

Final Report

Spawning Ground Surveys, 1998-99 Season Mattole River Watershed

BLM Cooperative Agreement 1422-B300-A7-1010, Task Order 002

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The 1998-99 season marked the 18th consecutive year of spawning ground surveys in the Mattole River watershed. These surveys provide data on the distribution and relative abundance of live salmon spawners, carcasses, and redds (spawning nests) in key tributaries and selected mainstem reaches. Surveys are conducted by a resident network of trained volunteers and paid personnel by wading, canoeing or diving specified stream segments one or more times during the salmon spawning season (generally late November through mid-January). Data are used as an indicator of changes or trends in salmon escapement, and for evaluation of progress toward restoration goals.

The basic protocols for conducting spawning ground surveys in the Mattole have remained consistent from the 1985-86 season to the present. In the fall of 1997, Project Coordinator Gary Peterson prepared a detailed, 14-page training manual and developed a series of new data forms which facilitated the recording of information in the field. The manual and field forms were updated in November 1998 (version 2.2) and issued to prospective surveyors with two attachments, a one-page Safety Sheet and an 8-page guide to identification of adult salmonids. As in past years, field training consisted of experienced surveyors accompanying new participants for the first few outings of the season.

All survey forms, maps, photographs, scale samples and ancillary information are kept on file by the Mattole Salmon Group (MSG). These materials are available for review and/or duplication by contacting the Project Coordinator. The information gathered in the field each season is entered into a database and distributed as raw data compilations to agencies, funding entities, and interested groups and individuals. Future plans are to integrate and digitize survey data as layers in a Geographic Information System (GIS).

The 1998-99 spawning ground surveys were the most extensive ever undertaken in the Mattole. From 4 December 1998 to 29 January 1999, 66.85 miles of mainstem and tributary habitat were inventoried. Most reaches were covered two or more times, resulting in 141.0 accumulated miles of survey. Both of these mileage figures were nearly 50% higher than last year's totals.

In the mainstem Mattole, 36.45 miles were surveyed (75.1 accumulated miles), comprising over half of the entire mainstem length. All mainstem surveys below Big Finley Creek were done by canoeing or snorkeling. In the tributaries, 30.4 miles were walked (65.9 accumulated miles) in 11 sub-basins containing historically productive salmon habitat. About one-third of the tributary coverage was focused on Bear Creek, the Mattole's third-largest tributary.

Twenty-four people were involved in the survey effort during the 1998-99 season, one less than the record number of participants last year. Two of MSG's most experienced observers (Gary Peterson and Campbell Thompson) were involved in 108.5 miles of survey, or about 77% of the total accumulated mileage.

The final project budget of \$10,118.12 was funded almost entirely by the Bureau of Land Management (\$9,301.90 from Cooperative Agreement 1422-B300-A7-1010, Task Order 002), and supplemented by \$816.22 in grant monies from the Mendocino County Fish and Game Commission (Table 1). A total of 927.5 person-hours was expended over the course of the season (field work plus office time), and about 40% of this was volunteer labor. Comparable figures for last year were 803.6 total person-hours and 30% volunteer time.

A cost comparison of the last two years of Mattole spawning ground surveys revealed that the 1998-99 program was considerably more economical than in 1997-98. The cost per mile of stream surveyed was about \$72 this year and \$130 last season. The difference is attributed to several factors, most notably that there was much less field training (7 new surveyors this season, and 16 last year) and equipment expenditures, greatly increased volunteerism, and many more miles of canoe surveys (40.2 versus 12.7 miles) and solo surveys (49.5 versus 25.2 miles) during 1998-99 as compared to the previous season. (It should be noted that, for reasons of safety, solo surveying is not recommended, and renewed efforts will be made to minimize this practice in the future.)

Figure 1 shows the timing of surveys in relation to rainfall patterns. The sandbar at the mouth of the Mattole breached on 7 November, and salmon were detected in the Eitersburg area (river-mile 42.9) nine days later during broodstock trapping operations conducted by MSG as part of its Stock Rescue Program (natal-stock "hatchbox program"). From 16-18 November, four small male chinook were captured at MSG's portable trap and weir in the mainstem Mattole just upstream from the confluence of Bear Creek. Rising flows forced MSG to evacuate the trap

and weir during the early morning hours of 21 November. A series of strong storms occurred over the next two weeks, and it was not until 7 December that water levels receded sufficiently to allow resumption of trapping operations. The highest water of the season occurred on 2 December, and field surveys began two days later in the Mattole headwaters area. It is likely that many redds constructed by early-spawning fish were flattened out and rendered indistinguishable by bedload movement, particularly in the mainstem Mattole downstream from Thompson Creek and in the larger tributaries (i.e., Bear, Honeydew, Squaw and Bridge creeks).

Tabular summaries of survey results were prepared separately for mainstem reaches (Table 2) and tributary surveys (Table 3, and Table 4 for Bear Creek only). The location of all survey reaches is displayed in a series of three maps, which appear on pages 10-12. A comparison of the past five years of Mattole spawning ground surveys is presented in Table 5. Major findings, interpretations and conclusions from the 1998-99 season are discussed below.

The first two rounds of surveys in established index reaches showed low numbers of chinook, and very little direct evidence of coho. Because of these disappointing early results, it was decided that survey coverage would be expanded to determine the distribution and relative abundance of spawners and redds in various non-index reaches. A month-long dry spell from mid-December to mid-January afforded the opportunity to conduct surveys in areas seldom inventoried, mostly in the mainstem (i.e., the upper Mattole from Stanley Creek to Thorn Junction, and lower-river reaches downstream from Honeydew) and also in several tributaries (Upper Mill, McKee, lower Eubanks, Big Finley and upper Squaw creeks). Few chinook and almost no coho were documented in this expanded survey effort, along with moderate numbers of steelhead in early January in the lower and middle mainstem. These findings were substantiated by the meager results of MSG's broodstock capture operations near Ettersburg, where 7 chinook (2 females and 5 males), zero coho and 13 steelhead were counted from 7 December until the trapping season concluded on 15 December.

Based on past knowledge of peak spawning periods and run timing of Mattole chinook and coho, surveys usually end around mid-January. But this year we made an exception. In late January, one last round of surveys was completed in most index reaches following a week-long period of moderately heavy rains, in order to determine if runs were somehow delayed or unusually late in this post-El Niño year. Our worst suspicions were confirmed when 8 live salmon (5 chinook and 3 coho), 2 coho carcasses and 27 live steelhead were seen in 19 miles of these late-season surveys. Forty fresh redds were also recorded — nearly half of the 87 definite redds counted during the entire season — but the overwhelming majority of these were likely made by steelhead.

In South Fork Bear Creek, one of the areas most heavily targeted as a source of spawner information, counts of salmon were the lowest since 1995-96. The only evidence of coho was five live fish seen at the Shelter Cove Road between 12/24/98 and 1/1/99. No carcasses or skeletons of either salmon species were found this year on Bear Creek. No live chinook were seen, although two redds were large enough to be identified as likely to have been made by chinook.

Surveys in Honeydew Creek and Eubanks Creek were especially disheartening. Eubanks has an abundance of high-quality spawning habitat for chinook and coho, but there have been no wintertime sightings of live salmon, carcasses or salmon redds here since the banner year of 1987-88. Likewise, the last time Honeydew Creek showed anything like a substantial run of chinook was in 1987-88 (adult coho are rarely seen in the surveyed portion of Honeydew Creek, a third-order reach more suited to chinook spawning). It should be noted that, as a result of the January 1997 flood — the third-highest on record in the Mattole — the area of Honeydew Creek upstream from the Lower East Fork has exhibited widespread downcutting and a substantial decline in accumulations of suitable spawning gravels.

An interesting but troubling occurrence was revealed by surveys in the upper mainstem Mattole. Here, in two contiguous reaches totaling 4.6 miles, we found an unusually high incidence of redd superimposition — redds constructed on top of previously excavated redds. Four of 15 redds (nearly 27%) were superimposed in the 2.2 miles from the county bridge to Stanley Creek; similarly, there was 25% superimposition (2 of 8 redds) in the 2.4-mile reach below Stanley Creek. Based on redd dimensions, substrate size and observations of live fish and/or carcasses nearby, all but one of the superimposed redds were thought to have been made by salmon, either chinook or coho. Half of the superimposed redds were recorded during the month-long dry spell between mid-December and mid-January, so there is some reason to believe that flow limitations prevented some salmon spawners from accessing prime spawning habitat further upstream. In the mainstem Mattole above the county bridge and in Thompson Creek, redd superimposition was not observed and there were extensive areas of high-quality gravels devoid of salmon spawning activity. On a positive note, a very high proportion of salmon in the Mattole headwaters and lower Thompson Creek were seen holding and/or spawning in association with instream log cover structures that MSG crews had installed in 1996 and 1998.

For the second straight year, the average size of salmon seen on surveys and at the Ettersburg fish trap was noticeably smaller than normal. This was considered a result of unproductive feeding conditions in the ocean during the strong El Niño of 1997 and 1998. The chinook run in both of the last two seasons was dominated by small to medium-sized fish thought to be 3-year-olds, with very few adults large enough to be considered age 4 or older (generally >37" fork length) and variable proportions of grilse (an estimated 9% of the run in 1998-99, and 23% the previous year). Interestingly, information gathered in our work and from angler reports indicated that the average size of adult steelhead did not decline and may in fact have increased, particularly for the 1998-99 run.

As shown in the table below, the observed decrease in size was most pronounced for chinook grilse, coho grilse and female chinook. Compiled size information was a combination of estimated total lengths (live fish seen by surveyors) and measured fork lengths (carcasses, and salmon retained as broodstock at MSG's fish trap), and thus the numbers given in the table should be considered as rough approximations only. Length data for the last two seasons were combined because the estimated average sizes were nearly identical between years.

Species, sex and life-stage classification	Average length of salmon, rounded off to the nearest 0.5 inch (data from surveys and broodstock trapping operations)		Percent change in length from long-term average
	Long-term average, 1981-82 through 1996-97 seasons	Average for 1997-98 and 1998-99 seasons	
Chinook females	33.0"	28.0"	-15%
Chinook males (adults)	33.0"	31.5"	-5%
Chinook grilse ("chubs")*	21.5"	17.0"	-21%
Coho females	25.5"	24.5"	-4%
Coho males (adults)	26.0"	23.5"	-10%
Coho grilse ("jacks")*	19.5"	15.5"	-21%

* Grilse are small, precocious male salmon returning to spawn at age 2. Classification of male salmon as either grilse or adults was based on fish size, with the separation point determined subjectively by examining length data. During the 1997-98 and 1998-99 seasons, chinook males were designated as grilse if they were less than 22" long, and coho males were called grilse if they were smaller than 20". This was a departure from the traditionally used demarcation of 25" and 22" for chinook and coho, respectively.

Very few carcasses or skeletons were seen, a recurring phenomenon for the past 10 years. The primary reasons for this are intensive scavenging (by raccoons, otters, bears, etc.) coupled with low numbers of salmon spawners and, hence, low numbers of carcasses generated. Only 19 carcasses or skeletons of spawned-out salmon were encountered during the entire 141 miles of survey during the 1998-99 season, and all but one of these was seen in the mainstem. Of 11 carcasses fresh enough to mark with a color-coded jaw tag, only one was retrieved on a subsequent survey — in this instance, a female coho carcass was recovered on New Year's Day in the very same location where it was marked 10 days earlier (in the deep pool at Redwoods Monastery). The last time carcass mark-and-recapture provided sufficient information for valid population estimates was back in the early 1980s when surveys first began in the Mattole.

Due to the fact that we extended our surveys further into the winter than usual, some of our latest observations of spawning salmon were made this year. One live spent chinook female was noted in lower Bridge Creek on 25 January, 4 live chinook and 1 coho were seen by divers in the upper mainstem near Thorn Junction on 29 January, and a female coho carcass was found on a spot-check survey in upper Thompson Creek on 11 February.

Based on best professional judgment in reviewing all available information, we are estimating that 350 chinook and 150 coho returned to spawn in the Mattole during 1998-99. These escapement estimates are less than half of those for the previous three seasons, and the lowest for chinook since 1992-93. The reasons for this decline are complex, but likely have to do with two factors. One is weather conditions in the spawning season (1994-95) that should have produced the 4-year-old age class of chinook this year. A massive storm in January 1995, following a long drought that forced salmon to spawn lower in the system than is ideal, probably wiped out a large percentage of the eggs that had been deposited in redds. Second, as mentioned previously, El Niño played a significant role this year in terms of ocean feed conditions, reducing both numbers and size of salmon which returned to spawn in the Mattole and throughout the Northcoast. These weather and climatic factors would be much less dangerous to the future of our salmon were the runs otherwise strong and unimpacted by loss of spawning and rearing habitat. The waning of El Niño, combined with the fact that there were substantial numbers of juvenile chinook migrating to the ocean in the spring of 1996 and 1997, give us hope that Mattole salmon runs will improve over the next two years.

TABLE 2: Spawning Ground Surveys, mainstem Mattole River, 1998-99 Season

Surveys conducted by the Mattole Salmon Group (phone 707-629-3660/3670; fax 707-629-3679; e-mail: salmon@humboldt.net). Primary funding provided by the Bureau of Land Management, Arcata Field Office (Cooperative Agreement 1422-B300-A7-1010, Task Order 002). Data compiled February 1999 by Gary D. Peterson, MSG fisheries biologist. **Key to abbreviations at bottom of page 6.**

Map Code No.	MAINSTEM SURVEY REACHES Location & Description	Survey Date (m/d/y)	Reach Length (miles)	Inventory Procedure (type/direction)	Survey Personnel	Live Fish Seen	Carcasses & Skeletons Examined	Fresh Redds & designation by species	
								total # redds	# occupied
1a & 1b	Mattole headwaters, primary index reach, from Stanley Creek (RM 57.1) to Hulse Creek (RM 61.8) [Note: Due to the length of this reach, it is divided into two sections. The upper section, from the county bridge to Hulse Creek, is 2.5 miles long and is surveyed walking upstream. The lower section, from the county bridge to Stanley Creek, is 2.2 miles long and is surveyed walking downstream.]	12/5/98 (upper)	2.5	W/u above county bridge	upper section: GP	2 KSF 1 KSM 2 KSG	1c KSF	3 KS	2
		12/6/98 (lower)	2.2	W/d below county bridge	lower section: GP	1 KSM	-	1 KS	0
		12/15/98 (upper)	2.5	W/u above county bridge	upper section: CT, AD, DD	1 KSF 1 UNF	-	2 SS	0
		12/16/98 (lower)	2.2	W/d below county bridge	lower section: MR, DBa	1 SSF	-	1 KS 1 ND	0 0
		1/1/99 (upper)	2.5	W/u above county bridge	upper section: MR, GBe	-	-	-	-
		1/1/99 (lower)	2.2	W/d below county bridge	lower section: GP	1 SSF 1 UNF	1s KSX	3 KS 2 SS 1 UN	0 1 0
		1/21/99 (upper)	2.5	W/u above county bridge	upper section: GP	1 SHF 1 SHM 1 SHX	1c SSG	3 UN 3 SH 2 ND	0 2 0
		1/26/99 (lower)	2.2	W/d below county bridge	lower section: GP	-	-	3 UN 3 ND	0 0
	spot check at Monastery Pool, located about 0.2 miles downstream from Thompson Cr.	12/22/98	-	spot check	GP, CT	-	1c SSF	-	-
2	upper mainstem Mattole, from Stanley Creek RM 57.1 to Mickey Dulas' house (RM 54.7; located about 0.9 miles downstream from Anderson Creek & 0.7 miles upstream from Van Arken Creek)	12/20/98	2.4	W/d	CT, MD	-	1s KSM	1 KS 2 UN 1 possible	0 0 -
		1/2/99	2.4	W/d	GP	-	1s KSM 1c SSG	3 UN 1 ND	0 0
		1/14/99	-	spot check	CT, GBe	-	1c SSF	-	-
		1/26/99	-	spot check	MD, SB, GP, CT	1 SHF 2 SHM	-	1 SH	1
3	upper mainstem Mattole, from Mickey Dulas' house (RM 54.7) to McKee Cr. (RM 52.8)	12/20/98	1.9	W/d	GP	1 KSF	1s KSX	-	-
		1/2/99	1.9	W/d	CT	-	-	1 UN	0
4a+ 4b	upper mainstem Mattole, from Junction Hole at McKee Creek (RM 52.8) to "Raintree" area on Huckleberry Lane (RM 51.2)	12/11/98	1.6	W/d	CT	1 KSF	-	-	-
		12/18/98	1.6	W/d	CT, MD	1 KSM 2 UNX	1c KSG	-	-
		1/2/99	1.6	W/d	CT	1 KSF 1 KSM	-	1 KS	1
4a	upper mainstem Mattole, from Junction Hole (RM 52.8) to Bridge Creek (RM 52.1)	1/29/99	0.7	Snorkel survey	MR, DK	3 KSF 1 KSM 1 SSX 4 SHF 4 SHM	-	1 ND	0
5	middle mainstem Mattole, from Big Finley Creek (RM 47.4) down to Bear Creek near Eltersburg (RM 42.8)	12/12/98	4.6	Canoe survey	GP, CT	2 KSF 3 KSM	-	1 KS	0
		1/4/99	4.6	Canoe survey	GP, CT	9 KSM 1 UNX	1s KSF 2c KSM 1c SSM	5 KS 1 ND	0 0

Table continued on following page

Table 2 (continued from previous page)

Map Code No.	MAINSTEM SURVEY REACHES Location & Description	Survey Date (m/d/y)	Reach Length (miles)	Inventory Procedure (type/direction)	Survey Personnel	Live Fish Seen	Carcasses & Skeletons Examined	Fresh Redds & designation by species	
								total # redds	# occupied
6a	middle mainstem Mattole, from Bear Creek (RM 42.8) down to Mattole Canyon Creek (RM 41.1)	1/3/99	1.7	Snorkel survey	MR, DK	3 KSF 7 KSM 1 SHF 1 SHX	-	-	-
6a+ 6b	middle mainstem Mattole, from Bear Creek (RM 42.8) down to footbridge about 0.25 miles upstream from Gilham Creek (confluence at RM 32.8)	12/19/98	9.75	Canoe survey	GP, CT	1 KSF 1 SHF 1 SHM	-	2 KS 3 possible	1 -
		1/9/99	9.75	Canoe survey	GP, CT	1 KSF 25 SHX	1s KSF 2c KSM 1s KSX 1s SSG	-	-
7	lower mainstem Mattole, from Honeydew Creek (RM 26.5) to Upper Mattole School bridge (RM 21.1)	12/24/98	5.4	Canoe survey	GP, JWh	-	-	-	-
7a	lower mainstem Mattole, spot-check survey at Honeydew Creek confluence pool (RM 26.5 to 26.4)	1/10/99	0.1	Snorkel survey (spot check)	MR, DK	1 KSM 1 SHF 5 SHM	-	-	-
7b	lower mainstem Mattole, spot-check survey from Hunter's Bluff (RM 25.4) to pool below Bundle's Prairie Creek (RM 25.2)	1/10/99	0.2	Snorkel survey (spot check)	MR, DK	1 SHF 1 SHM	-	-	-
8	lower mainstem Mattole, from Upper Mattole School bridge (RM 21.1) to bridge 0.1 mile upstream from Squaw Cr. (RM 14.9)	1/10/99	6.1	Canoe survey	GBe, DBa	-	-	-	-
SUMMARY & TOTALS: MAINSTEM SURVEYS									
Four contiguous reaches, totaling 10.6 miles, were surveyed at least twice to provide complete coverage of the upper mainstem Mattole to the headwaters area. In the middle mainstem, 2 reaches (14.35 miles) were canoed twice, plus a 1.7-mile stretch was surveyed by snorkeling. Dry weather from mid-December through mid-January allowed canoe & snorkel surveys in the lower mainstem Mattole below Honeydew Cr. Redd counts indicated that escapements of chinook and coho were substantially lower than the previous two seasons. Mainstem spawning by chinook was concentrated in the headwaters index reach (upstream from Stanley Creek), and to a lesser extent in the Ettersburg area. The only documented mainstem spawning by coho was in the headwaters index reach.						16 KSF 25 KSM 2 KSG 2 SSF 0 SSM 1 SSX 2 UNF 3 UNX 10 SHF 14 SHM 27 SHX	1c KSF 2s KSF 4c KSM 2s KSM 1c KSG 3s KSX 2c SSF 1c SSM 2c SSG 1s SSG	18 KS redds 4 SS redds 13 UN redds 4 SH redds 9 ND redds 4 possible redds	4 1 0 3 0 -
						11 different surveyors participated			

Key to Abbreviations: RM = River-Mile reference location along the channel of the mainstem Mattole River, expressed as distance upstream from the mouth. River-Mile designations are based on mapping by the California Department of Water Resources (1973). (DWR. 1973. Character and use of rivers: Mattole River (a pilot study) Memorandum Report, CA Dept. of Water Resources, Division of Resources Development, Sacramento, CA, April 1973. 145 pp + 3 appendices.)

W/u = wading upstream KS = king (chinook) salmon F = female
W/d = wading downstream SS = silver (coho) salmon M = male
UN = unknown if chinook or coho X = sex of fish undetermined
ND = species not determined G = grise (KS chub or SS jack). Grise are small male salmon returning to spawn at age 2. Chinook grise are males < 22" long; coho grise are males < 20" long.

c = carcass (recently dead fish, suitable for jaw tagging because head and body are relatively intact)
s = skeleton (pieces or parts of fish, not suitable for jaw tagging because head and body are not intact)

SB = Sarah Balster AD = Alisa Dancer MD = Mickey Dulas GP = Gary D. Peterson CT = Campbell Thompson
DBa = Drew Barber DD = Dylan Dulas DK = Daniel Kosmal MR = Maureen Roche JWh = Jeremy Wheeler
GBe = Geoff Beyersdorf

TABLE 3:
Spawning Ground Surveys, Mattole River tributaries (except Bear Cr.), 1998-99 Season

Surveys conducted by the Mattole Salmon Group (phone 707-629-3660/3670; fax 707-629-3679; e-mail: salmon@humboldt.net). Primary funding provided by the Bureau of Land Management, Arcata Field Office (Cooperative Agreement 1422-B300-A7-1010, Task Order 002). Data compiled February 1999 by Gary D. Peterson, MSG fisheries biologist. *Key to abbreviations at bottom of page 8.*

Map Code No.	TRIBUTARY SURVEY REACHES (except Bear Creek) Location & Description	Survey Date (m/d/y)	Reach Length (miles)	Inventory Procedure (type/direction)	Survey Personnel	Live Fish Seen	Carcasses & Skeletons Examined	Fresh Redds & designation by species	
								total # redds	# occupied
9a	Thompson Creek mainstem, from mouth to north-side tributary at straw-bale house (Metz property)	12/5/98	1.3	W/u	CT, MD	1 SSF 1 SSM	-	-	-
		12/15/98	1.3	W/u	GP, MS	2 KSG 1 SSF 1 SSM	-	1 SS	1
		1/22/99	1.3	W/u	GP	1 SHF 1 SHM	-	1 SH	1
9b	Thompson Creek mainstem, from straw-bale tributary to culvert on Kersh property, 0.35 miles upstream from confluence of Danny's Creek (North Fork Thompson Cr.) spot-check observation at culvert on Kersh property (upstream boundary of reach 9b)	12/6/98	1.25	W/u	CT	-	-	-	-
		12/15/98	1.25	W/u	GP, MS	-	-	-	-
		1/25/99	1.25	W/u	CT	1 SSF 1 SSM 1 SHF	-	1 SS 1 UN 3 SH 1 ND	1 0 1 0
		2/11/99	-	spot check	DS, RG	-	1c SSF	-	-
9c	Danny's Creek (North Fork Thompson Creek), from mouth to 0.9 miles upstream	12/6/98	0.9	W/u	CT	-	-	-	-
		12/15/98	0.9	W/u	GP	-	-	-	-
		1/21/99	0.9	W/u	CT	-	-	-	-
9d	Yew Creek, from mouth to 0.4 miles upstream from major south-side tributary (near east edge of Section 28)	12/4/98	0.95	W/u	CT	-	-	-	-
		12/14/98	0.95	W/u	CT, AD, DD	-	-	1 possible	-
		1/21/99	0.95	W/u	CT	4 SHX	-	-	-
10	Baker Creek, from mouth up to first major forks	12/4/98	1.0	W/u	GP	-	-	-	-
		12/14/98	1.0	W/u	GP	-	-	-	-
		1/26/99	1.0	W/u	CT	-	-	1 ND 1 possible	0 -
11	Upper Mill Creek (west of Whitethorn), from mouth to major forks	1/6/99	1.5	W/u	GP, CT	-	-	1 SS	0
		1/26/99	1.5	W/u	CT, MD	1 SHF 1 SHM	-	1 SH 1 ND	1 0
12	McKee Creek, from mouth to east-side tributary 0.2 miles upstream from Painter Creek, at private bridge crossing	12/20/98	0.6	W/u	GP	-	-	1 KS 1 possible	0 -
		1/25/99	0.6	W/u	GP	-	-	1 ND	0
13a+ 13b	Bridge Creek mainstem, from mouth up to major forks (confluence of Robertson Creek & West Fork Bridge Creek)	12/7/98	1.4	W/u	GP, CT	1 UNG	-	-	-
13a	Bridge Creek mainstem, from mouth up to beginning of gorge area	12/16/98	0.5	W/u	GP	-	-	1 KS	0
		1/6/99	0.5	W/u	CT	-	-	3 KS 1 possible	0 -
		1/25/99	0.5	W/u	GP	1 KSF	-	2 ND	0
13c	Robertson Creek (South Fork Bridge Creek), lower section up to West Fork Robertson Creek	12/7/98	0.25	W/u	GP, CT	1 KSF	-	1 KS	1
		12/16/98	0.25	W/u	GP	-	-	-	-
		1/6/99	0.25	W/u	CT	-	-	-	-
		1/25/99	0.25	W/u	GP	-	-	-	-

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Table 3 (continued from previous page)

Map Code No.	TRIBUTARY SURVEY REACHES (except Bear Creek) Location & Description	Survey Date (m/d/y)	Reach Length (miles)	Inventory Procedure (type/direction)	Survey Personnel	Live Fish Seen	Carcasses & Skeletons Examined	Fresh Redds & designation by species	
								total # redds	# occupied
13d	West Fork Bridge Creek, lower section up to old stringer bridge	12/7/98	0.15	W/u	GP, CT	-	-	-	-
		12/16/98	0.15	W/u	GP	-	-	-	-
		1/6/99	0.15	W/u	CT	-	-	-	-
		1/25/99	0.15	W/u	GP	-	-	1 ND	0
14a	Eubanks Creek, from Torbert's bridge up to about 0.15 miles above road crossing	12/10/98	1.4	W/u	CT, MD, AD	-	-	-	-
		1/28/99	1.4	W/u	CT, MD	-	-	1 ND	0
14b	Eubanks Creek, from mouth up to Torbert's bridge	12/17/98	0.65	W/d	GP, JWh	-	-	-	-
15	Big Finley Creek, from mouth to about 275 yards below major forks	12/17/98	0.6	W/u	GP, JWh	-	-	-	-
16a	Honeydew Creek mainstem, from mouth to upstream end of BLM parking areas	12/24/98	1.0	W/d	GP, JWh	-	-	1 KS 1 ND	0 0
16b	Honeydew Cr. mainstem, from Catalina/BLM boundary (0.8 miles above county bridge, & 0.8 miles below Lower E. Fk. Honeydew Creek) up to W. Fk. Honeydew Creek	12/11/98	2.3	W/u	GP, WZ	-	-	-	-
		12/19/98	2.3	W/u	GBe, DBa	-	-	-	-
16c	West Fork Honeydew Creek, from mouth to north-side tributary located 200 yards above former debris jam barrier	12/11/98	0.25	W/u	GP, WZ	-	-	-	-
		12/19/98	0.25	W/u	GBe, DBa	-	-	-	-
16d	Lower East Fork Honeydew Creek, from mouth to 0.2 miles upstream	12/11/98	0.2	W/u	GP, WZ	-	-	-	-
16e	Bear Trap Cr., from mouth up to impassable barrier (2 step falls/cascade, 12' & 6' high)	12/12/98	0.7	W/u	MR, JWh	-	-	-	-
		12/17/98	0.7	W/u	MR, JWa, EM	-	-	-	-
17a	Squaw Creek, from mouth to 1.3 miles upstream	1/6/99	1.3	W/u	GBe, DBr	2 SHX	-	-	-
17b	Squaw Cr., from Mozzetti access road (north edge of Sect. 7, T3S, R1W) to east-side tributary near boundary of BLM & Eel River Sawmills parcels (NE quarter of Sect. 8)	12/18/98	1.7	W/u	GP, WZ	-	-	1 KS 1 ND	0 0
18	Mill Creek (southwest of Petrolia), from mouth to uppermost log weirs	12/14/98	0.6	W/u	JV	-	-	-	-
		12/19/98	0.6	W/u	JV	-	-	-	-
SUMMARY & TOTALS: MATTOLE TRIBUTARY SURVEYS (except Bear Creek)									
0.9 miles surveyed four times, 5.4 miles surveyed three times, 7.35 miles surveyed twice, & 6.35 miles surveyed once in ten key tributaries of the Mattole River. 48 separate surveys, totaling 40.85 miles of stream walked.									
Surveys indicated very low utilization of tributaries by chinook (spawning documented only in Bridge Creek, & inferred in lower Honeydew, upper Squaw & McKee creeks). Thompson Creek was the only tributary where coho were seen (also Bear Creek; see Table 4). Nearly all live fish seen during surveys in late January were steelhead.									
						17 different surveyors participated	2 KSF 2 KSG 3 SSF 3 SSM 1c SSF 1 UNG 3 SHF 2 SHM 6 SHX	8 KS redds 3 SS redds 1 UN redd 5 SH redds 10 ND redds 4 possible redds	1 2 0 3 0 -

Key to Abbreviations:

W/u = wading upstream KS = king (chinook) salmon F = female
W/d = wading downstream SS = silver (coho) salmon M = male
UN = unknown if chinook or coho X = sex of fish undetermined
ND = species not determined G = grise (KS chub or SS jack). Grise are small male salmon returning to spawn at age 2. Chinook grise are males < 22" long; coho grise are males < 20" long.

c = carcass (recently dead fish, suitable for jaw tagging because head and body are relatively intact)
s = skeleton (pieces or parts of fish, not suitable for jaw tagging because head and body are not intact)

DBa = Drew Barber DD = Dylan Dulas GP = Gary D. Peterson MS = Marco Stanley JWa = Jennifer Walls
DBr = Dick Brown MD = Mickey Dulas MR = Maureen Roche CT = Campbell Thompson JWh = Jeremy Wheeler
GBe = Geoff Beyersdorf RG = Richard Gienger DS = David Simpson JV = John Vargo WZ = Willie Ziolkowski
AD = Alisa Dancer EM = Elizabeth McDonald

TABLE 4: Spawning Ground Surveys, Bear Creek, 1998-99 Season

Bear Creek is the third-largest tributary of the Mattole River (enters at river-mile 42.8, near Ettersburg)

Surveys conducted by the Mattole Salmon Group (phone 707-629-3660/3670; fax 707-629-3679; e-mail: salmon@humboldt.net). Primary funding provided by the Bureau of Land Management, Arcata Field Office (Cooperative Agreement 1422-B300-A7-1010, Task Order 002). Data compiled February 1999 by Gary D. Peterson, MSG fisheries biologist. **Key to abbreviations at bottom of page.**

Map Code No.	BEAR CR. SURVEY REACHES Location & Description	Survey Date (m/d/y)	Reach Length (miles)	Inventory Procedure (type/direction)	Survey Personnel	Live Fish Seen	Carcasses & Skeletons Examined	Fresh Redds & designation by species	
								total # redds	# occupied
19a	South Fork Bear Creek headwaters, from Day's (0.4 miles downstream from BLM's Nadelos Campground) up to Edwards' house	12/10/98	1.2	W/u	TD	-	-	-	-
		1/27/99	1.2	W/u	GP	-	-	2 ND	0
19b	South Fork Bear Creek, from confluence of Hidden Valley Creek (about 0.15 miles downstream from "tire pool" at Chermise Mountain Road culvert) up to Day's house	12/6/98	0.9	W/u	MR, TD	-	-	1 UN	0
		12/16/98	0.9	W/u	TD, LE	-	-	-	-
		12/31/98	0.9	W/u	TD	-	-	-	-
		1/28/99	0.9	W/u	GP, TD	2 SHF 2 SHM	-	1 SS 2 SH 3 ND 1 possible	0 2 0 -
19c	South Fork Bear Creek, from Shelter Cove Road up to Hidden Valley Creek	12/31/98	0.35	W/u	GM	-	-	-	-
19d	South Fork Bear Creek, from Marengi/Lingel bridge up to Shelter Cove Road ("Bear Creek pool")	12/8/98	1.7	W/u	CT, GBe	-	-	1 possible	-
		12/15/98	1.7	W/u	GM	-	-	-	-
		12/31/98	1.7	W/u	GM	2 SSG 3 SSX	-	-	-
		1/27/99	1.7	W/u	GM, RL	-	-	1 UN	0
19e	South Fork Bear Creek, from near BLM/Brown property line (where gradient steepens) up to Marengi/Lingel bridge	12/10/98	0.6	W/u	GM, GBr	-	-	-	-
		12/17/98	0.6	W/u	GBr	-	-	1 possible	-
		12/31/98	0.6	W/u	GBr	-	-	-	-
19f	South Fork Bear Creek, from trail access at BLM's Tolkan Campground up to Queen Mine Road crossing	12/9/98	1.75	W/u	GP, MR	-	-	-	-
		12/16/98	1.75	W/u	CT, MD	-	-	-	-
		12/31/98	1.75	W/u	GP	1 NDX	-	1 KS 1 ND	0 0
19h	South Fork Bear Creek, from about 0.5 miles upstream from Low Gap ski road down to old bridge site at Low Gap Creek (major west-side tributary located 0.4 miles south of BLM's Horse Mountain Campground)	12/10/98	0.95	W/d	GM, GBr	-	-	-	-
19g+ 19h+ 19i	South Fork Bear Creek, from trail access southeast of BLM's Horse Mountain Campground (0.2 miles downstream from old bridge site at Low Gap Creek) up to trail access at Tolkan Campground	1/1/99	2.0	W/u	CT	1 NDX	-	-	-
20	North Fork Bear Creek, from mouth to bridge at Horse Mountain Road (Kings Peak Road)	12/17/98	1.9	W/u	CT, AD	-	-	-	-
SUMMARY & TOTALS: BEAR CR. SURVEYS						0 KS		1 KS redd	0
2.6 miles surveyed four times, 2.35 miles surveyed three times, 2.15 miles surveyed twice, and 3.3 miles surveyed once in 8 different reaches in the Bear Creek watershed. 20 separate surveys, totaling 25.05 miles of stream walked.						2 SSG	No carcasses or skeletons seen	1 SS redd	0
Repeated surveys, concentrated in historically productive salmon habitat in South Fork Bear Creek, failed to detect any carcasses or live chinook. Only 5 live coho were seen (at Shelter Cove Road culvert). Lowest counts since the 1995-96 season.						3 SSX		2 UN redds	0
11 different surveyors participated						2 SHF		2 SH redds	2
						2 SHM		6 ND redds	0
						2 NDX	3 possible redds	-	

Key to Abbreviations:

W/u = wading upstream
W/d = wading downstream

KS = king (chinook) salmon
SS = silver (coho) salmon
UN = unknown if chinook or coho
ND = species not determined

F = female

M = male

X = sex of fish undetermined

G = grise (KS chub or SS jack).

Grise are small male salmon returning to spawn at age 2. Chinook grise are males < 22" long; coho grise are males < 20" long.

c = carcass (recently dead fish, suitable for jaw tagging because head and body are relatively intact)
s = skeleton (pieces or parts of fish, not suitable for jaw tagging because head and body are not intact)

GBe = Geoff Beyersdorf
GBr = Gene Brown
AD = Aisa Dancer

TD = Tim Day
MD = Mickey Dufas

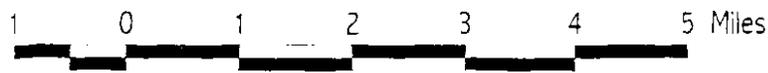
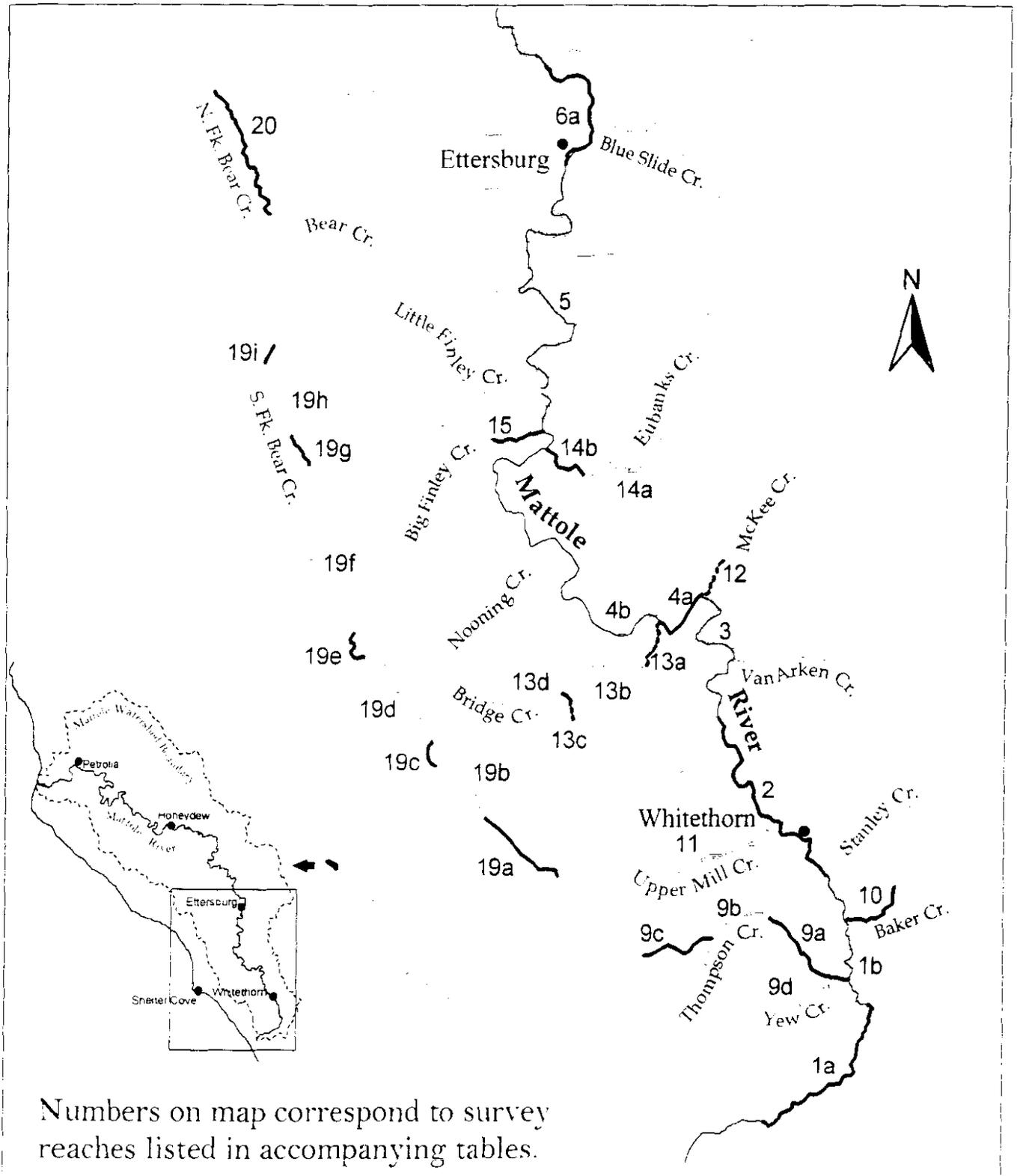
LE = Logan Edwards
RL = Ray Lingel

GM = Greg Mullins
GP = Gary D. Peterson

MR = Maureen Roche
CT = Campbell Thompson

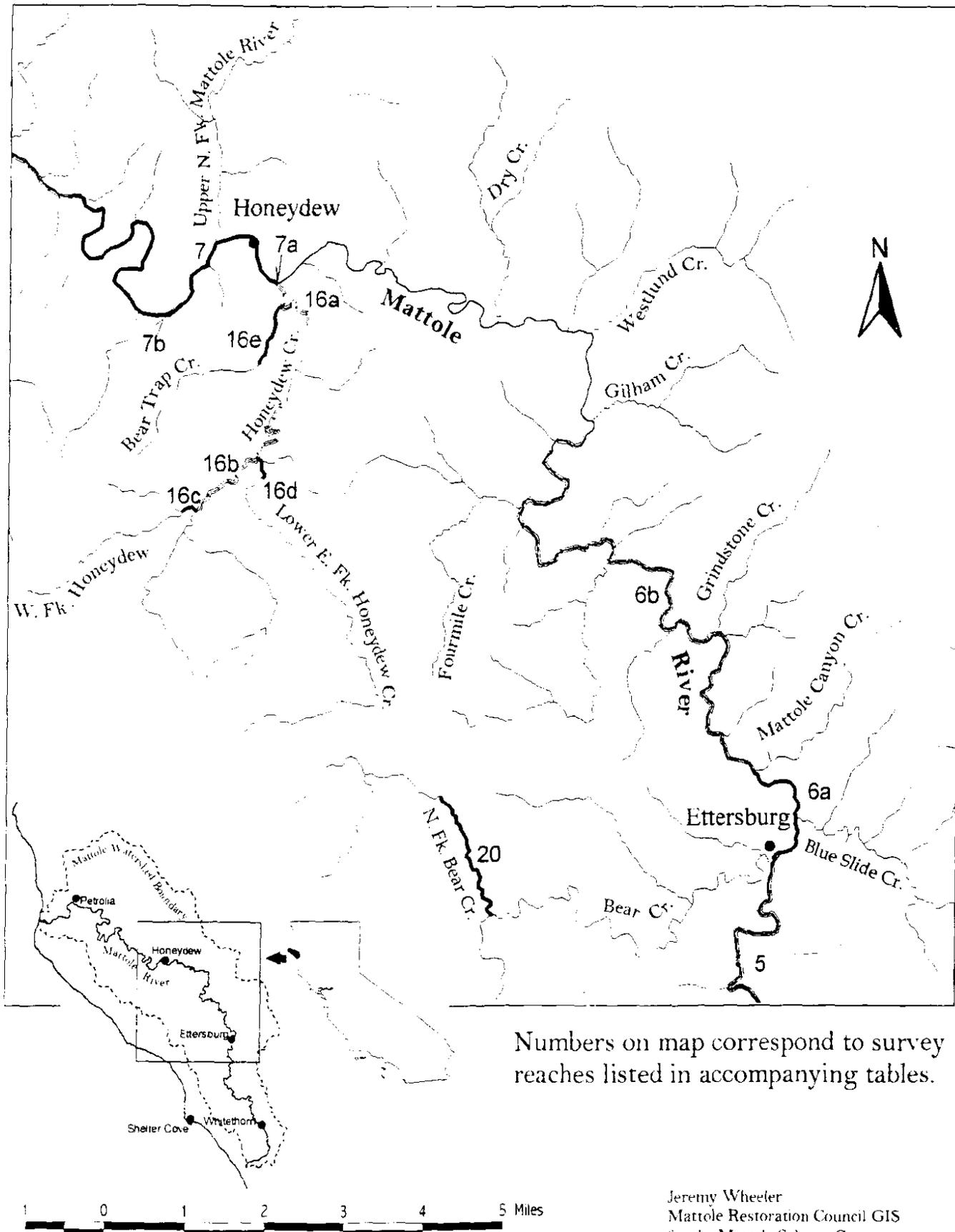
Spawning Ground Survey Reaches Mattole River Watershed 1998-99 Season

Map 1 of 3: Mattole headwaters to Ettersburg



Jeremy Wheeler
 Mattole Restoration Council GIS
 for the Mattole Salmon Group
 2/22/1999

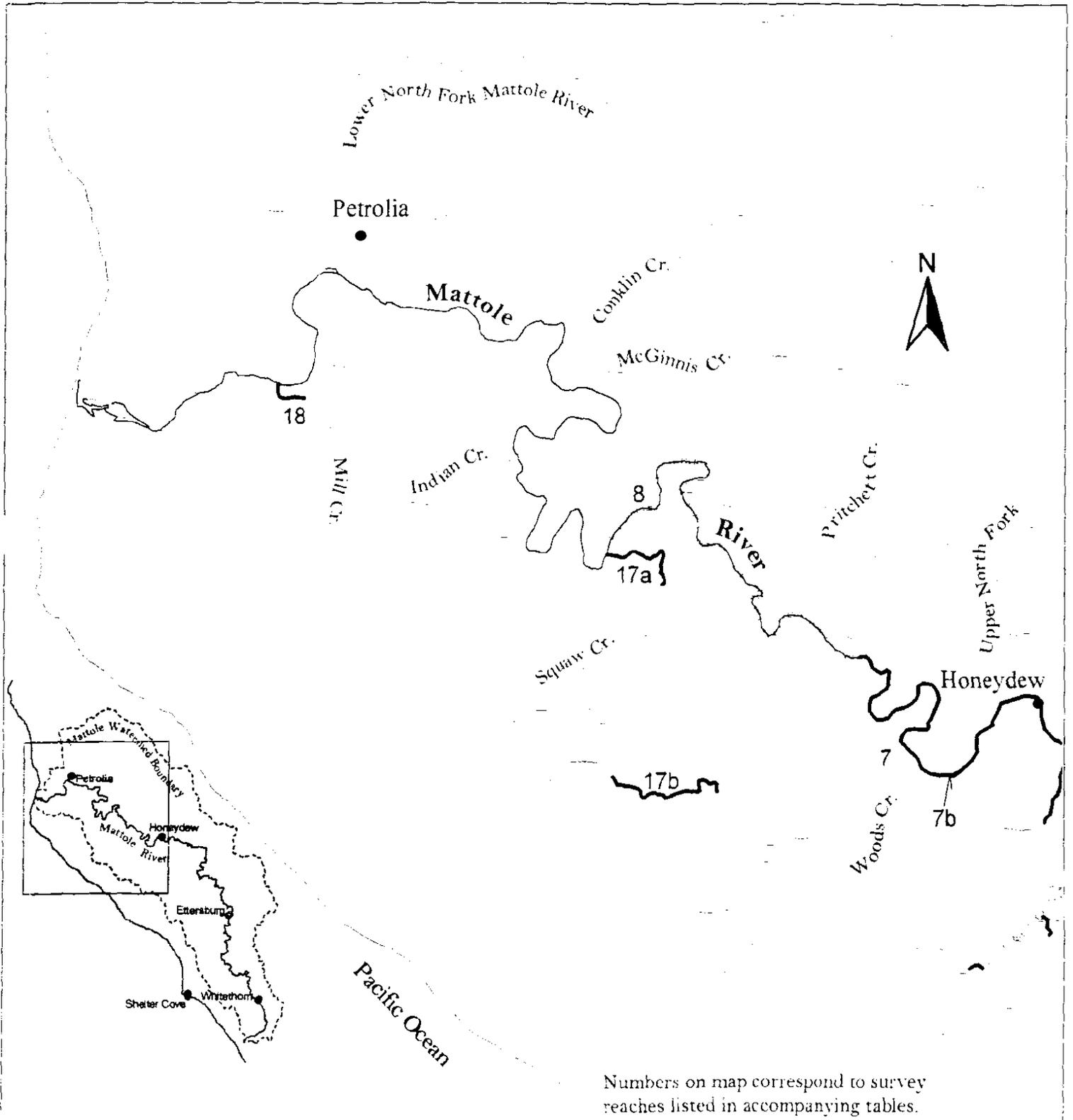
Spawning Ground Survey Reaches
 Mattole River Watershed
 1998-99 Season
 Map 2 of 3: Ettersburg to Honeydew



Numbers on map correspond to survey reaches listed in accompanying tables.

Jeremy Wheeler
 Mattole Restoration Council GIS
 for the Mattole Salmon Group
 2/22/1999

Spawning Ground Survey Reaches
Mattole River Watershed
1998-99 Season
Map 3 of 3: Honeydew to Pacific Ocean



Jeremy Wheeler
Mattole Restoration Council GIS
for the Mattole Salmon Group
2/22/1999

TABLE 5: Data summary for 1994-95 through 1998-99 seasons: Spawning ground surveys, Mattole River watershed

Spawning ground surveys in the Mattole, ongoing since the 1981-82 season, have focused primarily on assessments of fall-run chinook salmon. Survey effort, coverage and timing have varied somewhat from season to season, depending upon such factors as funding, availability of trained personnel, weather conditions and water visibility. Escapement Index (average number of redds per mile) was calculated as total redds divided by reach length. Surveys conducted by the Mattole Salmon Group (phone 707-629-3660/3670; fax 707-629-3679; e-mail: salmon@humboldt.net). Data summary prepared March 1999 by Gary D. Peterson, MSG fisheries biologist.

Survey Season & inclusive dates	Survey Reaches (results displayed for 6 mainstem segments, for Bear Creek, & as pooled data for all other Mattole tributaries)	Reach Length (miles)	Accumulated Survey Miles	Live Fish Seen					Carcasses & Skeletons					Number of Definite Redds					Escapement Index (ave. # of redds per mile)	
				KS	SS	UN	SH	ND	KS	SS	UN	SH	ND	KS	SS	UN	SH	ND		Total Redds
1994-95 11/14/94 to 1/23/95	Mattole headwaters index reach (Stanley Creek to Hulse Creek)	4.7	9.4	9	4	-	-	-	1	2	-	-	-	18	5	6	-	3	32	6.8
	upper mainstem, Whitethorn area to Thom Jct. (Stanley Cr. to McKee Cr.)	not surveyed																		
	upper mainstem, Thom Jct. index reach (McKee Cr. to "Raintree" area)	1.6	1.6	4	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3	1.9
	middle mainstem index reach above Ettersburg (Eubanks Cr. to Bear Cr.)	1.6	3.2	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	0.6
	middle mainstem below Ettersburg (Bear Creek to Honeydew Creek)	0.5	1.0	-	-	-	-	-	7	-	-	-	-	1	-	-	-	-	1	2.0
	lower mainstem Mattole River (downstream from Honeydew Creek)	0.6	0.6	15	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3	5.0
	tributaries (except Bear Creek)	9.8	11.8	2	3	-	2	-	2	1	-	-	-	11	10	3	2	-	26	2.7
	Bear Creek (enters Mattole River at Ettersburg)	7.6	11.4	-	-	-	-	-	-	-	-	-	-	3	-	1	-	-	4	0.5
	ALL REACHES COMBINED 1994-95 SEASON	26.4	39.4	32	7	-	2	-	10	3	-	-	-	40	15	10	2	3	70	2.7
1995-96 12/1/95 to 1/15/96	Mattole headwaters index reach (Stanley Creek to Hulse Creek)	4.7	9.4	6	3	-	-	-	-	-	-	-	-	7	2	-	-	4	13	2.8
	upper mainstem, Whitethorn area to Thom Jct. (Stanley Cr. to McKee Cr.)	4.1	4.1	3	-	-	2	-	-	-	-	-	-	1	-	-	1	-	2	0.5
	upper mainstem, Thom Jct. index reach (McKee Cr. to "Raintree" area)	2.1	4.2	11	-	-	-	-	1	-	-	-	-	3	-	-	-	-	3	1.4
	middle mainstem index reach above Ettersburg (Eubanks Cr. to Bear Cr.)	4.9	11.3	23	-	-	-	-	7	-	-	-	-	16	-	-	-	-	16	3.3
	middle mainstem below Ettersburg (Bear Creek to Honeydew Creek)	8.2	10.2	3	1	-	-	-	1	-	-	-	-	4	-	-	-	1	5	0.6
	lower mainstem Mattole River (downstream from Honeydew Creek)	4.0	4.0	28	-	-	-	6	2	-	-	-	-	1	-	-	-	-	1	0.3
	tributaries (except Bear Creek)	7.5	10.8	3	4	-	4	1	3	-	-	-	-	7	5	-	-	2	14	1.9
	Bear Creek (enters Mattole River at Ettersburg)	8.9	11.4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	1	1	0.1
	ALL REACHES COMBINED 1995-96 SEASON	44.4	65.4	77	8	-	9	7	14	-	-	-	-	39	7	-	1	8	55	1.2
1996-97 12/13/96 to 1/10/97	Mattole headwaters index reach (Stanley Creek to Hulse Creek)	4.7	10.2	33	8	2	-	-	27	1	1	-	1	51	2	1	-	9	63	13.4
	upper mainstem, Whitethorn area to Thom Jct. (Stanley Cr. to McKee Cr.)	not surveyed																		
	upper mainstem, Thom Jct. index reach (McKee Cr. to "Raintree" area)	1.6	3.2	3	-	-	-	-	2	-	-	-	-	11	-	-	-	-	11	6.9
	middle mainstem index reach above Ettersburg (Big Finley Cr. to Bear Cr.)	not surveyed																		
	middle mainstem below Ettersburg (Bear Creek to Honeydew Creek)	not surveyed																		
	lower mainstem Mattole River (downstream from Honeydew Creek)	not surveyed																		
	tributaries (except Bear Creek)	9.25	14.9	5	3	1	1	-	-	3	-	1	-	6	17	1	-	-	24	2.6
	Bear Creek (enters Mattole River at Ettersburg)	12.6	19.4	1	9	-	-	-	-	7	-	-	-	12	31	12	-	1	56	4.4
	ALL REACHES COMBINED 1996-97 SEASON	28.15	47.7	47	21	3	9	-	29	11	1	1	1	80	50	14	-	10	154	5.5

Table continued on following page

Table 5 (continued from previous page)

Survey Season & inclusive dates	Survey Reaches (results displayed for 6 mainstem segments for Bear Creek, & as pooled data for all other Mattole tributaries)	Reach Length (miles)	Accumulated Survey Miles	Live Fish Seen					Carcasses & Skeletons					Number of Definite Redds					Escapement Index (ave. # of redds per mile)	
				KS	SS	UN	SH	ND	KS	SS	UN	SH	ND	KS	SS	UN	SH	ND		Total Redds
1997-98 11/28/97 to 1/10/98	Mattole headwaters index reach (Stanley Creek to Hulse Creek)	4.7	18.8	8	9	4	-	-	1	3	-	-	-	27	12	14	-	9	62	13.2
	upper mainstem, Whitehorn area to Thom Jct. (Stanley Cr. to McKee Cr.)	not surveyed																		
	upper mainstem, Thom Jct. index reach (McKee Cr. to "Raintree" area)	1.6	6.4	2	-	1	-	-	2	-	-	-	-	6	-	-	-	-	6	3.8
	middle mainstem index reach above Ettersburg (Big Finley Cr. to Bear Cr.)	4.6	4.6	1	-	-	-	-	1	-	-	-	-	11	-	-	-	-	11	2.4
	middle mainstem below Ettersburg (Bear Creek to Honeydew Creek)	8.1	8.1	-	-	2	-	-	2	-	-	-	-	-	-	-	-	-	0	0.0
	lower mainstem Mattole River (downstream from Honeydew Creek)	not surveyed																		
	tributaries (except Bear Creek)	16.35	35.35	-	12	-	-	2	-	-	1	-	-	14	15	5	-	10	44	2.7
	Bear Creek (enters Mattole River at Ettersburg)	9.85	22.15	10	1	-	-	-	4	-	4	-	-	27	7	26	-	2	62	6.3
ALL REACHES COMBINED 1997-98 SEASON	45.2	95.4	21	22	9	-	2	10	3	5	-	-	85	34	45	-	21	185	4.1	
1998-99 12/4/98 to 1/29/99 (+ spot check on 2/11/99)	Mattole headwaters index reach (Stanley Creek to Hulse Creek)	4.7	18.8	7	2	2	3	-	2	2	-	-	-	8	4	7	3	6	28	6.0
	upper mainstem, Whitehorn area to Thom Jct. (Stanley Cr. to McKee Cr.)	4.3	8.6	1	-	-	3	-	2	2	-	-	-	1	-	6	1	1	9	2.1
	upper mainstem, Thom Jct. index reach (McKee Cr. to "Raintree" area)	1.6	5.5	8	1	2	8	-	1	-	-	-	-	1	-	-	-	1	2	1.3
	middle mainstem index reach above Ettersburg (Big Finley Cr. to Bear Cr.)	4.6	9.2	14	-	1	-	-	3	1	-	-	-	6	-	-	-	1	7	1.5
	middle mainstem below Ettersburg (Bear Creek to Honeydew Creek)	9.75	21.2	12	-	-	29	-	4	1	-	-	-	2	-	-	-	-	2	0.2
	lower mainstem Mattole River (downstream from Honeydew Creek)	11.5	11.8	1	-	-	8	-	-	-	-	-	-	-	-	-	-	-	0	0.0
	tributaries (except Bear Creek)	20.0	40.85	4	6	1	11	-	-	1	-	-	-	8	3	1	5	10	27	1.4
	Bear Creek (enters Mattole River at Ettersburg)	10.4	25.05	-	5	-	4	2	-	-	-	-	-	1	1	2	2	6	12	1.2
ALL REACHES COMBINED 1998-99 SEASON	66.85	141.0	47	14	6	66	2	13	7	-	-	-	27	8	16	11	25	87	1.3	

Key to Abbreviations:

KS = king (chinook) salmon

SS = silver (coho) salmon

UN = unknown if chinook or coho

SH = steelhead

ND = species not determined