STEELHEAD SPAWNING SURVEYS, WHEATFIELD FORK AND OTHER SELECTED REACHES, GUALALA RIVER, CALIFORNIA, 2002

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L/R: Debris dam (non-barrier), Haupt Creek; Summer dam (low-flow barrier), House Creek; Coniferous forest/oak woodland conversions to vineyards; watershed erosion impacts, typically from roads, vineyards, grazing and logging.

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ABSTRACT

Because of a dearth of current information on population status of steelhead in the Gualala River, steelhead spawning surveys (counts of adults and redds) initiated in 2001 were continued in 2002, focusing on an 18.3-mile reach of the Wheatfield Fork, from House Creek downstream to the South Fork. This navigable reach, which is proposed as a population indexing reach, was surveyed a total of eight times (146.4 miles total) from small, river-dory style boats during February 2-April 19, 2002. Totals of 377 live adult steelhead and 145 steelhead redds were recorded, suggesting a total spawning escapement for this portion of the watershed of at least several hundred fish. A substantial, but unknown, amount of spawning likely also occurred upstream of the index reach, due to high-flow conditions which prevailed early in the spawning season. Spawning was well-distributed both temporally and spatially within the index reach. Tracking of 74 of the index-reach redds over multiple surveys showed that discernability was often as short as 1 week and that even in the absence of high stream flows, most redds became non-discernable within 3-4 weeks. The relatively low discernability periods are likely due to the high degree of coarse bedload mobilization which occurs along the index reach, a relatively large, fourth-order mainstem section of the river. Discernability results indicated that to avoid missing significant numbers of redds, redd surveys of the index reach should be conducted at least weekly (with extensions to a maximum of bi-weekly). Also, preliminary findings with regard to observer variation in redd detection and identification, suggested the need for surveys to be conducted in two-person teams composed of well-trained and experienced observers. Preliminary findings also suggested that confusion and misidentification of steelhead and lamprey redds may be an important confounding factor in surveys along the index reach. However, if index-reach survey results are appropriately evaluated in light of precipitation and river hydrograph, they may provide a useful means of monitoring gross changes and trends in the steelhead population of the survey-area, if not the watershed. Miscellaneous, one-time surveys of several other Gualala River reaches are also reported. All of the index-reach surveys and miscellaneous surveys are detailed in individual survey reports which are appended.

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INTRODUCTION AND BACKGROUND

As with other California coastal rivers, steelhead populations of the Gualala River are depressed due to long-term aquatic habitat degradation which began with the modern era of development in the mid-1800s. Consequently, the Northern California Evolutionarily Significant Unit (ESU) of steelhead, which occurs in the Gualala River, was listed as a threatened species under the Federal Endangered Species Act (ESA) in June 2000. Earlier, in October 1996, the Central California Coast ESU of coho salmon, which also was once common in the Gualala River, was federally-listed as threatened.

Today, fishery restoration efforts and intensive watershed analyses have been undertaken on the Gualala and other impaired coastal watersheds which historically supported one or both of these anadromous salmonids. There is broad agreement that these efforts must include fisheries monitoring. Monitoring is needed not only to judge present fishery status and effectiveness of restoration actions, but also to facilitate adaptive management for improving effectiveness of restoration measures. Monitoring is also important to gage when "recovery" of a listed species has been achieved, so that ESA de-listing may be undertaken.

Monitoring may focus on either measurement of habitat components and attributes which are known to be directly related to fish carrying capacity, or on actual enumeration of fish during one or more of their life stages. A combination of both approaches provides the ideal monitoring regime.

Monitoring of steelhead populations on the Gualala must begin anew, since there have been no consistent monitoring efforts in the past and relatively little is known about past or present population status. The California Department of Fish and Game (CDFG) conducted limited monitoring in the 1960s and 1970s. For example, in the 1960s, CDFG estimated the adult steelhead return on the Gualala at 16,000 fish (*in* NOAA 2001). A decade later, Boydstun of CDFG (*in* Higgins 1997) used a mark-recapture study to estimate an adult steelhead return of 7,608 fish and 6,300 fish, during 1974-75 and 1975-76, respectively. More recently, in 1995 in association with the pending listing of steelhead under the ESA, Cramer et al. (1995) gave their "best professional judgement" that the adult steelhead return supportable on the Gualala system was 200-500 fish.

Partly in response to the dearth of current information, I initiated surveys of spawning steelhead on the river during 2001 (DeHaven 2001). A total of 169 steelhead redds were found along 57 miles of potential spawning habitat surveyed once during the latter half (February-April) of the spawning season. In addition, a total of 99 live adult steelhead and five steelhead carcasses were counted. My 2001 results indicated that the Wheatfield Fork of the river, from the South Fork upstream, was an important spawning area.

During 2002, I continued the spawning surveys, focusing mainly on one 18.3-mile reach along the Wheatfield Fork. This reach, which I propose to use as a long-term spawning population index route, was surveyed multiple times during the 2002 season. In addition, several other

reaches of the Gualala River were surveyed once during the 2002 season. This report presents the results and findings from all of my 2002 surveys.

My short-term goal is to develop a standardized spawning population index survey route (and methods) for running annually along the Gualala system. My long-term objective is to generate index data that is of use in tracking gross changes and trends in the river's steelhead spawning escapement.

METHODS

Based on my 2001 findings (DeHaven 2001) and several trial surveys early in the 2002 season, one contiguous 18.3-mile reach of the Wheatfield Fork, extending from House Creek downstream to the South Fork, was selected for multiple in-season surveys. This potential spawning population index reach is navigable and all surveys of it were conducted from small, river-dory style boats. There is good boating access at both the starting (House Creek) and ending (South Fork) locations. In addition, the Annapolis Road bridge, where there is also good boating access, divides the overall reach into two roughly equal sub-reaches of 8.9 miles (upstream section) and 9.4 miles (downstream section). Each of these sub-reaches can easily be surveyed in 1 day. Under high-flow conditions, the entire 18.3-mile reach can be surveyed in 1 long day.

This index reach was surveyed as soon as possible after each significant rainfall runoff event. The river was only considered surveyable if, under favorable lighting conditions with minimal surface turbulence, the bottoms of the deepest pools could all be clearly seen while floating over them.

Surveys were usually completed by one observer (myself) in one boat, but on a few occasions two observers traveled together in two small boats, so that observer variability and accuracy could be evaluated. Observers generally wore polarized sunglasses and baseball-style caps to reduce glare and improve in-water visibility.

While floating over pools and other potential steelhead resting and hiding cover, the observer stood up in the boat and searched for any live, adult steelhead (the only adult salmonid species observed this season). When an adult was seen, its status (fresh or spent) was determined if possible. While floating over or near potential spawning substrates (including all pool tail-outs and other suitable areas), the observer stood up in the boat and searched for any spawning adults and substrate excavations. Such excavations were generally indicated as a depression with lighter color substrate (due to periphyton dislodged from the cobble and gravel) compared to surrounding substrate. Care was taken not to confuse any natural excavations caused by roughness elements, such as rocks and woody debris, with excavations made by fish.

Each excavated area was carefully examined (by stopping, when necessary) and classified as either: (1) a test area (based on the anthropomorphically-derived assumption that a steelhead or

lamprey may first "test" certain areas for spawning suitability, before actually spawning); (2) a steelhead redd (in any stage of completion); (3) an unknown redd; or (4) a lamprey redd.

Based on my experience and the literature, lamprey redds were assumed to be relatively neat and round in appearance, often with a conical bowl and tailings placed upstream and/or to the sides. Multiple lamprey redds together were generally assumed to be wider than long, with small conical bowls scattered throughout. Steelhead redds, on the other hand, were assumed to generally be longer than wide, with tailings evenly distributed downstream with the current. Coho salmon and chinook salmon redds were assumed to be absent (and thus not a potential confounding factor), due to: (1) no adults of either of these two species being seen during either the 2001 or 2002 field work; (2) the relatively late-season starting date (February 2) of 2002 surveys, which would have generally been well after any coho or chinook spawning windows; (3) season-high flows occurring just prior to the February 2, 2002 starting date, which would have made any coho or chinook redds indiscernible (*see* discernability results and discussion); and (4) the very low likelihood, based on other recent accumulated evidence (*see* KRIS Gualala website) that either of these two species presently has any viable spawning escapement in the Wheatfield Fork of the river or elsewhere in the Gualala system, for that matter.

Each redd, which in the observer's best judgement was a steelhead redd, was counted when first found and monitored during subsequent surveys. Each redd was uniquely marked with a piece of engineer's flagging tied to stream-side riparian vegetation. The distance and direction from the flagging to the center of the deepest portion of the excavated pit area of the redd was recorded to within ± 2 feet; this allowed the same redd to be monitored for discernability on subsequent surveys. Once a redd was no longer discernable (i.e., the survey on which it would not have been found and/or correctly identified, if being seen for the first time) during a subsequent survey, the flagging was removed and the redd was deleted from the monitoring.

In addition to the multiple surveys of the index reach by boat, a few additional spawning surveys were conducted elsewhere on the Gualala system, either by boat or on foot. These miscellaneous surveys generally followed the same protocols used for the boat surveys of the index reach, except that most of the redds were not flagged and monitored

During all boat and foot surveys, care was taken to avoid stepping on or near either the pit or the tailings areas of the identified steelhead redds. In addition, when live steelhead were seen on or near redds, surveyors avoided disturbing them to the extent feasible.

CDFG's Steelhead Research and Monitoring Program in Fort Bragg, California requested that I follow their monitoring protocol developed for salmonid spawning escapement estimates on the Noyo River (Gallagher 2001). This protocol specifies a number of physical parameters to be measured on each salmonid redd when it is first found. After careful consideration, I elected not to make these intensive redd measurements during 2002. Because I am working alone, doing so would have severely limited the number and extent of my surveys of the index reach. However, I anticipate inclusion of these redd measurements during my 2003 surveys, assuming a suitable (to both parties) coordination agreement is negotiated with CDFG.

INDEX REACH–RESULTS AND DISCUSSION

Number and Temporal Spacing of Surveys–The index reach was surveyed a total of eight times, beginning on February 2 and ending on April 19 (Table 1). A total of 146.4 miles was

Table 1. Summary of 2002 steelhead spawning survey results along the 18.3-mile index reach of the Wheatfield Fork, Gualala River, between House Creek and the South Fork confluence. (Reference reports appear in Appendix A.)

Date(s)	Reference Report	Number New Redds	New Redds/Mi	Number Live Adults	Live Adults/Mi	Number Carcasses
Feb 2-3	M-015	5	0.27	107	5.85	0
Feb 15	M-016	15	0.82	148	8.09	0
Mar 1-2	M-017	2	0.11	49	2.68	0
Mar 15-16	M-018	16	0.87	25	1.37	1
Mar 29-30	M-019	36	1.97	4	0.22	0
Apr 6	M-020	22	1.20	16	0.87	0
Apr 12-13	M-021	16	0.87	26	1.42	0
Apr 19	M-022	33	1.80	2	0.11	0
Totals	8 surveys	145	7.92	377	20.60	1

thus covered. An individual report was prepared for each survey (Table 1; Appendix A). The hydrology which occurred during the season (*see* below) facilitated surveys roughly once every 2 weeks during February to late March, then once each week during late March to late April. Five of the eight surveys were conducted over a 2-day period, while the other three were conducted in 1 day.

Spawning Season Precipitation and River Hydrology–These initial index-reach survey results (and similar subsequent annual results) must be carefully examined and considered in light of the precipitation and river hydrology which occurred over the rainy season and during the spawning survey period. The lower Wheatfield Fork index reach is a relatively large, mainstem section of the river. Thus, during years of low annual precipitation or during within-season dry periods with a declining hydrograph, more intensive "holding" (in pools) and spawning is likely to occur there. On the other hand, under higher rainfall and flow conditions, fewer adults and redds are likely to be recorded along the index reach, since adult steelhead typically move farther (and more rapidly) to upstream spawning areas during high-flow conditions.

For the 2001-2002 spawning season, the precipitation at Fort Ross, California, which is along the coast just west of the center of the South Fork drainage, was examined (Figure 1) and used as an

index to overall precipitation amounts and patterns in the watershed. Precipitation at Fort Ross for the 7-month rainy season from October through April, totaled 37.10 inches, which was slightly above the average of 36.15 inches for the 53-year period of record. However, the temporal distribution of that rainfall showed distinct variances. In particular, while the month of October was about average, the months of November and December were well above average, and the months of January through April had well below average rainfall (Figure 1).

Unfortunately, the seasonal hydrograph that this precipitation created on the Gualala system for 2001-2002 is not yet available at the time this report is being prepared. This is because during the current season, there were no operating real-time stream gages on the system. However, the 2001-2002 hydrograph pattern of the Gualala system can be generally inferred from the spawning-season hydrographs for the Noyo and Navarro rivers; both of these hydrographs, as derived from real-time USGS stream gage data presently available on the internet, are provided in Appendix B.

Such precipitation data and river hydrographs are expected to be evaluated more intensively as future annual index-reach survey results are generated and analyzed.

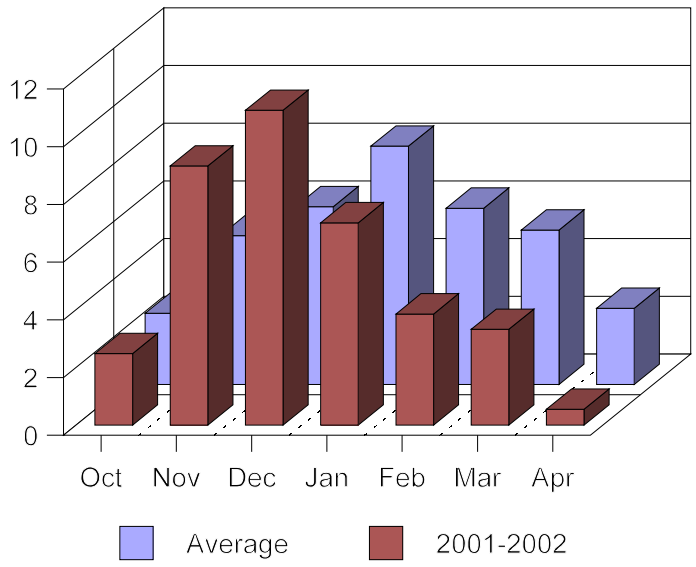

Figure 1. *Monthly precipitation (inches) during 2001-2002, in relation to average (1948–2001), at Fort Ross, California. (Total 2001-2002 precipitation for the 7 months shown=37.10 inches, versus 36.15 inches on average for the period. (Average=Blue; Actual=Rust)*

Number of Redds–A total of 145 redds was found (Table 1). The two highest counts–36 and 33 redds–occurred on the Mar 29-30 and April 19 surveys, respectively. Totals of 15-16 redds were found on the February 15, March 15-16, and April 12-13 surveys. The lowest numbers were five and two redds, recorded on the February 2-3 and March 1-2 surveys, respectively. The 145 total

redds found during the eight index-reach surveys was equivalent to 7.9/mile.

In comparison, during three different one-time-only spawning surveys in 2001 totaling 18.0 miles along the 18.3-mile index reach, I found 121 redds or 6.7 redds/mile (DeHaven 2001). And on one of the 2001 surveys along 8.6 miles of the index reach (from Haupt Creek downstream to the South Fork), I found 78 redds or 9.1 redds/mile during 2001 (DeHaven 2001). The implication of fewer redds in 2002 compared to 2001 is likely related to the generally lower rainfall and flows during the 2001 season. As a result, proportionally more of the total spawning population may have spawned along the index reach in 2001 than in 2002. Indeed, the first half of the 2002 spawning season, especially, was characterized by high rainfall and flows, which likely attracted more fish to farther upstream areas. A more detailed and quantitative evaluation of precipitation and river hydrograph effects on numbers of fish spawning in the index reach of the river will be undertaken after several years of survey data have accumulated.

During multiple in-season (December-April) spawning surveys of suitable habitat throughout most of the Noyo River, California in 2000-2001, Gallagher (2001) identified a total of 296 steelhead redds. He reported steelhead redd densities along various Noyo river reaches ranging from 0 to 14.7/mile, with an average of 3.9/mile.

Number of Live Adults and Carcasses–A total of 377 live adult steelhead (2.6/mile surveyed; 20.6/index-route mile) was recorded during the eight surveys (Table 1). The majority of these were groups of fresh adult steelhead observed holding in pools. For example, in just two large pools on the downstream half of the index reach on February 15th, a total of 58 adults (33 and 25) was recorded.

The two highest index-reach counts of adults–107 and 148–occurred during the first two surveys on February 2-3 and February 15, respectively. Subsequently, during the other six surveys, the number of live adults seen ranged from a low of 2 (April 16) to a high of 49 (March 1-2). No relationship was apparent between the number of adults seen and number of redds found.

The 377 live adults seen is severalfold larger than the 99 adults I recorded along the Gualala system in 2001 (DeHaven 2001). However, I only covered 59 miles during ten, one-time/reach surveys in 2001. On my one-time survey of 18.0 miles of the index reach in 2001, 37 live adults were counted. Thus, both my 2001 and 2002 live adult numbers are suggestive of a spawning population within the same general order of magnitude along the index reach.

More important, however, the 377 live adults I recorded is a comparatively large figure for such surveys. For example, in contrast, during multiple, in-season steelhead spawning surveys along the Noyo River, only 35 and 69 total live adults were observed in 2000 (Gallagher 2000) and 2001 (Gallagher 2001), respectively. (Note: Based on the 2001 Noyo data, Gallagher [2001] estimated, using various methods, an adult steelhead spawning population of from 222 to 583 adults for the Noyo River.) Moreover, during similar steelhead spawning surveys along numerous Oregon coastal basin streams in 1998 (Susac and Jacobs 1999) and 2001 (ODFW 2002; *summary from the internet*) counts of more than 200 live adults were rare, being recorded

for just two rivers–the North Umpqua (225 in 1998, when 585 redds were found) and Nestucca (365 in 2001, when 1,545 redds were found). More typically in the Oregon coastal river monitoring, live counts have totaled from 0 to 100 fish during the cumulative surveys along any particular river, with only occasional totals of 100-200 live adults.

Based on the relatively large number of adults I recorded on the Gualala index reach this season, the total 2002 spawning escapement for this portion of the watershed was probably a minimum of at least several hundred fish. Also, it appears likely that considerable spawning occurred upstream of the index reach. Spawning habitat exists upstream in the upper Wheatfield Fork, Tombs Creek, House Creek, and several other first- and second-order tributary streams, and I found steelhead redds in many of these reaches during 2001 (DeHaven 2001).

I found only one steelhead carcass in 2002–during the March 15-16 survey of the index reach. During my 2001 surveys, I found five adult steelhead carcasses, including one along the 18.0 mile portion of the index reach that was surveyed once that year (DeHaven 2001).

Temporal Distribution of Spawning–The earliest indirect evidence of adult steelhead in spent condition occurred on January 11, 2002. Several anglers who were surveyed near a popular boat take-out at the mouth of the North Fork that day indicated that three of ten steelhead they had caught by angling appeared to have been spent (Appendix A; Memo 011). Spawning may have occurred at least several weeks earlier than this, since throughout the month of December precipitation and the river hydrograph were both relatively high.

New redds were found during each of the eight surveys conducted from February 2 to April 19. Also, since the second highest number of redds found was on the last survey on April 19, I am confident that additional spawning occurred after this date. Thus, at a minimum, spawning occurred at least from December through April and perhaps up to several weeks longer.

Spatial Distribution of Spawning–Of the 145 redds found, 63 were along the upstream half and 82 along the downstream half of the index reach. Two or more new redds were found on every survey of both the upstream and downstream sections, except that no redds were found along the upstream section during two surveys (February 2-3 and March 1-2). The spatial distribution of redds has not yet been plotted onto maps of the index reach; however, this is planned for later when additional data has accumulated. A cursory, qualitative examination of the redd location data indicates that spawning was well-distributed throughout the index reach, except for the lowermost 1.5 miles, where spawning suitability is generally poor, due to a low stream gradient and water velocities combined with a high sediment load. While redds were Often, two or more redds were found within relatively short distances of one another.

Discernability of Redds–Three issues involving redd discernability were initially examined: (1) temporal length of redd discernability; (2) observer variation in redd detection and identification; and (3) confusion of lamprey redds as steelhead redds and vice versa. The last two issues were only cursorily examined, but due to initial findings will be given greater attention during subsequent spawning seasons.

Length of Discernability. The discernability of 74 redds was tracked over six subsequent surveys (Table 2). In general, lower discernability occurred earlier in the season, when from a low of 0 percent to a high of 60 percent of new redds discovered during one survey were still discernable during the first subsequent survey 2 weeks later. Also, in general, discernability period tended to gradually lengthen as the season progressed. For example, for the two surveys conducted during mid and late March, 86 and 90 percent, respectively, of new redds found were still discernable during the first subsequent survey conducted 1 week later. Nevertheless, for the 36 redds first discovered during the March 29-30 survey, only 62 percent (22 redds) were still

Table 2. Subsequent discernability of 74 steelhead redds along the 18.3-mile index route of the Wheatfield Fork, Gualala River, after first discovery (FD) dates, during 2002.

FD DATES (Number) Redds)	PERCENT REDDS FROM FD DATE(S) STILL DISCERNABLE ON						
	Feb 15	Mar 1-2	Mar 15-16	Mar 29-30	Apr 6	Apr 12-13	Apr 19
Feb 2-3 (5)	60	0	0	0	0	0	--
Feb 15 (15)	–	0	0	0	0	0	--
Mar 1-2 (2)	–	–	50	50	0	0	--
Mar 15-16 (16)	–	–	–	19	6	6	–
Mar 29-30 (36)	–	–	–	–	90	62	–
Apr 6 (22)	–	–	–	–	–	86	–

discernable 2 weeks later during the April 12-13 survey. Overall, despite river stage or hydrograph trend, very few redds were still discernable 3 or 4 weeks after first discovery.

These results are enlightening, but also quite intuitive. The index reach is a relatively large, fourth-order stream. Coarse substrate bedload movement appears to occur relatively frequently, during even relatively modest high-flow events. As a result, on surveys following high-flow events, evidence of redds constructed before or during the event has frequently been completely erased. In addition, it appears that once major bedload mobilization has occurred during any given season, even modest subsequent flows during a declining hydrograph tend to quickly erode and mask redd features. Ensuring that substantial numbers of redds are not missed between

surveys of the index reach appears to call for at least weekly surveys under most conditions, with perhaps a 2-week survey interval during periods when a low, stable hydrograph persists.

In his reports of recent studies on the Noyo River, Gallagher (2000; 2001) did not discuss temporal length of redd discernability. On Oregon coastal rivers, however, recent studies by Susac and Jacobs (1999) found that redd longevity averaged nearly 30 days, with virtually all

redds still visible after 1 week. And after 2 weeks, the proportion of redds no longer visible ranged from 7 percent for northern Oregon coastal rivers to 32 percent along the mid-Oregon coast. Based on these findings, Susac and Jacobs (1999) concluded that a reliable count of essentially all observable redds throughout the spawning season could be derived using a weekly survey schedule expanded to 2 weeks in the absence of freshets in the second half of the spawning season.

Observer Variation. Despite limited comparisons, there was evidence that observer variation in redd detection and identification can be substantial (*see* individual survey reports, Appendix A). Perhaps partly due to their eagerness to record redds, inexperienced observers tended to incorrectly count as steelhead redds certain test redds and areas scoured out by hydraulic roughness elements. On the other hand, during one survey, an inexperienced observer located four steelhead redds that I missed during our two-person float-survey (*see* Report M-019, Appendix A) along a portion of the index reach.

Observer variation along the index reach is no doubt at least partly due to the relatively large size of the stream. As a result, relatively large areas have to be scanned for redds, often under unfavorable lighting and surface-turbulence (due both to wind and natural roughness factors) conditions. In addition, spawning along the index reach is recorded in runs and riffles with substantial natural turbulence, as well as in pool tail-outs; this further increases search area and chances for missing redds.

Minimizing problems due to observer variation appears to call for index-reach surveys to be done only by well-trained and experienced individuals working in two-person teams whenever possible. Each two-person team should work the same reach simultaneously from individual boats, while collaborating and combining results. When index-reach surveys are done by a single observer, he or she should be very highly trained and experienced, and the route should be covered slowly and methodically to avoid missing redds. During surveys along smaller first-, second- and third-order tributaries, the need for two-person teams is probably much less important, since search areas are smaller, visibility problems are reduced, and spawning is usually concentrated in pool tail-outs.

However, another important issue involves the counts of live adult steelhead during index-reach redd surveys. Again, although comparisons were limited, there were relatively large differences in numbers of live steelhead seen by two observers working a given reach together (*see* individual survey reports, Appendix A). In particular, counts of groups of fish holding in large pools often varied considerably between the two observers. In addition, small numbers of moving or hiding fish were often seen by one observer but not the other. Thus, the two observers on each survey team need to stay in close proximity, communicate closely during surveys, and collaborate to arrive at live-fish totals which minimize duplicate counts. (During both 2001 and 2002 surveys, the live steelhead numbers I have reported were generally the fish I alone observed.)

Misidentification of Lamprey and Steelhead Redds. Based on my two consecutive seasons of

work and especially my 2001 observations (*see* individual survey reports, Appendix A), redd misidentification (i.e., steelhead versus lamprey redds) may be an important issue for consideration during surveys of the index reach. I observed instances in which very large spawning lamprey were constructing redds that were virtually indistinguishable from steelhead redds (or were, in fact, superimposing their redds over them), including the same downstream pattern of gravel and cobble tailings. I also recorded instances of confirmed steelhead redds found during one survey which had one of more new lamprey redds superimposed over them on a subsequent survey. Moreover, one two occasions late in the season, foothill yellow-legged frog egg masses were found within lamprey redd bowls which were superimposed within steelhead redds. Redd superimposition and misidentification are clearly issues deserving greater attention and study during future seasons.

OTHER REACH SURVEY RESULTS

Upper Wheatfield Fork–Prior to selection of the 18.3-mile reach as the index reach, a 20.1-mile reach of the Wheatfield Fork was tentatively selected as the index reach. This longer reach included another 1.8 miles of the Wheatfield Fork, from House Creek upstream to Wolf Creek. This 1.8-mile section was surveyed four times (February 2, 15; March 2, 15) before being dropped from the indexing surveys. It was dropped because it has relatively low areal extent and quality of spawning substrates compared to the 18.3 miles actually used for indexing. Low spawning substrate quality is due to extensive bedrock covered by relatively thin spawning substrate layers and a high degree of substrate imbeddedness in non-bedrock areas. Imbeddedness appears to be due largely to compaction and overuse by large numbers of livestock (cattle).

Results for the 1.8-mile reach (*see* Memos 015-018, Appendix A) included 6 adult steelhead observed (February 15=1; March 2=5) and 3 steelhead redds found (March 2=2; March 15=1). Of the two redds found and marked on March 2, neither one was discernable when reexamined during the March 15 survey.

Lower Wheatfield Fork–On January 19, 1.8 miles of the Wheatfield Fork from the mouth of Fuller Creek upstream to the Annapolis Road Bridge, were surveyed (*see* Memo 014, Appendix A). Neither any adults nor redds were seen.

Upper South Fork–On February 12, the upper South Fork, from Neistrath Road Bridge downstream for 2.7 miles was surveyed (*see* Memo 012, Appendix A). Two "possible" redds were found, but not recorded due to their uncertainty, and two adults were seen. The lower two-thirds of this reach has a significant number of old logging stumps which are providing good instream structure and cover (Appendix A).

Lower Fuller Creek–On January 19, 2.2 miles of Fuller Creek, from the Annapolis Road crossing downstream to the mouth, were surveyed (*see* Memo 014, Appendix A). One possible redd was found (but not confirmed); no adults were seen. General information on habitat quality was collected along the survey reach (Appendix A).

Lower Wolf Creek–The lowermost 1.8 miles of Wolf Creek, ending at the mouth, were surveyed on March 2 and 15 (*see* Memos 017-018, Appendix A). Three redds, but no adults, were found during the first survey. During the follow-up survey, one adult was seen, no new redds were found, and of the three redds found earlier, two were still discernable. General information on habitat quality was collected during the first survey (Appendix A).

CONCLUSIONS

The 18.3-mile reach of the Wheatfield Fork has potential as an index reach for tracking, via counts of live adults and redds made from boats, gross changes and trends in the adult steelhead spawning population for this portion of the Gualala River watershed. Spawning occurred there throughout the February-April survey period and likely throughout the 6-month steelhead spawning window. The 2002 results from eight surveys of the reach suggested a spawning escapement of at least several hundred adult steelhead in this portion of the watershed. Developing more refined annual indices useful in trend analyses will necessitate consideration of seasonal precipitation amounts and patterns and river hydrographs, because the index reach is a mainstem river reach in which spawning may be proportionally reduced (and occur upstream), with adults proportionally less visible, under high-flow regimes. Spawning surveys of the index reach should be conducted at least weekly, with extension to bi-weekly later in the spawning season and/or during prolonged low-flow conditions. Use of experienced, well-trained surveyors is essential and surveyors should work in two-person teams whenever possible. Steelhead and lamprey redd misidentification is a potentially important confounding factor which should be examined in greater detail during future spawning seasons.

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APPENDIX A–INDIVIDUAL SURVEY REPORTS FOR 2002, GUALALA RIVER SYSTEM

MEMORANDUM TO THE FILE–#011

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Angling Survey, South Fork, from South Fork/Wheatfield Fork confluence to South Fork/North Fork confluence, January 11, 2002

Description of Survey: A fellow biologist from my office and I floated (two one-person drift boats) this reach between 1000 and 1530 hours. We stopping to angle for adult steelhead using spin-n-glows tipped with salmon roe at about a dozen traditional fishing spots along the way. The river was perfect for angling, with a gray-green color and about 2-3 feet of visibility; it appeared to have been fishable for only about 1 or 2 days. As an index to flow (since there are currently no real-time stream gages in operation on the Gualala system), the stage today at DWR's Garcia River real-time gage ranged from about 3.3 to 3.4 feet.

Neither of us caught any adults or juveniles. However, we were no doubt handicapped, as we were floating downstream behind at least a dozen other drift boats containing at least 25 anglers who obviously had started floating downstream much earlier in the morning.

At the take-out gravel bar for the boats, just downstream of the North Fork confluence, we talked to seven anglers who had floated down in three of the driftboats. They reported catching and releasing a total of nine adult steelhead of which they thought about three were spent. Also, along the float we encountered six anglers who had hiked in to the river, but they reported no steelhead catch.

Since there were only three or four anglers on the reach of the river downstream of the North Fork to the Highway 1 bridge (an unusually small number, given the excellent angling conditions), we did not bother conducting an angler survey in this reach.

Conclusion: There are some adults in the river, and some steelhead have apparently already spawned and are moving back downstream.

Prepared: January 20, 2002 (RWD)

MEMORANDUM TO THE FILE–#012

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Spawning survey, upper South Fork, from Neistrath Road Bridge downstream 2.7 miles, January 12, 2002

Personnel

I conducted this survey with another biologist (LT) from my office in Sacramento who has 7 years of professional experience with salmonids.

Methods

My standard steelhead (SH) redd and adult survey protocol for 2002 was followed. However, the two of us worked independently, on separate portions of the survey reach, by walking along and wading the stream. Qualitative information on habitat was also recorded.

I surveyed upstream, starting from 2.0 miles downstream of the Bohan Dillon Road bridge to the Bohan Dillon Road bridge, a stream sinuous distance of 2.0 miles. LT simultaneously surveyed upstream from the Bohan Dillon Road bridge to the Neistrath Road bridge, a stream sinuous distance of 0.7 mile. Both distances were measured with an electronic planimeter from the Fort Ross (1978) USGS 7.5 minute topographic quadrangle map. The survey was conducted from about 0930 to 1130 hours, and the average rate of stream travel was 1.2 mph.

Weather and Stream Conditions

The weather was unseasonably warm and sunny, with a light north wind blowing over nearby ridge tops due to building high pressure in the atmosphere. The stream was in near-perfect condition for survey, with relatively low flow and good clarity. Nevertheless, due to surface turbulence and cover in the deeper areas, there were abundant SH hiding places where adult fish would not have been observed, if present. The past few days are likely the first time in several weeks that the stream has been surveyable, because of prolonged high flows for about 5 weeks during December and early January.

In 2001, USGS discontinued operations of the three real-time stream gages on the Gualala system. These gages were transferred to DWR, but DWR has not yet put them back online, reportedly because of a shortage of available transmission frequencies. Until these gages again are available in real-time, probably the best real-time index gage is the DWR gage on the Garcia River. On January 12, the day of the survey, the Garcia gage had a stage of about 3.2 to 3.3 feet.

Results

Redds and Adult Fish. I located two *possible* redds, a few hundred yards apart within 0.2-mile downstream of the Bohan Dillon Road bridge. Each appeared to have been flattened by the recent high flows. Since I could not positively confirm them as redds, they were not recorded. I also observed two adult steelhead (SH), one in the same general area as the two possible redds and one about 0.5 mile upstream of the survey starting point. LT observed neither any redds nor

any adult SH.

Habitat Conditions-Upper 0.7 Mile. General habitat complexity and diversity was good. Number and abundance of deep pools was fair, with approximate maximum pool depth of 3-4 feet. Potential spawning substrate of gravel and small cobble was relatively abundant, however, substrate depth was generally shallow, making for poor spawning conditions. Riparian overhead cover was fair. Deep pool holding cover was generally nonexistent in the vicinity of the better potential spawning sites.

Habitat Conditions-Lower 2.0 Miles. General habitat complexity and diversity was good. Number of deep pools was good, with a maximum depth at one site of 7-8 feet. Relative areal extent of potential spawning substrate ranged from fair to good; however there was moderate embeddedness and moderate amounts of fines reducing spawning values. Depth of gravel/cobble in potential spawning areas was, like the upper section, generally shallow, thus providing only fair value. Riparian overhead cover was generally good. Instream cover was very good, with the dominant forms being boulders, bedrock, rootwads, and instream stumps, likely from pre-1950s logging. Locations of key habitat features, by time (assuming a 0935 hrs starting time and the 1.2 mph rate of travel) proceeding upstream, were as follows:

0957-large MCP (main channel pool) 150 x 25-feet and 5 feet deep.
1004-MCP, redwood stump EH (enhanced)
1007-MCP, boulder EH
1011-MCP, bedrock/redwood stump EH
1012-MCP, redwood stump EH
1024-MCP, redwood stump EH
1025-MCP, redwood stump EH
1026-MCP, bedrock EH–also one adult SH
1029-$1 million house right next to the stream, south side
1030-MCP, redwood stump/LWD (large woody debris) EH
1034-large creek enters from the NE
1050-channel-spanning piece of LWD
1051-MCP, rootwad EH
1055-abundant bedrock substrate
1058-LSP (lateral scour pool), bedrock EH
1101-large creek enters from the S
1102-LSP, rootwad EH; LSP boulder EH
1103-LSP, rootwad EH
1105-LSP, rootwad and boulder EH
1109-LSP, redwood stump EH
1112-large LSP, LWD/rootwad/boulder EH
1114-largest MCP on the 2.7-mile reach, 7-8 feet deep, bedrock EH
1117-MCP, redwood stump EH
1119-LSP, rootwad EH

1123-possible redd; did not record
1127-MCP-LWD/rootwad EH
1131-possible redd; did not record
1130-large MCP and creek entering from S
1134-bridge and end of survey

A main conclusion is that this reach has a significant number of instream logging stumps that are providing a significant amount of habitat diversity, complexity, and overall habitat value.

Prepared: January 20, 2002 (RWD)

MEMORANDUM TO THE FILE–#013

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Spawning survey, Little North Fork, for 0.5 mile, from 0.5 mile upstream of Little North Fork/North Fork confluence, to 0.5 mile upstream, January 18, 2002

Personnel

This survey was arranged (by K. Morgan) as a brief training survey for the two local (Point Arena, California) Americorps volunteers (Jennifer Presnell and Libby Earthman) who were supposed to later assist me on this year's spawning surveys. Per my request, we were also accompanied by John Richardson from Sean Gallagher's office at CDFG in Fort Bragg, California.

Survey Methods

My standard SH redd and adult survey methods and DFG's protocol for the Noyo River for 2002 were both employed and demonstrated to Morgan and the two Americorps volunteers while searching 0.5 mile of the stream from about 1230 to 1500 hrs. John Richardson and I focused on training the three volunteers on *where* to look for and expect spawning redds to be found. We also demonstrated data collection and recording methods for both survey protocols. Following completion of the survey, I left a complete survey kit in the possession of Jennifer and Libby for their possible future survey work. However, they are going to need additional training–including actually finding and recording a number of redds–before proceeding on their own.

Results

No adult fish were seen and no redds were found. *(Due to the high flows that had preceded this survey, I had felt all along that this site, selected by Morgan, was too far downstream on the stream system.)* This was my first visit to this particular tributary, and the view was somewhat surreal. In many ways the stream looked more like an artificial channel that a functioning stream ecosystem. The surveyed section is in very poor condition. The channel is deeply incised, pools are shallow, sediment impacts are evident and despite the low flow of only a few cfs, the stream was still flowing slightly turbid.

In addition, the habitat restoration effort I observed in the form of several large logs which have been dumped (and cabled) into the channel was disappointing, to say the least. While these are generally large diameter logs, they have been stripped clean of any limbs and branches. As a result, while providing some channel-forming capability, the cabled logs are providing little in the way of habitat structure, diversity, and fish cover. Roughly the same channel-forming values could likely have been achieved at substantially less cost using large boulders dumped into the stream bed. Hopefully, future efforts of this type will use large, *complex* pieces of wood in the restoration work.

Prepared: January 21, 2002 (RWD); Revised: May 1, 2002 and Janury 2, 2005 (RWD)

MEMORANDUM TO THE FILE–#014

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Spawning survey, Fuller Creek, from Annapolis Road bridge downstream 2.2 miles to confluence with Wheatfield Fork; then 1.8 miles upstream on Wheatfield Fork to Clark's Crossing (Annapolis Road) bridge, for a total distance of 4.0 miles, January 19, 2002

Personnel

I conducted this survey alone.

Survey Methods

My standard redd and adult survey protocols for 2002 were followed. The survey was conducted from 1040 to 1350 hrs. The average rates of survey on Fuller Creek and Wheatfield Fork were 1.1 and 1.8 mph, respectively. The stream sinuous distances surveyed were measured with a simple map wheel and are thus only approximate values. While on Fuller Creek, I also recorded qualitative information on habitat values, since it was the first time I have surveyed this reach.

Weather and Stream Conditions

The weather was clear, but chilly. Stream conditions on Fuller Creek were ideal for survey, with good water clarity. The Wheatfield Fork had a slight green tinge and was still rather high. My ability to observe any adults present in Fuller Creek would have been good; on the other hand, in the Wheatfield Fork, due to deep pools and various forms of cover, including turbulence, any adult SH that were present would have had relatively low detectability.

As an index to today's flow conditions, the flow in the Navarro River at the USGS gage near Navarro was about 300 cfs today, while the stage at the DWR gage on the Garcia River near Point Arena was about 2.5-2.6 feet.

Results

I observed no adult SH and no confirmed redds. I did observe one *possible* redd that appeared flattened by high flows, but since I could not confirm it, I did not record it. I also observed one age 2+ juvenile SH.

The first 1.1 miles downstream on Fuller Creek was characterized by good stream habitat complexity and diversity. Pools were fairly abundant, but they were not as deep as they could or should be–at roughly 4-5 feet, maximum depth. Riparian overhead cover was moderately good. Instream cover was very good. There were several pre-1950s logging stumps enhancing the stream habitat in several areas. However, the spawning substrates were in generally poor condition, with high embeddedness and armoring, and, in most instances, only a shallow layer of gravel and cobble.

The locations of some key stream habitat features within the first 1.1 miles of Fuller Creek (based on the 1040 hrs starting time, and 1.1 mph survey rate) were as follows:

1119-large MCP (main channel pool), approx. 30 x 20 feet and 4-5 feet in depth
1121-LSP (lateral scour pool), bedrock EH (enhanced), about 5 feet deep
1124-Age 2+ juvenile SH observed
1127-Logjam
1132-good sized tributary enters from the east side, Sullivan Creek, I believe.

The second 1.1 miles along Fuller Creek also had good habitat diversity and complexity. However, there was less LWD and more channel- and habitat-forming boulders and bedrock. Spawning substrate condition was better than in the upper reach, but still only fair to poor condition overall. Just as upstream, the main problem was embeddedness and thin layering of gravel and cobble. Riparian overhead cover was good and similar to the upper reach.

1141-possible redd, but not confirmed
1155-MCP, 35 x 30 feet, maximum 5 feet in depth; also a channel-spanning piece of large woody debris (LWD)
1210-MCP, 20 x 10 feet, 5 feet maximum depth, bedrock and boulder EH
1219-MCP, 5 x 10 feet, 5 feet deep, boulder and bedrock EH
1221-MCP-4.5 feet deep, redwood stump EH
1224-LSP, about 5.5 feet deep, bedrock EH
1244-LCP, about 6 feet deep, 30 x 10 feet in size
1246-end of survey, confluence with Wheatfield Fork

Prepared: January 21, 2002

MEMORANDUM TO THE FILE–#015

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Spawning survey, Wheatfield Fork, from Wolf Creek Confluence Downstream 20.1 Miles to South Fork Confluence, February 2–3, 2002

Personnel

I conducted this survey alone.

Survey Methods

This was a 2-day survey. However, since it involved one continuous reach of 20.1 miles of the river, it is reported here in one report. Surveys both days were completed while floating down the river in my 8-foot-long mini drift-boat, constructed of fiberglass over wood. The survey began at 0836 hrs on February 2. The boat was launched off the Skaggs Springs Road down to the river by rope at a spot where LO permission had been obtained. Because of the steepness and 180 foot drop to the river, the boat was more or less rappeled down the bank to the water. The float/survey began where Wolf Creek enters the Wheatfield Fork, then continued downstream to the Annapolis Rd bridge, a distance of 10.7 miles (electronic planimeter from USGS 7.5-minute quad sheets). I arrived at the Annapolis Rd bridge at 1355 hrs, for an average survey rate of 2.0 mph. This was a surprisingly quick rate, considering the numerous obstacles and hazzards around which the boat had to be dragged. This is definitely a float of moderate-to-high difficulty, and may be impossible at flows substantially lower than today's flow.

Phase two of the float/survey began at the Annapolis Rd bridge at 0755 hrs on February 3. From there, I floated 9.4 miles (electronic planimeter from USGS 7.5-minute quad sheets) downstream to the confluence of Wheatfield and South forks, arriving there at 1205 hrs, for an average survey rate of 2.25 mph. The faster rate compared to February 2 was because there were fewer obstacles and hazzards around which the boat had to be dragged. The float through this reach also has a much lower level of difficulty than the above reach, and would probably still be navigable at a much lower flow than today's flow.

While floating downstream, my standard survey protocol for 2002 was followed. By slowly floating over deep pools and other hiding cover (and being able to view downward), my efficiency in spotting adults was actually *bette*r than if I had been on foot. Also, by standing up in the boat and visually searching all likely pool tail-outs and other potential spawning habitat as I drifted by, I likely found most of the redds that were present, or at least as many as I would have if surveying on foot. When occasional areas with channel braiding were encountered, I generally floated down through one braid, then beached the boat and returned on foot to the other braided portion(s) to survey it.

Weather and Stream Conditions

The weather was clear (except for brief periods of fog each morning), with just slightly below seasonal temperatures. Stream conditions on the Wheatfield Fork were ideal for survey, with moderate flows and excellent water clarity.

As an index to flow conditions these two days, the flow in the Navarro River at the USGS gage near Navarro showed about 190-195 cfs (stage=4.42-4.50 feet) on February 2-3, while the stage at the DWR gage on the Garcia River near Point Arena had a stage of about 2.3 feet during both days.

Results

A total of 107 adult steelhead were seen, including 62 and 45 on the upper and lower survey reaches, respectively. Based on their behavior and condition, most of these fish were fresh. Only three definitely spent fish were observed.

The 107 total adults is larger than the 99 total adults I observed during *all* of my ten 2001 surveys. No redds were found on the upper reach, but 5 were found on the lower reach. No carcasses were found in either of the two survey reaches. The significant observations, by time, are listed below.

<u>Wolf Creek to Annapolis Rd Bridge (10.7 miles)</u>

0836–start if survey
0936–House Cr mouth
1008–14 adults in pool, bedrock enhanced
1042–old road crossing with concrete rubble pieces in river
10043–3 adults in one run
1056–16 adults in one pool/run
1132–13 adults, along one run just downstream of min-falls
1136–1 adult
1143–2 adults, both downstreamers
1149–2 adults
1257–7 adults
1345–4 adults in first deep pool above Annapolis Bridge
1355–end of survey (Totals: 62 adults and 0 redds)

<u>Annapolis Rd Bridge to South Fork (9.4 miles)</u>

0755–start of survey
0829–3 adults (including one pair on active redd) and 1 redd
0856–3 redds within close proximity
0914–2 adults
0924–1 adult
0952–7 adults in large, deep (≥10 feet in depth) pool

1005–6 adults in large, 12 feet deep pool
1059–6 adults
1102–1 redd
1119–14 adults
1152–6 adults in very deep pool over 10 feet deep
1205–end of survey (Totals: 45 adults and 5 redds)

Other Related Observations

The 62 adults seen on the upper reach may have represented only a portion of the fish present, since there was abundant cover and large, deep pools where other fish may have gone unobserved. Also, it appears that spawning had not yet begun in this upper reach.

The 45 adults seen on the lower reach also may represent a partial count, since abundant cover and deep pools exist here as well. In fact, while not particularly abundant, several of the large, deep pools along this lower reach are among the largest and deepest anywhere on the Gualala River system. In addition, many of these pools have excellent complexity and diversity of habitat and cover. These pools are no doubt highly important to juvenile rearing over the dry season.

And, as I reported last year, this reach has an abundance of good-quality spawning substrate, especially in the upper portion of the reach. In my view, and until actual substrate size and condition measurements (and related aerial extent measurement) prove otherwise, I would say this may be the most important spawning reach for steelhead, per mile, within the Gualala River system. Part of my belief for this is based on the 78 redds found along this reach last April. It will indeed be interesting to see the cumulative total steelhead redds observed here this season.

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On a related note, I found (based on their tracks) that 4-wheel drive vehicles had been driving down the stream bed of the lower survey reach for about 4 miles, from Haupt Creek (where they were gaining access) downstream to a large landslide (about 4 years old) area where poaching activity may have been occurring in a large pool. This 4 x 4 activity included about 20 passages across the river through prime spawning substrates. I reported this to the local warden, Danny Reno, and found that three parties had recently been arrested and cited for various violations. Reno also indicated he would be contacting NMFS law enforcement regarding the possibility of charges against these individuals relative to “take” under the ESA.

Prepared: February 4, 2002

MEMORANDUM TO THE FILE–#016

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Spawning survey, Wheatfield Fork, Wolf Creek Confluence Downstream 20.1 Miles to South Fork Confluence, February 15, 2002

Personnel

I conducted this survey with LT, a biologist from my office in Sacramento. LT has several years experience working with salmonids, via our Instream Flow and Hydropower Licensing branch.

Survey Methods

This was a 1-day survey, covering the same continuous 20.1-mile reach of the Wheatfield Fork that I last surveyed alone on February 2-3, 2002. My standard 2002 survey protocol was followed. However, today, LT surveyed the lower 9.4 miles from Annapolis Road Bridge downstream to South Fork confluence; I simultaneously surveyed the upper 10.7 miles, from Wheatfield Fork-Wolf Creek confluence downstream to Annapolis Road Bridge. The survey of the lower reach lasted from 1000 hrs to 1630 hrs, for an average rate of 1.45 mph; this reach was surveyed from a small (7-foot length) rowboat. The upper reach was surveyed from my 8-foot mini drift boat; this portion of the survey lasted from 1034 to 1542 hrs, for an average rate of 2.14 mph. The put-ins and take-outs for the boats were the same as used during the February 2-3, 2002 surveys.

On the lower reach, the five redds that were found and marked on February 3, 2002 we reexamined to determined their present discernability.

Weather and Stream Conditions

The weather was overcast and drizzling much of the day; we had only a few brief periods of sunshine. Air temperature was mild and seasonable. Stream conditions were ideal for survey, with moderately low flows and excellent water clarity throughout the entire 20.1-mile reach.

As an index to flow conditions today, the flow in the Navarro River at the USGS gage near Navarro showed about 175 cfs on this date, while the stage at the DWR gage on the Garcia River near Point Arena had a stage of about 2.25 feet.

Results

A total of 149 adult steelhead were seen, including 40 and 109 on the upper and lower survey reaches, respectively. Based on their behavior and condition, we estimated that about 20-25 percent of the adults seen were spent.

The 149 total adults observed is larger than the 107 total adults I observed on this 20.1-mile

section during February 2-3, 2002, and substantially more than the 99 total adults I observed during *all* of my ten 2001 surveys of the Gualala River system.

On the upper reach, where no redds were found on February 2, 2002, nine redds were found and marked. On the lower reach, where five redds were found on February 3, 2002, six additional redds were found and marked. Of the five earlier redds on the lowermost reach, two were judged to have become sufficiently indiscernible that they would likely have been overlooked today.

No carcasses were found within either of the two survey reaches. The significant observations along each reach, by time, are noted below.

Wolf Creek Downstream to Annapolis Road Bridge (10.7 miles)

1034–start of survey
1046–1 adult
1201–12 adults in one pool
1227–1 redd
1250–1 redd; 2 adults
1259–2 adults
1319–4 adults
1322–1 adult
1333–2 redds, side-by-side
1348–8 adults in large pool at Berkeley Boy Scout Camp
1351–2 redds; 2 adults
1409–1 adult
1441–2 adults
1444–4 adults
1515–1 redd
1530–2 redds, 4 feet apart
1539–3 adults
1542–Annapolis Road Bridge=End of Survey

Annapolis Road Bridge Downstream to South Fork Confluence (9.4 miles)

1000–start of survey
1025–2 adults
1053–4 adults
1055–old redd #1=poor discernability
1125–5 adults
1142–old redd #s 2-4=good discernability
1213–3 adults
1253–11 adults
1255–2 adults
1300–33 adults in one pool (got excellent count; largest group seen to date)

1315–3 redds
1320–1 redd
1340–2 adults
1400–5 adults
1410–1 redd
1445–1 redd
1505–25 adults in one pool (estimate fair; second largest group seen to date)
1617–1 adult
1625–14 adults in one pool with evidence of fishing pressure (closed area)
1635–South Fork Confluence=End of Survey

Prepared: February 17, 2002

MEMORANDUM TO THE FILE–#017

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Spawning surveys, Wheatfield Fork, from Wolf Creek Confluence Downstream 20.1 Miles to South Fork Confluence, March 1-2, 2002, and lowermost 1.8 miles of Wolf Creek, March 2, 2002

Personnel

I conducted this survey alone.

Survey Methods

This was a 2-day survey, covering the same continuous 20.1-mile reach of the Wheatfield Fork that I last surveyed with LT on February 15, 2002. My standard 2002 survey protocol was followed. I had intended to survey the entire 20.1-mile reach on one long day–March 2. However, because of uncertainty about whether I could complete such a long distance before dark, I began instead at House Creek on March 1 and surveyed to the South Fork–a distance of 18.3 miles. I finished the other 1.8 miles from Wolf Creek to House Creek on the morning of March 2. Both sections were surveyed from the water while floating downstream in my 8-foot mini drift boat. Overall, the 20.1 miles took 9.5 hours, for an average survey rate of 2.12 mph. The put-ins and take-outs for the boat were the same as used during the February 2-3, and 15, 2002 surveys, except for the additional put-in at House Creek mouth on March 1.

In addition, on the morning of March 2, 2002, I surveyed for the first time, the lowermost 1.8 miles of Wolf Creek. This reach was surveyed on foot from 0725 to 0900 hrs, for an average survey rate of 1.2 mph.

On the 20.1-mile reach of the Wheatfield Fork, a total of 11 redds that were found and marked on February 3 and 15, 2002, we reexamined to determined their present discernability.

Weather and Stream Conditions

The weather was sunny and unseasonably warm, with about a 70^0 F maximum mid-afternoon temperature. Stream conditions were less than ideal for survey of the Wheatfield Fork, because it was still flowing relatively high. In fact, although water clarity was quite good, the flow was higher than during *any* previous survey this year or last year. As an index to flow conditions today, the flow in the Navarro River at the USGS gage near Navarro showed about 275 cfs at mid-day, while the stage at the DWR gage on the Garcia River near Point Arena held a stage of about 2.5 feet for most of the day.

Conditions on Wolf Creek–in terms of both flow and clarity–were ideal for survey.

Results

Wheatfield Fork--A total of 54 adult steelhead were seen, including 20 and 34 on the upper and lower (as divided by the Annapolis Road Bridge) survey reaches, respectively. Based on their behavior and condition, I estimate that the majority of the adults seen were fresh rather than spent.

The 54 total adults seen is smaller than the 149 and 107 total adults observed, respectively, on this 20.1-mile section during the two previous surveys this season. Clearly, the high flows which occurred between this survey and the last previous survey on February 15, 2002 moved fish upstream that had been holding due to low-water conditions. In addition, however, I clearly missed a number of fish today, due to the high flow, which in turn, despite the good water clarity, created sufficient surface turbulence that the deeper pools and hiding cover could not be fully viewed and examined as I floated over them.

Only four new redds were found–two each on the upper and lower sections. Of the 11 redds that had been previously located and marked (February 3 or 15) along the 20.1-mile survey reach, none were now visible. In fact, most of these spawning locations had been completely re-leveled by the recent high flows, leaving no indications whatsoever of the earlier spawning activity.

No carcasses were found along the 20.1-mile reach. The significant observations, by time, for each section, are noted below.

House Creek downstream to Annapolis Road Bridge on March 1 (8.9 miles):

0807–start of survey
0835–1 adult=downstreamer (DS)
0938–5 adults=upstreamers (UPS)
0956–4 adults UPS
1013–5 adults UPS

Annapolis Road Bridge downstream to South Fork confluence on March 1 (9.4 miles):

1147–reach bridge=start of survey
1209–1 adult DS
1225–13 adults UPS
1232–1 adult DS
1301–7 adults (unknown)
1317–1 adult DS
1320–1 new redd
1332–5 adults (unknown)
1340–1 new redd
1344–1 adult DS
1455–5 adults UPS
1550–end of survey=South Fork confluence

Wolf Creek downstream to House Creek on March 2 (1.8 miles):

0900–start of survey
0924–5 adults (unknown), deep pool in bedrock, may have been more
0930–2 new redds, side x side
1030–end of survey

Wolf Creek–I found no adults or carcasses along the surveyed reach, but did find three redds. In general, the streambed in this reach is bedrock with only very sparsely distributed patches of potential spawning substrates. And these patches are generally shallow and/or compacted. Maximum pool depth is about 5 feet in one pool just below the concrete dam (see below); the other pools, almost exclusively in bedrock, are about 3-4 feet maximum in depth. The stream gradient is steep, with steep stream banks showing a moderate amount of erosion. There is very little instream wood present, except for several small logjams. However, overhead riparian cover and shade are quite good, largely because of the steep banks. Trees forming the overhead cover are mainly oaks and California laurel. There is little, if any, habitat enhancement potential within this reach, due to the extensive bedrock substrate. Key observations, by time, are shown below.

Downstream on Wolf Creek for 1.8 miles to mouth (confluence with Wheatfield Fork):

0725–start of survey
0740–1 new redd
0808–1 new redd
0810–concrete water diversion dam (Hillside Ranch); appears non-operative; 4-foot-wide stop-board "notch," 5-foot-deep pool below.
0815–stream passes underneath road in a 12-foot-diameter culvert
0835–riparian canopy decreases in density and coverage to end of survey
0844–1 new redd
0848–stream again passes underneath road in a 12-foot-diameter culvert
0900–confluence with Wheatfield Fork=end of survey.

Prepared: March 3, 2002

MEMORANDUM TO THE FILE–#018

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Spawning surveys, Wheatfield Fork, from Wolf Creek Confluence Downstream 20.1 Miles to South Fork Confluence, March 15-16, 2002; and lowermost 1.8 miles of Wolf Creek, March 15, 2002

Personnel

I conducted this survey with a resident volunteer (DS) whom I have been training to assist me on future survey work.

Survey Methods

This was a 2-day survey, covering the same continuous 20.1-mile reach of the Wheatfield Fork that I last surveyed alone on March 1-2, 2002 and the same 1.8-mile reach of lowermost Wolf Creek that I last surveyed alone on March 2, 2002. My standard survey procedures were used. However, both of us surveyed for redds, adults, and carcasses independently, while floating down the river together (within talking distance) in separate small boats. (Both of us *walked* the Wolf Creek survey reach, however.) This allowed for my first comparison of variability between observers in detecting redds and adults.

The upper half (10.7 miles) of the Wheatfield Fork was surveyed by boat from 0800-1330 hrs on March 15, for an average survey rate of 1.9 mph. The lower half (9.4 miles) of the Wheatfield Fork was surveyed by boat from 0930-1500 hrs on March 16, for an average survey rate of 1.7 mph. (The slower rate was due to headwinds the last 3-4 miles.) Wolf Creek (1.8 miles) was surveyed from foot, from 1500-1645 hrs, for an average rate of 1.0 mph on March 15, following completion of the upper Wheatfield float survey.

On the 20.1-mile reach of the Wheatfield Fork, four marked redds found and marked on March 1-2, 2002, we reexamined to determined their relative discernability now. The same was done for the three redds found and marked on Wolf Creek on March 2, 2002.

Throughout the conduct of the surveys, including checking previous redds and flagging new redds, care was taken to avoid stepping on or near the pit and tailspill areas, and to avoid disturbing any fish on active redds.

Weather and Stream Conditions

On the Wheatfield fork, water clarity during both days was excellent. However, the flow was still relatively high both days. As an index to flow conditions (since there are currently no real-time stream gages operating on the river), the flow in the Navarro River at the USGS gage near Navarro showed about 265 cfs at mid-day on March 15 and 240 cfs at mid-day on March 16, while the stage at the DWR gage on the Garcia River near Point Arena had a mid-day stage of

about 2.6 feet and 2.5 feet, respectively, on March 15 and 16.

Weather conditions on March 15 were less than ideal, with mostly cloudy, windy, and showery conditions; the air temperature was unseasonably low. The higher than ideal flows, surface turbulence and poor lighting clearly lowered the detectability rate of both redds and adults. Weather on March 16 was much more favorable, with sunny, warmer conditions; however, a strong north wind created surface turbulence and lowered detectability, especially during the last 3-4 miles of the survey.

Conditions during the brief survey of Wolf Creek were ideal, with low, clear flows and very little wind (due to the steepness of the streambed slopes).

Results

Wheatfield Fork--A total of 25 adult steelhead were seen, including 18 and 7 on the upper and lower (as divided by the Annapolis Road Bridge) survey reaches, respectively. Based on their behavior and condition, we estimated that about two-thirds of these fish were spent.

A total of 17 new redds were found and marked, including 10 and 7, respectively, on the upper and lower sections. Of the 4 redds that had been previously located and marked on March 1-2, three in main-channel locations were no longer discernable; the fourth, in a small side-channel braid was still clearly discernable. At the three redd sites from main-channel areas, there was no indication whatsoever of the previous spawning activity.

One carcass of a 70 cm (FL) adult male was found on the lower survey section. This fish appeared to have had the upper half of the upper caudal fin lobe cleanly cut and removed. I was unable to determine whether this was a natural (e.g., for example feeding by an otter, or a sea lion bite) or man-made mark. However, it appeared the fish had been fed upon recently by an otter.

DD missed two redds that I located; I missed seeing one of those that he found. In addition, there were substantial observer differences in detecting and counting adults. DD recorded 10 bluebacks in one pool in which I observed none; however, I recorded several singles and pairs in locations where he recorded none. Both of our counts were of a similar order of magnitude–23 versus 18–but it was clear that in many cases *different* fish were being counted. For consistency with my other surveys, the number of adults reported herein is the number I saw and recorded.

The key observations, by time, for each surveyed reach are note below.

March 15–Wheatfield Fork–Wolf Creek to Annapolis Rd. Bridge (10.7 miles):

0800–start of survey
0801–1 new redd
0830–two previous redds; neither one is now discernable

0900–House Creek mouth
0912–1 new redd
0923–1 new redd
0952–1 adult
1000-1 new redd
1037–1 new redd
1042–1 adult
1050–1 adult
1100–3 new redds
1118–1 adult
1119–1adult
1138–1 adult
1209–1 new redd
1235–1 new redd
1243–1 adult
1246–1 new redd
1330–end of survey at Annapolis Rd. Bridge

March 15–Wheatfield Fork–Annapolis Bridge to South Fork confluence (9.4 miles):
0930–start of survey
0955–2 adults
1014–1 adult
1050–1 adult
1101–3 adults
1108–1 new redd
1333–previous redd not discernable
1140–carcass of one adult 70 cm (FL) male; fed upon by otter
1148–1 adult
1152–previous redd in small side channel still discernable
1205–2 adults
1221–1 new redd
1225–1 new redd
1300–1 new redd
1311–2 new redds
1336–1 new redd
1349–7 adults (fresh bluebacks)
1500–end of survey, South Fork confluence

Wolf Creek–We found neither any carcasses nor new redds, but we did see one adult. Two of the three redds found on the last survey were still discernable; one was not.

After viewing this reach for the second time, I was even more struck by the abundant bedrock

substrate with only very sparsely distributed patches of potential spawning substrate. And these patches are generally shallow and/or compacted. For this reason, I do not plan to survey this reach again. My main purpose–documenting spawning–has already been achieved. Key observations, by time, were:

1500–start of survey
1522–previous redd still discernable
1553–previous redd still discernable
1622–1 adult

1632–previous redd not now discernable
1646–end of survey, mouth of creek

Prepared: *March 17, 2002*

MEMORANDUM TO THE FILE–#019

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Spawning survey, Wheatfield Fork, from House Creek Confluence Downstream 18.3 Miles to South Fork Confluence, March 29-30, 2002

Personnel

I conducted this survey with a resident volunteer (DS) whom I have been training to assist me on future survey work.

Survey Methods

This was a 2-day survey, covering the same continuous survey reach of the Wheatfield Fork that I last surveyed with DS on March 15-16, 2002, except that today we began the survey at House Creek, omitting the 1.8-mile reach from Wolf Creek to House Creek. My standard survey procedures were followed. However, both of us surveyed for redds, adults, and carcasses independently, while floating down the river together (within talking distance) in separate small boats. This allowed for my second comparison of variability between observers in detecting redds and adults.

The upper half (8.9 miles) of the Wheatfield Fork was surveyed by boat from 0900-1430 hrs on March 29, for an average survey rate of 1.6 mph. The lower half (9.4 miles) of the Wheatfield Fork was surveyed by boat from 0900-1500 hrs on March 16, for an average survey rate of 1.7 mph. These rates of survey were somewhat slower than normal, due to time I spent training DS.

On the 18.3-mile survey reach a total of 18 marked redds (10 on upper reach; 8 on lower reach) found and marked on March 15-16, 2002, we reexamined to determined their present discernability.

Weather and Stream Conditions

Water clarity during both days was excellent, however, the flow was still relatively high both days. As an index to flow conditions, the flow in the Navarro River at the USGS gage near Navarro showed about 275 cfs at mid-day on March 29 and 235 cfs at mid-day on March 30, while the stage at the DWR gage on the Garcia River near Point Arena was about 2.6 feet and 2.5 feet, respectively, on March 29 and 30.

Weather on March 29 was unseasonably warm (76^0F), clear, and windy (north wind). March 30 was substantially cooler (about 65^0F), with partly cloudy conditions and lighter breezes (but still a strong head wind the last 1-2 miles of the survey). Coastal fog moved in overnight. The higher than ideal flows, surface turbulence from wind at times, and marginal lighting on the second day clearly lowered the detectability of both redds and adults.

Results

Upper 8.9 Miles–DS saw two adults; I observed one (only my observations were officially recorded, for consistency with previous surveys). A total of 15 new redds were found and marked. Of the 10 redds previously marked on March 15th, 3 were still discernable and 7 were not discernable. Two of the three discernable redds were along the edge of the channel; the third was in more of a mid-channel location. Key observations by time were:

0900–start of survey
0908–old redd #16 not visible; flag removed
0910–old redd #17 not visible; flag removed
1009–new redd #36
1016–old redd #18 not visible; flag removed
1036–new redd #37
1036–new redd #38
1050–old redd #19 still visible
1122–old redd #20 still visible
    old redd #21 not visible; flag removed
    old redd #22 not visible; flag removed
    new redd #39
1157–new redd #40
1204–new redd #41
    new redd #42
    1 adult near redds
1230–old redd #23 still visible
1241–new redd #43
1249–new redd #44
1252–new redd #45
1256–new redd #46
1307–new redd #47
1321–old redd #24 not discernable; now high-and-dry; channel has shifted; flag removed
1328–new redd #48
1340–old redd #25 not visible; flag removed
1341–new redd #49

1421–new redd #50–down right side channel
1430–Annapolis Road Bridge; end of survey

Lower 9.4 Miles–DS observed five adults, while I observed three; generally, these appeared to be different fish, as they were seen in different locations. For consistency with previous surveys, only my observations were officially recorded for use in the indexing. A total of ~~24~~ 21 (based on 4/6 survey) new redds were found; this included four found by DS that I had floated past and missed. Of the eight previously marked redds rechecked, five found March 16 were not visible, while two (one at edge of main channel; one along a side channel) from March 16 were still

visible. In addition, one found March 2 was still visible; this redd was in a small side channel. This redd now holds the record this year for discernability of 4 weeks. A single adult bald eagle was seen about 3 miles into the float. This year's steelhead fry were seen in several locations along the stream margins. Observations of redds, by time, were:

0900–start of survey
0902–new redds #51-53
0930–new redd #54
0938–new redd #55
0953–new redd #56
1005–new redd #57
1010–new redd #58
1018–new redds #59-60
1025–new redd #61; RD missed, DS found; *based on 4/6 survey, this changed to lamprey redd*
1038–new redd #62; RD missed, DS found; *based on 4/6 survey, this changed to lamprey redd*
1040–new redd #63
1104–new redd #64
1139–new redd #65; RD missed, DS found
1150–new redd #66
1214–new redd #67
1302–new redd #68
1327–new redds #69-71
1338–new redd #72, down left side channel
1425–new redd #73
1427–new redd #DO3; RD missed, DS found; *based on 4/6 survey, this changed to lamprey redd.*

Prepared: April 1, 2002/Revised April 8, 2002

MEMORANDUM TO THE FILE–#020

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Spawning survey, Wheatfield Fork, from House Creek Confluence Downstream 18.3 Miles to South Fork Confluence, April 6, 2002

Personnel

I conducted this survey with a resident volunteer (DS) whom I have been training to assist me on future survey work.

Survey Methods

This was a 1-day survey, covering the same continuous 18.3 mile survey reach of the Wheatfield Fork that I last surveyed with DS on March 29-30, 2002, except that today I surveyed the lower portion while DS surveyed the upper portion. My standard survey protocol was followed. Both of us surveyed for redds, adults, and carcasses while floating down the river in small boats. We covered separate reaches, because I thought that DS had been sufficiently trained to be able to deliver complete and reliable data.

The upper half (8.9 miles) of the Wheatfield Fork was surveyed by DS from 0730-1400 hrs for an average survey rate of 1.4 mph. The lower half (9.4 miles) of the Wheatfield Fork was surveyed by me from 0830-1400 hrs for an average survey rate of 1.7 mph. My rate was the same as recent survey rates; DS's rate was somewhat slower.

On the 18.3-mile survey reach, a total of 45 redds (18 on upper reach; 27 on lower reach) found and marked on recent previous surveys (mostly on March 29-30), we reexamined to determined their present discernability.

Weather and Stream Conditions

Water clarity was excellent and the flow was much lower than during the March 29-30 surveys. As an index to flow conditions, the flow in the Navarro River at the USGS gage near Navarro showed about 125 cfs (4.2 ft) at mid-day on April 6, while the DWR gage on the Garcia River near Point Arena had a mid-day stage of about 2.3 feet on April 6.

A weather front which brought light rain and drizzle moved through the area during the afternoon of April 5. However, conditions on April 6 were clear and sunny, with seasonable temperatures. Wind was encountered on both reaches, however, as usual, the most wind was encountered along the lowermost 2-3 miles of the lower 9.4 mile portion. Surface turbulence associated with the wind hampered our detection or both redds and adult fish.

Results

Upper 8.9 Miles–DS observed five adults, two of which were spent and three of which were fresh and still moving upstream through riffles. Of 11 previous redds checked for discernability, 5 were not discernable while 6 were still discernable. These results suggest somewhat greater non-discernability than my results (see below) are thus suspect. In addition, DS failed to locate and re-check 7 of the previously marked redds. ~~Fifteen~~ Ten new redds were found and marked (#s75D-89D, [less numbers 75D, 79D, 80D, 82D, and 85D]), however, the standard time-location data were not collected. As a result, I intend to re-check and verify all of DS's survey data during my next survey of this 8.9-mile reach in 1 or 2 weeks. (Post Script: Five of DS's new redds found this date were subsequently determined to have been lamprey redds on April 12, 2002–RWD; numbers herein were appropriately corrected.)

Lower 9.4 Miles–A total of 11 adults were seen, including 9 fresh fish in one group and 2 individual SH–1 a downstreamer and 1 fresh, moving upstream. Of 27 previous redds checked for current status, results were as follows: of 21 first found 1 week ago (March 30), 19 were discernable and 2 were not; of 2 first found on March 16, 1 was discernable and 1 was not; and of 1 first found on March 2, it was not discernable. A total of 12 new redds were found and marked (#s75R-81R, 83R, 85R, 87R-89R).

One pair of lamprey was observed digging and spawning on a redd. However, more significant is that this redd lacked typical characteristics of a lamprey redd and would have been called a steelhead redd by me if encountered absent the lampreys. Based on the characteristics of this lamprey redd, I changed three previous steelhead redds from the last survey to lamprey redds and used more caution during the remainder of the survey day. This clearly points up one of the potential errors in the survey protocol, particularly if observers are not well trained and experienced, such as is the case with DS. As a result, I intend to re-check DS's 15 new redds as soon as possible to be sure lamprey redds were not counted as steelhead redds.

Key observations, by time, were:

0830–start of survey
0831–new redd #75R
0835–new redd #76R
0850–new redds #s77R-78R
0906–new redd #79R
0907–new redd #80R
0909–new redd #81R
1001–new redd #82R–later reassessed to be a lamprey redd
1031–new redd #83R
1050–new redd #84R–later reassessed to be a lamprey redd
1100–new redd #85R
1101–new redd #86R–later reassessed to be a lamprey redd
1116–1 adult, downstreamer

1147–new redd #87R
1212–new redd #88R
1245–9 adults, fresh, moving upstream
1254–new redd #89R; two lamprey beds nearby
1352–1 adult, fresh, moving upstream
1400–end of survey, South Fork confluence

Prepared: April 8, 2002/Revised and Results Corrected: April 16, 2002

MEMORANDUM TO THE FILE–#021

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Spawning survey, Wheatfield Fork, from House Creek Confluence Downstream 18.3 Miles to South Fork Confluence, April 12-13, 2002

Personnel

I conducted this survey with a resident volunteer (DS) whom I have been training to assist me on future survey work.

Survey Methods

This was a 2-day survey, covering the same continuous 18.3-mile survey reach of the Wheatfield Fork that I last surveyed with DS on April 6, 2002. During both days, DS and I traveled together in separate small boats, surveying for redds, adults, and carcasses. My standard survey protocol was followed.

The upper half (8.9 miles) of the Wheatfield Fork was surveyed from 1100-1630 hrs on April 12 for an average survey rate of 1.6 mph. The lower half (9.4 miles) of the Wheatfield Fork was surveyed from 0935-1505 hrs on April 13 for an average survey rate of 1.7 mph.

On the 18.3-mile survey reach, a total of 59 redds (28 on upper reach; 31on lower reach) found and marked on recent previous surveys, we reexamined to determined their present discernability.

Weather and Stream Conditions

Water clarity was excellent and the flow was the lowest of any survey this season. As an index to flow conditions, the stage of the DWR realtime gage on the Garcia River near Point Arena at mid-day was about 2.19 feet and 2.18 feet, respectively, on April 12 and 13. My other standard

flow index–the USGS realtime gage on the Navarro River near Navarro–was inoperable during this period.

The weather on both survey days was clear and sunny, with above average daytime maximum temperature approaching 85^0F and 75^0F, respectively, on April 12 and 13. Wind was calm on April 12. On April 13, the usual windy conditions were encountered along the lower reach, especially along the last 2-3 miles. Surface turbulence associated with this wind hampered our detection or both redds and adult fish.

Results

Upper 8.9 Miles–Of 28 total previous redds checked for discernability, 22 were still discernable and 6 were not. This included: 10 marked on April 6, of which 9 were discernable and 1 was

not; 11 marked on March 29, of which 8 were discernable and 3 were not; and 2 marked on March 15, of which 1 was discernable and 1 was not. After careful consideration and discussion, we reclassified as lamprey redds 5 redds (#s75D, 79D-80D, 82D, and 85D) that DS found and marked during his April 6 solo survey of this reach. (I had suspected there was a problem after review of DS's data from the April 6 survey.)

Nine new redds were found and marked today. Thus, a total of 31 marked redds are currently discernable on this reach.

Lamprey redds were abundant, numbering in the dozens, but they were not counted. We also observed several pairs of lampreys actively digging and/or spawning. More importantly, however, we found that three definite steelhead redds from earlier surveys now had lamprey redds superimposed over them. This tends to further complicate the discernability issues involving these two species. In addition, on one of the superimposed species redds, foothill yellow-legged frog eggs were found attached to cobble in the lamprey redd.

A total of four adults were seen; these were all downstreamers.

Key observations, by time, were: 1100–start of survey at House Creek; 1102–three new redds; 1200–three downstreamer adults; 1205–1 downstreamer adult; 1234–two new redds; 1415–one new redd; 1514–one new redd; 1558–one new redd; 1609–one new redd; 1630–one new redd; and 1630–end of survey at Annapolis Road Bridge.

Lower 9.4 Miles–A total of 22 adults were seen. All of these fish appeared to be fresh, upstreamers; about half were smaller "bluebacks." Twenty of the total fish were seen in the first large, deep pool upstream of the South Fork confluence.

Of 31 previous redds checked for current status, 20 were still discernable as follows: of 18 first found March 30, 10 were still discernable and 8 were not; of 12 first found on April 6, 10 were still discernable and 2 were not; and of 1 first found on March 16, it was not discernable. A total of seven new redds were found and marked (#s75R-81R, 83R, 85R, 87R-89R). Thus, a total of 27 marked redds are currently discernable along this reach.

Lamprey redds were abundant, with dozens observed; several digging and/or spawning pairs were also observed. More importantly, two very distinctive previous steelhead redds now had lamprey redds superimposed over them. In fact, one of the lamprey pairs was actively digging and/or spawning.

Key observations, by time, were: 0935–start of survey at Annapolis Road Bridge; 1000–one new redd; 1032–one new redd; 1128–one new redd; 1222–one new redd; 1240–one new redd; 1256–one new redd; 1300–one new redd; 1355–two adults, fresh (bluebacks); 1457–20 adults in one large pool (about half bluebacks), all fresh; and 1505–end of survey at confluence with

South Fork.

Other Note

The low water conditions of these 2 days resulted in severe damage to the bottom of my fiberglass-over-wood drift boat. In fact, it is now so unserviceable that any additional surveys this season may have to be from foot.

Prepared: April 16, 2002

MEMORANDUM TO THE FILE–#022

File: Gualala River Steelhead Study **From:** Richard W. DeHaven

Subject: Spawning survey, Wheatfield Fork, from House Creek Confluence Downstream 18.3 Miles to South Fork Confluence, April 19, 2002, *my final survey for the 2002 season.*

Personnel

I conducted this survey with a resident volunteer (DS) whom I have been training to assist me on future survey work.

Survey Methods

This was a 1-day survey, covering the same continuous 18.3-mile survey reach of the Wheatfield Fork that I last surveyed with DS on April 12-13, 2002. Today, DS and I surveyed the two sections of this reach separately by small boat, while surveying for redds, adults, and carcasses. My standard survey protocol was followed (except as noted below). My two small boats were just barely serviceable today, due to severe damage they sustained during last week's surveys. Thus, this was the final survey of 2002, despite the likelihood that additional spawning will occur after this date. Extensive boat repairs will be necessary before any surveys can be conducted in the 2003 spawning season.

The upper half (8.9 miles) of the Wheatfield Fork was surveyed by me from 0830-1430 hrs for an average survey rate of 1.5 mph. The lower half (9.4 miles) of the Wheatfield Fork was surveyed by DS from 0800-1730 hrs for an average survey rate of 1.0 mph. These rates were relatively slow; this was largely because of the very low flows, which necessitated that the boats be dragged over or around numerous obstacles.

Due to the low flow (and my need to leave for home early today), previously marked redds were not re-checked for discernability today; it was simply assumed that most, if not all, from last week were still discernable. I decided that enough discernability data had been collected for the year. Thus, our primary effort was to find any new redds, to be certain we did not confuse any lamprey redds with steelhead redds, and to remove all the flagging we had earlier placed along the river for marking redds.

Weather and Stream Conditions

Water clarity was excellent and the flow was the lowest of any survey this season. As an index to flow conditions, the flow at the DWR realtime gage on the Garcia River near Point Arena showed a mid-day stage of about 2.12 feet on April 19. My other standard flow index–the USGS realtime gage on the Navarro River near Navarro–showed a flow at mid-day of about 70 cfs.

The weather on the survey day was clear and sunny, with a normal maximum daytime temperature of about 68^0F and little or no wind. Nevertheless, the usual wind and surface

turbulence which hampered detection or both redds and adult fish, was encountered over the last 2 miles or so of the lower survey reach.

Results

Upper 8.9–Eleven new steelhead redds were found; as usual, these well-distributed over the survey reach. No adult steelhead were seen. However, this year's steelhead fry were relatively abundant all along the survey reach.

Lamprey redds were abundant, with new (since last week's survey) ones numbering (although they were not counted) in the dozens. Several spawning pairs of lampreys were also observed.

I also found several more instances where previous steelhead redds now had a lamprey redd superimposed over them. In fact, in two more instances, a third species–the foothill yellow-legged frog–had then deposited egg masses on cobble within the lamprey redd within the steelhead redd. So, these three spawning species were co-mingling in one area.

Observations of redds, by time, were:

0830–start of survey at House Creek	0840–1 new redd
0917–2 new redds	1040–1 new redd 1329–1 new redd
1148–1 new redd	1149–1 new redd
1408–1 new redd	1430–end of survey at South Fork confluence

Lower 9.4 Miles–Two adults (spent condition) were seen and 22 new steelhead redds were found. As usual, the redds were well-distributed throughout the reach. This year's steelhead fry were abundant throughout all areas.

Lamprey redds were abundant, with new (since last week's survey) ones numbering (although they were not counted) in the dozens. However, only one actively spawning pair of lampreys was observed.

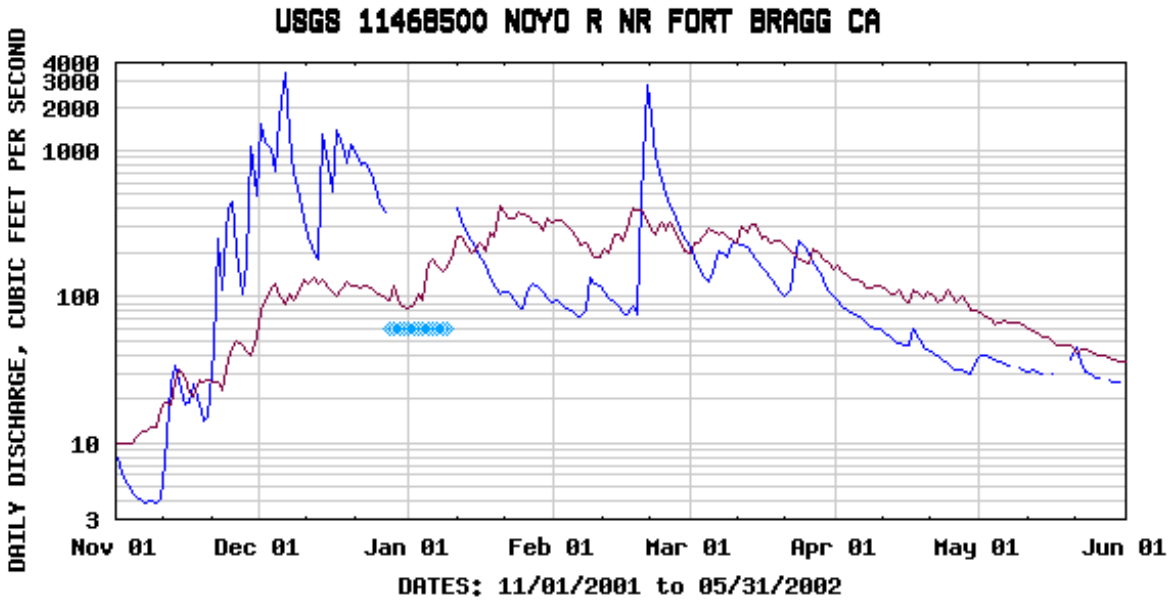
DS found three more instances where previous steelhead redds now had a lamprey redd superimposed over them. However, DS did not find any frog egg masses in the lamprey redds.

Observations of the new redds, by time, are not available for this section of the survey, because DS lost a small field notebook in a minor boating accident near the end of the survey.

Prepared: April 22, 2002

APPENDIX B–HYDROGRAPHS FOR THE NOYO AND NAVARRO RIVERS DURING THE 2001-2002 STEELHEAD SPAWNING SEASON, FOR INDEXING THE GULALA RIVER HYDROGRAPH, WHICH IS NOT YET AVAILABLE

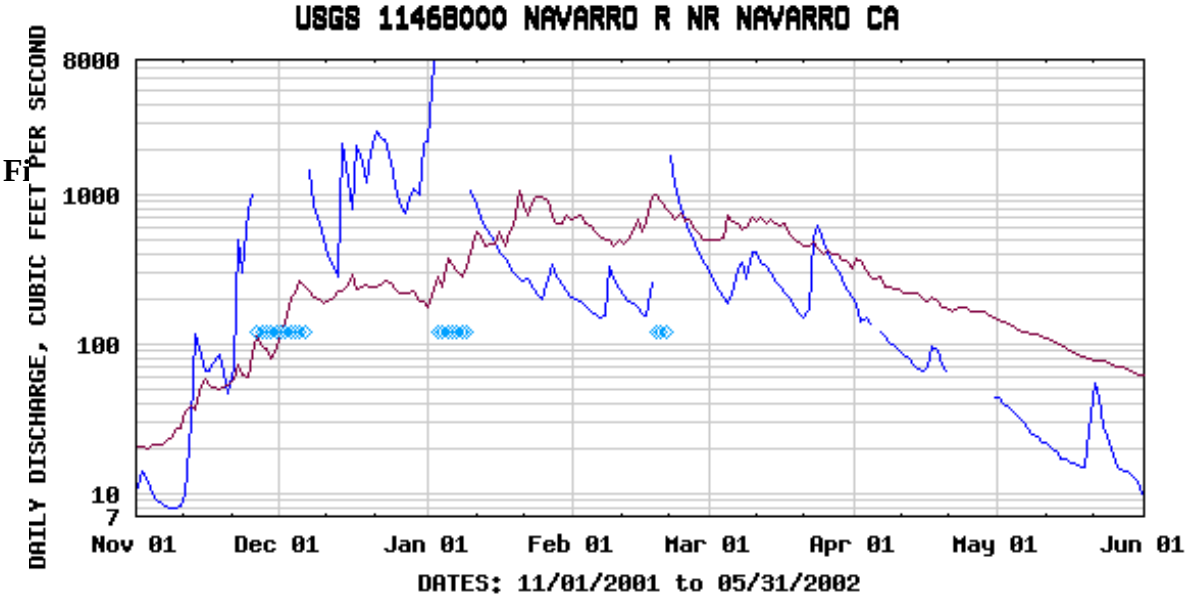
USGS



EXPLANATION

DAILY MEAN DISCHARGE

MEDIAN DAILY STREAMFLOW BASED ON 49 YEARS OF RECORD



EXPLANATION

DAILY MEAN DISCHARGE

MEDIAN DAILY STREAMFLOW BASED ON 50 YEARS OF RECORD

Equipment malfunction

Provisional Data Subject to Revision