	78/ 6/13																				3	1	3	1			
	1.75	78/ 6/13	12	3.0	50/ 50	10	30	30	15	15	0	20	65	15	0	1	2	2	1	1	1.0							
1	1.78	78/ 6/13																				2	1	3	1			
	2.00	78/ 6/13	8	3.0	40/ 60	10	20	30	20	20	0	40	50	10	0	2	2	2	2	2	2.0							
1	2.20	78/ 6/13																				4	2	6	1			
	2.25	78/ 6/13	10	3.0	60/ 40	20	30	20	20	10	15	25	45	10	5	2	2	2	4	4	4.0							
1	2.30	78/ 6/13																				1	1	12	2			
1	2.35	78/ 6/13																				1	2	25	2			
1	2.40	78/ 6/13																				2	1	6	1			
1	2.45	78/ 6/13																				2	5	6	2			
	2.50	78/ 6/13	8	3.0	40/ 60	0	10	20	30	40	10	45	30	10	5	2	2	2	3	4	3.5							
1	2.52	78/ 6/13																				3	1	6	1			

PROGRAM: STREAM

DATE: 12/12/78

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: MC GARVEY CREEK
STREAM CODE: 49.

					STREAM HABITAT INVENTORY																	BARRIER-DIVERSION INVENTORY					
		ACW	FLOW	POOL/	POOL COMPOSITION (PERCENT)					RIFFLE COMPOSITION (PERCENT)						BANK STAB.		GRADIENT (PERCENT)			R	BARRIER			DIVERSION		
RIVER MILE	DATE YR MO DY	EST. FEET	EST. CFS	RIFFLE RATIO	1	2	3	4	5	B	R	G	S-S	O	COVER	L	R	UP	DN	AV	P	TYPE	HT	PASS /IMP	PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 6/26	12	1.0	100/ 0	95	5	0	0	0	0	0	0	95	5	2	3	3	1	1	1.0							
1.00	78/ 6/26	8	2.0	80/ 20	10	15	15	30	30	0	10	70	20	0	2	2	2	1	2	1.5							
1.25	78/ 6/26	8	3.0	80/ 20	10	30	30	15	15	0	5	85	10	0	1	2	2	1	1	1.0							

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: BLUE CREEK
STREAM CODE: 69.

					STREAM HABITAT INVENTORY																	BARRIER-DIVERSION INVENTORY					
					POOL COMPOSITION (PERCENT)					RIFFLE COMPOSITION (PERCENT)						BANK STAB.		GRADIENT (PERCENT)				BARRIER			DIVERSION		
RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	1	2	3	4	5	B	R	G	S-S	O	COVER	L	R	UP	DN	AV	R P	TYPE	HT	PASS /IMP	PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	77/10/12	40	25.0	0/100	0	0	0	5	95	5	10	80	5	0	3	2	2	1	1	1.0							
0.25	77/10/12	35	25.0	20/ 80	90	0	0	0	10	20	40	30	10	0	3	2	2	1	1	1.0							
0.50	77/10/12	35	25.0	40/ 60	90	0	0	0	10	20	30	40	10	0	3	2	2	1	1	1.0							
0.75	77/10/12	30	25.0	10/ 90	0	0	0	5	95	20	50	20	10	0	3	2	2	1	1	1.0							
1.00	77/10/12	60	25.0	40/ 60	40	10	10	10	30	5	30	40	25	0	3	2	2	1	1	1.0							
1.25	77/10/12	40	25.0	60/ 40	40	20	10	10	20	20	40	30	10	0	3	2	2	1	1	1.0							
1.50	77/10/12	35	25.0	80/ 20	40	30	10	10	10	30	40	20	10	0	3	2	2	1	1	1.0							
1.75	77/10/12	45	25.0	50/ 50	30	20	30	10	10	30	40	10	20	0	3	2	2	1	1	1.0							

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: OHAGER CREEK
STREAM CODE: 60.

					STREAM HABITAT INVENTORY																		BARRIER-DIVERSION INVENTORY					
		ACW	FLOW	POOL/	POOL COMPOSITION (PERCENT)					RIFFLE COMPOSITION (PERCENT)						BANK		GRADIENT (PERCENT)				BARRIER			DIVERSION		
RIVER MILE	DATE YR MO DY	EST. FEET	EST. CFS	RIFFLE RATIO	1	2	3	4	5	9	R	G	S-S	O	COV ER	STAB. L	R	UP	DN	AV	R P	TYPE	HT	PASS /IMP	PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 7/18	10	0.0	10/ 90	0	0	0	0	99	0	0	10	90	0	3	3	3	1	1	1.0							
0.25	78/ 7/18	40	0.0	20/ 80	0	0	0	20	80	0	5	60	45	0	3	3	3	1	1	1.0							
0.50	78/ 7/18	20	0.0	30/ 70	0	0	20	30	50	0	20	55	25	0	3	3	3	1	1	1.0							
0.75	78/ 7/18	20	1.0	10/ 90	0	0	10	20	70	0	40	40	20	0	2	3	2	2	2	2.0							
1.00	78/ 7/18	20	2.0	50/ 50	0	0	20	40	40	10	35	35	20	0	3	3	2	3	3	3.0							
1.25	78/ 7/18	15	2.0	60/ 40	5	10	25	30	30	15	30	35	20	0	2	3	2	4	3	3.5							
1.49	78/ 7/18																				3	1	5	1			
1.50	78/ 7/18																				3	6	4	1			
1.50	78/ 7/18	12	2.0	70/ 30	10	20	30	20	20	15	40	20	20	5	2	2	2	3	3	3.0							
1.52	78/ 7/18																				3	1	4	1			
1.54	78/ 7/18																				3	1	4	1			
1.60	78/ 7/18																				3	1	3	1			
1.65	78/ 7/18																				3	1	3	1			
1.70	78/ 7/18																				3	1	8	2			
1.72	78/ 7/18																				3	1	10	2			
1.75	78/ 7/18	10	1.0	30/ 70	0	0	20	40	40	0	40	40	20	0	2	2	2	1	1	1.0							
1.80	78/ 7/18																				3	1	6	2			
1.87	78/ 7/18																				3	1	3	1			
1.90	78/ 7/18																				3	1	6	2			
2.00	78/ 7/18	10	1.0	60/ 40	0	10	20	30	40	10	30	40	20	0	1	3	2	4	4	4.0							
2.05	78/ 7/18																				3	1	10	2			
2.13	78/ 7/18																				3	1	12	2			
2.18	78/ 7/18																				3	1	6	2			
2.23	78/ 7/18																				3	1	9	2			
2.25	78/ 7/18	6	1.0	40/ 60	0	0	20	30	50	0	15	50	25	10	1	2	2	5	3	4.0							
2.30	78/ 7/18																				3	1	6	2			
2.35	78/ 7/18																				3	1	8	2			

PROGRAM: STREAM

DATE: 12/12/78

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: AH PAH CREEK, NORTH FORK
STREAM CODE: 165.

		STREAM HABITAT INVENTORY																					BARRIER-DIVERSION INVENTORY					
	RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COV ER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
	0.00	78/ 6/ 7	6	1.0	50/ 50	0	35	25	20	20	0	5	80	15	0	2	2	2	1	0	0.5							
1	0.02	78/ 6/ 7																				4	1	2	1			
	0.25	78/ 6/ 7	16	0.0	50/ 50	10	40	30	20	2	0	20	65	15	0	2	2	2	1	1	1.0							
	0.50	78/ 6/ 7	8	6.0	60/ 40	20	20	20	20	20	5	50	30	15	0	2	2	2	1	2	1.5							
1	0.70	78/ 6/ 7																				1	2	25	2			
	0.75	78/ 6/ 7	10	8.0	80/ 20	30	30	20	10	10	50	30	10	5	5	2	1	2	12	15	13.5							
1	0.80	78/ 6/ 7																				1	1	20	2			
	1.00	78/ 6/ 7	10	8.0	60/ 40	10	30	30	20	10	10	40	40	10	0	2	2	2	2	2	2.0							
1	1.10	78/ 6/ 7																				1	1	6	2			
	1.25	78/ 6/ 7	10	6.0	80/ 20	5	10	30	35	20	5	35	45	15	0	1	2	2	2	1	1.5							
	1.50	78/ 6/ 7	10	5.0	80/ 20	15	15	30	30	10	5	40	45	10	0	1	2	2	2	2	2.0							

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: AH PAH CREEK
STREAM CODE: 164.

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	STREAM HABITAT INVENTORY: POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COV ER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER-DIVERSION INVENTORY: BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	77/10/27	25	15.0	5/ 95	0	0	0	0	99	0	5	60	35	0	3	3	3	0	0	0.0							
0.25	77/10/27	12	12.0	30/ 70	0	0	10	20	70	0	10	60	30	0	2	2	2	0	0	0.0							
0.40	77/10/27																				2	1	3	1			
0.50	77/10/27	15	12.0	20/ 80	10	0	10	30	50	0	30	60	10	0	2	2	2	0	0	0.0							
0.75	77/10/27	20	12.0	10/ 90	20	10	10	20	30	0	10	80	10	0	2	2	2	0	0	0.0							
1.00	77/10/27	10	9.0	40/ 60	30	20	20	15	15	0	5	85	10	0	2	2	2	0	0	0.0							
1.25	77/10/27	12	9.0	10/ 90	0	0	10	10	80	0	40	50	10	0	2	2	2	0	0	0.0							

PROGRAM: STREAM

DATE: 12/12/78

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: BEAR CREEK
STREAM CODE: 178.

					STREAM HABITAT INVENTORY																		BARRIER-DIVERSION INVENTORY					
RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COV FR	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 6/19	8	0.0	10/ 90	0	0	0	20	80	5	15	65	15	0	3	3	3	1	1	1.0							
0.25	78/ 6/19	25	0.0	30/ 70	5	15	15	30	35	5	30	40	15	0	3	3	3	2	1	1.5							
0.50	78/ 6/19	12	1.0	30/ 70	10	20	30	20	20	5	30	40	15	0	3	3	3	2	1	1.5							
0.75	78/ 6/19	15	3.0	30/ 70	20	10	10	30	30	5	30	40	15	0	2	3	3	1	1	1.0							
1.00	78/ 6/19	10	4.0	40/ 60	10	10	20	30	30	10	40	35	15	0	3	2	2	1	1	1.0							
1.25	78/ 6/19	15	6.0	50/ 50	30	20	15	15	20	10	35	40	15	0	2	2	2	2	2	2.0							
1.50	78/ 6/19	12	6.0	60/ 40	30	30	20	10	10	15	40	35	10	0	2	2	2	4	2	3.0							
1.75	78/ 6/19	15	6.0	40/ 60	5	5	25	40	25	10	40	40	10	0	2	2	2	3	3	3.0							
1.90	78/ 6/19																				4	1	5	1			
1.92	78/ 6/19																				4	4	6	1			
1.96	78/ 6/19																				1	1	10	2			
2.00	78/ 6/19	10	6.0	70/ 30	30	30	20	10	10	15	35	35	10	5	2	2	2	5	5	5.0							
2.25	78/ 6/19	8	4.0	70/ 30	25	5	20	30	20	25	30	35	10	0	2	2	1	8	5	6.5							
2.38	78/ 6/19																				1	1	6	2			
2.40	78/ 6/19																				1	1	12	2			
2.45	78/ 6/19																				1	1	8	2			
2.47	78/ 6/19																				1	1	16	2			
2.50	78/ 6/19																				2	1	5	1			
2.50	78/ 6/19	8	3.0	30/ 70	0	10	0	50	40	5	35	45	10	5	2	2	2	7	7	7.0							
2.55	78/ 6/19																				1	1	10	2			
2.58	78/ 6/19																				1	1	12	2			
2.65	78/ 6/19																				1	1	6	2			
2.75	78/ 6/19	8	3.0	50/ 50	10	10	40	20	20	20	30	35	10	5	2	2	2	8	7	7.5							
2.90	78/ 6/19																				1	1	15	2			
2.95	78/ 6/19																				1	1	20	2			
3.00	78/ 6/19																				5	4	20	2			
3.00	78/ 6/19	8	3.0	70/ 30	0	20	30	30	20	20	30	40	10	0	1	2	2	15	12	13.5							

PROGRAM: STREAM

DATE: 12/12/78

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: AH PAH CREEK, SOUTH FORK
STREAM CODE: 173.

					STREAM HABITAT INVENTORY																	BARRIER-DIVERSION INVENTORY						
		ACW	FLOW	POOL/	POOL COMPOSITION (PERCENT)					RIFFLE COMPOSITION (PERCENT)						BANK			GRADIENT (PERCENT)				BARRIER			DIVERSION		
RIVER MILE	DATE # YR MO DY	EST. FEET	EST. CFS	RIFFLE RATIO	1	2	3	4	5	B	R	G	S-S	O	COVER	STAB. L	R	UP	DN	AV	R P	TYPE	HT	PASS /IMP	PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	77/10/27	6	3.0	5/ 95	0	0	0	5	95	0	30	60	10	0	3	3	2	1	1	1.0							
0.25	77/10/27	8	5.0	10/ 90	0	0	0	10	90	5	50	35	10	0	2	2	2	3	3	3.0							
0.50	77/10/27	8	5.0	10/ 90	0	0	0	10	90	5	25	60	10	0	2	2	3	3	3	3.0							

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: TECTAH CREEK
STREAM CODE: 192.

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COVER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	RP	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	77/10/19	6	3.0	10/ 90	0	0	0	0	99	5	30	50	15	0	3	3	3	0	0	0.0							
0.25	77/10/19	10	4.0	50/ 50	0	0	10	20	70	5	20	70	5	0	2	3	2	0	0	0.0							
0.50	77/10/19	12	5.0	50/ 50	0	10	10	20	60	10	30	50	10	0	3	1	3	0	0	0.0							
0.75	77/10/19	16	8.0	30/ 70	0	10	10	20	60	10	30	50	10	0	2	2	2	0	0	0.0							
1.00	77/10/19	16	8.0	60/ 40	0	0	20	20	60	15	50	30	5	0	2	2	2	0	0	0.0							
1.25	77/10/19	24	8.0	70/ 30	0	0	10	40	50	10	30	50	10	0	2	1	2	0	0	0.0							
1.50	77/10/19	24	6.0	20/ 80	0	0	0	10	90	5	40	40	15	0	2	2	2	0	0	0.0							
1.75	77/10/19	16	8.0	60/ 40	20	40	20	10	10	25	30	30	15	0	2	2	2	0	0	0.0							
2.00	77/10/19	24	8.0	50/ 50	10	10	30	20	20	20	40	30	10	0	2	2	3	0	0	0.0							

PROGRAM: STREAM

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: SURPUR CREEK
STREAM CODE: 186.

					STREAM HABITAT INVENTORY																	BARRIER-DIVERSION INVENTORY					
		ACW	FLOW	POOL/	POOL COMPOSITION					RIFFLE COMPOSITION						BANK		GRADIENT				BARRIER			DIVERSION		
RIVER	DATE	EST.	EST.	RIFFLE	(PERCENT)					(PERCENT)					COV	STAB.		(PERCENT)			R			PASS	PIPE	SCREEN	FLOW
MILE	YR MO DY	FEET	CFS	RATIO	1	2	3	4	5	B	R	G	S-S	O	ER	L	R	UP	ON	AV	P	TYPE	HT	/IMP	SIZE	SIZE	DIVRT
0.00	78/ 6/22	5	2.0	10/ 90	0	0	0	25	75	10	35	45	10	0	3	3	3	2	2	2.0							
0.25	78/ 6/22	8	2.0	60/ 40	10	20	30	20	20	10	45	35	10	0	3	3	3	3	3	3.0							
0.27	78/ 6/22																				3	1	3	1			
0.50	78/ 6/22	8	4.0	70/ 30	15	30	30	15	10	25	35	30	10	0	2	2	2	5	5	5.0							
0.70	78/ 6/22																				3	3	5	1			
0.72	78/ 6/22																				3	1	4	1			
0.75	78/ 6/22	10	4.0	60/ 40	10	15	20	30	25	15	40	30	10	0	2	2	2	3	5	4.0							
0.84	78/ 6/22																				2	1	12	2			
0.85	78/ 6/22																				2	1	12	2			
0.97	78/ 6/22																				3	1	3	1			
1.00	78/ 6/22	10	4.0	50/ 50	10	25	25	20	20	10	50	30	10	0	3	2	3	3	3	3.0							
1.25	78/ 6/22	8	4.0	50/ 50	10	15	30	25	20	15	40	35	10	0	2	2	2	5	3	4.0							

PROGRAM: STREAM DATE: 12/12/76

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: PECWAN CREEK
STREAM CODE: 214.

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COV ER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 7/11	30	12.0	50/ 50	0	0	10	45	45	25	45	20	10	0	3	3	3	4	4	4.0							
0.25	78/ 7/11	40	12.0	60/ 40	0	10	25	40	25	25	45	20	10	0	3	3	3	2	2	2.0							
0.50	78/ 7/11	40	12.0	65/ 35	15	20	25	25	15	35	30	15	20	0	3	3	2	3	3	3.0							
0.75	78/ 7/11	20	8.0	60/ 40	15	25	25	20	15	25	35	25	15	0	3	2	2	6	6	6.0							
0.78	78/ 7/11																				5	3	6	1			
0.79	78/ 7/11																				5	4	30	2			
1.00	78/ 7/11	25	10.0	90/ 10	40	25	15	10	10	60	15	15	10	0	2	2	2	23	17	20.0							
1.15	78/ 7/11																				5	4	40	2			
1.25	78/ 7/11	15	10.0	90/ 10	60	20	10	5	5	65	20	10	5	0	2	1	1	30	30	30.0							

PROGRAM: STREAM

DATE: 12/12/78

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: JOHNSON CREEK
STREAM CODE: 212.

			STREAM HABITAT INVENTORY																				BARRIER-DIVERSION INVENTORY						
	RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COVER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
	0.00	78/ 6/22	6	0.0	5/ 95	0	0	0	5	95	0	5	90	5	0	1	2	2	2	2	2.0							
	0.25	78/ 6/22	6	2.0	10/ 90	0	0	5	15	80	0	35	60	5	0	2	2	2	3	3	3.0							
1	0.30	78/ 6/22																				3	4	20	1			
1	0.45	78/ 6/22																				3	4	5	1			
1	0.46	78/ 6/22																				3	2	8	1			
1	0.49	78/ 6/22																				3	3	9	2			
1	0.50	78/ 6/22																				3	1	4	1			
	0.50	78/ 6/22	8	3.0	70/ 30	30	30	20	10	10	20	35	30	5	0	2	2	1	12	18	15.0							
1	0.52	78/ 6/22																				3	1	8	1			
1	0.69	78/ 6/22																				3	3	6	2			
1	0.70	78/ 6/22																				3	1	8	2			
1	0.71	78/ 6/22																				3	1	10	2			
1	0.72	78/ 6/22																				3	1	4	2			
	0.75	78/ 6/22	8	3.0	20/ 80	0	0	0	20	80	15	55	25	5	0	1	2	2	3	3	3.0							
	1.00	78/ 6/22	8	3.0	40/ 60	0	0	10	20	60	15	40	40	5	0	1	2	2	4	3	3.5							
	1.25	78/ 6/22	8	3.0	60/ 40	5	20	25	30	20	10	35	50	5	0	1	2	2	5	5	5.0							
1	1.27	78/ 6/22																				3	1	4	2			

PROGRAM: STREAM

DATE: 12/12478

U. S. FISH AND WILDLIFF SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: . HETTAN CREEK
STREAM CODE: 248.

						STREAM HABITAT INVENTORY																		BARRIER-DIVERSION INVENTORY					
			ACW	FLOW	POOL/	POOL COMPOSITION (PERCENT)					RIFFLE COMPOSITION (PERCENT)						BANK		GRADIENT (PERCENT)			R	BARRIER			DIVERSION		
	RIVER MILE	DATE YR MO DY	EST. FEET	EST. CFS	RIFFLE RATIO	1	2	3	4	5	B	R	G	S-S	O	COVER	STAB. L	R	UP	DN	AV	P	TYPE	HT	PASS /IMP	PIPE SIZE	SCREEN SIZE	FLOW DIVRT
	0.00	78/ 6/23	6	2.0	10/ 90	0	0	0	0	99	5	50	35	10	0	3	3	3	1	1	1.0							
	0.25	78/ 6/23	16	3.0	60/ 40	0	0	0	25	75	5	50	35	10	0	3	3	3	1	1	1.0							
	0.50	78/ 6/23	10	4.0	50/ 50	15	15	25	25	20	15	40	20	10	0	2	2	2	2	2	2.0							
	0.75	78/ 6/23	15	4.0	70/ 30	30	25	25	10	10	25	45	20	10	0	2	2	2	5	9	7.0							
	1.00	78/ 6/23	10	4.0	70/ 30	30	25	25	10	10	25	45	20	10	0	2	1	2	12	8	10.0							
1	1.15	78/ 6/23																				2	2	.8	2			
	1.25	78/ 6/23	10	4.0	60/ 40	20	20	20	20	20	15	45	30	10	0	2	2	2	3	3	3.0							
1	1.35	78/ 6/23																				2	2	5	2			
	1.50	78/ 6/23	10	4.0	70/ 30	40	30	20	5	5	25	40	25	10	0	2	2	2	8	4	6.0							

PROGRAM: STREAM DATE: 12/12/78

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: PECWAN CREEK, EAST FORK
STREAM CODE: 215.

		STREAM HABITAT INVENTORY																				BARRIER-DIVERSION INVENTORY					
					POOL COMPOSITION (PERCENT)					RIFFLE COMPOSITION (PERCENT)						BANK STAB.		GRADIENT (PERCENT)				BARRIER			DIVERSION		
RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	1	2	3	4	5	B	R	G	S-S	O	COVER	L	R	UP	DN	AV	R P	TYPE	HT	PASS /IMP	PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 7/11	20	4.0	60/ 40	10	20	25	25	20	15	40	30	15	0	3	3	2	2	2	2.0							
0.25	78/ 7/11	20	6.0	80/ 20	25	25	30	10	10	55	20	15	10	0	2	2	2	14	6	10.0							
0.50	78/ 7/11	20	6.0	90/ 10	35	30	15	10	10	30	15	40	15	0	2	2	2	14	12	13.3							

PROGRAM: STREAM

DATE: 12/12/78

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: MOREK CREEK
STREAM CODE: 293.

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COVER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	RP	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 6/15	8	3.0	10/ 90	0	0	0	5	95	10	55	25	10	0	3	3	3	5	6	6.0							
0.10	78/ 6/15																				4	1	3	1			
0.25	78/ 6/15	8	4.0	60/ 40	0	10	30	40	20	25	40	25	10	0	2	2	2	5	5	5.0							
0.30	78/ 6/15																				4	4	5	1			
0.45	78/ 6/15																				2	2	40	2			
0.50	78/ 6/15	6	4.0	70/ 30	20	20	40	10	10	25	40	20	15	0	2	2	2	8	16	12.0							
0.60	78/ 6/15																				2	2	6	1			
0.65	78/ 6/15																				4	1	3	1			
0.70	78/ 6/15																				2	1	6	2			
0.75	78/ 6/15	6	4.0	70/ 30	10	20	30	20	20	25	35	30	10	0	1	2	2	12	18	15.0							
0.76	78/ 6/15																				3	1	4	1			
0.77	78/ 6/15																				3	2	8	2			
0.90	78/ 6/15																				3	4	4	1			
0.92	78/ 6/15																				3	4	8	2			
1.00	78/ 6/15																				3	4	4	1			
1.00	78/ 6/15	6	4.0	80/ 20	20	20	40	10	10	25	30	35	10	0	1	2	2	16	12	14.0							

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: ROACH CREEK
STREAM CODE: 261.

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COVER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	RP	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 6/23	15	10.0	20/ 80	0	0	10	20	70	0	50	40	10	0	3	3	3	2	2	2.0							
0.25	78/ 6/23	25	12.0	90/ 10	40	20	10	20	10	40	30	20	10	0	3	1	1	5	5	5.0							
0.35	78/ 6/23																				1	3	10	2			
0.50	78/ 6/23	30	12.0	90/ 10	30	30	20	10	10	50	20	20	10	0	2	2	2	6	4	5.0							
0.75	78/ 6/23	25	12.0	90/ 10	30	30	25	10	5	50	20	20	10	0	2	1	2	4	4	4.0							
1.00	78/ 6/23																				5	4	50	1			
1.00	78/ 6/23	25	12.0	90/ 10	30	30	25	10	5	50	20	20	10	0	2	1	2	10	12	11.0							
1.25	78/ 6/23	20	10.0	60/ 40	20	10	30	20	20	20	40	30	10	0	2	2	2	3	3	3.0							

PROGRAM: STREAM DATE: 12/12/78

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: PINE CREEK
STREAM CODE: 343.

	RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) R	P	G	S-S	O	COV ER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
	0.00	77/ 9/27	20	10.0	80/ 20	0	0	0	50	50	30	30	25	15	0	3	3	3	0	0	0.0							
	0.25	77/ 9/27	40	10.0	80/ 20	0	0	10	50	40	35	30	20	15	0	2	2	2	0	0	0.0							
	0.50	77/ 9/27	20	10.0	80/ 20	10	10	20	40	20	25	25	35	15	0	2	2	2	0	0	0.0							
	0.75	77/ 9/27	30	10.0	80/ 20	20	30	30	10	10	35	30	25	10	0	2	2	2	0	0	0.0							
	1.00	77/ 9/27	40	10.0	80/ 20	20	20	30	20	10	40	25	25	10	0	2	1	1	0	0	0.0							
	1.25	77/ 9/27	25	9.0	50/ 50	0	5	35	30	30	35	30	25	10	0	2	2	2	0	0	0.0							
	1.50	77/ 9/27	30	8.0	50/ 50	10	20	30	20	20	10	30	45	15	0	3	2	1	0	0	0.0							
	1.75	77/ 9/27	20	8.0	80/ 20	10	20	20	30	20	40	25	25	10	0	2	2	2	0	0	0.0							
	2.00	77/ 9/27	20	8.0	50/ 50	0	10	40	30	20	50	20	20	10	0	2	2	3	0	0	0.0							
1	2.25	77/ 9/27																				4	4	30	1			
	2.25	77/ 9/27	15	8.0	80/ 20	40	20	20	10	10	60	15	15	10	0	2	2	2	0	0	0.0							
	2.50	77/ 9/27	25	8.0	70/ 30	20	15	40	15	10	35	30	25	10	0	2	2	1	0	0	0.0							
	2.75	77/ 9/27	30	7.0	40/ 60	0	10	30	40	20	20	35	30	15	0	2	2	2	0	0	0.0							
	3.00	77/ 9/27	15	7.0	80/ 20	20	30	20	20	10	40	20	25	15	0	2	1	2	0	0	0.0							
	3.25	77/ 9/27	25	7.0	80/ 20	10	30	30	20	10	20	25	40	15	0	2	2	2	0	0	0.0							
	3.50	77/ 9/27	12	7.0	90/ 10	30	20	20	20	10	40	25	25	10	0	2	2	2	0	0	0.0							
	3.75	77/ 9/27	20	7.0	50/ 50	10	30	30	20	10	20	20	40	20	0	2	2	2	0	0	0.0							
	4.00	77/ 9/27	35	7.0	50/ 50	0	10	30	40	20	30	40	20	10	0	2	2	2	0	0	0.0							
	4.25	77/ 9/27	30	7.0	50/ 50	10	20	30	20	20	25	20	30	15	10	2	2	3	0	0	0.0							
	4.50	77/ 9/27	45	7.0	80/ 20	0	10	40	30	20	20	40	30	10	0	2	2	2	0	0	0.0							
	4.75	78/10/31	25	0.0	80/ 20	10	60	20	10	0	5	20	50	20	5	2	2	1	1	1	1.0							
	5.00	78/10/31	32	0.0	80/ 20	25	50	15	10	0	15	20	25	35	5	2	1	1	2	2	2.0							
	5.25	78/10/31	32	0.0	60/ 40	25	50	15	10	0	40	25	15	20	0	2	1	1	3	3	3.0							
1	5.30	78/10/31																				4	4	10	1			
1	5.32	78/10/31																				4	1	3	1			
	5.50	78/10/31	20	0.0	50/ 50	40	40	20	0	0	75	15	10	0	0	1	1	1	5	5	5.0							
	5.75	78/10/31	30	0.0	65/ 35	10	40	20	20	10	30	30	20	20	0	2	1	2	1	1	1.0							
	6.00	78/10/31	30	0.0	60/ 40	10	30	20	20	20	25	25	25	25	0	2	1	2	1	1	1.0							
	6.25	78/10/31	30	0.0	45/ 55	10	30	20	20	20	20	30	25	25	0	2	1	1	1	1	1.0							
	6.50	78/10/31	30	0.0	70/ 30	10	40	20	20	10	20	30	25	25	0	2	1	1	1	2	1.5							
	6.75	78/10/31	30	0.0	60/ 40	10	40	20	20	10	20	30	25	25	0	2	1	1	1	2	1.5							
	7.00	78/10/31	30	0.0	50/ 50	0	40	30	20	10	20	30	25	25	0	2	1	1	1	1	1.0							
	7.25	78/10/31	30	0.0	50/ 50	0	40	30	20	10	20	30	25	25	0	2	1	1	1	1	1.0							
	7.50	78/10/31	30	0.0	40/ 60	10	40	20	20	10	25	25	25	25	0	1	2	2	1	1	1.0							
	7.75	78/10/31	30	0.0	55/ 45	10	30	30	20	10	30	25	25	20	0	1	1	1	2	2	2.0							
	8.00	78/10/31	30	0.0	40/ 60	0	10	40	25	25	40	25	20	15	0	1	1	1	2	2	2.0							
1	8.15	78/10/31																				4	2	6	1			
	8.25	78/10/31	30	0.0	40/ 60	0	10	40	25	25	75	5	10	10	0	1	1	1	3	3	3.0							
	8.50	78/10/31	30	0.0	40/ 60	0	10	30	30	30	40	40	10	10	0	1	1	1	1	1	1.0							
1	[illegible]	78/10/31																				4	3	6	1			
1	8.61	78/10/31																				4	3	6	1			
1	8.65	78/10/31																				4	3	8	1			

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: TULLY CREEK
STREAM CODE: 322.

						STREAM HABITAT INVENTORY																		BARRIER-DIVERSION INVENTORY					
	RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) R	B	G	S-S	O	COVER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	RP	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
	0.00	78/ 7/13	25	6.0	10/ 90	0	0	0	0	99	10	45	35	10	0	3	3	3	6	6	6.0							
1	0.12	78/ 7/13																				4	1	8	1			
	0.25	78/ 7/13	20	6.0	70/ 30	10	30	30	15	15	15	25	45	15	0	3	2	2	3	3	3.0							
	0.50	78/ 7/13	15	5.0	80/ 20	25	35	20	10	10	25	25	35	15	0	2	1	2	1	7	4.0							
1	0.72	78/ 7/13																				2	2	16	2			
	0.75	78/ 7/13	25	5.0	70/ 30	15	20	25	20	20	25	15	40	20	0	3	2	2	5	3	4.0							
1	0.80	78/ 7/13																				3	1	5	1			
1	0.85	78/ 7/13																				3	1	6	1			
	1.00	78/ 7/13	15	5.0	70/ 30	15	20	25	20	20	35	20	30	15	0	2	2	2	10	10	10.0							
1	1.04	78/ 7/13																				3	3	8	1			
	1.25	78/ 7/13	10	5.0	80/ 20	40	20	20	10	10	35	20	30	15	0	2	2	2	10	14	12.0							

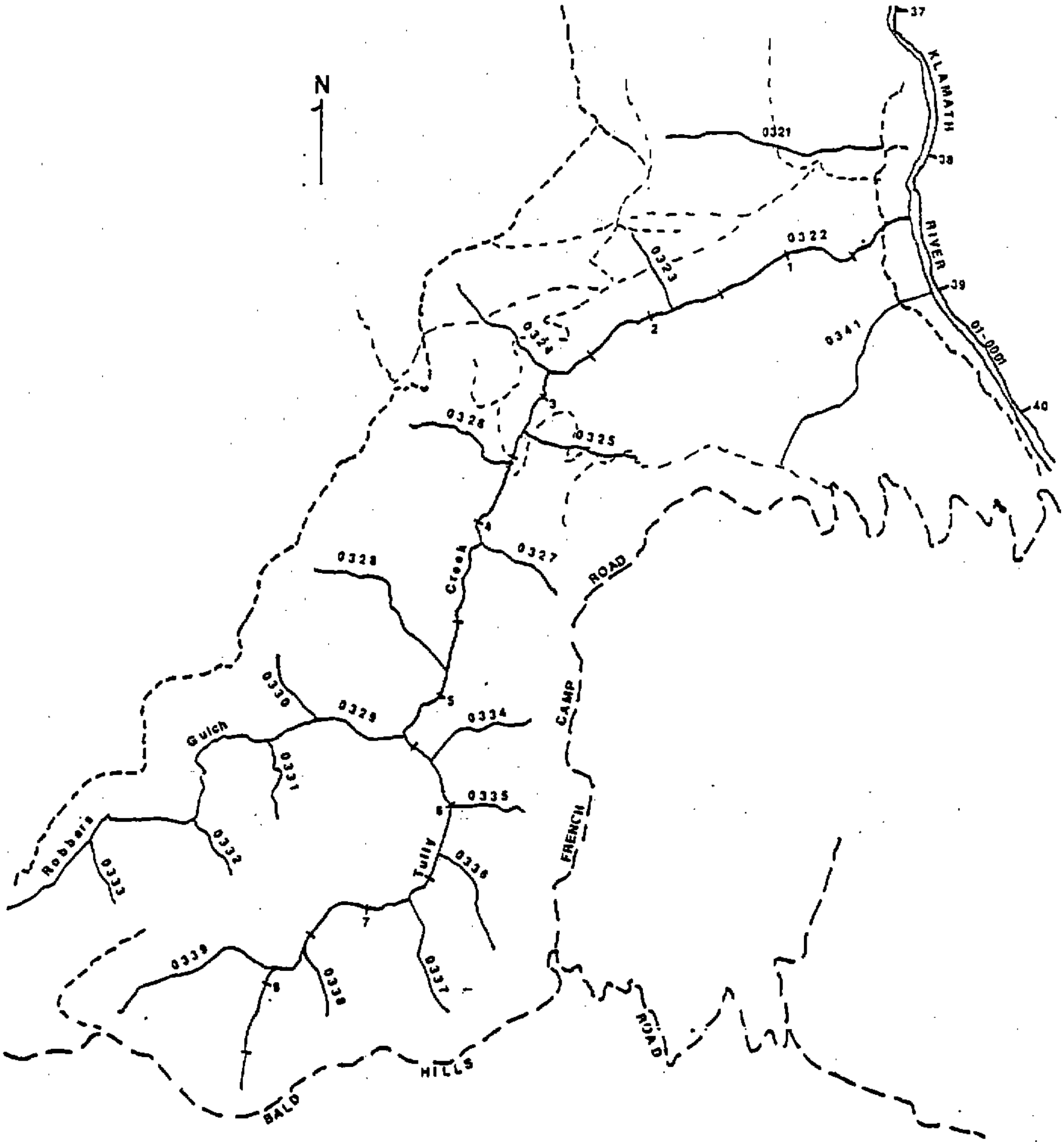
U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION DATA RETRIEVAL

KLAMATH RIVER BASIN

RESULTS FOR: PINE CREEK
STREAM CODE: 343.

	RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) R	R	G	S-S	O	COVER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
	8.75	78/10/31	30	0.0	20/ 80	0	10	40	25	25	75	15	10	0	0	1	1	1	4	4	4.0							
	9.00	78/11/ 6	25	0.0	60/ 40	0	20	20	30	30	10	20	40	25	5	2	2	2	1	1	1.0							
	9.25	78/11/ 6	25	0.0	50/ 50	0	25	20	30	25	10	25	35	30	0	2	2	2	1	1	1.0							
	9.50	78/11/ 6	25	0.0	40/ 60	0	30	20	30	20	0	30	30	35	5	2	2	2	1	1	1.0							
	9.75	78/11/ 6	25	0.0	40/ 60	5	25	25	25	20	5	30	30	30	5	2	2	2	1	1	1.0							
	10.00	78/11/ 6	20	0.0	50/ 50	15	20	20	25	20	10	40	25	25	0	2	2	2	1	1	1.0							
	10.25	78/11/ 6	20	0.0	40/ 60	10	15	20	25	30	10	35	25	30	0	2	2	2	1	1	1.0							
	10.50	78/11/ 6	20	0.0	40/ 60	5	10	20	25	40	10	30	25	35	0	2	2	2	2	2	2.0							
	10.75	78/11/ 6	20	0.0	40/ 60	5	10	20	30	35	15	30	25	30	0	1	2	2	2	2	2.0							
	11.00	78/11/ 6	20	0.0	30/ 70	5	10	25	35	25	20	30	20	25	5	1	2	2	2	2	2.0							
	11.25	78/11/ 6	15	0.0	25/ 75	5	10	15	40	30	25	25	20	25	5	1	2	2	2	2	2.0							
	11.50	78/11/ 6	15	0.0	20/ 80	0	10	10	40	20	40	30	15	10	5	1	2	2	3	3	3.0							
	11.75	78/11/ 6	25	0.0	30/ 70	0	10	20	30	40	20	20	40	20	0	2	1	2	1	1	1.0							
	12.00	78/11/ 6	25	0.0	40/ 60	10	10	20	30	30	30	20	40	10	0	1	1	1	1	1	1.0							
1	12.10	78/11/ 6																				3	2	6	1			
1	12.15	78/11/ 6																				3	2	6	1			
1	12.20	78/11/ 6																				3	2	10	1			
	12.25	78/11/ 6	25	0.0	50/ 50	10	20	40	30	0	50	20	20	10	0	1	1	1	4	3	3.5							
	12.50	78/11/ 6	25	0.0	50/ 50	20	20	20	20	20	50	20	20	10	0	1	2	1	3	3	3.0							
1	12.68	78/11/ 6																				3	2	6	1			
1	12.75	78/11/ 6																				2	1	8	1			
	12.75	78/11/ 6	25	0.0	50/ 50	30	20	20	20	10	35	30	20	15	0	1	1	1	3	2	2.5							
	13.00	78/11/ 6	25	0.0	20/ 80	10	20	20	20	30	15	15	30	30	10	1	1	1	2	2	2.0							
	13.25	78/11/ 6	25	0.0	50/ 50	20	20	20	20	20	40	20	20	20	0	3	3	3	2	2	2.0							
	13.50	78/11/ 6	25	0.0	70/ 30	20	30	40	10	0	60	20	10	10	0	3	3	3	3	2	2.5							
1	13.55	78/11/ 6																				2	1	10	1			
1	13.75	78/11/ 6																				3	2	6	1			
	13.75	78/11/ 6	25	0.0	70/ 30	20	30	40	10	0	50	30	10	10	0	3	3	3	3	3	3.0							
1	13.85	78/11/ 6																				3	2	4	1			



TULLY CREEK 01-0322

U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

TRINITY RIVER BASIN

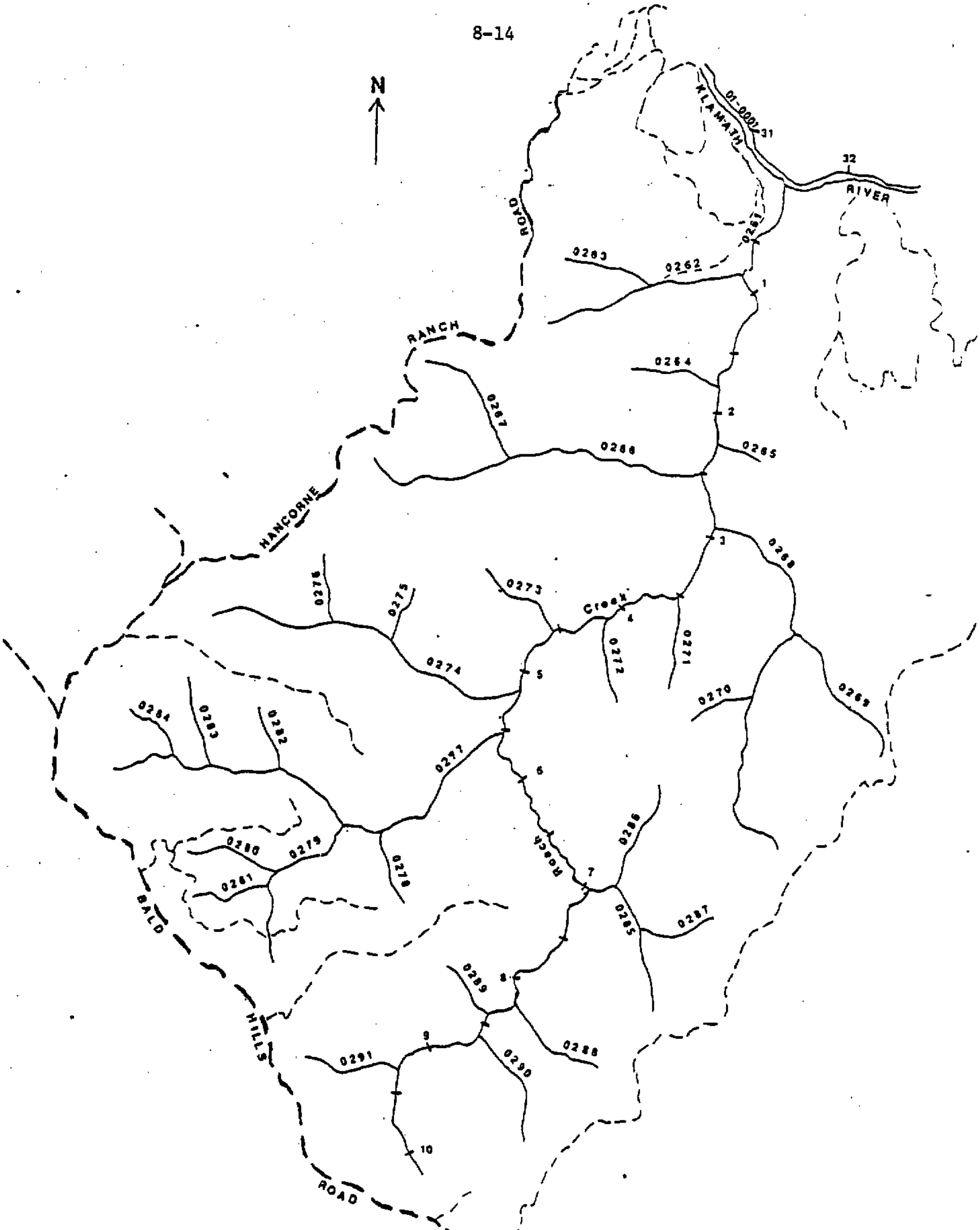
RESULTS FOR: SOCTISH CREEK
STREAM CODE: 19.

STREAM HABITAT INVENTORY

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COV ER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV
0.00	78/ 7/10	15	2.0	20/ 80	0	0	10	45	45	5	50	35	10	0	3	3	3	3	3	3.0
0.25	78/ 7/10	20	2.0	60/ 40	0	0	10	30	60	10	40	40	10	0	3	3	3	1	2	1.5
0.50	78/ 7/10	20	2.0	50/ 50	0	10	20	30	40	20	45	25	10	0	2	2	2	3	3	3.0
0.55	78/ 7/10																			
0.58	78/ 7/10																			
0.75	78/ 7/10	15	5.0	60/ 40	0	15	25	40	20	20	40	30	10	0	2	2	2	2	2	2.0
0.90	78/ 7/10																			
0.92	78/ 7/10																			
1.00	78/ 7/10	10	4.0	70/ 30	20	30	30	10	10	40	30	20	10	0	2	2	2	10	10	10.0
1.20	78/ 7/10																			
1.21	78/ 7/10																			
1.25	78/ 7/10	10	4.0	80/ 20	20	30	30	10	10	40	30	20	10	0	2	2	1	8	6	7.0
1.30	78/ 7/10																			
1.50	78/ 7/10	15	4.0	70/ 30	10	15	15	30	30	10	50	30	10	0	2	2	2	3	2	2.5
1.75	78/ 7/10	10	2.0	40/ 60	0	10	10	35	45	15	45	30	10	0	3	3	2	3	3	3.0
2.00	78/ 7/10	10	2.0	50/ 50	10	10	20	30	30	15	45	30	10	0	3	2	2	3	3	3.0
2.25	78/ 7/10	10	2.0	80/ 20	10	20	30	20	20	25	35	30	10	0	1	2	2	9	9	9.0
2.50	78/ 7/10	8	2.0	80/ 20	10	20	40	20	10	20	40	30	10	0	1	2	2	8	8	8.0
2.75	78/ 7/10	8	2.0	70/ 30	10	20	40	20	10	25	40	25	10	0	2	3	3	12	12	12.0
3.00	78/ 7/10	8	2.0	50/ 50	0	10	25	35	30	25	35	30	10	0	1	2	2	9	9	9.0

BARRIER-DIVERSION INVENTORY

RIVER MILE	B P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00							
0.25							
0.50							
0.55	1				18.00	4.00	2.00
0.58	1				12.00	12.00	1.00
0.75							
0.90	3	2	4	1			
0.92	3	1	3	1			
1.00							
1.20	3	3	3	1			
1.21	3	2	4	1			
1.25							
1.30	2	4	5	2			
1.50							
1.75							
2.00							
2.25							
2.50							
2.75							
3.00							



ROACH CREEK 01-0261

PROGRAM: STREAM

DATE: 12/12/78

U. S. FISH AND WILDLIFE SERVICE

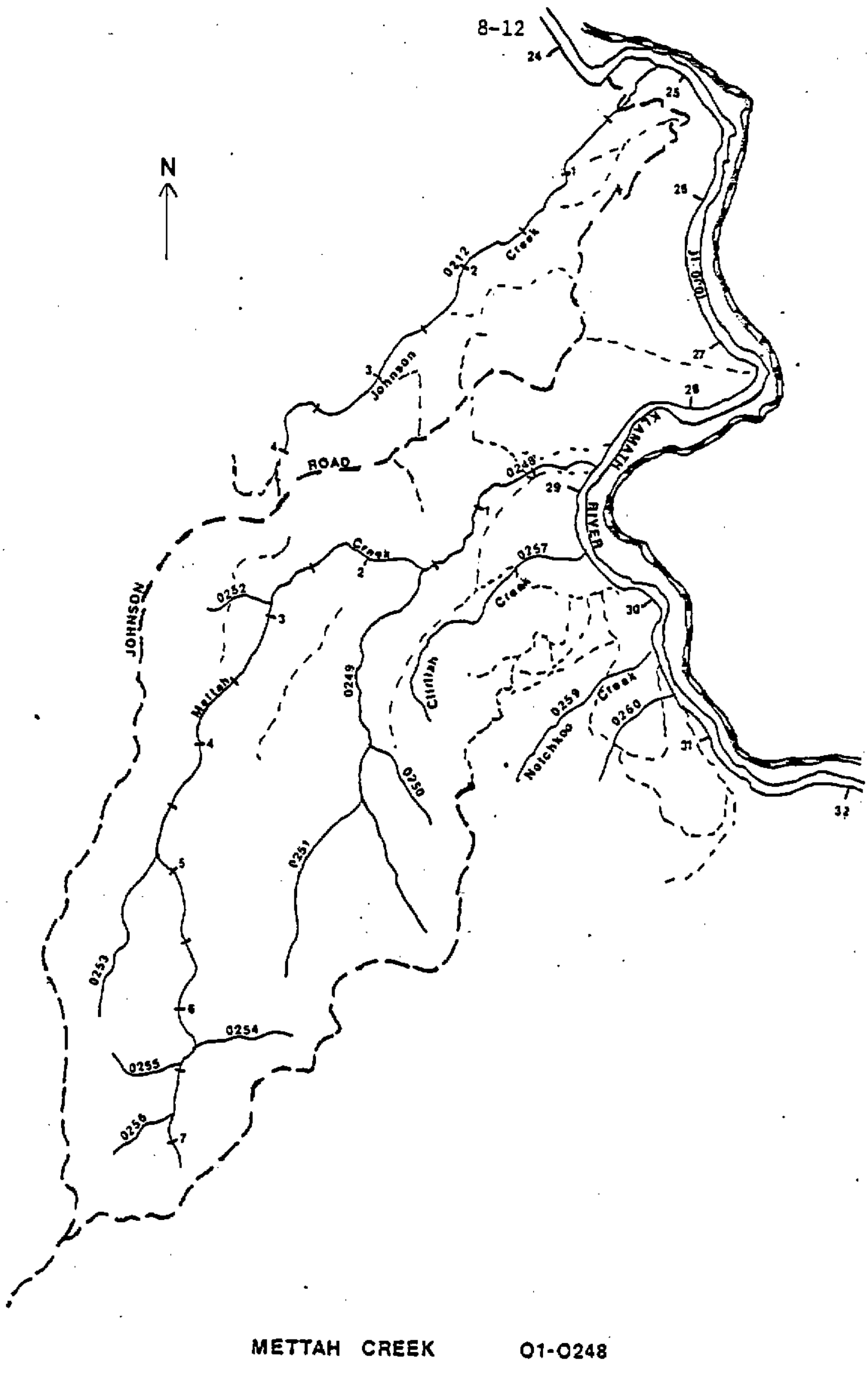
STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

THINITY RIVER BASIN

RESULTS FOR: HOSTLER CREEK
STREAM CODE: 54.

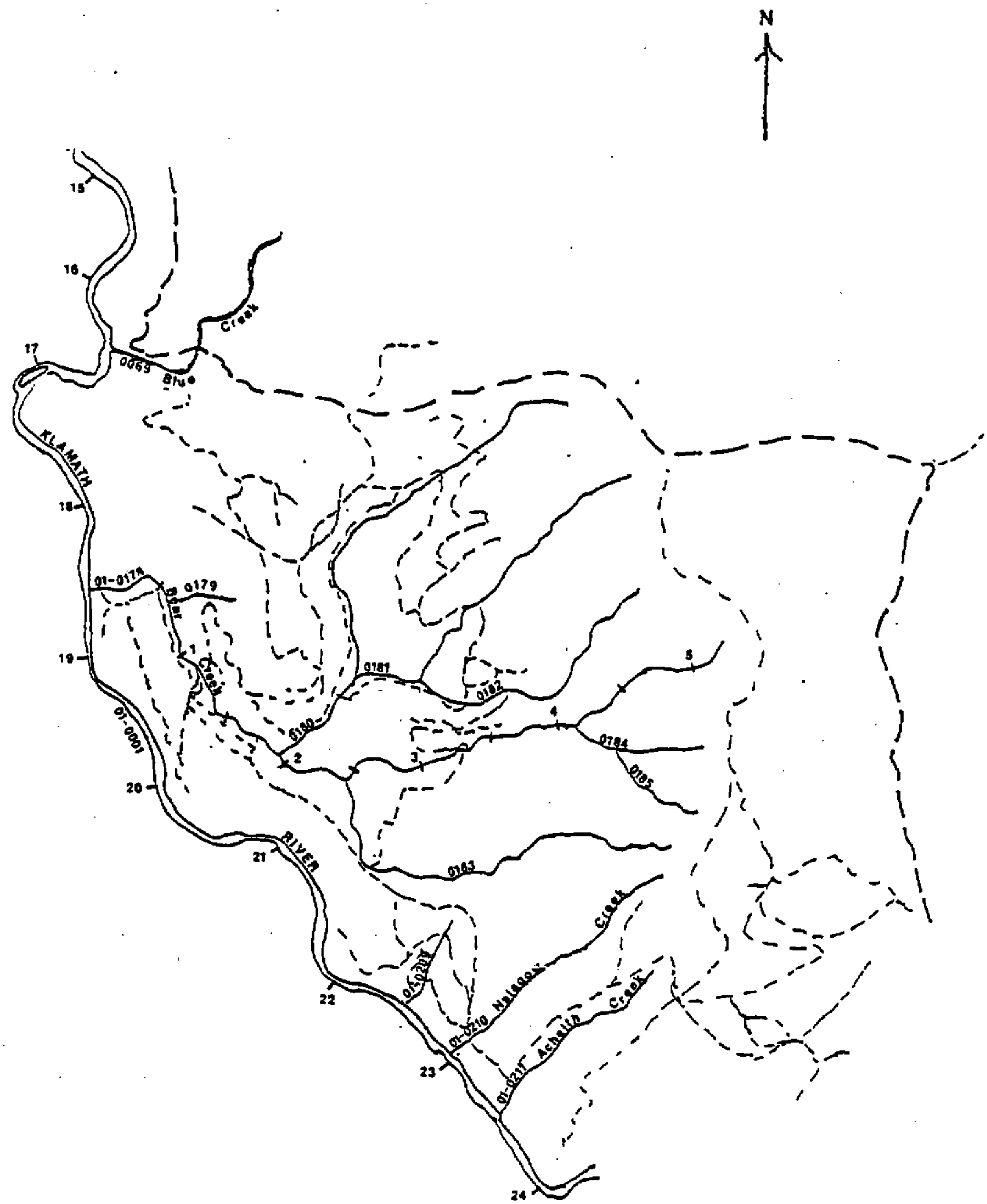
STREAM HABITAT INVENTORY / BARRIER-DIVERSION INVENTORY

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) R	P	G	S-S	BANK COV O	FR	STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	77/ 9/30	5	3.0	10/ 90	0	0	0	10	90	20	40	25	15	0	3	3	3	0	0	0.0							
0.12	77/ 9/30																				4	5	2	1			
0.24	77/ 9/30																				4	5	3	1			
0.25	77/ 9/30	10	3.0	40/ 60	0	10	20	40	30	30	40	20	10	0	1	2	2	0	0	0.0							
0.42	77/ 9/30																				1	5	14	2			
0.43	77/ 9/30																				1				18.00	0.00	1.00
0.50	77/ 9/30	10	4.0	40/ 60	0	0	20	50	30	20	40	30	10	0	2	2	2	0	0	0.0							
0.75	77/ 9/30	15	5.0	60/ 40	0	20	30	30	20	20	30	40	10	0	1	2	2	0	0	0.0							
0.85	77/ 9/30																				5				1.00	0.00	0.01
1.00	77/ 9/30	10	5.0	80/ 20	10	20	40	20	10	30	40	20	10	0	2	2	2	0	0	0.0							
1.20	77/ 9/30																				3	1	3	1			
1.25	77/ 9/30	12	5.0	50/ 50	0	10	20	40	30	30	40	20	10	0	2	2	2	0	0	0.0							
1.50	77/ 9/30	10	5.0	50/ 50	0	20	30	30	20	25	30	30	15	0	1	2	2	0	0	0.0							
1.65	77/ 9/30																				2	2	6	2			
1.75	77/ 9/30	8	5.0	70/ 30	0	10	20	40	30	25	30	30	15	0	2	2	2	0	0	0.0							
2.00	77/ 9/30	10	5.0	80/ 20	10	20	40	20	10	30	40	20	10	0	2	2	2	0	0	0.0							



METTAH CREEK 01-0248

JOHNSON CREEK 01-0212



BEAR CREEK 01-0178

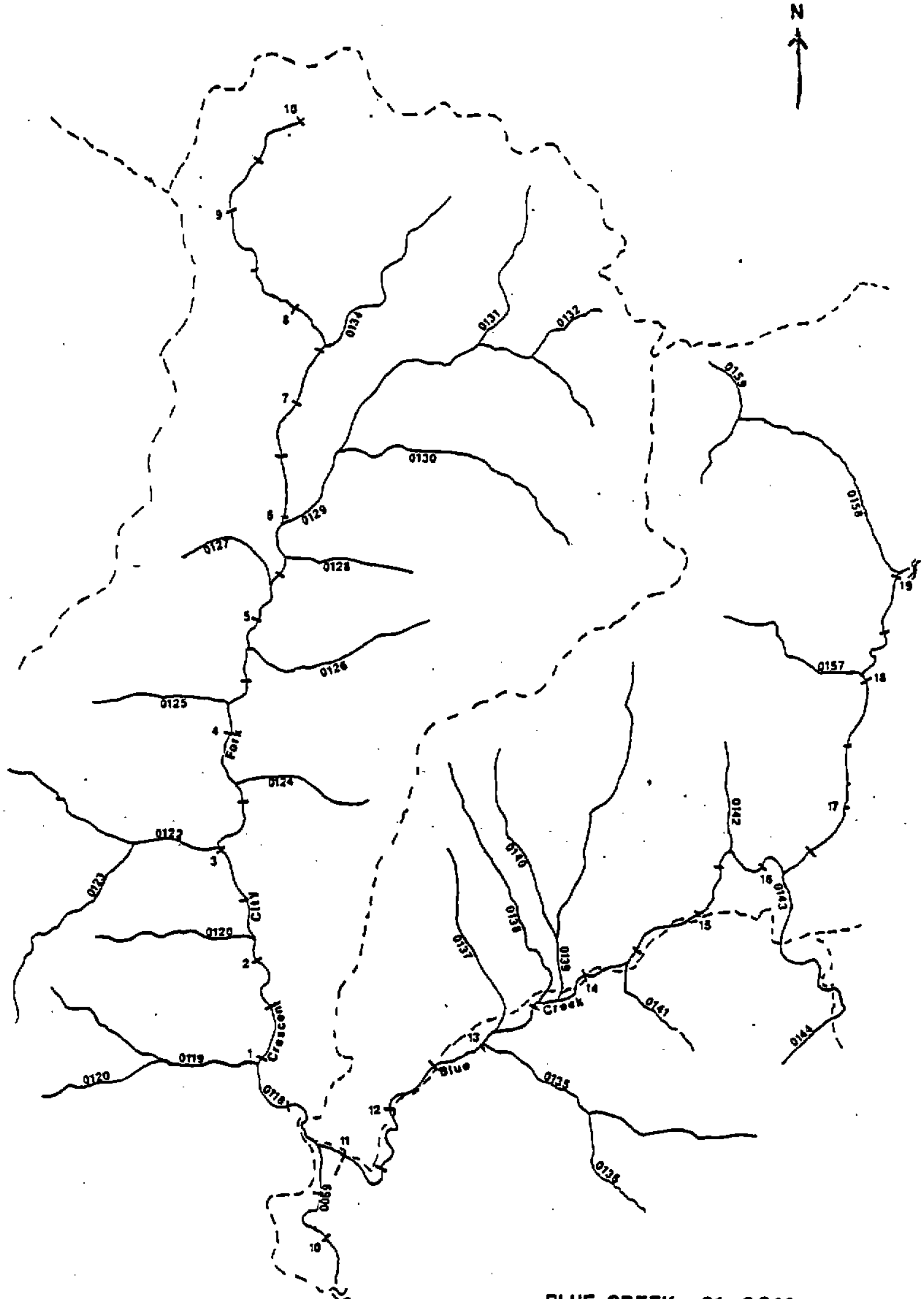
U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

TRINITY RIVER BASIN

RESULTS FOR: HOSPITAL CREEK
STREAM CODE: 72.

					STREAM HABITAT INVENTORY																		BARRIER-DIVERSION INVENTORY					
					POOL COMPOSITION (PERCENT)					RIFFLE COMPOSITION (PERCENT)						BANK STAB.		GRADIENT (PERCENT)				BARRIER			DIVERSION		
RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	1	2	3	4	5	B	R	G	S-S	O	COV ER	L	R	UP	DN	AV	R P	TYPE	HT	PASS /IMP	PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	77/ 9/ 9	6	0.0	5/ 95	0	0	0	5	95	10	40	35	15	0	3	3	3	0	0	0.0							
0.25	77/ 9/ 9	12	0.0	5/ 95	0	0	0	5	95	10	40	35	15	0	2	2	2	0	0	0.0							
0.50	77/ 9/ 9	6	0.0	20/ 80	0	0	10	45	45	15	40	30	15	0	2	2	2	0	0	0.0							
0.51	77/ 9/ 9																				4	5	3	1			
0.75	77/ 9/ 9	6	1.0	20/ 80	0	0	10	45	45	15	40	30	15	0	2	2	2	0	0	0.0							
0.85	77/ 9/ 9																				3	1	3	1			
1.00	77/ 9/ 9	4	1.0	50/ 50	0	10	20	35	35	25	40	25	10	0	1	1	1	0	0	0.0							
1.05	77/ 9/ 9																				4	2	7	2			
1.15	77/ 9/ 9																				5	4	50	2			
1.25	77/ 9/ 9	4	1.0	70/ 30	0	10	20	35	35	25	35	30	10	0	1	2	2	0	0	0.0							
1.50	77/ 9/ 9																				5	7	0	2			
1.50	77/ 9/ 9	12	0.0	5/ 95	0	0	0	5	95	10	40	35	15	0	2	2	2	0	0	0.0							



BLUE CREEK 01-0069

CRESCENT CITY FORK

PROGRAM: STREAM

DATE: 12/12/78

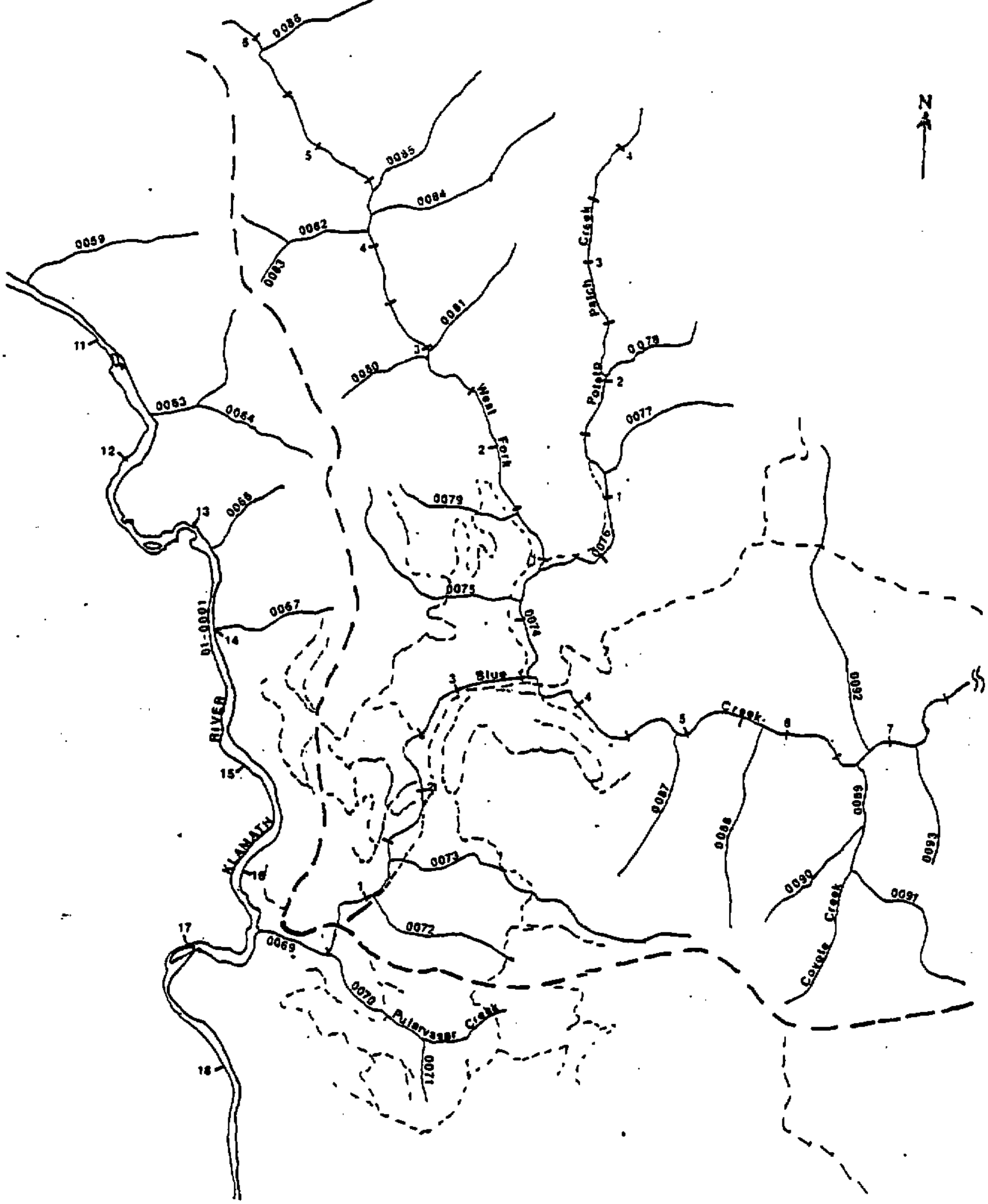
U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

TRINITY RIVER BASIN

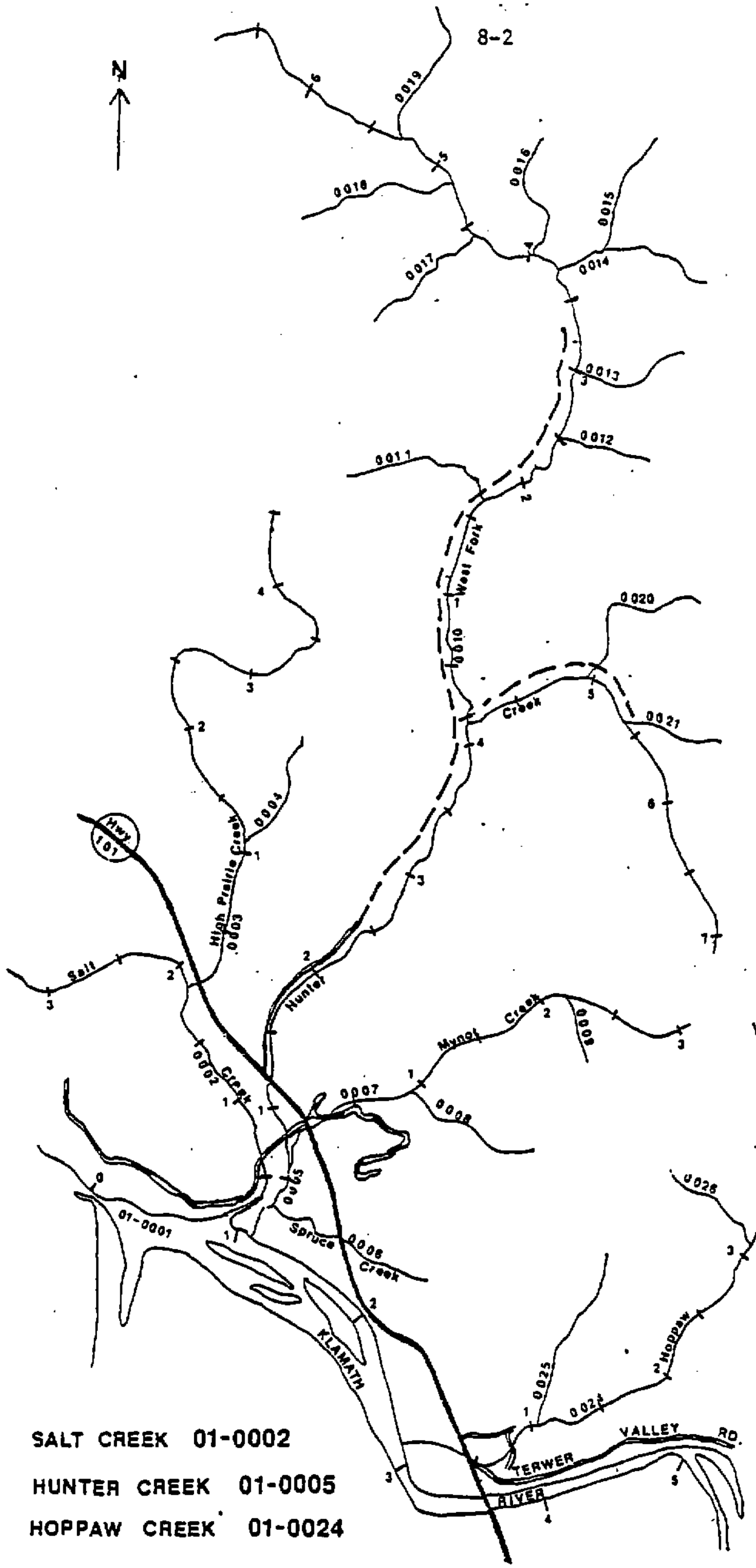
RESULTS FOR: TISH TANG A TANG CREEK
STREAM CODE: 77.

					STREAM HABITAT INVENTORY																	BARRIER-DIVERSION INVENTORY					
RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) R	R	G	S-S	O	COV ER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	77/10/20	30	12.0	10/ 90	0	0	0	5	95	20	40	20	20	0	3	3	3	6	0	3.0							
0.25	77/10/20	27	12.0	30/ 70	20	20	20	20	20	20	30	30	20	0	2	2	3	5	1	3.0							
0.40	77/10/20																				3	1	6	1			
0.50	77/10/20	25	12.0	10/ 90	0	0	10	10	80	25	30	30	15	0	2	2	2	2	2	2.0							
0.75	77/10/20	30	12.0	10/ 90	0	0	10	20	70	10	40	30	20	0	2	2	2	1	1	1.0							
1.00	77/10/20	27	12.0	30/ 70	10	10	10	30	40	30	30	20	20	0	2	2	1	1	5	3.0							
1.25	77/10/20	30	12.0	20/ 80	0	0	10	30	60	20	40	25	15	0	2	2	2	2	2	2.0							
1.50	77/10/20	27	12.0	30/ 70	0	20	20	30	30	20	35	25	20	0	2	2	2	3	2	2.5							
1.75	77/10/20	30	12.0	40/ 60	0	30	30	20	10	30	40	15	15	0	2	2	2	5	2	3.5							
2.00	77/10/20	30	12.0	40/ 60	0	20	40	20	20	30	40	15	15	0	2	2	2	3	2	2.5							
2.25	77/10/20	25	12.0	80/ 20	40	30	10	10	10	30	30	20	20	0	2	1	1	4	3	3.5							
2.35	77/10/20																				3	1	12	1			
2.50	77/10/20	25	12.0	80/ 20	10	40	30	10	10	40	30	20	10	0	2	1	1	3	3	3.0							
2.75	77/10/20	30	12.0	70/ 30	30	30	20	10	10	20	40	20	20	0	2	1	1	3	3	3.0							
2.80	77/10/20																				5	3	40	2			



BLUE CREEK 01-0069

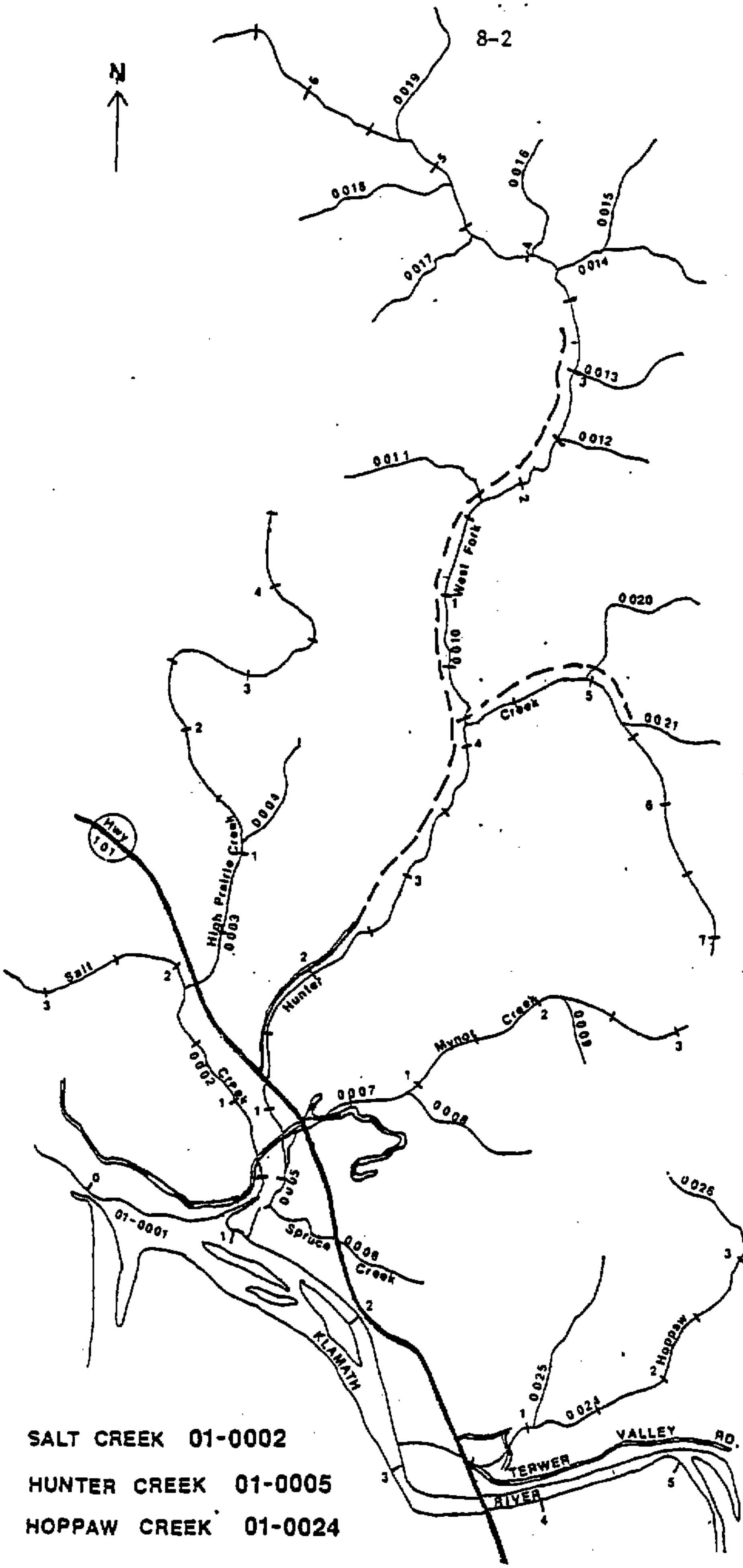
LOWER SECTION



SALT CREEK 01-0002

HUNTER CREEK 01-0005

HOPPAW CREEK 01-0024



SALT CREEK 01-0002

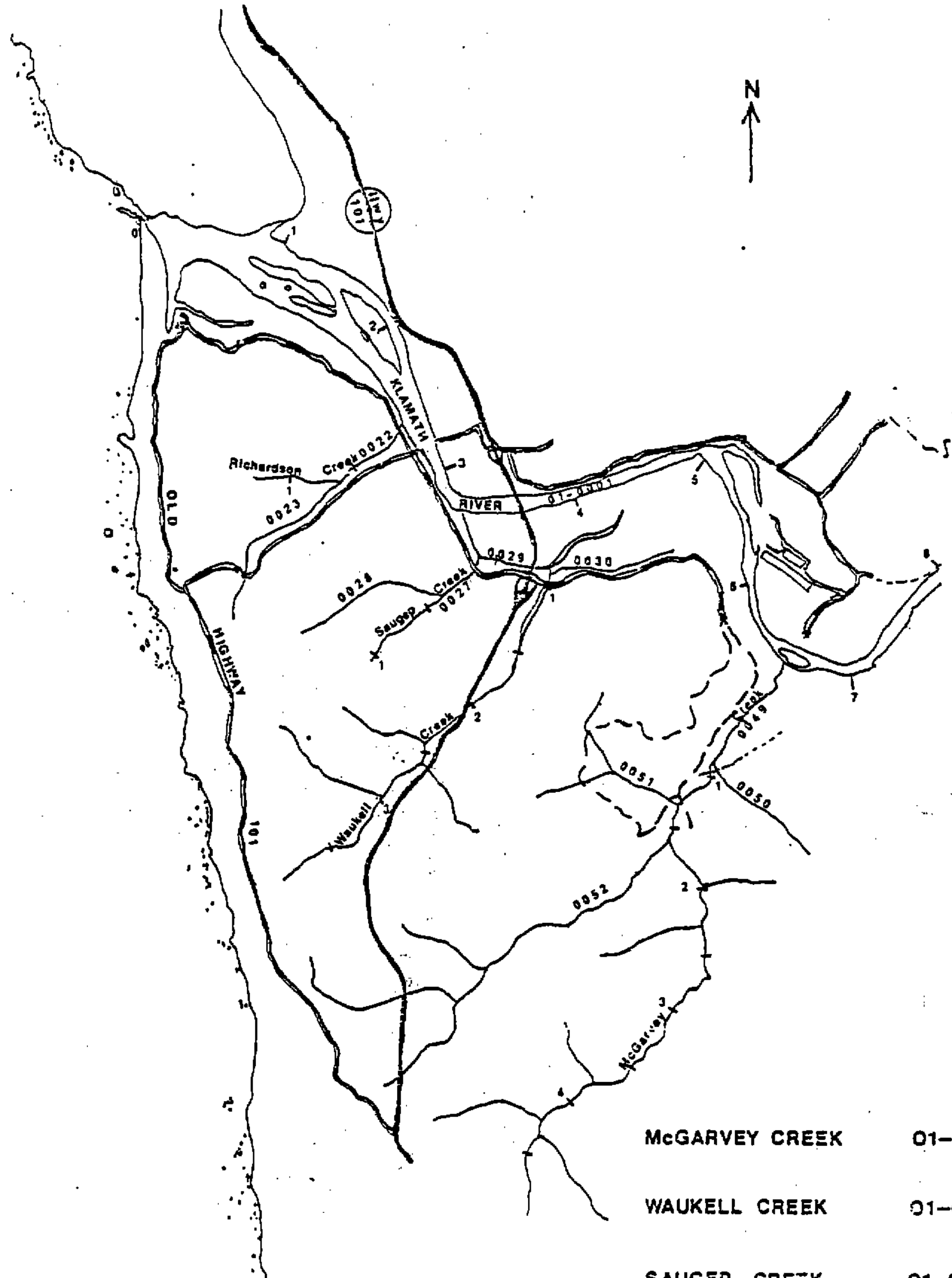
HUNTER CREEK 01-0005

HOPPAW CREEK 01-0024

U. S. FISH AND WILDLIFE SERVICE

BARRIER-DIVERSION STREAM IMPROVEMENT
DATA RETRIEVAL

RIVER MILES	SURVEY DATE YR MO DY	REMOVAL PRIORITY	BARRIER TYPE	HEIGHT (FEET)	PASSABLE	CORRECTION DATE YR MO DY	RIVER MILES OPENED	EFFORT MAN-DAYS	CORRECTION METHODS 1	2	3	AGENCIES INVOLVED 1	2	3
TRINITY RIVER BASIN														
SUPPLY CREEK														
0.27	77/ 9/22	HELPFUL	DAM	3	YES	77/12/15	0.00	0	NATURE					
0.85	77/ 9/22	HELPFUL	DAM	2	YES	77/12/15	0.00	0	NATURE					
2.20	77/ 9/22	DESIRABLE	LOGS	2	YES	77/12/15	0.00	0	NATURE					
3.00	77/ 9/22	CRITICAL	LOG-ROCK	7	NO	77/12/15	0.70	0	NATURE					
3.00	78/ 6/26	DESIRABLE	LOG-ROCK	4	YES	78/ 9/25	0.00	6	HAND			USFWS		

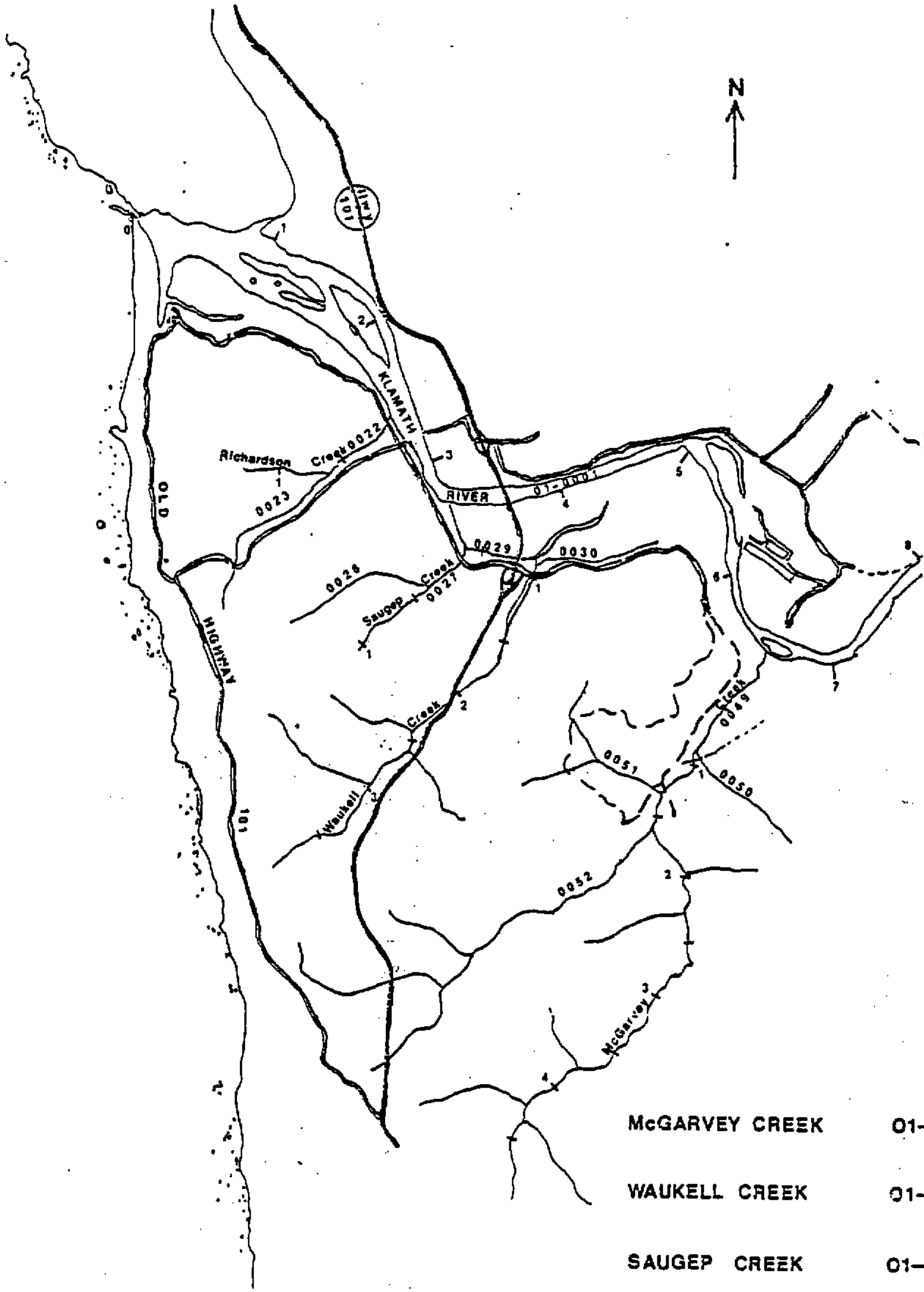


McGARVEY CREEK 01-0049

WAUKELL CREEK 01-0029

SAUGEP CREEK 01-0027

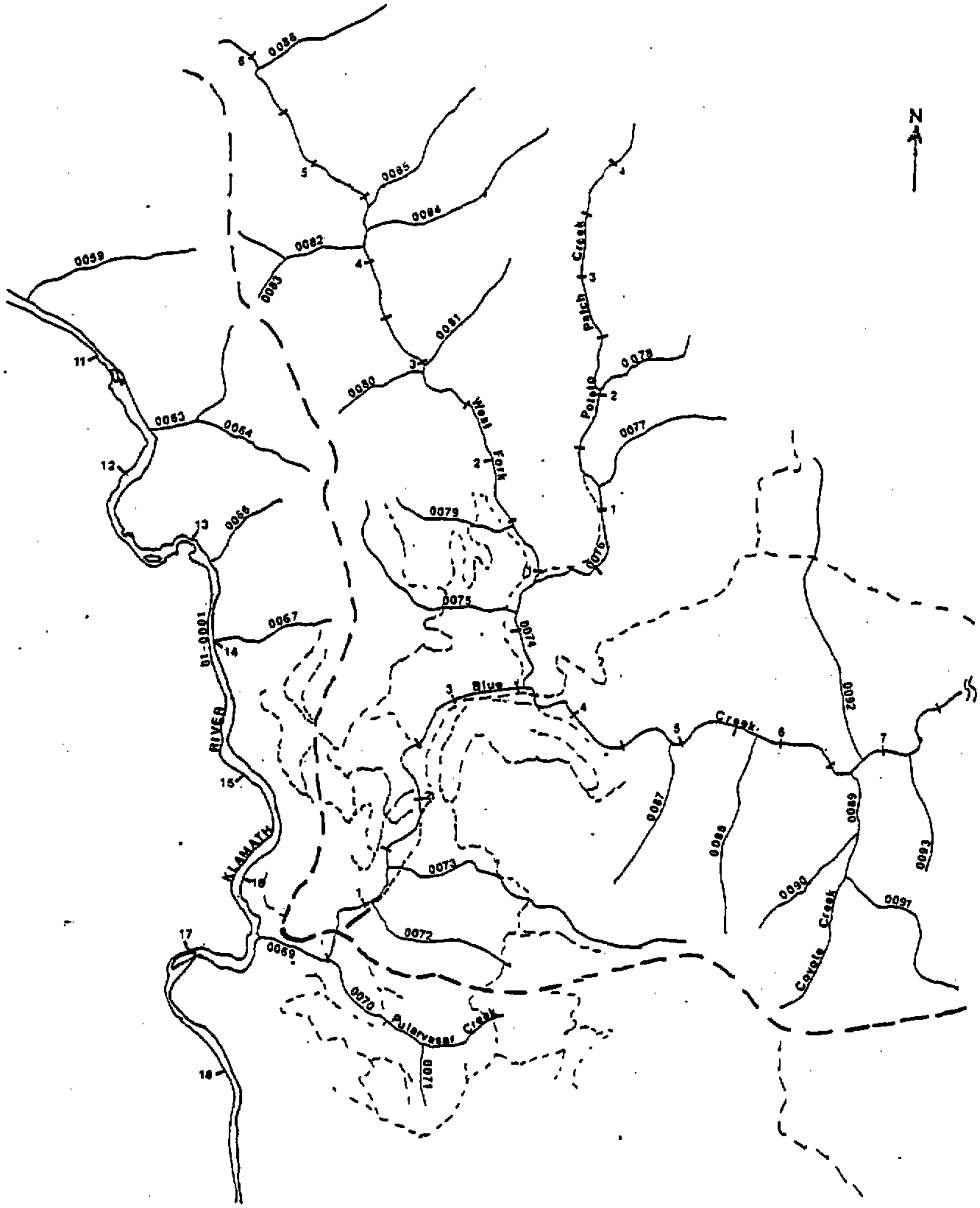
RICHARDSON CREEK 01-0022



McGARVEY CREEK	01-0049
WAUKELL CREEK	01-0029
SAUGEP CREEK	01-0027
RICHARDSON CREEK	01-0022

BARRIER-DIVERSION STREAM IMPROVEMENT
DATA RETRIEVAL

RIVER MILES	SURVEY DATE YR MO DY	REMOVAL PRIORITY	BARRIER TYPE	HEIGHT (FEET)	PASSABLE	CORRECTION DATE YR MO DY	RIVER MILES OPENED	EFFORT MAN-DAYS	CORRECTION METHODS 1	CORRECTION METHODS 2	CORRECTION METHODS 3	AGENCIES INVOLVED 1	AGENCIES INVOLVED 2	AGENCIES INVOLVED 3
TRINITY RIVER BASIN														
SUPPLY CREEK														
0.27	77/ 9/22	HELPFUL	DAM	3	YES	77/12/15	0.00	0	NATURE					
0.85	77/ 9/22	HELPFUL	DAM	2	YES	77/12/15	0.00	0	NATURE					
2.20	77/ 9/22	DESIRABLE	LOGS	2	YES	77/12/15	0.00	0	NATURE					
3.00	77/ 9/22	CRITICAL	LOG-ROCK	7	NO	77/12/15	0.70	0	NATURE					
3.00	78/ 6/26	DESIRABLE	LOG-ROCK	4	YES	78/ 9/25	0.00	6	HAND			USFWS		



BLUE CREEK 01-0069

LOWER SECTION

ROGRAM: STREAM

U. S. FISH AND WILDLIFE SERVICE

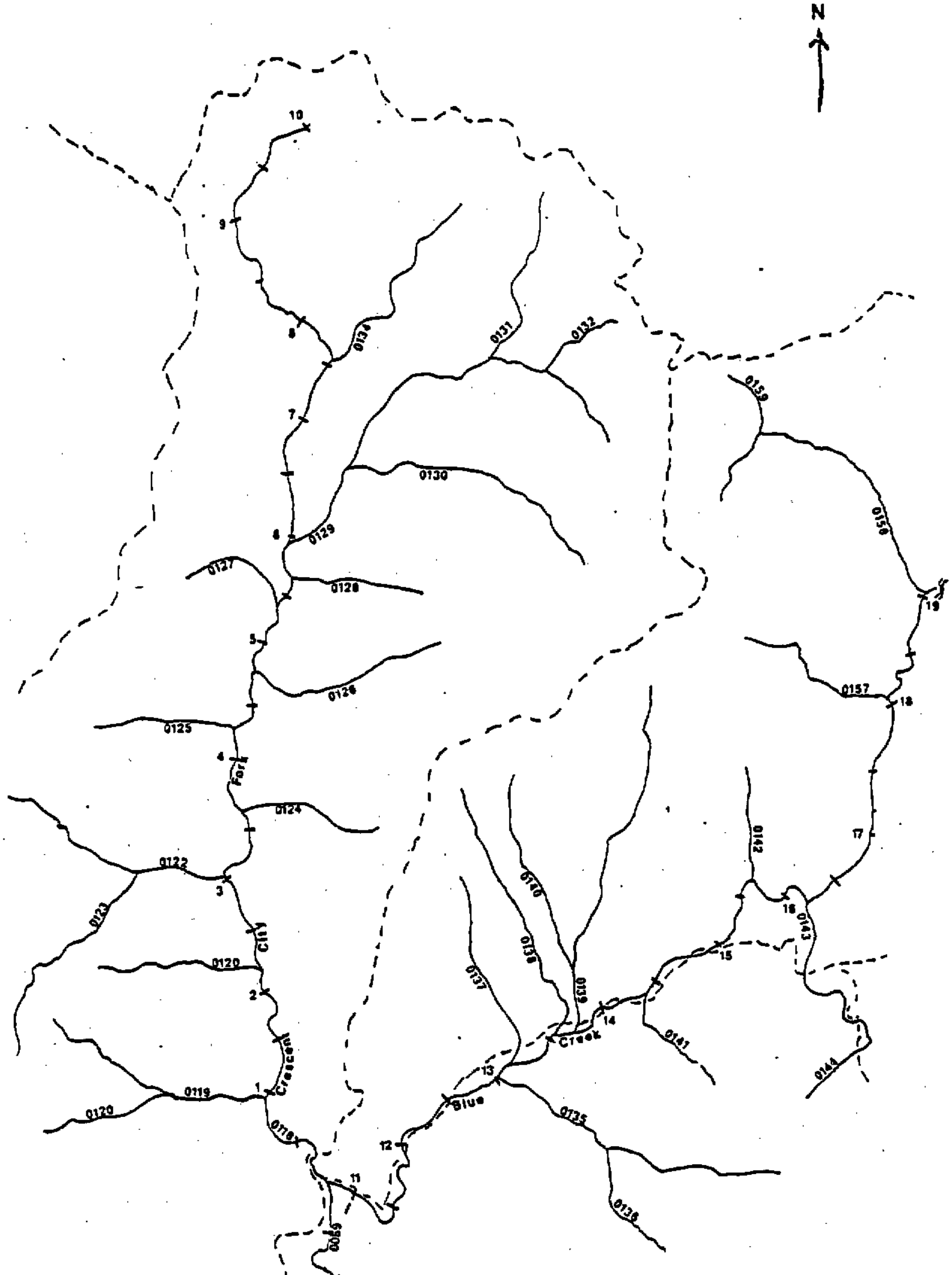
DATE: 12/12/78

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

RINITY RIVER BASIN

ESULTS FOR: TISH TANG A TANG CREEK
STREAM CODE: 77.

					STREAM HABITAT INVENTORY																	BARRIER-DIVERSION INVENTORY						
					POOL COMPOSITION (PERCENT)					RIFFLE COMPOSITION (PERCENT)					BANK			GRADIENT (PERCENT)				BARRIER			DIVERSION			
RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	1	2	3	4	5	R	R	G	S-S	O	COVER	STAB. L	R	UP	DN	AV	R P	TYPE	HT	PASS /IMP	PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	77/10/20	30	12.0	10/ 90	0	0	0	5	95	20	40	20	20	0	3	3	3	6	0	3.0							
0.25	77/10/20	27	12.0	30/ 70	20	20	20	20	20	20	30	30	20	0	2	2	3	5	1	3.0							
0.40.	77/10/20																				3	1	6	1			*
0.50	77/10/20	25	12.0	10/ 90	0	0	10	10	80	25	30	30	15	0	2	2	2	2	2	2.0							
0.75	77/10/20	30	12.0	10/ 90	0	0	10	20	70	10	40	30	20	0	2	2	2	1	1	1.0							
1.00	77/10/20	27	12.0	30/ 70	10	10	10	30	40	30	30	20	20	0	2	2	1	1	5	3.0							
1.25	77/10/20	30	12.0	20/ 80	0	0	10	30	60	20	40	25	15	0	2	2	2	2	2	2.0							
1.50	77/10/20	27	12.0	30/ 70	0	20	20	30	30	20	35	25	20	0	2	2	2	3	2	2.5							
1.75	77/10/20	30	12.0	40/ 60	0	30	30	20	10	30	40	15	15	0	2	2	2	5	2	3.5							
2.00	77/10/20	30	12.0	40/ 60	0	20	40	20	20	30	40	15	15	0	2	2	2	3	2	2.5							
2.25	77/10/20	25	12.0	80/ 20	40	30	10	10	10	30	30	20	20	0	2	1	1	4	3	3.5							
2.35	77/10/20																				3	1	12	1			
2.50	77/10/20	25	12.0	80/ 20	10	40	30	10	10	40	30	20	10	0	2	1	1	3	3	3.0							
2.75	77/10/20	30	12.0	70/ 30	30	30	20	10	10	20	40	20	20	0	2	1	1	3	3	3.0							
2.80	77/10/20																				5	3	40	2			



BLUE CREEK 01 - 0069

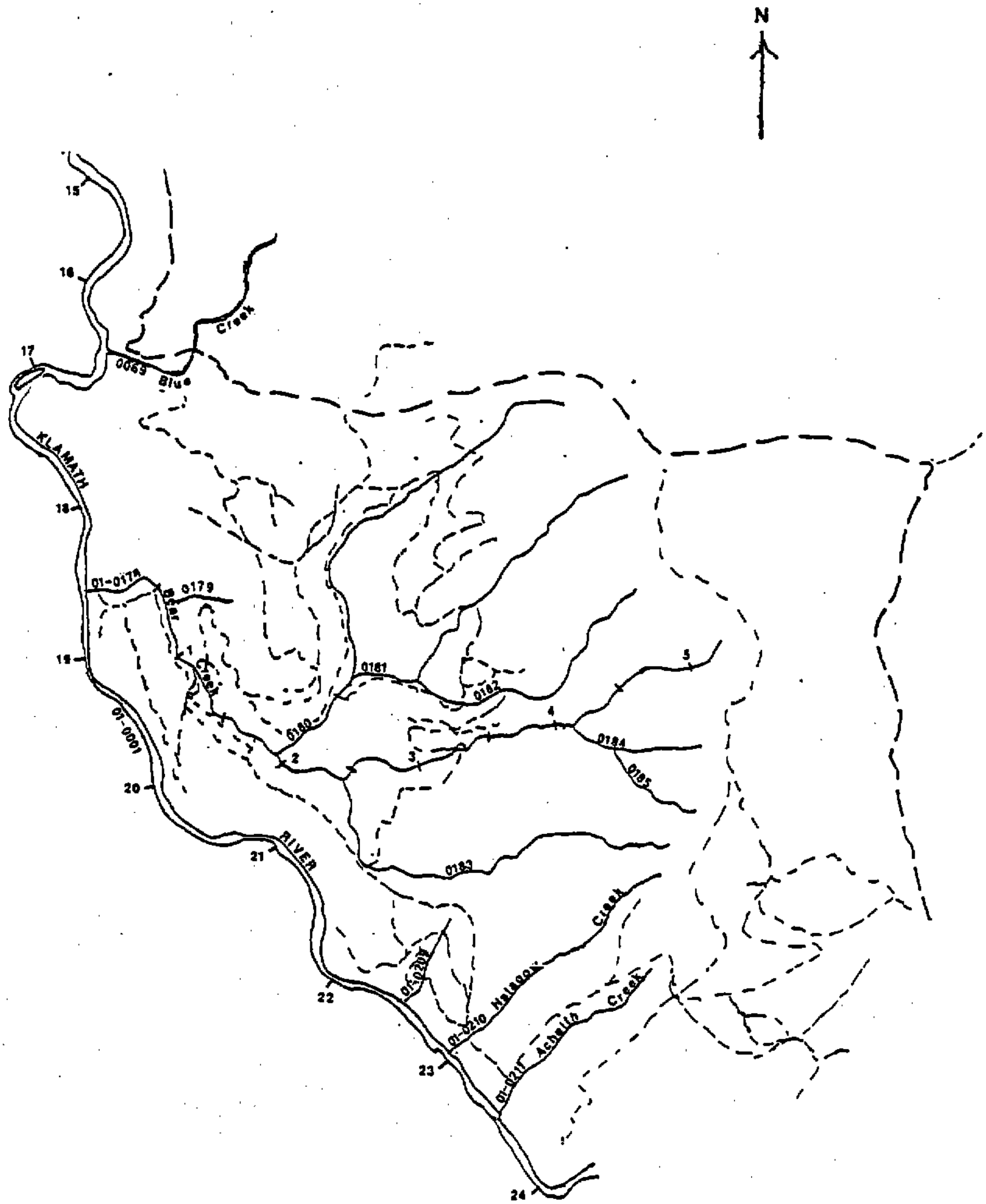
CRESCENT CITY FORK

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

TRINITY RIVER BASIN

RESULTS FOR: HOSPITAL CREEK
STREAM CODE: 72.

					STREAM HABITAT INVENTORY																		BARRIER-DIVERSION INVENTORY					
RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COV ER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	77/ 9/ 9	6	0.0	5/ 95	0	0	0	5	95	10	40	35	15	0	3	3	3	0	0	0.0							
0.25	77/ 9/ 9	12	0.0	5/ 95	0	0	0	5	95	10	40	35	15	0	2	2	2	0	0	0.0							
0.50	77/ 9/ 9	6	0.0	20/ 80	0	0	10	45	45	15	40	30	15	0	2	2	2	0	0	0.0							
0.51	77/ 9/ 9																				4	5	3	1			
0.75	77/ 9/ 9	6	1.0	20/ 80	0	0	10	45	45	15	40	30	15	0	2	2	2	0	0	0.0							
0.85	77/ 9/ 9																				3	1	3	1			
1.00	77/ 9/ 9	4	1.0	50/ 50	0	10	20	35	35	25	40	25	10	0	1	1	1	0	0	0.0							
1.05	77/ 9/ 9																										
1.15	77/ 9/ 9																				4	2	7	2			
1.25	77/ 9/ 9	4	1.0	70/ 30	0	10	20	35	35	25	35	30	10	0	1	2	2	0	0	0.0	5	4	50	2			
1.50	77/ 9/ 9																				5	7	0	2			
1.50	77/ 9/ 9	12	0.0	5/ 95	0	0	0	5	95	10	40	35	15	0	2	2	2	0	0	0.0							



BEAR CREEK 01-0178

PROGRAM: STREAM

U. S. FISH AND WILDLIFE SERVICE

DATE: 12/12/78

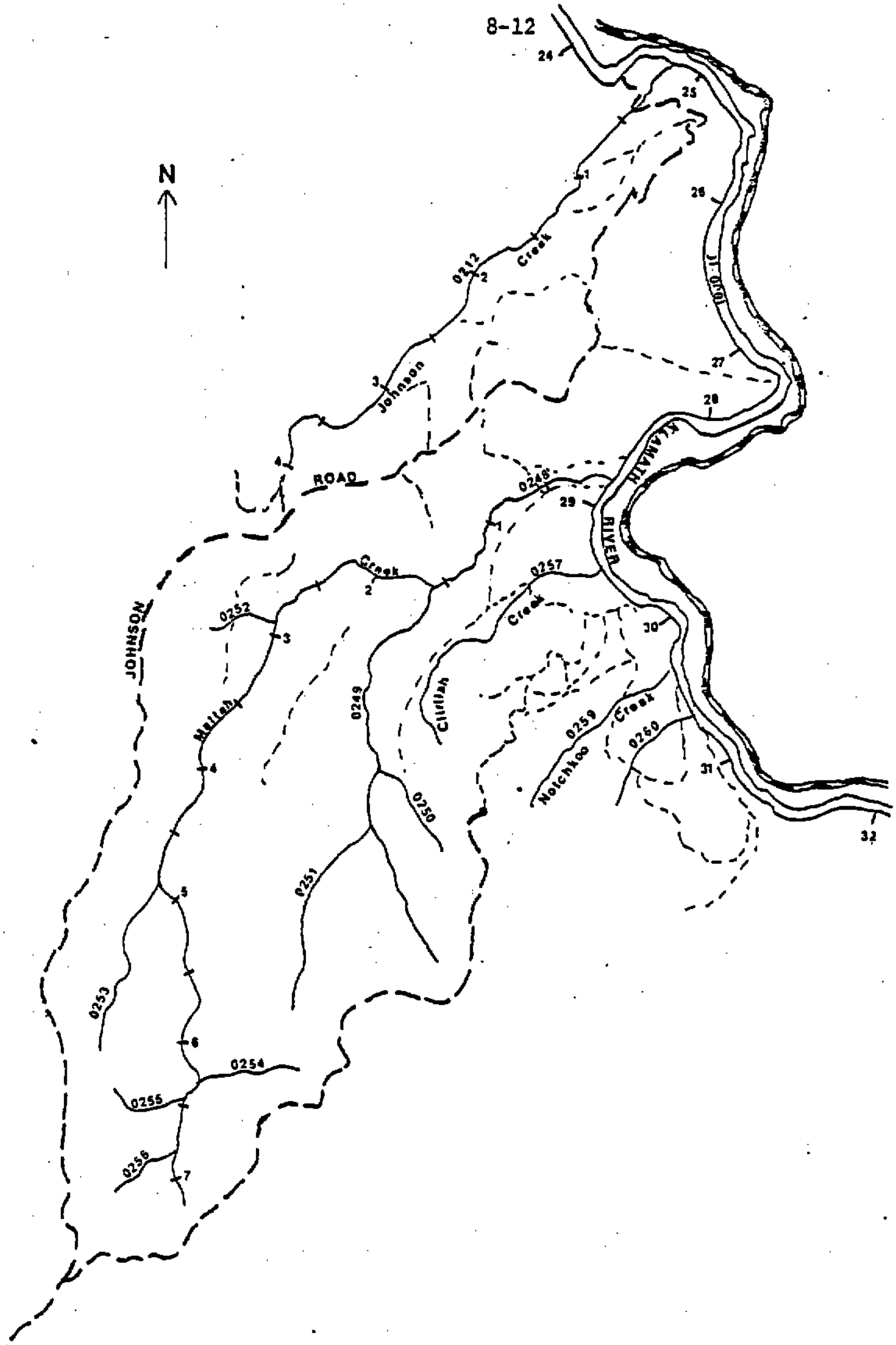
STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

TRINITY RIVER BASIN

RESULTS FOR: HOSTLER CREEK
STREAM CODE: 54.

STREAM HABITAT INVENTORY — BARRIER-DIVERSION INVENTORY

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	BANK COV FR	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	RP	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	77/ 9/30	5	3.0	10/ 90	0	0	0	10	90	20	40	25	15	0	3	3	3	0	0	0.0							
0.12	77/ 9/30																				4	5	2	1			
0.24	77/ 9/30																				4	5	3	1			
0.25	77/ 9/30	10	3.0	40/ 60	0	10	20	40	30	30	40	20	10	0	1	2	2	0	0	0.0							
0.42	77/ 9/30																				1	5	14	2			
0.43	77/ 9/30																				1				18.00	0.00	1.00
0.50	77/ 9/30	10	4.0	40/ 60	0	0	20	50	30	20	40	30	10	0	2	2	2	0	0	0.0							
0.75	77/ 9/30	15	5.0	60/ 40	0	20	30	30	20	20	30	40	10	0	1	2	2	0	0	0.0							
0.85	77/ 9/30																				5				1.00	0.00	0.01
1.00	77/ 9/30	10	5.0	80/ 20	10	20	40	20	10	30	40	20	10	0	2	2	2	0	0	0.0							
1.20	77/ 9/30																				3	1	3	1			
1.25	77/ 9/30	12	5.0	50/ 50	0	10	20	40	30	30	40	20	10	0	2	2	2	0	0	0.0							
1.50	77/ 9/30	10	5.0	50/ 50	0	20	30	30	20	25	30	30	15	0	1	2	2	0	0	0.0							
1.65	77/ 9/30																				2	2	6	2			
1.75	77/ 9/30	8	5.0	70/ 30	0	10	20	40	30	25	30	30	15	0	2	2	2	0	0	0.0							
2.00	77/ 9/30	10	5.0	80/ 20	10	20	40	20	10	30	40	20	10	0	2	2	2	0	0	0.0							



METTAH CREEK 01-0248

JOHNSON CREEK 01-0212

OGRAM: STREAM

DATE: 12/12/78

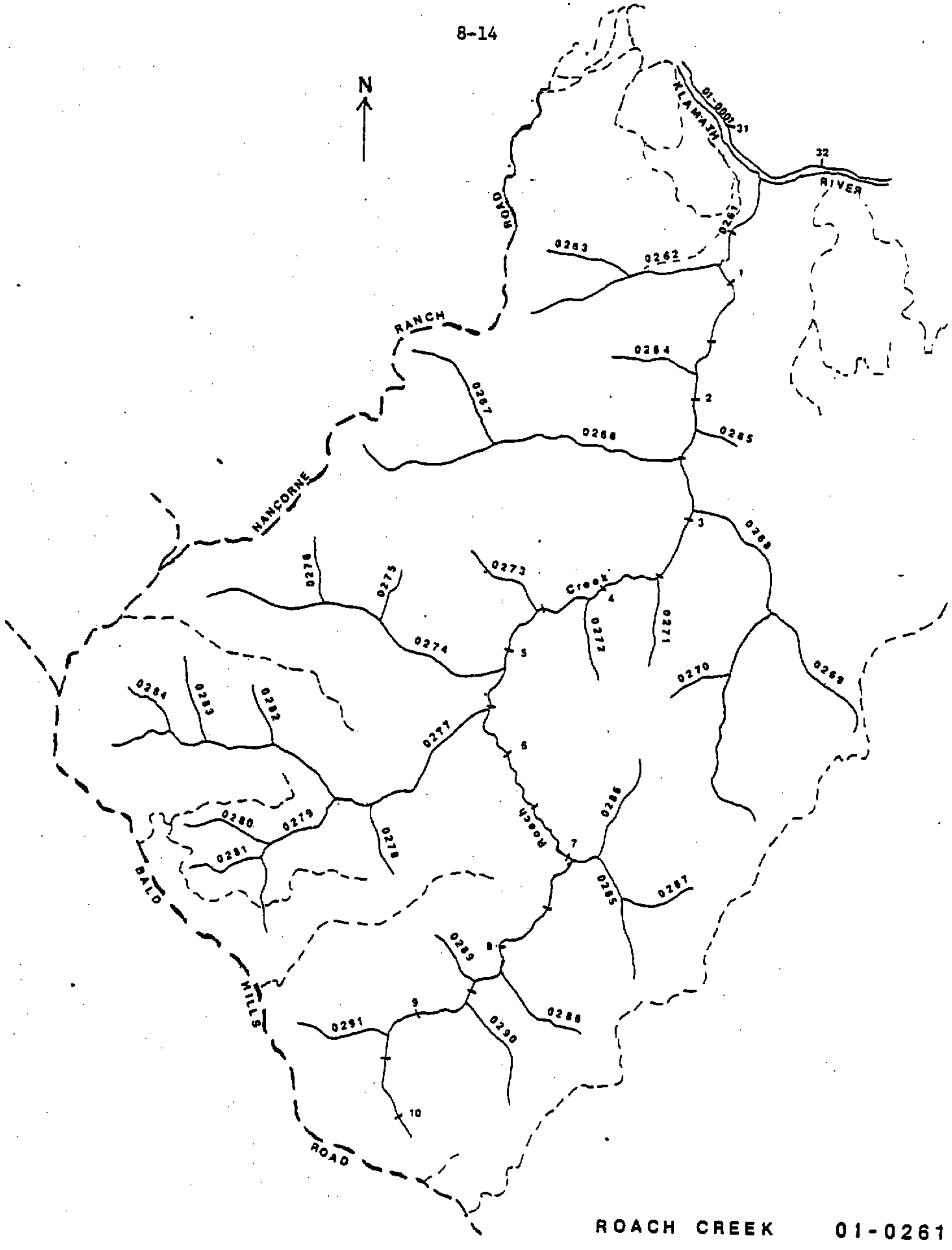
U. S. FISH AND WILDLIFE SERVICE

STREAM HABITAT AND BARRIER DIVERSION
DATA RETRIEVAL

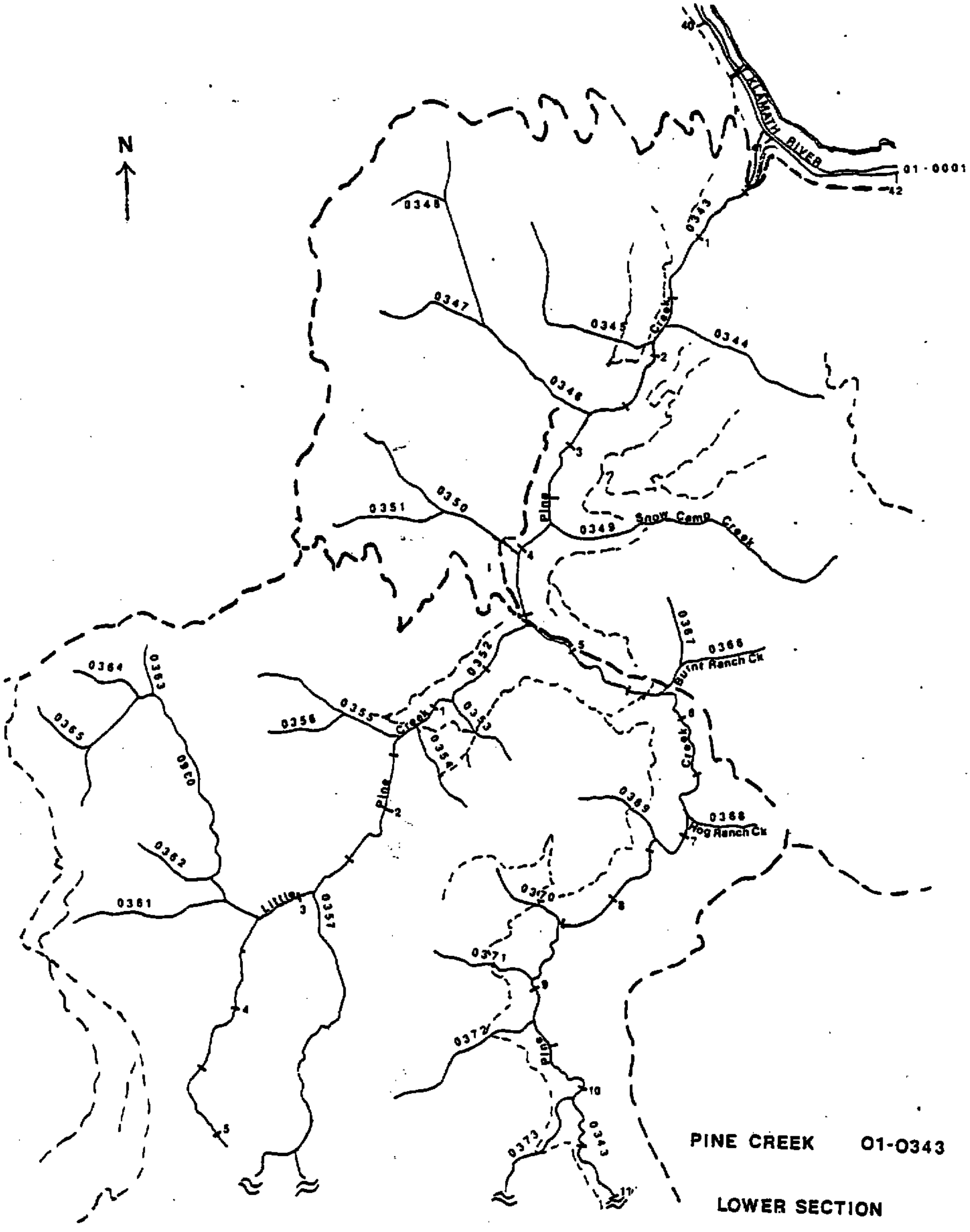
RINITY RIVER BASIN

ESULTS FOR: SOCTISH CREEK
THEAM CODE: 19.

RIVER MILE	DATE YR MO DY	ACW EST. FEET	FLOW EST. CFS	POOL/ RIFFLE RATIO	POOL COMPOSITION (PERCENT) 1	2	3	4	5	RIFFLE COMPOSITION (PERCENT) B	R	G	S-S	O	COVER	BANK STAB. L	R	GRADIENT (PERCENT) UP	DN	AV	R P	BARRIER TYPE	HT	PASS /IMP	DIVERSION PIPE SIZE	SCREEN SIZE	FLOW DIVRT
0.00	78/ 7/10	15	2.0	20/ 80	0	0	10	45	45	5	50	35	10	0	3	3	3	3	3	3.0							
0.25	78/ 7/10	20	2.0	60/ 40	0	0	10	30	60	10	40	40	10	0	3	3	3	1	2	1.5							
0.50	78/ 7/10	20	2.0	50/ 50	0	10	20	30	40	20	45	25	10	0	2	2	2	3	3	3.0							
0.55	78/ 7/10																				1				18.00	4.00	2.00
0.58	78/ 7/10																				1				12.00	12.00	1.00
0.75	78/ 7/10	15	5.0	60/ 40	0	15	25	40	20	20	40	30	10	0	2	2	2	2	2	2.0							
0.90	78/ 7/10																				3	2	4	1			
0.92	78/ 7/10																				3	1	3	1			
1.00	78/ 7/10	10	4.0	70/ 30	20	30	30	10	10	40	30	20	10	0	2	2	2	10	10	10.0							
1.20	78/ 7/10																				3	3	3	1			
1.21	78/ 7/10																				3	2	4	1			
1.25	78/ 7/10	10	4.0	80/ 20	20	30	30	10	10	40	30	20	10	0	2	2	1	8	6	7.0							
1.30	78/ 7/10																				2	4	5	2			
1.50	78/ 7/10	15	4.0	70/ 30	10	15	15	30	30	10	50	30	10	0	2	2	2	3	2	2.5							
1.75	78/ 7/10	10	2.0	40/ 60	0	10	10	35	45	15	45	30	10	0	3	3	2	3	3	3.0							
2.00	78/ 7/10	10	2.0	50/ 50	10	10	20	30	30	15	45	30	10	0	3	2	2	3	3	3.0							
2.25	78/ 7/10	10	2.0	80/ 20	10	20	30	20	20	25	35	30	10	0	1	2	2	9	9	9.0							
2.50	78/ 7/10	8	2.0	80/ 20	10	20	40	20	10	20	40	30	10	0	1	2	2	8	8	8.0							
2.75	78/ 7/10	8	2.0	70/ 30	10	20	40	20	10	25	40	25	10	0	2	3	3	12	12	12.0							
3.00	78/ 7/10	8	2.0	50/ 50	0	10	25	35	30	25	35	30	10	0	1	2	2	9	9	9.0							

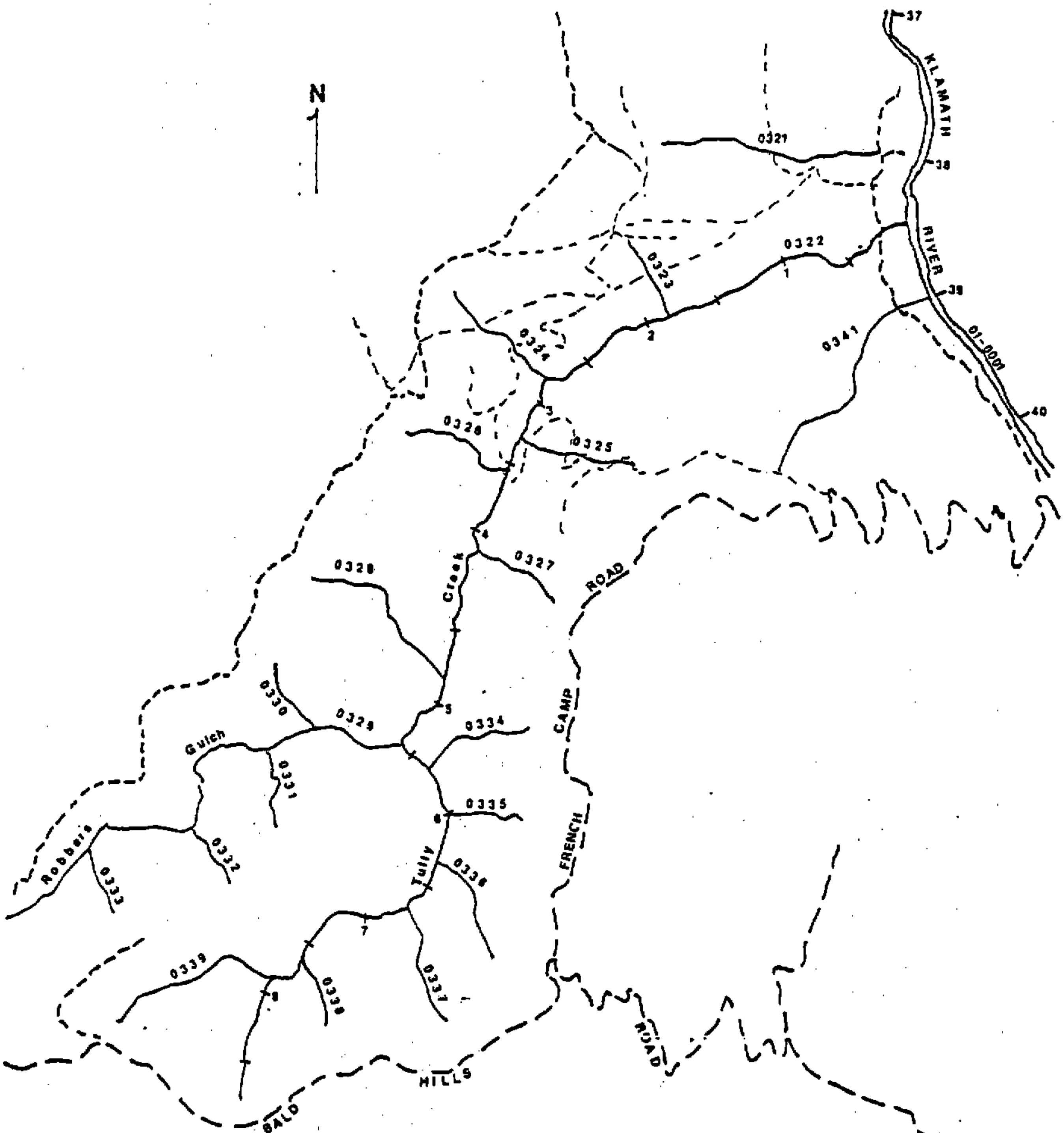


ROACH CREEK 01-0261

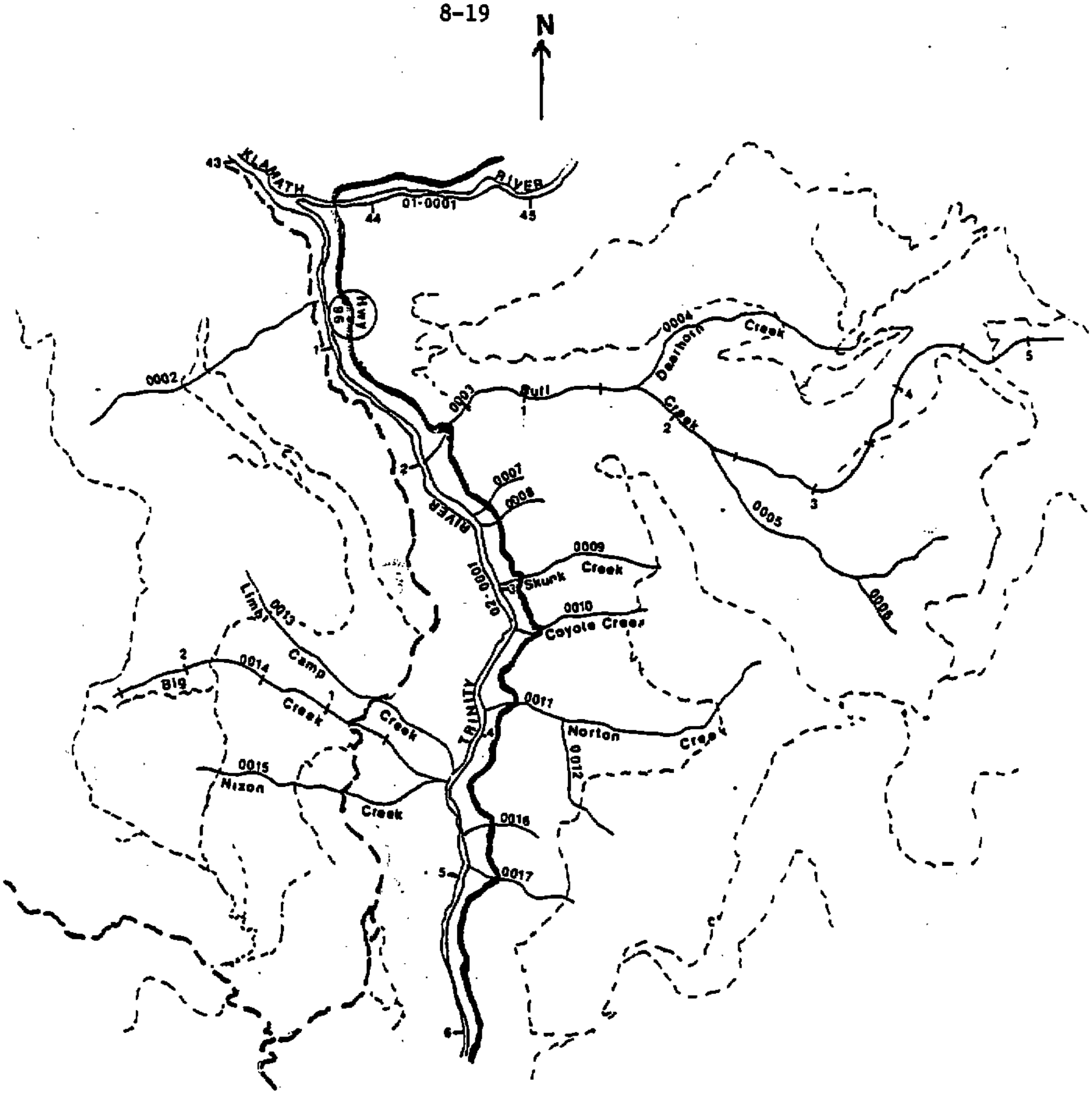


PINE CREEK 01-0343

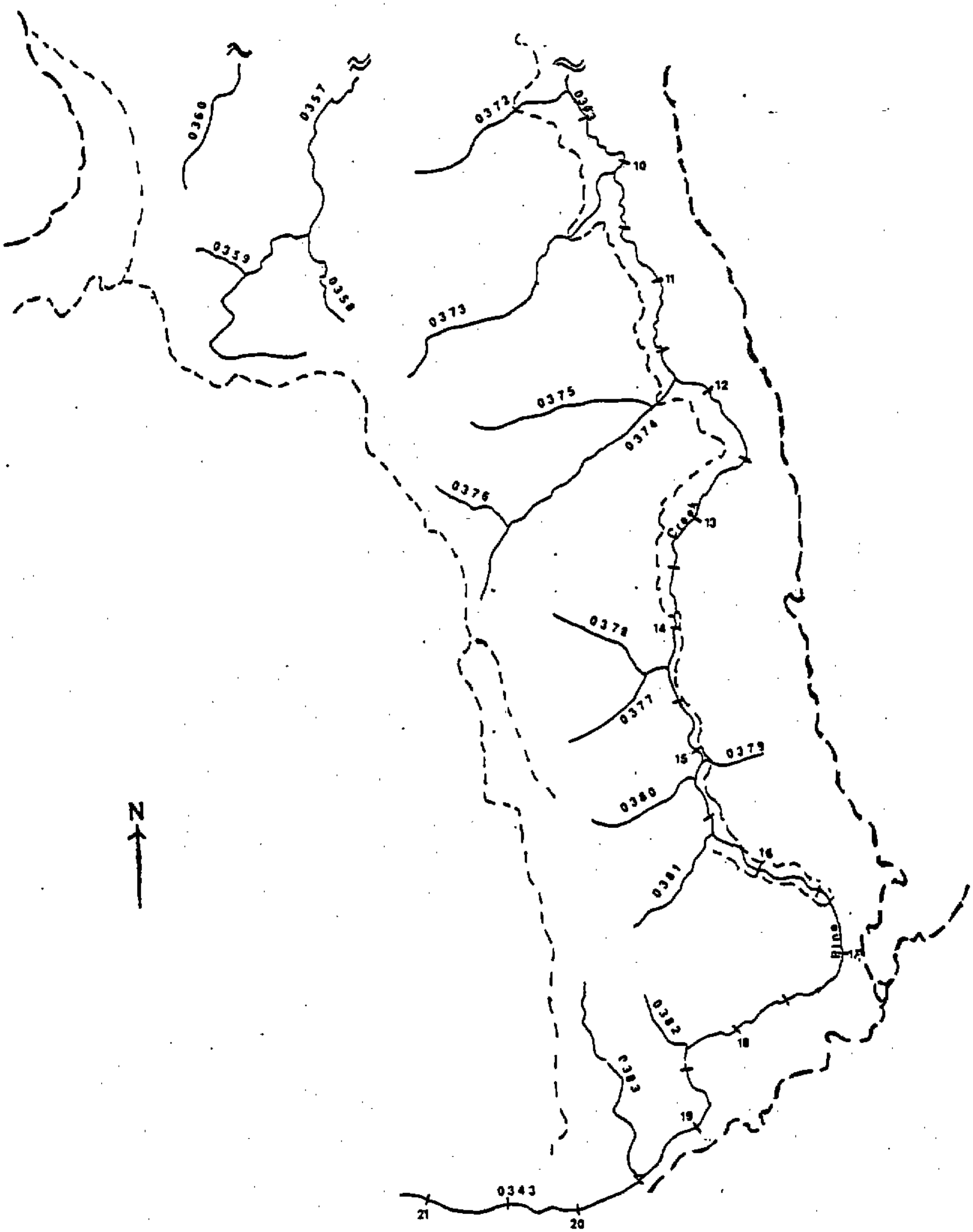
LOWER SECTION



TULLY CREEK 01-0322

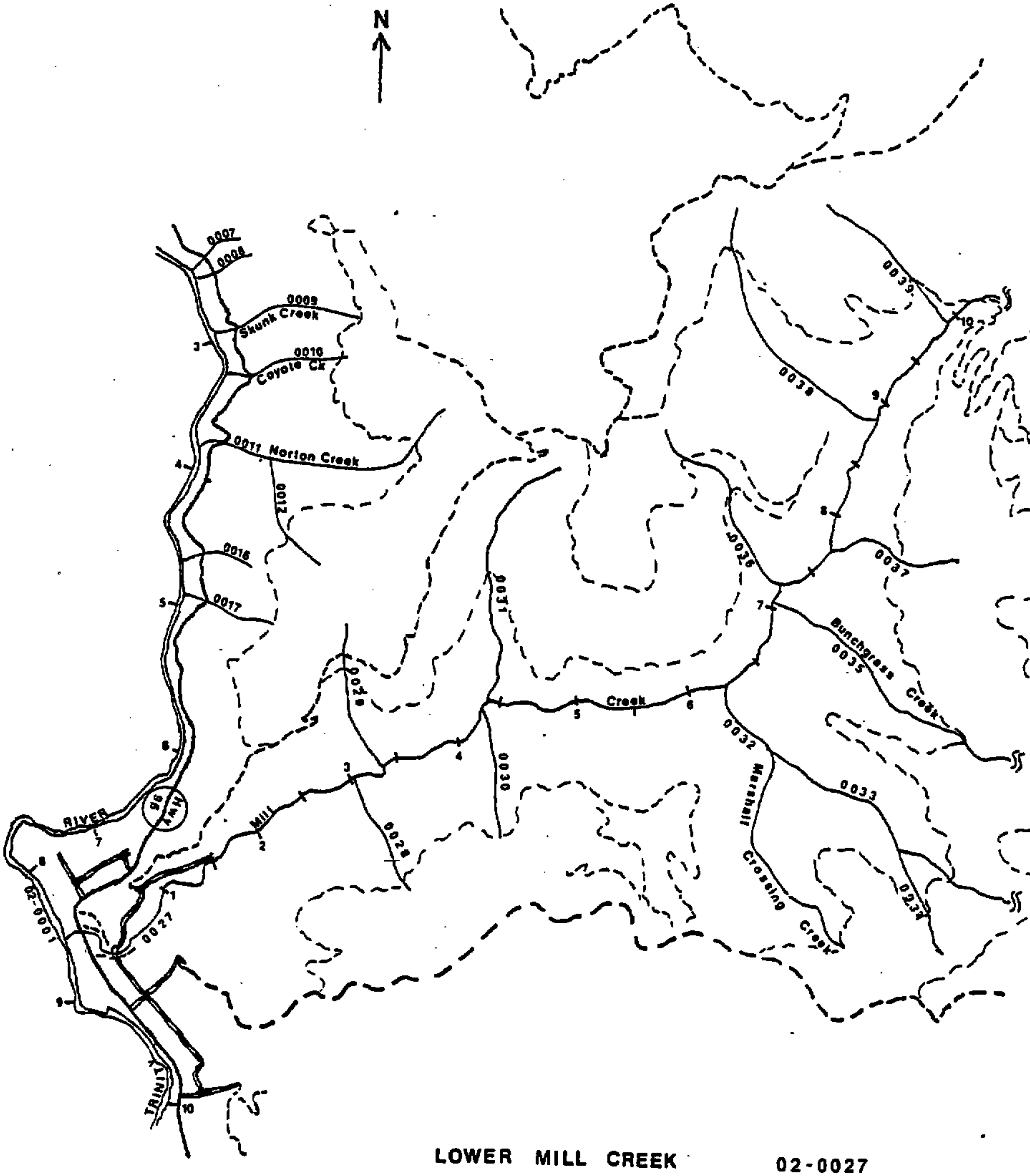


BULL CREEK 02-0003

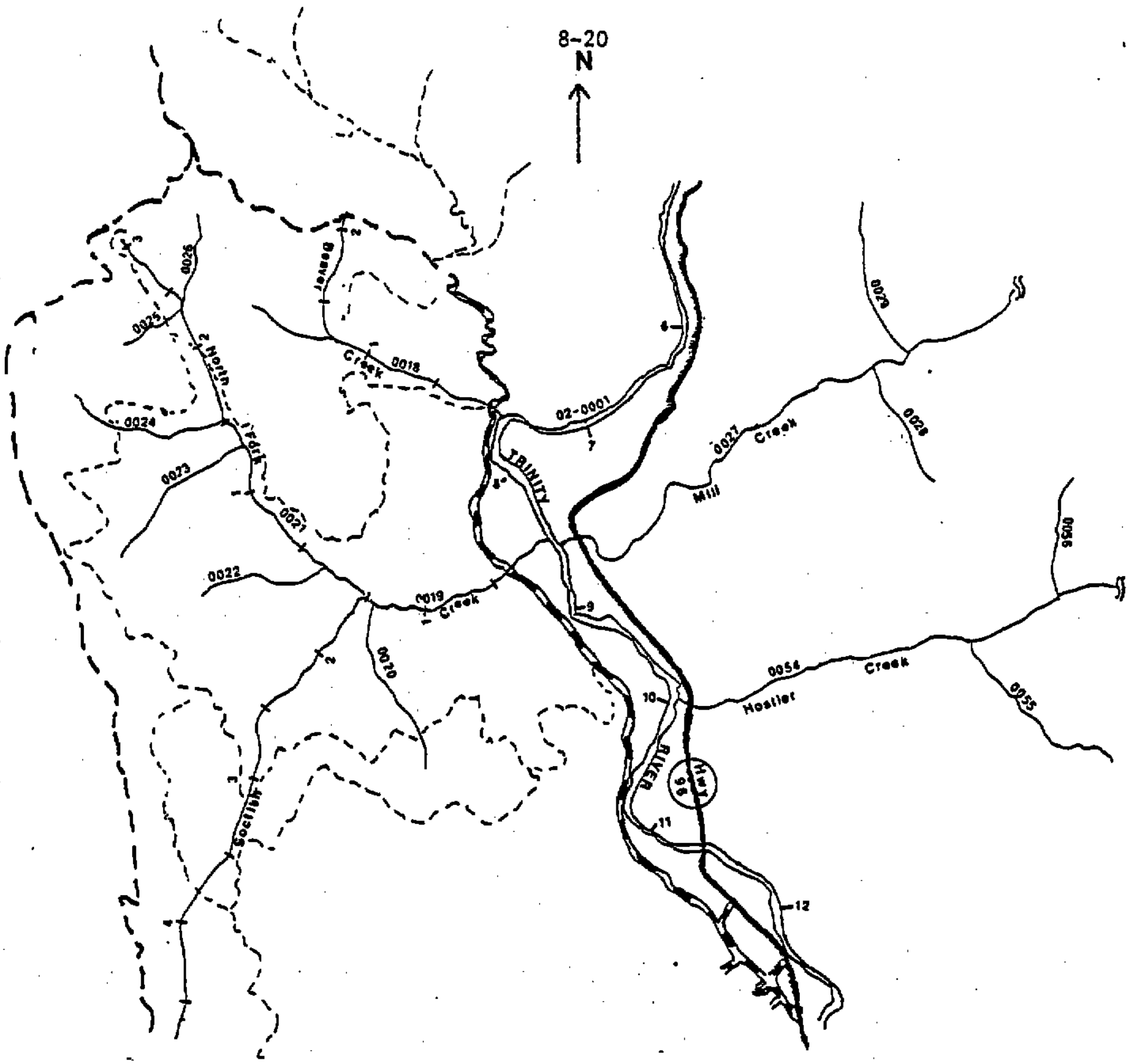


PINE CREEK 01-0343

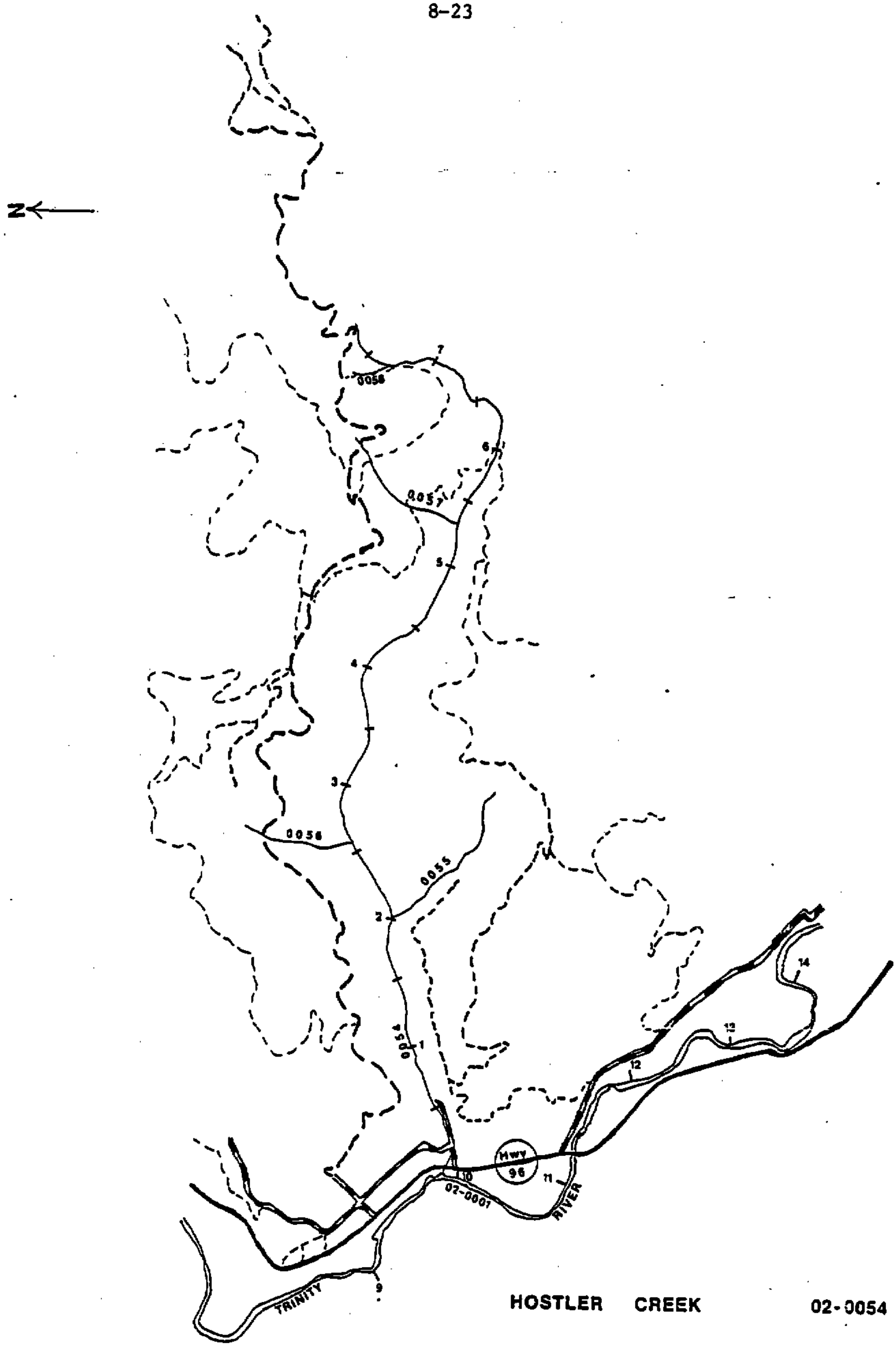
UPPER SECTION



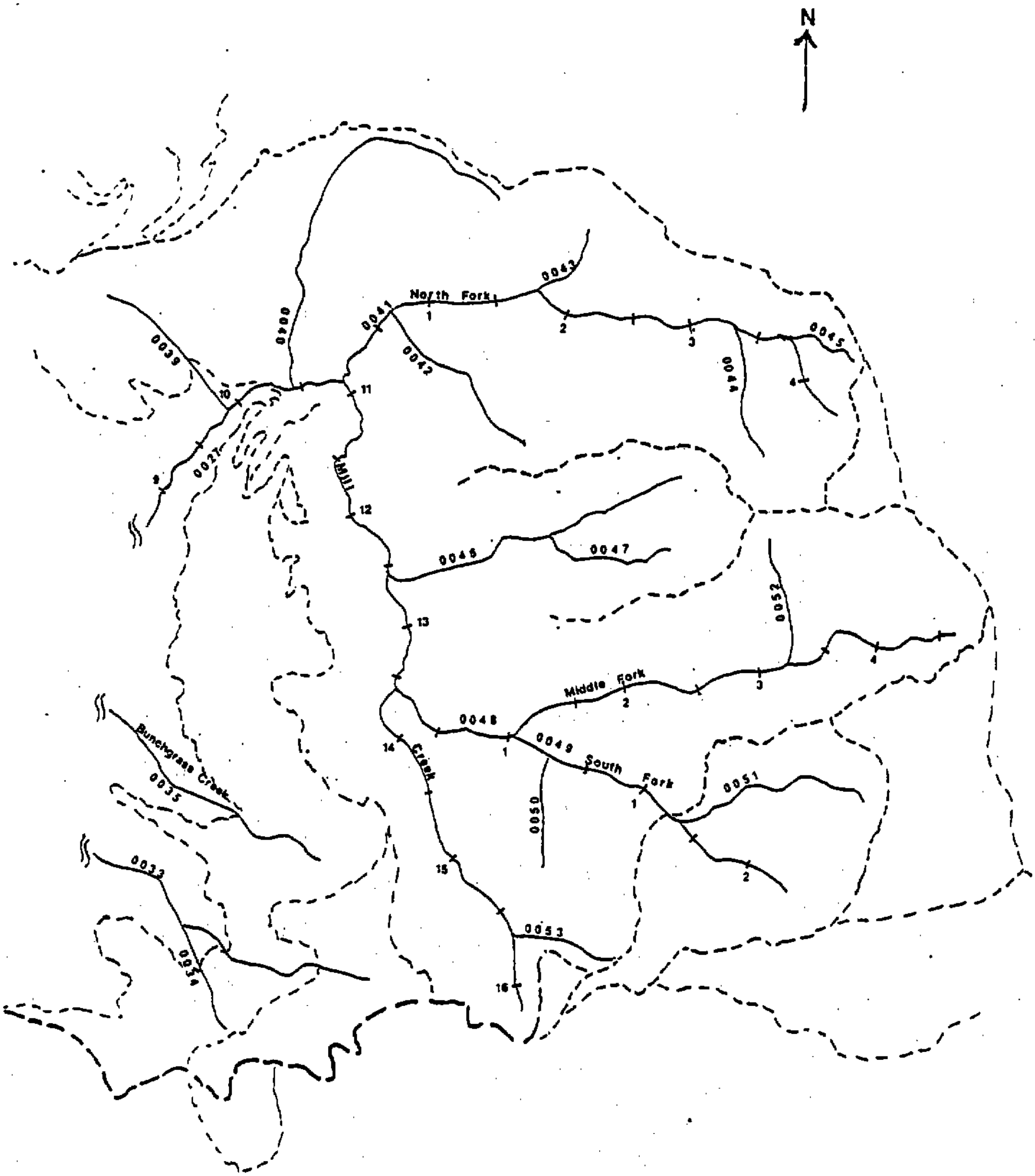
LOWER MILL CREEK 02-0027



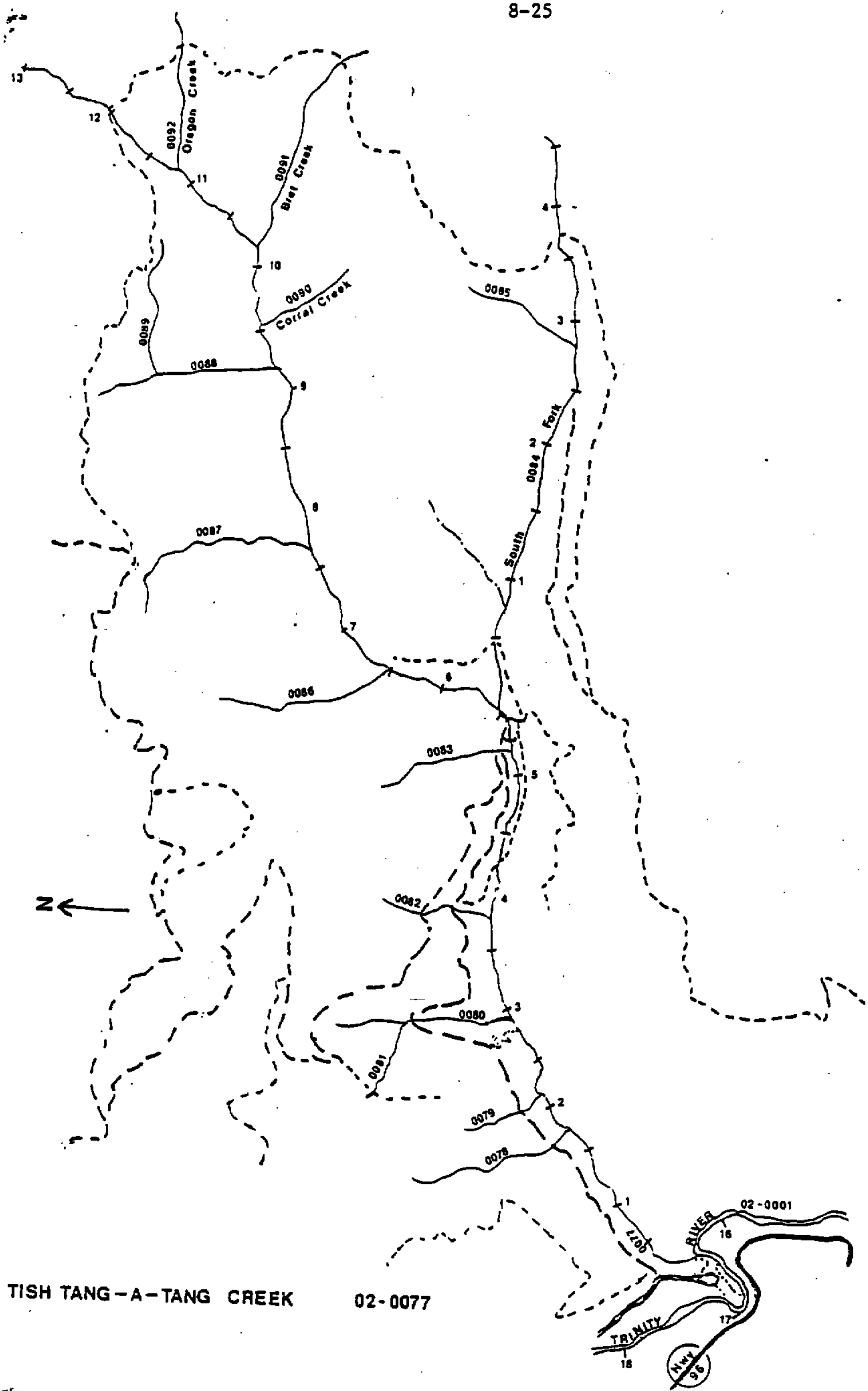
SOCTISH CREEK 02-0019



HOSTLER CREEK **02-0054**



UPPER MILL CREEK 02-0027



TISH TANG-A-TANG CREEK 02-0077