

1998-99 CHINOOK AND COHO SPAWNING REPORT

LOWER TRINITY RANGER DISTRICT

SIX RIVERS NATIONAL FOREST

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AmeriCorps Watershed Stewards Project

Spawning surveys were conducted from late October 1998 through early February 1999 on Cedar, Horse Linto, Old Campbell (formerly Madden), Sharber/Peckham, and Willow creeks and South Fork Trinity River. AmeriCorps Watershed Stewards Project (WSP) members Becky L. Dutra and Sean A. Thomas were the primary surveyors and received assistance from experienced fisheries personnel and volunteers, including California Department of Fish and Game (CDFG) employees, Shasta-Trinity National Forest, Hayfork Ranger District (HRD) employees, National Resource Conservation Service (NRCS) employees and other WSP members. Spawning surveys and juvenile downstream migrant trapping (DSM) in the Horse Linto Watershed are performed under CDFG contract number FG-7350 IF and funded in part by a CDFG grant. Cedar, Horse Linto (Extended reach) and Willow creeks were surveyed weekly through early January 1999. However, Horse Linto (Index reach), Old Campbell, and Sharber/Peckham creeks were surveyed through the first week of February 1999 due to high numbers of fish continuing to spawn in these waters combined with low flows (Appendix A). Occasionally surveys were prevented due to inclement weather and subsequent high flows; they commenced again when water levels allowed surveyors to work safely and accurately.

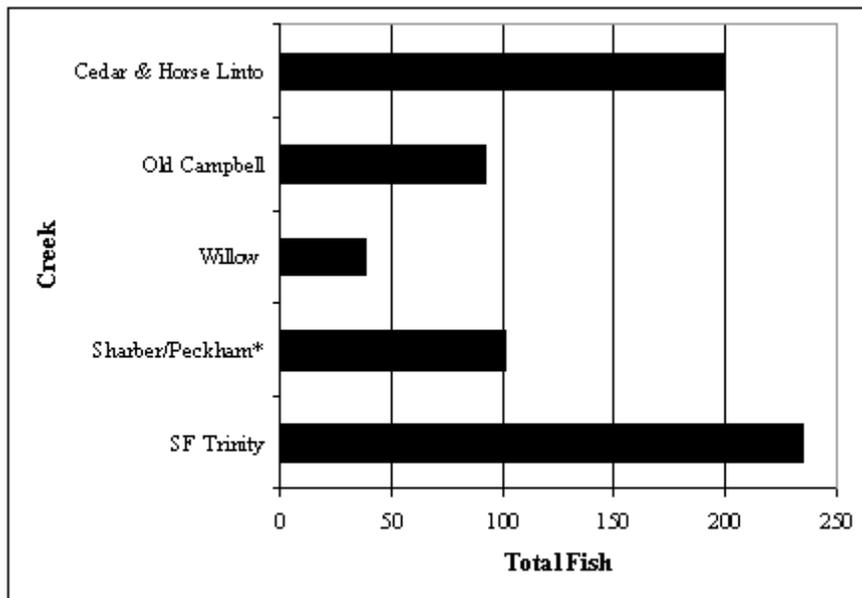
Several additional reaches were surveyed in the 1998-99 spawning season. SF Trinity River has been surveyed in the past by CDFG, however surveys on the lower eight miles were conducted this year by the Six Rivers National Forest, Lower Trinity Ranger District (LTRD). LTRD plans to continue these surveys on the SF Trinity annually if CDFG cannot. Also, an extra survey was performed on upper Horse Linto Creek to check for spawning activity above the Index reach. Finally, several surveys were performed on Sharber/Peckham Creek within the approximate 150-yard stretch between the mouth and the culvert, due to fish passage problems. These additional surveys will be discussed later in the report.

1998-99 Spawning Data

The primary species of anadromous fish observed in each survey stream, with the exception of Sharber/Peckham Creek, was chinook salmon (*Onchorhynchus tshawytscha*). Sharber/Peckham Creek supports mainly coho salmon (*Onchorhynchus kisutch*). In all streams except Sharber/Peckham Creek and SF Trinity River, fish habitat has been augmented in many places to enhance/mimic natural spawning sites. Redds found near an enhanced site are referred to as artificial, whereas redds found where no augmentation has occurred are said to be natural. Numbers of live fish were recorded for informational purposes only, as an indicator of fish activity. Using the CDFG recommended expansion of 2.25 fish per redd, the total number of fish in each watershed was calculated and the results are shown in Figure 1.

Figure 1

1998-99 estimated total number of salmon found per watershed on the Lower Trinity Ranger District based on CDFG expansion of 2.25 fish per redd.



*Coho salmon

Spawning survey effort has been relatively constant over the last eight years. However, 1998-99 surveys on Horse Linto (Index reach) and Old Campbell Creek extended past the time scope of past surveys. This extra effort would have skewed comparisons with other years. Accordingly, this data is not included in Table 1 or other comparisons within this report, but is shown in Appendix A as additional information. Survey reaches have been consistent and unaltered since 1991, with only a few exceptions. Please refer to Appendix B for dates and additional information on surveys conducted from 1991 to 1998. The total number of redds recorded from 1991 to 1998 on each survey stream are shown in Appendix C.

Horse Linto watershed spawning activity, which includes both Cedar and Horse Linto creeks, was the lowest since 1993 (Table 1 & Appendix C). This may be related to flooding which occurred in this watershed during the winter of 1994-95. As cited in the LTRD 1995 DSM final report, 103 salmon redds were counted in the Horse Linto watershed in the fall of 1994, which is not a low number. Subsequent DSM trapping in the spring of 1995 and direct observation dives found extremely low numbers of young of the year (YOY) chinook. A total of 113 YOY chinook and 1,606 YOY steelhead (*Oncorhynchus mykiss*) were captured in the trap. Either the redds were damaged by the extreme high flows or most of the fish left the stream before the trap was operational. Based on this data and the subsequent low returns, it seems likely that the flooding of 94-95 impacted the number of four-year-old salmon returning to the Horse Linto watershed during the 1998-99 season.

This was the final year returns were expected from the Horse Linto Hatchery. The five-year-old, 1993 brood year chinook were the last batch of fish released from the hatchery before its closure in 1994. The facility appears to have been successful at rebuilding fall chinook salmon returns in the short term. Future monitoring will help evaluate whether chinook populations can be maintained by wild production alone. Horse Linto Hatchery fish were 100% marked via adipose fin clipping and coded wire tags (CWT) when possible. The age component and hatchery component of the 1998 Horse Linto watershed run will be discussed in further detail later in this report. Despite the lower returning numbers of chinook during the 1998-99 season, habitat in the Horse Linto watershed continues to improve due to the combination of in-stream structures and natural recovery. Therefore, habitat condition is not thought to be a contributing factor to the lower returns seen this year. Table 1 shows the 1998-99 chinook spawning data for the Horse Linto watershed, as well as all other LTRD survey streams; this data is comparable with previous years.

As shown in Appendix A, on January 12, 1999 an additional survey on Horse Linto Creek was performed from the confluence with North Fork Horse Linto Creek downstream to station marker 14655 (terminus of the Index reach/14655 feet up from mouth), in order to count redds, collect carcass data and assess fish passage. This reach encompasses approximately 4.5 miles of fish habitat. Since this survey was performed after a two-week period of high flows in early December 1998, only spawning activity that occurred after that time could be detected. In total, ten redds were seen and no carcasses were found; this data is shown only in Appendix A, because it is not comparable with previous years. The redds were located in two separate bunches: five were seen in a section of the creek within T8N, R6E, S31 and the remaining five in S35. No barriers to fish passage were noted.

Table 1

1998-99 Lower Trinity Ranger District spawning survey totals for chinook salmon (*Oncorhynchus tshawytscha*) for comparison with previous years.

CREEK	LIVE FISH	CARCASSES				REDDS		
		F♀	M♂	U	TOTAL	NAT	ART	TOTAL
Cedar	57	16	1	3	20	34	2	36
HL Extended	28	8	3	2	13*	18	5	23
HL Index	28	1	2	1	4	22	8	30
Old Campbell	74	18	3	1	22*	28	13	41
Sharber/Peckham	1	1	2	3	6	1	0	1
Willow	29	6	2	10	18 ^α	14	3	17
SF Trinity	39	0	2	2	4	104	0	104

*Three carcasses could not be identified to species - assumed to be chinook.

^α Two carcasses could not be identified to species - assumed to be chinook.

Old Campbell Creek experienced the highest recorded spawning activity in the past decade during the 1998-99 spawning season (Table 1 & Appendix C). This increase in observed spawning activity may indicate that this watershed did not experience the same extent of flooding that other LTRD streams did during the winter storms of 1994-95. Surveys continued into February, unlike past years, due to the prolonged fish activity and these numbers are included only in Appendix A, because they are not comparable to previous years. It is important to note that in-stream enhancement work in Old Campbell Creek appears to be serving its intended purpose well. Many fish were observed utilizing pools and spawning gravel which were closely associated with structures placed in the creek within the past decade. Indeed, Old Campbell Creek exhibited the highest percentage of artificial-site redds of any other LTRD survey stream in 1998-99, with approximately one third of the redds located near augmented sites (Table 1). It seems likely then that the increased spawning activity in Old Campbell Creek in 1998-99 could also be attributed to fish habitat improvements from in-stream work and natural recovery. Old Campbell Creek also had the highest observed number of returning adult coho salmon of any other LTRD stream in 1998-99, with exception of the almost exclusively coho stream, Sharber/Peckham (Table 2).

Willow Creek high flows and chronic turbidity during the 1998-99 spawning season may have been factors (see Appendix A for surveys missed) in the lowest observed spawning activity in this creek since 1991 (Appendix C). However, survey efforts should have recorded the majority of redds. DSM data on Willow Creek for 1999 should indicate, to some extent, how accurate LTRD surveys were. DSM numbers in 1995 for YOY chinook in Willow Creek were very low apparently due to the flooding that occurred that winter in this and other watersheds. This flooding, as stated previously, may have affected the number of returning four-year-old chinook, thus contributing to the low spawning activity. Also, Willow Creek continues to be affected by sediment input, which is a consequence of its proximity to a major highway; this has been a chronic factor which probably limits both spawning and rearing. It is difficult to assess the affects of in-stream enhancement work on fish habitat within Willow Creek when juxtaposed with the on-going sediment problem.

Sharber/Peckham Creek is located just east of Salyer, California and is not well represented by current topographic maps. The majority of stream flow in the Sharber watershed reaches the Trinity River via Peckham Creek to the northeast. The mouth of the Sharber watershed probably switched between these two creeks more than once over geologic time, but past mining activity appears to have caused Peckham to recapture the Sharber flows. There is approximately one mile of perennial habitat available to anadromous fish which is located between station marker 2000 (2000 ft upstream of the mouth) and a waterfall barrier at approximately 10000. The majority of spawning occurs in a low gradient, braided, intermittent channel with abundant riparian vegetation between station markers 2000 and 4000. Some factors which may effect spawning are sedimentation, limited flow in the 2000-4000 stretch, the majority of which is dry in the summer, and a culvert on private land approximately 150 yards from the mouth. Both coho and chinook salmon spawn in Sharber/Peckham, however this creek is unique in the LTRD in that coho are found in much greater abundance. In fact, the 1998-99 spawning season, despite fish passage problems, had the greatest number of coho redds observed since surveys began in 1996 (Table 2).

In addition to the regular survey reaches on various braids between 2000-4000 of Sharber/Peckham Creek, surveys were performed between the culvert and the mouth from mid December 1998 until early February 1999 due to fish passage problems at the culvert (Appendix A). After several weeks of regular surveys it was discovered that the jump pool at the culvert was partially blocked by a large boulder and had been down-cut, which increased the jump height. Since the culvert would have been impassible at almost all flow conditions, only one redd was found above the culvert prior to the problem being identified. It was then found that thirteen redds were located in the 150 yard stretch between the culvert and the mouth. This area, which lies within the flood zone of the Trinity River, provides poor spawning and rearing habitat and it is believed that most YOY coho produced from these redds will not survive. After review from CDFG and the landowner, LTRD did a short-term modification of the stream to improve fish passage. Work was done to remove boulders from the jump pool and increase the pool-depth to jump-height ratio by placing logs at the downstream end of the pool. Within one week of completing the project, ten new redds were located above the culvert and no new redds

were ever recorded below it. It is believed that if this problem had been discovered and corrected earlier all redds would have been located above the culvert in better spawning and rearing habitat; for this reason, the thirteen redds found below the culvert are included in the data shown in Table 2. A grant is currently being written to obtain monies to remove the existing culvert and replace it with a bottomless arch culvert or bridge, which would permanently eliminate this fish passage problem.

Table 2
1998-99 Lower Trinity Ranger District spawning survey totals for coho salmon (*Oncorhynchus kisutch*).

CREEK	LIVE FISH	CARCASSES				REDDS		
		F♀	M♂	U	TOTAL	NAT	ART	TOTAL
Cedar	2	0	0	0	0	2*	2*	4
HL Extended	0	0	0	0	0	0	0	0
HL Index	0	0	0	0	0	0	0	0
Old Campbell	3	1	0	0	1	2	0	2
Sharber/Peckham	60	11	4	8	23 ^α	44	0	44
Willow	0	0	0	0	0	0	0	0
SF Trinity	0	1	0	0	1	0	0	0

*Believed to be coho salmon redds; however no fish were observed at site to verify.

^α One carcass could not be identified to species – assumed to be coho.

Tissue taken from all coho carcasses found along Sharber/Peckham Creek during the 1998-99 season was sent to Bodega Bay Marine Lab for DNA analysis. Kate Buckland, a graduate student from UC Davis, and her co-worker, Jeanne Robertson performed DNA analysis on these tissue samples to verify the species of each fish as well as address other genetic questions. Seven carcasses had been eaten/decomposed to a point that made species identification impossible in the field. Three of these carcasses appeared to possess characteristics of both coho and chinook salmon and this raised the question of possible hybridization. Results of the DNA analysis established that of the three possible hybrids, two were coho and one was chinook. No evidence of hybridization was found. The DNA analysis also found that out of the four remaining unidentifiable carcasses, two were coho, one was chinook and one was unable to be identified due to degraded DNA (^α note, Table 2). Ms. Buckland and Ms. Robertson will continue DNA analysis on all tissue samples to determine to what extent, if at all, these fish belong to a genetically unique

stock (see the discussion about coho under the Hatchery Component of Spawners section).

SF Trinity River surveys were done weekly with inflatable kayaks from the low water bridge (road 5N38), at river mile (RM) 8.25 to the confluence with the Trinity River through late November 1998, at which time high water levels and turbidity made surveying impossible (Appendix A). Refer to Table 1 for 1998-99 chinook spawning activity on the SF Trinity River. This lower reach was selected due to ease of access as well as past observation of high spawning activity. Two people using one kayak conducted the majority of surveys. However, surveys were more thorough when two kayaks were used. Redds were easily identified in the river, so it is believed that the redds recorded up to the time surveys ended is accurate. When redds were located, surveyors pulled to the bank to examine the site and record data. River width and pool depth made collecting and recording carcasses and live fish difficult; it may be that many of these fish were missed due to these factors.

The SF Trinity is also known to support high concentrations of spawning upstream between Grouse Creek and Hayfork Creek. To estimate fall chinook spawning activity on this upper reach, three additional SF Trinity surveys were done in conjunction with NRCS and HRD employees on November 20, 1998 (Appendix A). B. Dutra and S. Thomas performed one survey on foot between the mouth of Grouse Creek, at RM 18.75 and the Mule Bridge (road 4N50), at RM 20.25. Three live fish, one carcass and two redds were located during this survey. High predation by bear and river otter was in evidence on this survey. Chris James, HRD Fish Biologist, floated from Big Slide, at RM 25.0, to Mule Bridge and recorded a total of nine redds and twelve live fish. The final survey was done by NRCS Fish Biologist Tim Viel, who covered Hayfork Creek, at RM 30.0, to Big Slide by boat and noted a total of thirty-three redds. In total, forty-four redds and fifteen live fish were observed along this upper reach of the river. Data from these surveys is included in Table 1 and shown specifically in Appendix A. LTRD desired to collect more data on this upper reach of the SF Trinity, but did not have the time or sufficient personnel.

Coho Comparisons

Our surveyors observed coho in five of six streams in 1998-99 (Appendix A). However, coho carcasses were recovered, thus verifiable, in Old Campbell Creek, Sharber/Peckham Creek and SF Trinity River (Appendix A). In all creeks surveyed, with exception of Sharber/Peckham Creek, only five redds were positively attributed to coho salmon because coho were seen directly on or working these redds. Four of these five redds were located on Old Campbell Creek (Table 2). Also, two coho were observed working one redd in Horse Linto (Index reach) during the second week in January, however this data fell outside the established survey time window and is shown only in Appendix A. The determination of a coho redd, if live fish were absent, was based on the combination of

when the redd was found (i.e. late in season) and different geometry (i.e. deep pit, tall tail and relatively small area) (*note, Table 2).

It is interesting to note the differences and similarities in habitat where coho were found during the 1998-99 season. Old Campbell Creek has the highest gradient of all other LTRD survey streams whereas, Sharber/Peckham has the lowest gradient. The flow velocity in Old Campbell is much greater than in Sharber and it has many deep pools, step runs and cascades that are associated with a higher gradient stream. Sharber/Peckham Creek provides much less deep pool habitat, however it has many highly vegetated undercut banks, which are good refugia for YOY coho. Most significantly, these two streams are common in their relatively low temperature range throughout the year. With the exception of Cedar Creek, Old Campbell and Sharber/Peckham creeks have the lowest average summer temperature readings of any other LTRD survey stream. In 1998 Sharber/Peckham had the lowest average summer temperature of approximately 57°F and Old Campbell was a close third at approximately 60°F.

Hatchery Component of Spawners

Heads from carcasses that possessed an adipose-fin-clip were collected by LTRD spawning crews in order to recover CWTs. The 1998-99 sample size of CWTs was very small. Only fifteen CWTs were recovered out of seventeen adipose-fin-clipped fish found. One CWT was lost during recovery lowering the total number of CWTs to fourteen (Table 3). The heads were processed by LTRD personnel at the Hoopa Valley Tribal Fisheries office in Hoopa, CA. All CWTs were read by B. Dutra with assistance by S. Thomas and Hoopa Tribal Fisheries staff and were double-checked by Bill Jong at the CDFG office in Arcata, CA.

The CWTs recovered during the 1998-99 season were mostly from Horse Linto Hatchery fish (Table 3). As stated before, Horse Linto Hatchery fish were 100% ad-clipped/tagged when possible. This year a total of eleven CWTs were recovered from five-year-old, 1993 brood year, Horse Linto Hatchery chinook (#062928) (Table 3). One chinook from the Horse Linto Hatchery was found in Willow Creek and the remaining were found within the Horse Linto watershed (Table 3). Three CWTs from off-district strays were found in Old Campbell Creek (Tables 3 & 4). Out of the three strays, one was a three-year-old, spawned, female coho salmon from Rock Creek Hatchery (#091811), located on the North Fork Umpqua River in Oregon (Table 4). The remaining two strays included a three-year-old, spawned, female chinook from the Trinity River Hatchery (#065226) and a four-year-old, spawned, male chinook from the Prairie Creek Hatchery (#0601050104), a tributary of Redwood Creek (Table 4). Three off-district strays were also found in the 1997-98 spawning season.

Table 3

1998-99 Coded Wire Tag recoveries & Right maxillary clips on the Lower Trinity Ranger District

CREEK	CODED WIRE TAGS				RGT MAX CLIP
	#062928	#0601050104	#065226	#091811*	
Cedar	8				
HL Extended	1				
HL Index	1				
Old Campbell		1	1	1*	1*
Sharber/Peckham					7*
Willow	1				
SF Trinity					1*

*Coho salmon

Table 4

Information from Coded Wire Tags recovered on the Lower Trinity Ranger District in 1998-99

RELEASE INFO	CODED WIRE TAGS			
	#062928	#0601050104	#065226	#091811*
State	CA	CA	CA	OR
System	Klamath River	Redwood Creek	Klamath River	Umpqua River
Hatchery	Horse Linto	Prairie Creek	Trinity River	Rock Creek
Brood Year	1993	1994	1995	1995
Release Date	11/04/94	7/01 – 7/03/95	10/01 – 10/07/96	4/04/97

*Coho salmon

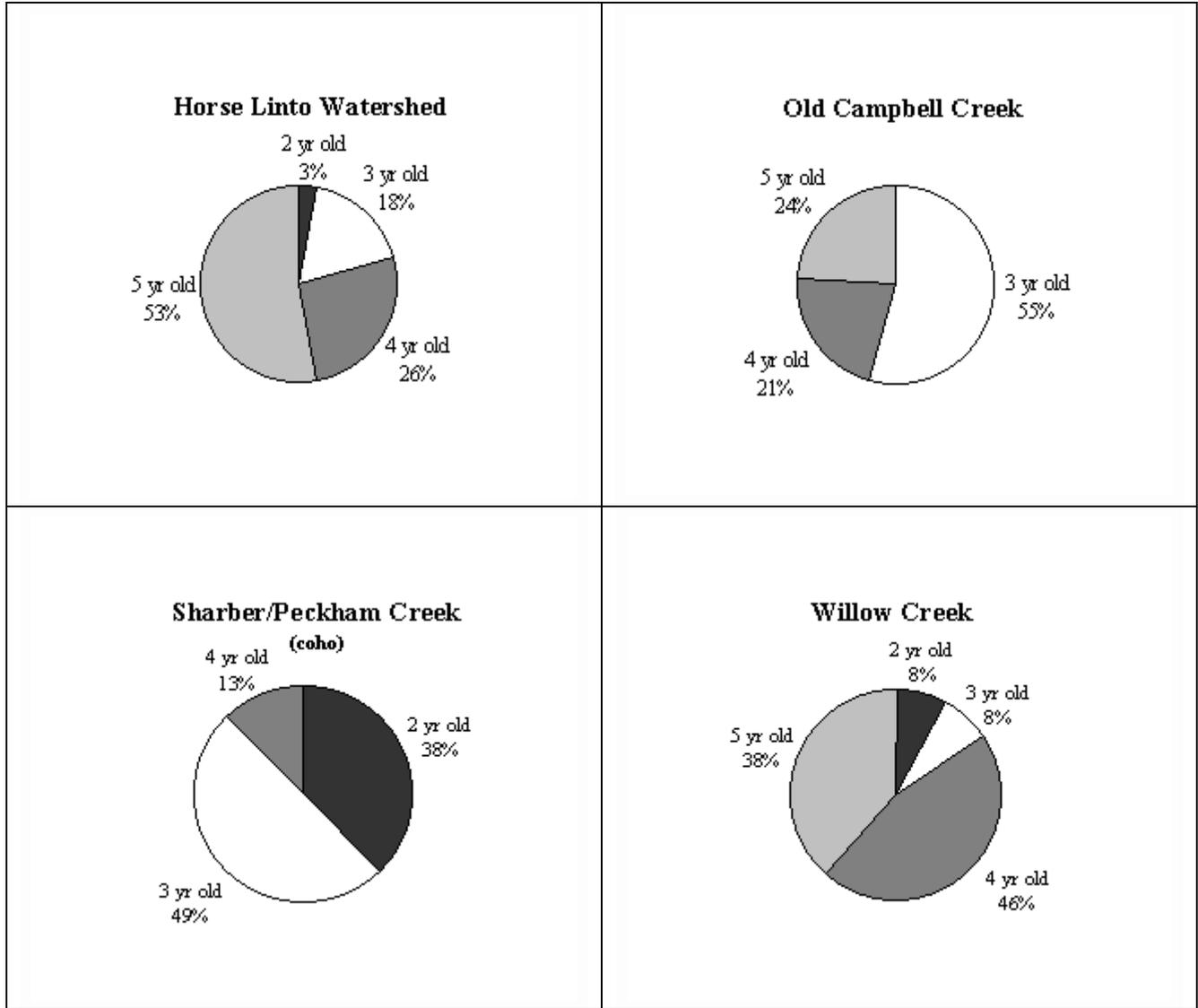
Coho strays from the Trinity River Hatchery appeared to comprise a large percentage of the run in Sharber/Peckham Creek and elsewhere during the 1998-99 season. Out of twenty three carcasses retrieved in Sharber/Peckham, eleven had intact heads, seven of which (64%) were found to be right maxillary clipped and thus of Trinity River Hatchery origin (Table 3). All three coho carcasses recovered in SF Trinity River and Old Campbell Creek were hatchery fish. Based on this data, it seems probable that the coho gene pool in the LTRD reflects the addition of hatchery genetics. Also, Sharber/Peckham may have been planted with coho by CDFG in the mid 1980's, but records are unclear about whether this actually occurred. Anecdotal evidence from local residents suggests that coho were present in this creek before the supposed stocking.

Age Component of Spawners

Scales were collected from a total of 111 carcasses retrieved from all survey streams (Appendix B). B. Dutra and S. Thomas mounted all the readable scales at the Hoopa Tribal Fisheries Office. These scales were then aged by readers in the Yurok Tribal Fisheries Program and in part by readers at the Hoopa Tribal Fisheries Department. The age class components were calculated as a percentage of the total carcass sample size for each watershed and are presented in Figure 2 on page nine. Aging accuracy was an issue with all LTRD scale samples. Based on a sample size of thirteen fish with both a CWT (known age) and scales, Yurok readers aged eleven fish correctly (at least two of three readers aged correctly) and two incorrectly (two or more readers aged incorrectly) for an accuracy of 85%. Only two Yurok readers read all coho scales, thus age class percentages for Sharber/Peckham Creek are based on a small sample size of sixteen fish, all of which the two readers' ages agreed. Scale sample sizes for each watershed were small with Old Campbell at thirty-three fish, Horse Linto, thirty-four and Willow, thirteen. These small sample sizes should serve as a caution when viewing and making assumptions about the given runs in Figure 2; this data is for general information purposes only. The scale data showed varying growth realized for each of the age classes recovered. In some cases as much as a ten-inch difference in fork-length per age class was noted. Also, there were a noticeably high percentage of five-year-olds returns (Figure 2). In fact, 1998-99 found the largest return of five-year-olds to date even though, four-year-old returns were depressed by flooding in 1995 possibly giving the false impression of a greater percentage of five-year-old returns, and the 1998-99 season experienced one of the smallest runs of the decade (Appendix C). It is not known why a greater number of fish held over in the ocean an additional year before returning to spawn. These growth and migration observations may be attributed to the El Nino event that occurred in 1997-98.

Figure 2

1998-99 age class percentages of spawning salmon per watershed on the Lower Trinity Ranger District as calculated from scale samples



Appendix A

1998-99 Spawning Survey Summaries on the Lower Trinity Ranger District

Cedar Creek

REACH	DATE	LIVE FISH	CARCASSES	REDDS
0 - 15000	11/03/98	4	0	3
0 - 15000	11/10/98	7	0	2
0 - 15000	12/07/98	23/2*	0	8
0 - 15000	12/15/98	13	1	10
0 - 15000	12/23/98	5	11	4
0 - 15000	12/30/98	5	6	7
0 - 15000	01/06/99	0	2	2/4*
TOTALS	7 Survey Days	57/2*		36/4*

*Coho salmon

Horse Linto Creek (Extended)

REACH	DATE	LIVE FISH	CARCASSES	REDDS
0 - 4500	10/29/98	0	0	1
0 - 4500	11/09/98	3	0	1
0 - 4500	11/16/98	0	0	0
0 - 4500	12/09/98	15	2	5
0 - 4500	12/17/98	7	2	8
0 - 4500	12/22/98	0	5	3
0 - 4500	12/29/98	2	0	2
0 - 4500	01/05/99	1	4	3
TOTALS	8 Survey Days			

Horse Linto Creek (Index)

REACH	DATE	LIVE FISH	CARCASSES	REDDS
4500 – 14700	11/03/98	0	0	2
4500 – 14700	11/10/98	0	0	3
4500 - 14700	11/16/98	1	0	2
4500 - 14700	12/07/98	13	1	2
4500 - 12600	12/15/98	2	1	2
4500 - 11000	12/21/98	0	1	1
4500 - 14000	12/28/98	5	1	5
4500 - 14700	01/04/99	7	0	13
TOTALS	8 Survey Days			
--Data below is outside the time scope of past surveys--				
4500 – 14100	01/12/99	5/2*	1	8/1*
4500 – 12000	02/04/99	0	0	0
TOTALS	10 Survey Days	33/2*		38/1*

*Coho salmon

Horse Linto Creek (North Fork to Index)

REACH	DATE	LIVE FISH	CARCASSES	REDDS
14655 – NF	01/12/98	0	0	10
TOTALS	1 Survey Day	0	0	10

Old Campbell Creek

REACH	DATE	LIVE FISH	CARCASSES	REDDS
0 – 6000	10/29/98	0	0	0
0 – 5000	11/09/98	0	0	0
0 – 5000	11/17/98	0	0	0
0 – 5600	12/10/98 α	37/2*	5	18/1*
0 – 6750	12/21/98	14/1*	7	14/1*

0 – 6750	12/30/98	12	4/1*	3
0 – 6200	01/06/99	11	6	6
TOTALS	7 Survey Days	74/3*	22/1*	41/2*
--Data below is outside the time scope of past surveys--				
0 – 5000	01/14/99	5/4*	13/1*	7/2*
0 – 5000	02/04/99	0	1	0
TOTALS	9 Survey Days	79/7*	36/2*	48/4*

*Coho salmon

^a Combined CDFG & LTRD survey

Sharber/Peckham Creek (Coho)

REACH^β	DATE	LIVE FISH	CARCASSES	REDDS
2300 – 4100	12/01/98 ^α	0	0	0
2300 – 4100	12/08/98 ^α	0	0	0
0 – 4100	12/16/98 ^α	20	1/2*	14
0 – 300	12/20/98	0	4	0
300 – 4300	12/22/98	0	0	2
0 – 4300	12/31/98	20/1*	1*	9/1*
0 – Falls	01/08/99	5	7	6
0 – Falls	01/13/99	5	3/1*	3
0 – Falls	01/20/99 ^α	7	0	0
1800 – 4100	01/26/99	3	8/2*	8
2000 – 4100	02/04/99	0	0	2
TOTALS	11 Survey Days	60/1*	23/6*	44/1*

*Chinook salmon

^α Combined CDFG & LTRD survey

^β Includes both Trib A and Trib B, with exception of 12/20/98.

Willow Creek

REACH	DATE	LIVE FISH	CARCASSES	REDDS
0 – 8100	10/16/98	0	0	0
0 – 8100	10/22/98	0	0	0
0 – 8100	10/28/98	2	0	0
0 – 10800	11/02/98	3	1	3
0 – 10020	11/09/98	2	1	1
0 – 10020	11/20/98	18	0	6
0 – 10000	12/17/98	1	7	6
0 – 9450	12/29/98	3	9	1
TOTALS	8 Survey Days			

South Fork Trinity River (Lower reach)

REACH	DATE	LIVE FISH	CARCASSES	REDDS
0 – 8.25mi	10/14/98	2	0	0
0 – 8.25mi	10/20/98	3	0	3
0 – 8.25mi	10/27/98	16	0	11
1.0 – 8.25mi	11/04/98	10	1	27
0 – 1.0mi	11/05/98	2	1*	9
1.0 – 1.5mi	11/09/98 ^α	0	1	0
0 – 8.25mi	11/12/98	6	0	10
1.0 – 1.5mi	11/17/98 ^α	0	1	0
TOTALS	8 Survey Days	39	3/1*	60

*Coho salmon

^α Survey done on foot.

South Fork Trinity River (Upper reach)

REACH	DATE	LIVE FISH	CARCASSES	REDDS
18.75 – 20.25mi	11/20/98 ^a	3	1	2
20.25 – 25.0mi	11/20/98*	12	0	9
25.0 – 30.0mi	11/20/98*	0	0	33
TOTALS	1 Survey Day			

*Surveys focused on redd counts only and performed by HRD and NRCS.

^a Survey done on foot.

Appendix C

Redd Totals per Creek from 1991 to 1998 for the Lower Trinity Ranger District

Sharber/Peckham Creek and SF Trinity River are not included in this appendix because formal surveys have not been conducted enough years to show significant spawning trends.

