APPENDIX 1: File Memos #063-#081 for 2007 Surveys.

MEMORANDUM TO THE FILE–#063

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, November 29-30, 2006 ***my first survey (an incomplete survey) of the index reach for the 2007 spawning season.***

Personnel and Survey Timing

I conducted this survey, my first of the 2007 spawning season, alone. I arrived at House Creek on November 29th at 1000 hrs, about 2 hours later than planned, due to two bad traffic accidents (and resulting traffic gridlock) encountered in route. I embarked on survey of the upper 8.9-mile index reach at 1030 hrs.

Survey Methods

I was using one of my 8-foot aluminum mini-drift-boats. After about 1/2-mile it became clear that boating was a mistake. The stream flow was way too low. I was dragging the boat more than I was rowing it. The survey clearly should have been done by walking along the stream. However, it was too late to drag the boat back upstream to the launch-point, so I continued on. At 1500 hrs, however, I finally realized that it would not be possible to complete the survey by nightfall. I therefore located a suitable location where I could pull the boat and my gear up from the stream bed to the nearby roadway. I then used my duping device (gas can) to hitch a lift back to my vehicle. The survey distance actually completed was about 7.5 miles of the upper survey reach. Also, because of the very low flow and closed river mouth (see below) I cancelled the survey of the lower index reach scheduled for the next day.

Weather and Stream Conditions

Weather was cold (about 38^0F) but the sky was clear and sunny. I did not encounter any wind. My flow index, the Navarro River gage at Navarro, was reading about 60 cfs on November 29th and was in steep decline. On November 30th, I checked and photographed the river's mouth and was surprised to find it still blocked by a sandbar, albeit a very low one. This was causing the largest and highest impoundment of the estuary that I have ever observed. Flow was backed upstream well past the mouth of the North Fork, a very unusual and remarkable event.

Rainfall and Hydrology Prior to this Survey

Between October 4 and November 26, six rainfall events of from 1 to 3 days in duration occurred in the watershed (all observations of rainfall based on the realtime gage at Venado [VEN] on the Russian River drainage). These were relatively small events ranging from 0.28 to 2.08 inches. The maximum single-day accumulations were 1.16 inches on November 2nd, 1.12 inches on November 12th, and 0.96 inch on November 26th.

Based on the Navarro River gage as an index, the flow increased by about 100 cfs from both the November 11th and November 26th rainfall events; both of these small surges then decreased very rapidly. The four other rainfall events prior to the survey increased river flow by no more

than about 15 cfs. I thought that the two surges to just over 100 cfs would have opened the river mouth and allowed some adult steelhead to enter the stream. I was clearly wrong on both counts.

Results

Neither any adult steelhead nor new redds were found. However, about 4 miles downstream from House Creek I did locate what appeared to be an old redd from last season. Visibility into the water was generally excellent and I got excellent views of the bottoms of the YMCA Pool, Bedrock Run, and Concrete Slab Pool, but no fish were observed in any of these important holding/resting spots.

Conclusions

Flows were extremely low–far too low in fact, for survey from a small boat. The river mouth was still blocked by a sandbar and may not have opened yet this rainfall season. The estuary stage was the highest I have ever observed, with flow backed up well upstream of the mouth of the North Fork. Only about 7.5 miles of the index reach was surveyed. No new redds or adult steelhead were observed. Spawning activity was clearly quite low or nonexistent.

Survey conditions: flow=low; clarity=excellent; and weather=excellent.

Prepared: December 21, 2006

Photo Gallery for the November 29-30, 2006 Spawning Survey follows on the next page.

A 1-inch rainfall fails to breach the river's mouth

With mouth closed by a sandbar, river is impounded upstream past the North Fork's mouth, the highest stage author has ever observed.

South Fork at Twin Bridges flowing after 1-inch rainfall.

Wheatfield Fork at Annapolis Road Bridge after 1-inch rainfall.

MEMORANDUM TO THE FILE–#064

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, December 17-18, 2006 ***my second survey (a complete survey) of the index reach for the 2007 spawning season.***

Personnel and Survey Timing

I conducted this survey, my second of the 2007 spawning season, alone. I arrived at House Creek on December 17th at 0815 hrs. I embarked on survey of the upper 8.9-mile index reach at 0900 hrs and completed it at 1400 hrs, for an average survey rate of 1.78 mph. On day two I started survey of the lower 9.4-mile index reach at 0845 hrs and completed it at 1400 hrs, for an average survey rate of 1.79 mph.

Survey Methods

I floated the stream both days in one of my 8-foot aluminum mini-drift-boats. All procedures were the same as documented in the past, except for the addition of GPS data (waypoints, tracks and maps). In an effort to obtain more reliable GPS data, I purchased a newer and better unit (Garmin GPSMap 76Cx) and mounted an external antenna for it on a 5-ft-tall aluminum pole attached to the boat. While these changes improved overall reception and accuracy, there were still several scattered locations along the index reach where, due to steep terrain and/or dense vegetative cover, "fixes" from the unit were up to 300 meters away from actual locations (e.g., up the hillside well away from the actual stream).

Weather and Stream Conditions

Weather was cold–about 33^0F–in the morning both days, but warmed up nicely to around 45-50^0F by mid-afternoon. The sky was clear and sunny both days and there was no wind. My flow index, the Navarro River gage at Navarro, was reading about 160 cfs at noon on day one and 140 cfs at noon on day two, and was in steep decline. On day one the flow was just a bit too high (with the water still with a tint of green color) for best survey conditions. On day two, survey conditions were excellent in all respects, except for the low sun angle due to date. The river mouth was open and flowing to the sea, with moderate surf, during the afternoon of the 17th; the mouth was not photographed.

Rainfall and Hydrology Between Prior Survey and this Survey

This season's first survey was on November 29, 2005. Thus, 18 days had elapsed. During this time, a total of 5.78 inches of rainfall (all discussion pertains to the VEN real-time gage) was recorded during 8 days with measurable rainfall. Highest 1-day amounts were 1.44 inches on December 8th and 1.56 inches on December 11th. The 3-day rainfall event beginning on December 8th resulted in about a 400 cfs rise of flow (based on the Navarro River gage at Navarro as an index). The 5-day rainfall event starting on December 11th resulted in about a

1,200 cfs rise in flow. On December 17th at the start of the survey, total cumulative seasonal rainfall to date was 11.16 inches.

Results

No steelhead redds were found. However, I did find fresh "test diggings," presumably by adult steelhead, at four locations–three along the upper reach and one along the lower reach. Also, six adult steelhead were seen, all of them along the upper survey reach. Along the upper reach, I had marginal visibility at the YMCA and Indian Spearing pools, but good-to-excellent visibility at the other major holding sites. Along the lower survey reach, I had excellent visibility into all of the major holding and resting sites. The six adults were observed as follows:

0927 hrs: Two A, size 2, one FR (fresh-run) and one S (spent), just above Bedrock Run;
1012 hrs: Two A, size 2 (1) and size 3 (1), both FR, Concrete Slab Pool; and
1349 hrs: Two A, size 2, both FR, un-named deep run.

Also, a school of age 2 and older juvenile steelhead (JSH) was observed in a deep woody run at 0929 hrs. Due to surface turbulence at the site, the number of fish in this school could not be estimated. In 2005 during a spawning survey about this same date, several large schools of JSH were recorded–a first during such surveys.

Conclusions

A low number of adult steelhead, including a few possibly spent fish, were migrating through the index reach on the survey dates. Spawning was likely occurring in upstream areas. Conditions had been suitable (including open river mouth) for adult migrations for about 10 days prior to the survey. One school of JSH was observed.

Survey conditions: flow=moderate; clarity=fair-excellent (day1-2); and weather=excellent.

Prepared: December 30, 2006

MEMORANDUM TO THE FILE–#065

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, January 1-2, 2007 ***my third survey (a complete survey) of the index reach for the 2007 spawning season.***

Personnel and Survey Timing

I conducted day one with a friend, Marc Felton, and day two alone. We arrived at House Creek on January 1st at 0825 hrs. and surveyed the upper 8.9-mile index reach from 0900 to 1354 hrs for an average survey rate of 1.78 mph. On January 2nd I started survey of the lower 9.4-mile index reach at 0900 hrs and completed it at 1303 hrs, for an average survey rate of 2.35 mph.

Survey Methods

The stream was navigated in my 8-foot aluminum mini-drift-boats. All procedures were the same as documented in the past, except for the addition of GPS data (waypoints, tracks and maps). During the first day, I took the lead in my boat (Marc followed closely behind) and numbers of fish recorded were only the fish that I alone observed.

Weather and Stream Conditions

Weather both days was unseasonably mild. Air temperatures ranged from the mid-40s to mid-50s, there was little or no wind, and full sunshine. The water was still slightly green on day one, which hampered visibility; much improved clarity was encountered on day two. Another limiting factor was the low sun angle, which amplified the amount of glare on the water and hampered visibility. Flow both days was slightly higher than ideal for survey, but another storm was predicted for Jan 3rd or 4th; I wanted to be sure a survey was done before then.

The flow index, the Navarro River gage at Navarro, was reading about 230 cfs at noon on day one and 185 cfs at noon on day two, and was in gradual decline. The river mouth was open and flowing to the sea, with low-to-moderate surf, during the afternoon of the 1st; the mouth was not photographed.

Rainfall and Hydrology Between Prior Survey and this Survey

Two weeks had elapsed since the previous survey was conducted on December 17-18, 2006. Based on the VEN real-time rain gage as an index, the watershed had two rainfall events during this 2-week period. The first was a 1-day event on December 21st totaling 1.48 inches and creating roughly a 550 cfs rise in flow (based on the Navarro gage); the second was a 2-day event beginning on December 26th in which 3.88 inches fell and the stream flow increased by roughly 6,000 cfs. The rise to just over 6,000 cfs occurred on December 27th; the hydrograph then exhibited a steep decline until the survey dates.

Results

A single steelhead redd, 20 adult steelhead, and 1 adult steelhead carcass were recorded. The single redd and one carcass were along the upper survey reach. Adults were equally divided between the upper (10) and lower (10) survey reaches; one adult appeared to be spent. Occurrences of the 20 adults are summarized in Table 1. No adults were seen in the Log, Indian Spearing, or YMCA pools along the upper survey reach, however, visibility was poor at the latter two sites. Along the lower survey reach, good views were obtained of Yellow Rope, ATV, Lower Cable, and Shaddy Lane pools, but no adults were recorded at these heavily-used sites.

Fewer than one dozen juvenile steelhead (JSH) were seen, mostly as widely scattered individual fish. On day one, my co-observer did observe one adult steelhead in a deep run that I failed to record.

Unlike the previous survey in mid-December, no fresh "test diggings," presumably by adult steelhead, were observed. In addition, the heavy sedimentation of major holding pools observed during the first two surveys this season had been greatly alleviated. The deepest pools were pretty much back to their original sizes and depths. Apparently, the 6,000 cfs peak flow of a few days earlier was effective in scouring them out and transporting sediment away.

Conclusions

A low number of adult steelhead, including possibly some spent fish, were migrating through the index reach on the survey dates. A low level of on-site spawning was occurring, with most spawning occurring upstream. During most of the 2 weeks between surveys, stream conditions were good for both migration and spawning. A small, widely scattered number of individual JSH were observed. Depths and sizes of the major holding pools improved compared to recent previous surveys.

Survey conditions: flow=high; clarity=fair-excellent (day1-2); and weather=excellent.

Prepared: January 7, 2007
Revised and Edited: January 13, 2007

Table 1. Observations of live adult steelhead along the index reach on January 1-2, 2007.

Reach	Time	Total # Adults	Number by Size Class C1	C2	C3	*	# Spent	Location
Upper	0937	6	0	3	3	0	1	un-named pool
Upper	--	3	0	1	2	0	0	Bedrock Run
Upper	--	1	0	0	1	0	0	Concrete Slab Pool
Lower	0916	4	0	2	2	0	0	un-named pool
Lower	1012	1	1	0	0	0	0	un-named pool
Lower	1020	1	0	0	1	0	0	un-named pool
Lower	1153	1	0	1	0	0	0	un-named run
Lower	1202	3	0	2	1	0	0	deep, un-named run
TOTAL		20	1	9	10	0	1	

MEMORANDUM TO THE FILE–#066

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, January 10-11, 2007 ***my fourth survey (a complete survey) of the index reach for the 2007 spawning season.***

Personnel and Survey Timing

I conducted the survey with Greg Benke, a friend from San Francisco. We arrived at House Creek on January 10th at 0815 hrs. and surveyed the upper 8.9-mile index reach from 0920 to 1337 hrs for an average survey rate of 2.08 mph. On January 11th we began survey of the lower 9.4-mile index reach at 0915 hrs and completed it at 1413 hrs, for an average survey rate of 1.88 mph.

Survey Methods

The stream was navigated both days in my 8-foot aluminum mini-drift-boats. All procedures were the same as documented in the past, except for the addition of GPS data (waypoints, tracks and maps). During both days, I took the lead in my boat (Greg followed closely behind) and numbers of fish recorded were only the fish that I alone observed.

Weather and Stream Conditions

Weather was dramatically different during the two days. Day one was overcast, breezy and cool (est. 40-45^{0}F). Day two was clear and very cold, with the air temperature only rising from 28 to 35^{0}F during the survey; as a result, in most places early-morning frost and ice never melted during the day. Wind was calm, however. Another limiting factor was the low sun angle during day two, which amplified the amount of glare coming off the water.

The flow both days was just about perfect for surveying. The flow index, the Navarro River gage at Navarro, was reading about 150 cfs at noon on day one and 130 cfs at noon on day two, and was in gradual decline. We were unable to check the status (open/closed) of the river's mouth, but I assume it was open based on the flow.

Rainfall and Hydrology Between Prior Survey and this Survey

Ten days had elapsed since the previous survey was conducted on January 1-2, 2007. Based on the VEN real-time rain gage as an index, the watershed had one day of rainfall (January 3rd) yielding 0.52 inches and resulting in about a 125 cfs increase of flow (based on the Navarro gage). From January 5 to the start of the survey, the hydrograph was in gradual decline from a peak of about 280 cfs.

Results

A relatively large number of adult steelhead for this early stage of the season–95 (Table 1)–were counted, including 51 on the upper survey reach and 44 on the lower reach. No new steelhead redds were found; the one redd from the previous survey was still clearly discernable. Ten of

the adults appeared to be spent, but others may have been too. About half of the adults were size 2 and about half were size 3. A total of 41 (43 %) of the 95 adults occurred in five named sites. Two very large spent adults exceeding 34 inches total length were also seen. For the first time ever, adult steelhead were seen in the Park Pool, Lady-Car Falls Pool, and in the long, deep run just upstream of Lady-Car Falls. We did not find any carcasses, nor were any juvenile steelhead (JSH) observed. We had excellent views of the bottoms of nearly all of the deepest runs and pools.

Conclusions

A relatively moderate-to-high number of adult steelhead, including kelts, were migrating through the index reach on the survey dates. On-site spawning was still nonexistent, however, with most spawning occurring upstream. During all or most of the 10 days between surveys, stream conditions were excellent for both migration and spawning. JSH were not observed.

Survey conditions: flow=moderate; clarity=excellent; and weather=excellent.

Prepared: January 12, 2007

Table 1. Observations of live adult steelhead along the index reach on January 10-11, 2007.

Reach	Time	Total # Adults	Number by Size Class C1	C2	C3	*	# Spent	Location
Upper	0922	3	0	2	1	0	0	un-named run
Upper	0949	1	0	1	0	0	1	un-named pool
Upper	--	16	0	8	8	0	0	Bedrock Run
Upper	1038	2	1	1	0	0	0	un-named run
Upper	--	11	0	6	5	0	0	just above Lady-Car Falls
Upper	--	7	0	4	3	0	0	Lady-Car Falls Pool
Upper	--	6	0	3	3	0	0	YMCA Pool
Upper	--	1	0	0	1	0	1	Park Pool
Upper	1214	1	1	0	0	0	1	un-named run
Upper	1222	2	0	0	0	2	2	un-named run
Upper	1225	1	0	0	1	0	0	un-named pool
Lower	1001	1	0	1	0	0	1	un-named pool
Lower	1018	6	1	3	2	0	0	un-named run
Lower	1047	15	0	8	7	0	0	un-named pool
Lower	1115	6	0	2	4	0	0	un-named run
Lower	1214	12	0	6	6	0	0	un-named run
Lower	1222	1	0	1	0	0	1	un-named pool
Lower	1245	1	0	1	0	0	1	un-named run
Lower	1303	1	0	1	0	0	1	un-named run
Lower	1313	1	0	1	0	0	1	un-named pool
TOTAL		95	3	49	41	2	10	

MEMORANDUM TO THE FILE–#067

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, January 19, 2007 ***my fifth survey (a complete survey) of the index reach for the 2007 spawning season.***

Personnel and Survey Timing

I conducted the survey with EB, a biologist and former colleague from the U. S. Fish and Wildlife Service. We arrived at the Annapolis Road Bridge 0855 hrs. and EB surveyed the lower 9.4-mile half of the index reach from 0930 to 1505 hrs for an average survey rate of 1.71 mph. I surveyed the upper 8.9-mile reach from 0950 to 1520 hrs for an average survey rate of 1.62 mph. The relatively slow survey rates were a reflection of the low flows.

Survey Methods

Both upper and lower survey reaches were navigated using my 8-foot aluminum mini-drift-boats. All procedures were the same as documented in the past, except for the addition of GPS data (waypoints–for redds, tracks and maps).

Weather and Stream Conditions

Weather was unreasonably cool, with air temperature ranging from about 30 to 45^0F. Extensive patches of ice remained along both reaches of the stream throughout the day. The sky was partly overcast throughout the day. There was no wind along the upper reach, but variable breezes were encountered along the lower reach, especially the last 3 miles, which occasionally obscured views of pool bottoms.

The flow was excellent for observing fish and finding redds, but at the low end of the range of navigability for my small boats. The flow index, the Navarro River gage at Navarro, was reading about 76 to 77 cfs during the day, and was in gradual decline. We were unable to check the status (open/closed) of the river's mouth, but based on the low flow it was likely either closed or alternating between open and closed in response to tidal conditions. However, we did observe the Ocean near Stewart's Point; it was very rough with high NW wind and waves.

Rainfall and Hydrology Between Prior Survey and this Survey

Nine days had elapsed since the previous survey was conducted on January 10-11, 2007. Based on the VEN real-time rain gage as an index, the watershed had no rain during this intervening period. The hydrograph remained in steady decline, from 130-150 cfs, during the 9-day period.

Results

Considering the relatively low flow, a moderate number of adult steelhead –80 (Table 1)–were recorded, including 67 along the upper survey reach and 13 along the lower reach. Adults were recorded in the Concrete Slab, Lady-Car Falls, YMCA, Park, Mossy Rock, and Yellow-Rope pools. Adults were not recorded in either the ATV Pool or Lower Cable Run along the lower

reach, or in the Log Pool or Indian Spearing Pool along the upper reach; visibility into all of these favored holding places was excellent. One new steelhead redd was found; the one redd found on January 1, 2007 was just barely discernable (to a very experienced observer). Seventeen of the adults appeared to be spent, but others may have been too. About 63 % of the adults were estimated to be size 2, about 27 % were size 3, and about 10 % were size 1. A total of 64 (80 %) of the 80 adults occurred in six named pools. For the second consecutive survey, adults were seen in the Park Pool and Lady-Car Falls Pool; three adults were also seen in Mossy Rock Pool for the first time this season. We did not find any adult steelhead carcasses, nor were any juvenile steelhead (JSH) observed. We had excellent views of the bottoms of all of the deepest runs and pools, except for a few obscured by surface turbulence (caused by wind) along the lowermost 3 miles of the index reach.

Conclusions

A moderate number of adult steelhead, including kelts, were migrating through the index reach. On-site spawning was low, thus most spawning was still occurring in upstream reaches. During all or most of the 9 days between surveys, stream conditions were excellent for both migration and spawning. JSH were not observed.

Survey conditions: flow=low; clarity=excellent; and weather=excellent.

Prepared: January 20, 2007

Table 1. Observations of adult steelhead along the index reach on January 19, 2007.

Reach	Time	Total # Adults	Number by Size Class C1	C2	C3	*	# Spent	Location
Upper	1039	1	1	0	0	0	1	un-named pool
Upper	1049	1	0	1	0	0	1	un-named run
Upper	1044	2	1	1	0	0	2	un-named run
Upper	--	16	0	10	6	0	2	Concrete Slab Pool
Upper	--	10	0	8	2	0	0	Lady-Car Falls Pool
Upper	1237	6	0	4	2	0	2	un-named pool
Upper	--	25	5	10	10	0	0	YMCA Pool
Upper	--	1	0	0	1	0	0	Park Pool
Upper	1431	3	0	3	0	0	3	Mossy Rock Pool
Upper	1518	2	0	1	1	0	2	un-named pool
Lower	--	9	0	9	0	0	0	Yellow-Rope Pool
Lower	1340	4	1	3	0	0	4	un-named run
TOTAL		80	8	50	22	0	17	

MEMORANDUM TO THE FILE–#068

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

Subject: Adult steelhead survey, main stem from North Fork mouth downstream 3 miles to the Highway 1 bridge, January 27, 2007, *my first survey of this estuary reach.*

Personnel and Survey Timing

This survey was prompted by the record low rainfall of January 2007, which was even lower than during the record 1976-1977 drought. The river had just been closed to all fishing by the Department of Fish and Game. I conducted the survey alone, arriving at the mouth of the North Fork at 1100 hrs. From 1115 to 1235 hrs, I floated the 3 miles to the Highway 1 bridge, for an average survey rate of 2.26 mph.

Survey Methods

I navigated the survey reach in one of my 8-foot aluminum mini-drift-boats. The purpose was to count any adult steelhead that could be observed holding in pools. The river mouth was checked and photographed immediately following the survey. As expected, it was closed. The sea had no wind-waves, but large (est. 8-10-ft) swells were breaking against the sandbar at the mouth.

Weather and Stream Conditions

Weather was partly cloudy with diffused sunlight (limiting visibility into the water), no wind, and a temperature of about 45-50^{0}F. The water was quite clear. The stream had a slight downstream flow from the mouth of the North Fork about 2,000 ft downstream; from there to the bridge, however, there was zero velocity due to the impoundment and slowly rising stage. I had a good view of pool bottoms for about the first 1.5 miles, then for the next 1.5 miles, much of the water was too deep (a combination of pool depth, plus impoundment stage) to see bottom.

Rainfall and Hydrology During January 2007

The last significant storm in the watershed occurred December 26, 2006, when 3.88 inches was recorded (VEN gage). The only subsequent rainfall occurred on January 3, 2007 (0.52 inches) and January 27, 2007 (0.13 inches). As a result, the hydrograph was in steady decline from January 4th to January 27th. Based on the stage (impounded upstream to about the Thompson Pool), the mouth had likely been closed for about 7-10 days.

Results

At 1130 hrs, I observed one school of 60 adult steelhead in Thompson Pool. Except for one very dark fish which may have been a kelt, they all appeared to be pre-spawners. My best estimate as to size was: 25 size #1, 25 size #2, and 10 size #3. No other adults (or juveniles) were seen. The fish that were seen were in a section with low, but moving (downstream) water velocity.

Conclusion

Despite the closed river mouth, at least one school of pre-spawn adult steelhead was holding in Thompson Pool, near the upstream edge of the estuary.

Prepared: February 1, 2007

MEMORANDUM TO THE FILE–#069

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

Subject: Angling survey, from Twin Bridges to North Fork mouth, February 16, 2007.

Personnel

I conducted this, my first angling trip to the Gualala River in 2 years, with Ted Yeh. We floated the river in two of my 8-foot mini-drift-boats, getting out to fish the traditional fish-holding spots along the way. We were on the water early, while it was still dark–at about 0615 hrs. That put us as the first boat downstream, ahead of six-to-eight other boats. We arrived at the take-out near the mouth of the North Fork at 1330 hrs.

Survey Methods

We both angled with my favorite traditional bait: a thumb-nail-sized piece of salmon roe behind a red and white or chartreuse number 12 spin-n-glow, with enough weight (sliding egg-weight) to properly bounce along the bottom.

Weather and Stream Conditions

The weather was clear and sunny with no wind. The hydrograph was slowly dropping after a very large, 6-day storm event starting on February 7th which dropped a total of 12.5 inches of rain (based on the VEN gage) on the watershed. Flows were higher–at about 480 to 450 cfs (Wheatfield Fork Realtime gage, which is now back in operation by USGS) during the day–than I prefer for angling, but water clarity was just about perfect, with around 2-3 feet of visibility.

Catch and Observations

This 1-day event could be characterized as the perfect ball game: no runs, no hits, and no errors. In short, neither of us has a legitimate "take" by an adult steelhead. I did, however, catch and release several steelhead smolts and pre-smolts and had fairly frequent smolt-type bites.

None of the half-dozen other anglers I spoke to caught any adult steelhead during the day.

Prepared: February 23, 2007; RWD

MEMORANDUM TO THE FILE–#070

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

Subject: Angling survey, from North Fork mouth to Highway 1 bridge, March 5, 2007.

Personnel

I conducted this, my second angling trip of the season, with Marc Felton. We floated the river in two of my 8-foot mini-drift-boats, getting out to fish the traditional fish-holding spots along the way. We were on the water from 0745 to 1230 hrs. There were no other boats on this section of the river; we did, however, encounter about six-to-eight other anglers who had walked and/or waded in.

Survey Methods

We both angled with my favorite traditional bait: a thumb-nail-sized piece of salmon roe behind a red and white or chartreuse number 12 spin-n-glow, with enough weight (sliding egg-weight) to properly bounce along the bottom.

Weather and Stream Conditions

The weather was clear and sunny with no wind until we encountered the afternoon sea breeze about 1/2-mile upstream of the H1 bridge. The hydrograph was slowly dropping. The last rainfall event had begun on February 24, lasting for 4 consecutive days, and depositing 3.68 inches in the watershed (based on the VEN gage). This storm event increased the flow by about 2,600 cfs. The flow while we were angling–about 320 cfs (Wheatfield Fork Realtime gage)–was absolutely perfect. Water clarity was very good for angling, with about 2-3 feet of visibility.

Catch and Observations

Marc and I each caught a small (size 1) fresh-run male adult steelhead. I also caught a spent adult (size 2) female steelhead. I also caught about 8-12 smolts. All fish were released in good condition (adults were photographed first).

Among the other anglers queried along the way, two adult steelhead kelts were reported to have been caught.

Prepared: March 13, 2007; RWD

MEMORANDUM TO THE FILE–#071

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

Subject: Spawning survey, Wheatfield Fork, from House Creek Confluence Downstream 18.7 Miles to Wheatfield Fork Bridge (just upstream of South Fork confluence), March 9-10, 2007, *my sixth survey (a complete survey) of the index reach for the 2007 spawning season.*

Personnel and Survey Timing

I conducted this survey alone. I arrived at the mouth of House Creek at 0920 hrs, began the survey of the upper index reach at 1010 hrs, and completed it at 1410 hrs, for an average survey rate of 2.35 mph. On day two, I surveyed the lower index reach from 0920 to 1320 hrs, for an average rate of 2.33 mph. The relatively quick survey rates were a reflection of the relatively high flow (i.e., in terms of *survey* flow) encountered each day.

Survey Methods

Both upper and lower survey reaches were navigated using one of my 8-foot aluminum mini-drift-boats. All procedures were the same as documented in the past (and on my website at http://www.gualalariversteelhead.info/homepage.html), except for the modification to the lengths of the survey reaches (i.e., upper, lower, and total length), based on new GPS data.

I originally measured the length of the index reach in 2002, using a planimeter and 1:24,000 USGS topographic quadrangle maps. The measured distance was from the mouth of House Creek to the confluence of the Wheatfield and South forks. This distance was found to be 18.3 miles, with 8.9 and 9.4-mile upper and lower survey reaches, respectively. However, this distance is slightly in error, because of the sinuosity of the stream at low-flow condition compared to measuring (with planimeter) down the center of the mapped bank-full stream width. In addition, since 2003, I have been terminating the survey of the index reach at the Wheatfield Fork bridge, instead of at the Wheatfield Fork/South Fork confluence, which shortens the Index Reach by a few hundred yards.

These inaccuracies can be resolved now that I have mounted a remote GPS antenna on a pole attached to my boat. In this manner, the GPS now provides consistently accurate (usually ± 25 feet or less) location "fixes," in contrast to the highly variable accuracy obtained with the built-in antenna of the hand-held GPS. Thus, during this 2-day survey, I ran the GPS's "Tracking" feature and recorded the start, end, and middle (Annapolis Road Bridge) of the index reach, as actually navigated by boat. The corrected distances were found to be 9.3 miles (upper reach) and 9.4 miles (lower reach), for a total of 18.7 miles. Henceforth, the index reach will be considered as 18.7 miles in length.

Weather and Stream Conditions

Weather was clear, sunny and warm both days. Maximum air temperature reached about 65^0F each day. After 1100 hrs on day one, I encountered moderate intermittent breezes along the

upper reach; and for about the last mile or so on day two, there was a strong on-shore (up-river) breeze, due to marine layer intrusion from the nearby coast.

Flows were relatively high and thus somewhat marginal for observing fish and finding redds. In fact, the 185 to 170 cfs flow (noon-to-noon) at the Wheatfield Fork gage was near the upper limit of the flow range for surveys by my boating method. In addition, the upper reach still had a slight green color "tinge" on day one. As a result of the high flows, slight turbidity, and wind (causing surface turbulence) I had a good view of the bottom over only about 2/3s of the 18.7 miles of stream.

Rainfall and Hydrology Between Prior Survey and this Survey

Forty-eight days had elapsed since the previous survey was conducted on January 19, 2007. Nevertheless, due to a relatively wet February (18.8 inches at the VEN gage), this was the earliest that another survey could reasonably be conducted. Based on the VEN gage, the watershed had 13 days with rain in four distinct rainfall events (event=consecutive days with rainfall) totaling 18.9 inches in the intervening period. The largest event, which began on February 7, lasted 6 days and deposited 12.48 inches. The largest 1-day rainfall in the period was 3.96 inches on February 10th. The last day with rainfall prior to the survey was February 27th.

The hydrograph (Wheatfield Fork gage) rises due to rainfall prior to the survey were: 9,000 cfs from the rainfall event starting on February 7th; 1,800 cfs from the rainfall event starting on February 21st ; and 2,600 cfs from the event starting on February 24th.

Results and Discussion

Despite the marginal survey conditions, a moderate-to-high number of adult steelhead –114 (Table 1)–were recorded, including 41 along the upper survey reach and 73 along the lower reach. Adults were recorded in the YMCA, and Yellow-Rope pools and in the Angle-Log and Bedrock runs. While adult fish were not seen in the other "favored" holding and resting pools, visibility at many of these sites was marginal, at best, and adults could easily have been missed.

Twenty-four (21 percent) of the adults appeared to be spent, but due to conditions, this must be considered a very rough estimate. An estimated 28 percent of the adults were size 1, 53 percent were size 2, and 19 percent were size 3; these also are just "ball-park" estimates because of the rather marginal survey conditions (i.e., poor visibility). A total of 56 adults (49 percent) were counted in just four named holding/resting sites. Marginal survey conditions also means that an unknown but potentially significant number of adults may have been missed.

I did not find any adult steelhead carcasses. A few (4-6) scattered juvenile steelhead (JSH) were observed. No new steelhead redds were found. Lamprey spawning activity was also quite low, with only two lamprey redds observed along the upper survey reach. There were neither pond turtles nor rough-skin newts seen. The river mouth was checked the afternoon of day one and was open with the river flowing to sea.

Conclusions

A moderate-to-high number of adult steelhead, including kelts, were migrating through the index reach. On-site spawning was low-to-nonexistent, thus most spawning was still occurring in upstream reaches. During half or more of the 48 days between surveys, stream conditions were good-to-excellent for both migration and spawning. A low number of JSH were observed. Overall, survey conditions were: flow=moderate; clarity=fair; and weather=fair.

Prepared: March 13, 2007

Table 1. Observations of adult steelhead along the index reach on March 9-10, 2007.

Reach	Dist. (Mi)	Total # Adults	Number by Size Class C1	C2	C3	*	# Spent	Location
Upper	--	15	7	8	0	0	0	Bedrock Run
Upper	1.68	1	0	1	0	0	1	un-named run
Upper	3.81	1	0	1	0	0	1	un-named run
Upper	--	15	5	5	5	0	7	YMCA Pool
Upper	7.25	2	0	1	1	0	2	un-named pool
Upper	7.64	2	0	1	1	0	0	un-named run
Upper	7.83	1	0	1	0	0	1	un-named pool
Upper	8.50	4	2	1	1	0	2	un-named pool
Lower	--	4	1	2	1	0	0	un-named pool
Lower	--	6	2	2	2	0	0	un-named run
Lower	--	19	5	8	6	0	0	un-named pool
Lower	--	6	2	4	0	0	0	Yellow-Rope Pool
Lower	--	2	0	2	0	0	2	un-named pool
Lower	--	8	2	6	0	0	0	un-named run
Lower	--	2	1	1	0	0	2	un-named pool
Lower	--	5	0	5	0	0	5	un-named pool and run
Lower	--	20	5	10	5	0	0	Angle-Log Run
Lower	--	1	0	1	0	0	1	un-named run
TOTAL		114	32	60	22	0	24	

MEMORANDUM TO THE FILE–#072

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

Subject: Reconnaissance-level Helicopter Survey of Selected Reaches of the Gualala River, March 15, 2007 (Survey No 1).

Purpose and Personnel

This was the first of three reconnaissance-level helicopter flights over the river planned for 2007. The purpose of these flights is to evaluate the utility of helicopter surveys for: (a) enumerating adult steelhead and their redds; (b) evaluating summertime dewatering of the stream; and (c) identifying significant stream perturbations that may be linked to the dewatering and other threats to steelhead habitat. If utility is demonstrated, a protocol for annual helicopter surveys will be designed and implemented in 2008. This initial survey and the two other reconnaissance surveys planned for 2007 are being funded and conducted by Marc Felton and myself.

Procedures

March 15th was selected as the first survey date, due to excellent weather (clear and calm, with high pressure aloft), the likelihood of adult steelhead being in the river in good numbers (i.e., because the spawning run often peaks during March), and a survey-friendly flow of about 131 cfs at the Wheatfield Fork realtime stream gage. To enhance visibility into the water, we also timed the survey so we would be airborne over the river between roughly 1200 and 1500 hours, when the sun is at its highest position in the sky. The survey was flown in a Bell 206B-1 JetRanger III helicopter chartered from Wine Country Helicopters of Napa, California. Owner Wayne Lackey was our pilot.

Based on the 4.5 hours of air-time we chartered, we planned to survey, in succession, four distinct reaches of the river: (1) Rockpile Creek, from its mouth upstream 10-15 miles; (2) Buckeye Creek from 5-10 miles upstream of its mouth downstream to its mouth; (3) Wheatfield Fork, from its confluence with the South Fork upstream about 25-30 miles to the vicinity of its confluence with Tombs Creek (and including the 18.7-mile spawning survey Index Reach); and (4) House Creek, from its mouth upstream for 5-10 miles. These ranges were established, since we did not know just how far we would be able to survey in the allotted air-time.

The aircraft was flown in a meandering pattern following the stream at an average speed of 25-30 mph and an average altitude of 200-250 feet (above stream surface). DeHaven was the primary observer. He rode in the rear seat behind the pilot (right side) with the rear sliding door opened, feet outside on the right-side skid, and head extended from the aircraft for viewing straight down towards the stream. Felton rode in front to the left of the pilot and recorded data–both on our field data forms and our (not the aircraft's) GPS. Our GPS was a Garmin GPSmap 76Cx with external antenna fastened to the aircraft's roof. The data recorded on the GPS included a "track" of each surveyed stream reach (and related transition flights between survey reaches), a "start" and "end" point (i.e., waypoint=WP) for each reach, odometer readings

at various points of interest along the way, and WPs recorded whenever items of interest (i.e., adult steelhead and their redds) were observed. (Note: It is assumed that the "track" distance was slightly less than the actual sinuous stream distance for each of the surveyed reaches).

The flight over each stream reach was continuous, without slowing or stopping to hover, except just briefly at beginning and end of each reach to record starting and ending points. WPs and tracks were recorded onto the Garmin 1:100,000 topographic map placed into the GPS (SD card) and on DeHaven's PC.

We did not attempt any photography–either stills or video–during this initial survey. We had plenty to do without this additional task. Clearly, however, photography will play an important role in any long-term helicopter survey protocol that may be implemented. In particular, high-quality (TV-station grade) gyro-stabilized video could prove quite useful.

Five days before the survey (i.e., on March 9-10), DeHaven conducted a spawning survey of the Index Reach by boat and marked (using florescent marking paint on the ground next to each site) each of this reach's 15 "favored" adult steelhead holding and resting pools. This was done to facilitate finding and identifying these key locations from the air. In addition, during the 2 days following the helicopter flight, DeHaven surveyed the Index Reach again by boat to determine e numbers of redds and adult steelhead seen in the Index Reach using this method.

Immediately upon completion of the survey of each stream reach by Helicopter, both DeHaven and Felton made an independent estimate (i.e., without knowledge of the other's estimate) of the percentage of total sinuous stream length that had just been visually observed. The two estimates, which proved to be surprisingly close (maximum 15 % difference) in every case, were then averaged to provide our "best guess" as to the actual viewable percentage of stream length.

Results and Discussion

About 51 miles of stream were surveyed (Table 1). A total of 66 adult steelhead and 2 redds were observed. Another 81 miles were flown in the area during transitions between survey points, about 70 miles were flown to Ukiah and back for fuel, and about 165 miles were flown getting to and from the study area. DeHaven and Felton both boarded the aircraft at Wine Country Helicopter's hangar at the Napa County Airport in Napa.

Figures 1-3 show the surveyed stream reaches, the waypoints where adult steelhead and steelhead redds were observed, and a few other items of interest.

The estimated percentages of surveyed reaches that were fully viewable from the aircraft were: Rockpile Creek-35 %; Wheatfield Fork Index Reach-75%; Upper Wheatfield Fork-73 %; and House Creek-83 %. When the stream could not be seen, it was usually due to steep terrain, riparian vegetation, shade, or some intermix of these factors. In addition, during survey of the Index Reach, an upstream wind along the lowermost 3-4 miles resulted in surface turbulence which greatly hampered ability to view the stream bottom at many locations.

Table 1. Survey reaches and findings.

Stream Reach	"Track" Distance (mi)	Steelhead Redds Observed	Adult Steelhead Observed
Rockpile Creek, mouth US	13.96	0	0
Buckeye Creek, DS to mouth	--Not Surveyed Due to Waypoint Error; See Figure 1--		
Wheatfield Fork-Index Reach	18.70 (17.19)	0	47
Upper Wheatfield Fork	9.90 (est.)	1	5
House Creek, mouth US	8.22	1	14
Totals	50.78	2	66

Three of the "favored" pools/runs along the Index Reach were inadvertently missed from the air. This was due to two factors: (1) the reach was surveyed in the opposite direction (i.e., upstream) that DeHaven normally surveys it by boat; and (2) landmarks DeHaven is familiar with were often not seen as the sites were approached, due to observing mostly straight down from one side of the aircraft.

The zero redds and 47 adult fish observed along the Index Reach were less than the 2 redds and 142 adult fish recorded during the March 16-17, 2007 follow-up survey by boat. However, the two redds were quite fresh and may have been constructed between the time of the aerial survey and boat survey (otherwise, they were missed during the aerial survey). And a larger number of adult fish during the boat survey than the preceding aerial survey is consistent with new schools of adult fish moving rapidly up stream from downstream of the Index Reach, which may have been an actual scenario. Ideally, both the aerial survey and boat survey of the Index Reach should be conducted on the same day, but this is not feasible. The best approach for getting at the issue of helicopter versus boat survey comparability will be to mark a number of redds during a boat survey and check them for detectability from the air during a follow-up helicopter survey.

Overall, we were quite encouraged with our ability to observe adult steelhead from the air. Especially with direct sunlight on the water, little or no wind creating surface turbulence, and a low-to-moderate flow minimizing turbulence, the bottom and thus any adult fish were readily seen in most locations. In fact, in most instances, it appeared that the approach of the helicopter startled adult fish holding in the pools and runs. When startled (presumably by the aircraft's shadow), they could be seen swimming towards deeper water or other forms of cover. This was an unexpected result, given our relatively high altitude of 200 to 250 feet above the water.

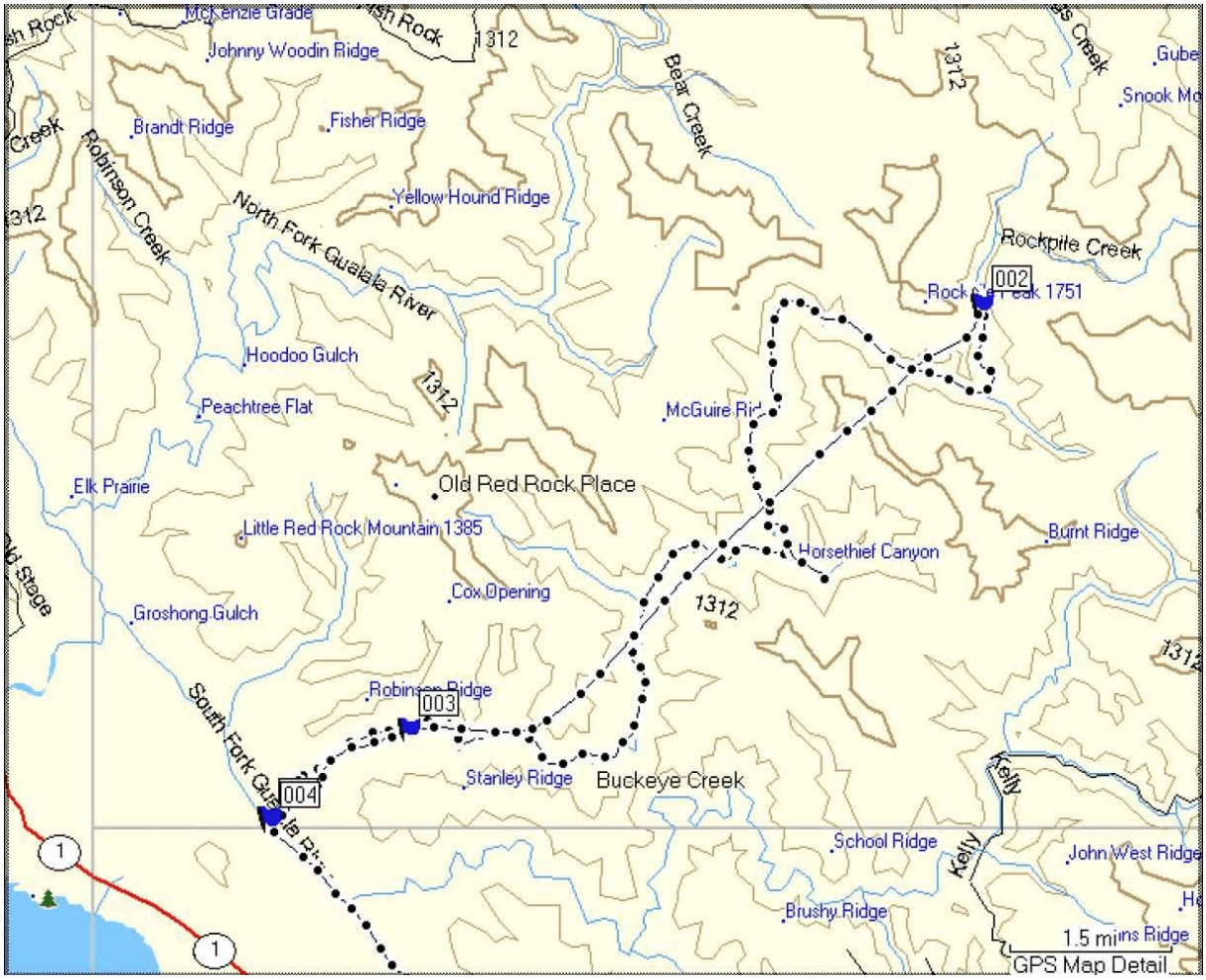

Figure 1. Rockpile Creek Survey Reach. *Waypoint (WP) #1 (obscured by WP #4) to WP #2 was 13.96 miles ("track" distance), but included a short "wrong turn" up Horsethief Canyon. From WP #2, we planned to fly over Burnt Ridge to WP # 3 (not shown) on upper Buckeye Creek to begin the Buckeye Creek survey back downstream to its mouth. Instead, WP # 1 (not WP #3) was inadvertently re-entered by the pilot. Thus, a relatively straight-line course was taken back to WP #3, where we then mistakenly believed we were on Buckeye Creek at the starting point of the Buckeye Creek survey. As a result, we then re-surveyed the lower 1.85 miles of the Rockpile Creek reach, while believing that we were on Buckeye Creek. This is a good example of how entering the wrong WP can get you lost–in a hurry–when relying 100 % on your GPS.*

Neither any adult steelhead nor their redds were seen on the Rockpile Creek survey. Most of the pool tail-outs appeared to consist of sand and gravel too small to be conducive to steelhead spawning. An estimated (average for DeHaven and Felton) 35 % (4.89 miles) of the 13.96 miles surveyed on Rockpile Creek involved a good aerial view of the stream surface. Elsewhere, the stream was partially-to-completely obscured by steep terrain, vegetation, shade or a combination of these factors.

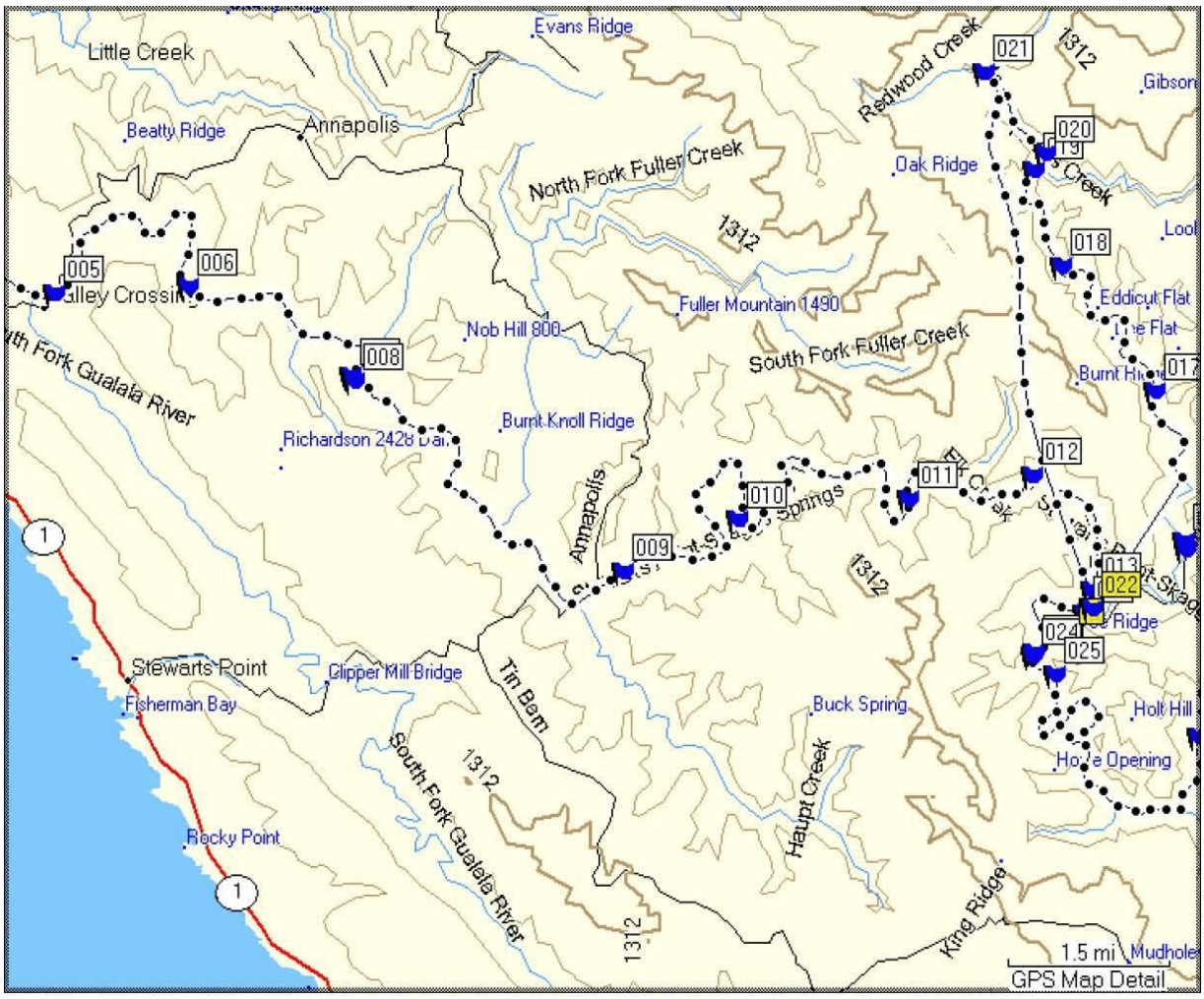

Figure 2. Wheatfield Fork Survey Reach. *WP #5 to WP #13 was the Index Reach (18.70 stream miles=17.19 "track" miles) of the Wheatfield Fork. A total of 47 adult steelhead (but no redds) were recorded at WP #6 (3), #7 (10), #8 (25), #10 (6), #11 (1), and #12 (2). The group of six fish was in the Park Pool. No other adult fish were seen in any of the 15 "favored" holding/resting pools, however, three such sites (Snagging and Log pools and Angle-Log Run) were inadvertently missed (aerial identification) because the ground-markings were not found. An estimated (average for DeHaven and Felton) 75 % (14.03 miles) of the 18.70 miles surveyed on the Index Reach involved a good aerial view of the stream surface.*

WP #14 (obscured by WP # 13) to WP #21 shows 7.90 miles ("track" distance) surveyed on the upper Wheatfield Fork, but about 2.0 miles more were surveyed above the House Creek mouth before the "tracking" feature of the GPS was turned back on (after returning from Ukiah where fuel was obtained). Five adult steelhead were recorded at WP #15 (2), #18 (1), #19 (1), and #20 (1). One redd was observed at WP #17. An estimated (average for DeHaven and Felton) 73 % (7.23 miles) of the 9.90 miles surveyed on this reach involved a good aerial view of the stream surface.

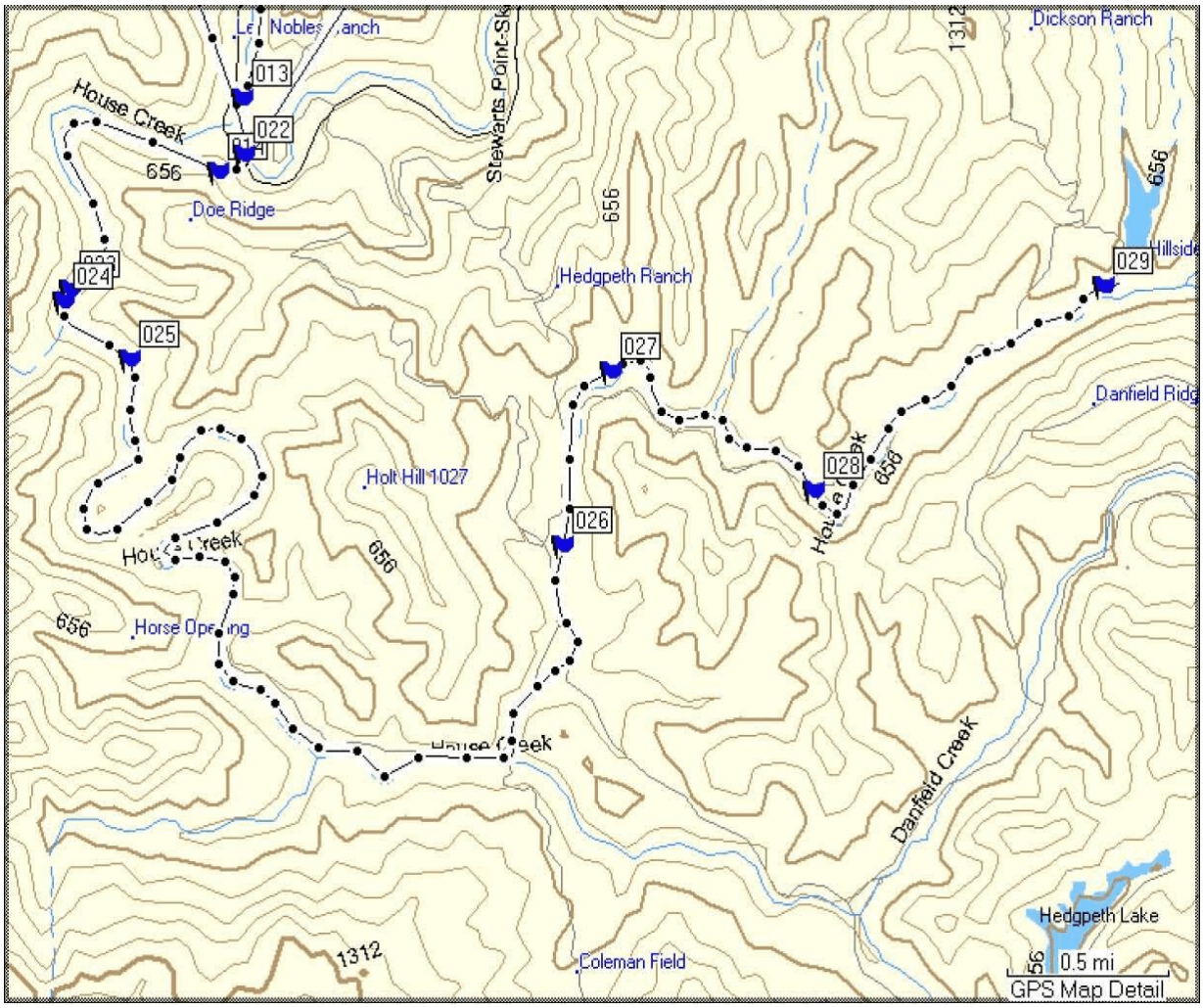

Figure 3. House Creek Survey Reach. *WP #22 to WP #29 shows 8.22 miles ("track" distance) surveyed along House Creek. Fourteen adult steelhead were observed at WP #23 (1), #24 (12), and #28 (1). One steelhead redd was observed at WP #25. WP #26 is where a diversion pump was found in 2002 and WP #27 is the site of the summer dam we discovered the same year. An estimated (average for DeHaven and Felton) 83 % (6.82 miles) of the 8.22 miles surveyed on House Creek involved a good aerial view of the stream surface. Elsewhere, the stream was partially-to-completely obscured by steep terrain, vegetation, shade or a combination of such factors.*

Conclusions and Recommendations

- This initial survey provided encouraging results suggesting that aerial surveys by helicopter may have potential for achieving at least one of the objectives being pursued–enumeration of adult steelhead and their redds.

- The better potential for effective counts of adults and redds appears to be along the Wheatfield Fork, both the Index Reach and upper reach from House Creek upstream to at least the vicinity of the mouth of Tombs Creek. Lower House Creek also appears to have good helicopter-survey potential. Much less potential apears to exist for Rockpile Creek and probably Buckeye Creek, both of which have similar physical attributes.

- The next survey should further compared boating survey results to helicopter survey results, including the detectability from the air of previously known and marked redds.

- Subsequent flights along the Index Reach should survey in the downstream rather than upstream direction so as to improve identification of key landmarks and known holding/resting locations.

Prepared: March 21, 2007
Edited: March 25, 2007 RWD

MEMORANDUM TO THE FILE–#073

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

Subject: Spawning survey, Wheatfield Fork, from House Creek Confluence Downstream 18.7 Miles to Wheatfield Fork Bridge (just upstream of South Fork confluence), March 16-17, 2007, ***my seventh survey (a complete survey) of the index reach for the 2007 spawning season.***

Personnel and Survey Timing

I conducted this survey alone. I arrived at the mouth of House Creek at 0920 hrs, began the survey of the 9.3-mile upper index reach at 1025 hrs, and completed it at 1435 hrs, for an average survey rate of 2.23 mph. On day two, I surveyed the lower 9.4-mile index reach from 0925 to 1330 hrs, for an average rate of 2.30 mph. The survey rates were slightly slower than the last survey 1 week ago, due to a slightly lower (and slower) flow.

Survey Methods and Purpose

Both upper and lower survey reaches were navigated using one of my 8-foot aluminum mini-drift-boats. All procedures were the same as documented in the past, including use of the new survey length of 18.7 miles.

This survey also had an important secondary objective–to compare results to results of the first helicopter survey of the Index Reach, which was conducted the day before on March 15, 2007.

Weather and Stream Conditions

Weather was clear, sunny and warm both days. Maximum air temperature reached into the low-to-mid 70s (^{0}F) each day. On day one, no wind was encountered during the survey. On day two, an upstream breeze began about 1130 hrs; and a relatively strong upstream breeze was encountered for the last 2 miles of the survey, due to marine layer intrusion from the nearby coast.

Flows were moderate and nearly perfect for survey. The hydrograph was still declining slowly. The Wheatfield Fork gage declined from about 123 to 117 cfs from noon to noon over the 2-day period. Water clarity was excellent. I could see bottom everywhere, except where wind created surface turbulence.

Rainfall and Hydrology Between Prior Survey and this Survey

One week had elapsed since the previous survey was conducted on March 9-10, 2007. No rainfall was recorded during this period. The hydrograph was in slow decline during the period, dropping about 62 cfs.

Results and Discussion

A relatively high number of adult steelhead –142 (Table 1)–were recorded, including 37 along the upper survey reach and 105 along the lower reach. A total of 97 adults (68 percent) were

recorded in just three of the named holding and resting sites: Concrete Slab Pool (27); Snagging Pool (20); and Angle-Log Pool (45). The 45 adults recorded in the Angle-Log Pool is the highest single-pool count to date during my 7 years on the river.

Along the upper reach, I had excellent visibility into Bedrock Run, Log Pool, YMCA Pool, Mossy Rock Pool, and the Indian Spearing Pool, and no adult steelhead were seen at any of these sites. Along the lower survey reach, no adult steelhead were seen in the Yellow Rope Pool, ATV Pool, Lower Cable Run, Shady-Lane Run, or Big Landslide Pool, however, visibility was poor at the last two sites due to surface turbulence obscuring my view of the stream bottom.

Sixteen (11 percent) of the adults appeared to be spent, but this must be considered a very rough estimate. An estimated 25 percent of the adults were size 1, 57 percent were size 2, and 18 percent were size 3. These estimates, which are very similar to results from the last survey, also are just "ball-park" estimates at best, because most fish occurred in comparatively large groups for which size assessments are problematic.

No adult steelhead carcasses were found. Also, no juvenile steelhead (JSH) were observed anywhere along the Index Reach. Lamprey spawning activity remained low, with only 13 lamprey redds observed along the entire 18.7-mile Index Reach. Rough-skinned newts finally made their appearance, but only along the upper 2/3s of the upper index reach during day one; none were seen the following day along the lower half of the Index Reach. One pond turtle was recorded–the first of the season–along the lower half of the Index reach.

Two new steelhead redds were found–one at mile 7.50 (upper reach) on day one and one at mile 9.40 (lower reach) on day two.

I checked the river mouth at 1600 hrs on day one. While it was still flowing to the sea, the connection was very narrow. Unless there is more rainfall soon, the mouth will almost certainly begin alternately opening and closing sometime within the next 10 days or so.

Conclusions

A relatively high number of adult steelhead, including kelts, were migrating through the index reach. On-site spawning (versus most spawning upstream) was just beginning, as the flow declined towards the spawning threshold of about 100 cfs. Without further rainfall, more redds can be expected during the next survey in about 1 week. During the week between successive surveys, conditions for adult steelhead migration through the Index Reach were excellent. JSH were not readily detectable from gross visual observation. Overall, survey conditions during the 2 days were: flow=moderate; clarity=excellent; and weather=excellent, except for the lowermost 2 miles during day two.

Table 1. Observations of adult steelhead along the index reach on March 16-17, 2007.

Reach	Dist. (Mi)	Total # Adults	Number by Size Class C1	C2	C3	*	# Spent	Location
Upper	1.19	1	0	1	0	0	1	un-named run
Upper	1.42	1	0	1	0	0	1	un-named pool
Upper	1.53	1	1	0	0	0	1	un-named run
Upper	--	27	5	15	7	0	0	Concrete Slab Pool
Upper	3.10	1	0	1	0	0	1	un-named pool
Upper	--	1	0	1	0	0	1	Lady-Car Falls Pool
Upper	--	4	1	2	1	0	4	Park Pool
Upper	8.21	1	1	0	0	0	1	un-named pool
Lower	9.96	1	1	0	0	0	1	un-named pool
Lower	13.44	26	6	20	0	0	0	un-named run
Lower	13.57	3	1	1	1	0	0	un-named pool
Lower	14.27	5	2	3	0	0	5	un-named pool
Lower	--	45	10	25	10	0	0	Angle-Log Pool
Lower	16.14	5	0	5	0	0	0	un-named run
Lower	--	20	7	6	7	0	0	Snagging Pool
TOTAL		142	35	81	26		16	

Prepared: March 18, 2007
Edited: March 25, 2007

MEMORANDUM TO THE FILE–#074

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

Subject: Spawning survey, Wheatfield Fork, from House Creek Confluence Downstream 18.7 Miles to Wheatfield Fork Bridge (just upstream of South Fork confluence), March 22-23, 2007, ***my eighth survey (a complete survey) of the index reach for the 2007 spawning season.***

Personnel and Survey Timing

I conducted this survey alone. I arrived at the mouth of House Creek at 0930 hrs, began the survey of the 9.3-mile upper index reach at 1010 hrs, and completed it at 1440 hrs, for an average survey rate of 2.07 mph. On day two, I surveyed the lower 9.4-mile index reach from 0915 to 1345 hrs, for an average rate of 2.09 mph. The survey rates were much slower than the last two surveys (1 and 2 weeks ago), due to much lower (and slower) flow.

Survey Methods and Purpose

Both upper and lower survey reaches were navigated using one of my 8-foot aluminum mini-drift-boats. All procedures were the same as documented in the past, including use of the new survey length of 18.7 miles.

This survey also had an important secondary objective–to provide survey data (numbers of adults and redd locations) just prior to the second reconnaissance-level helicopter survey of the Index Reach, which is scheduled for March 24, 2007.

Weather and Stream Conditions

Weather was clear and sunny with seasonal temperatures both days. Maximum air temperature reached into the low-to-mid 60s (^{0}F) each day. On day one, no wind was encountered during the survey. On day two, an upstream breeze began about 1230 hrs; and a relatively strong upstream breeze was encountered for the last 1.5 miles of the survey, due to marine layer intrusion from the nearby coast.

The flow was getting low, but was still almost perfect for survey. The hydrograph was still declining slowly. The Wheatfield Fork gage declined from about 93 to 91 cfs from noon to noon over the 2-day period. Water clarity was excellent. I could see bottom virtually everywhere, except where wind created surface turbulence.

Rainfall and Hydrology Between Prior Survey and this Survey

One week had elapsed since the previous survey was conducted on March 16-17, 2007. Only 0.04 inch of rainfall was recorded (on March 20th)during this 1-week period. There was no resulting rise in the hydrograph, which remained in slow decline during the period, dropping about 30 cfs.

Results and Discussion

A relatively high number of adult steelhead –157 (Table 1)–were recorded, including 55 along the upper survey reach and 102 along the lower reach. A total of 66 adults (42 percent) were recorded in just four named holding and resting sites: Concrete Slab Pool (46); Snagging Pool (12); Park Pool (6); and YMCA Pool (2). The 46 adults recorded in the Concrete Slab Pool is the highest single-pool count to date in any spawning season during my 7 years on the river, just eclipsing last week's new record of 45 adults set at the Angle-Log Pool.

Along the upper reach, I had excellent visibility into Bedrock Run, Log Pool, Mossy Rock Pool, and the Indian Spearing Pool, and no adult steelhead were recorded. Along the lower survey reach, no adult steelhead were seen in the Big Landslide Pool, Angle-Log Pool, Yellow Rope Pool, ATV Pool, Lower Cable Run, or Shady-Lane Run; I had excellent views of all of these except the Shady-Lane Run, where an upstream wind was blowing and causing surface turbulence.

Seven (5 percent) of the adults appeared to be spent, but this must be considered a very rough estimate. An estimated 41 percent of the adults were size 1, 46 percent were size 2, and 13 percent were size 3. There definitely appeared to be more smaller-sized fish than last week. However, all estimates of size are just "ball-park" estimates at best, because most fish occurred in comparatively large groups for which size assessment is problematic.

Seventeen (11 percent) of the adult steelhead I recorded had "bite" marks on their bodies or tails. These are assumed to be the results of encounters with seals, sea lions, and river otters. Apparently, entering the river and moving upstream in such low, clear water conditions is an extremely dangerous (to the fish) endeavor.

With this survey, the number of adult steelhead now counted this season during seven complete surveys and one partial survey of the Index Reach now stands at 614. This is by far the most adult steelhead I have recorded during my seven years on the river.

No adult steelhead carcasses were found. Also, no juvenile steelhead (JSH) were observed anywhere along the Index Reach. Lamprey spawning activity was beginning to pick up (but still well below previous years), with 29 total lamprey redds observed along the 18.7-mile survey reach. Rough-skinned newts were again present, but only along the upper 2/3s of the upper index reach. No pond turtles were recorded anywhere during the survey.

Five new steelhead redds were found, one each at stream mile 6.11, 7.32, 13.21, 13.81, and 16.58. The two previous redds at miles 7.66 and 9.65 were still discernable. All seven of these redds were marked with spray paint along the bank, so we could check their discernability from the air during the helicopter survey on the following day--March 24th.

I checked the river mouth at 1700 hrs on day one. The impoundment stage of the estuary was very high and the mouth had been closed. However, it had just opened and was flowing to sea

via a small 8-12-foot-wide rivulet. The mouth is clearly going into an opening-closing regime typical of flows under 100 cfs (at the Wheatfield Fork gage).

Conclusions

A relatively high number of adult steelhead, including kelts, were migrating through the index reach. Overall, the season is clearly on track as a record high year for adult spawning escapement, thereby demonstrating the value to the species of the high rainfall recorded during spring 2005. On-site spawning (versus most spawning upstream) was beginning to accumulate, as the flow declined below the spawning threshold of about 100 cfs. Without further significant rainfall, more redds can likely be expected during the next survey in about 1 week. During the week that elapsed between successive surveys, conditions for adult steelhead migration through the Index Reach were good-to-excellent. JSH were not readily detectable from gross visual observation. Overall, survey conditions during the 2 days were: flow=moderate; clarity=excellent; and weather=excellent, except for the lowermost 1.5 miles during day two.

Table 1. Observations of adult steelhead along the index reach on March 22-23, 2007.

Reach	Dist. (Mi)	Total # Adults	Number by Size Class C1	C2	C3	*	# Spent	Location
Upper	--	46	10	26	10	0	0	Concrete Slab Pool
Upper	4.75	1	1	0	0	0	1	un-named pool
Upper	--	2	0	1	1	0	2	YMCA Pool
Upper	--	6	4	2	0	0	0	Park Pool
Lower	9.21	13	7	6	0	0	0	un-named run
Lower	10.21	1	1	0	0	0	1	un-named pool
Lower	10.23	2	2	0	0	0	2	un-named pool
Lower	13.75	21	10	6	5	0	0	un-named run
Lower	13.85	18	9	9	0	0	0	un-named pool-run complex
Lower	14.60	18	5	10	3	0	0	un-named pool
Lower	16.30	1	0	1	0	0	1	un-named run
Lower	16.48	16	10	6	0	0	0	un-named pool-run complex
Lower	--	12	5	5	2	0	0	Snagging Pool
TOTAL		157	64	72	21	0	7	

Prepared: March 26, 2007 (RWD).

MEMORANDUM TO THE FILE–#075

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

Subject: Reconnaissance-level Helicopter Survey of Selected Reaches of the Gualala River, March 24, 2007 (Survey No 2).

Purpose and Personnel

This was the second of three reconnaissance-level helicopter flights over the river planned for 2007. The purpose of these flights is to evaluate the utility of helicopter surveys for: (a) enumerating adult steelhead and their redds; (b) evaluating summertime dewatering of the stream; and (c) identifying significant stream perturbations linked to the dewatering and/or other threats to steelhead. If utility is demonstrated for one or more of these objectives, a protocol for annual helicopter surveys will be designed and implemented in 2008. The three initial recon-level surveys are being funded jointly by Marc Felton and myself.

Procedures

For this survey, 2.8 hours of air-time was chartered from Wine Country Helicopters of Napa, California. The aircraft was Wine Country's Bell 206B-1 JetRanger III piloted by Wayne Lackey. All procedures were the same as during the first helicopter survey on March 15, 2007 (*see* File Memo #072), except that:

- Marc Felton was unavailable, so a biologist friend of mine was recruited to operate the GPS and record data;
- We were airborne over the stream from about 1130 to 1245 hours;
- A mid-survey flight to Ukiah for fuel for the aircraft was unnecessary, since at 2.8 hours, we remained just within the aircraft's operational range on one tank of fuel;
- We surveyed (1) the 18.7-mile (sinuous steam miles) Index Reach of the Wheatfield Fork, flying downstream from the mouth of House Creek to the Wheatfield Fork bridge, and then (2) 13.7 miles (GPS "Track" miles) upstream on the South Fork, from the confluence with the Wheatfield Fork to about 3/8-mile downstream of the Hauser Bridge;
- We landed briefly twice near the survey route (at sites where permission had been obtained) and took several still photographs to illustrate the aircraft and survey method;
- We generally flew slightly slower (Ave.=20-30 mph) and lower (about 175-200 feet above the stream) than during the first survey, because the location of most of the dangerous power line crossings had been identified during the first survey. Also, we "hovered" the aircraft briefly, as needed, for a better view at key locations;

- DeHaven was able to lean farther out of the opened aircraft door, due to an improved safety harness (as well as his improved confidence in such);

- A standard boating survey of the Index Reach was conducted during 2 days before (March 22-23) the helicopter survey, to count adult steelhead and locate and mark (spray paint on adjacent bank) all steelhead redds present; and

- The estimated percentage of total sinuous stream length visually observed from the aircraft during survey of each survey reach was DeHaven's estimate only, rather than the average of DeHaven and Felton, as on survey #1.

Results and Discussion

Wheatfield Fork Index Reach.–Nine occurrences of adult steelhead totaling 103 fish were recorded from the air (Figures 1 and 2). Twenty adults each were recorded in the Concrete Slab and Snagging pools; seven other occurrences of adults totaling 1 to 15 fish each were recorded in various un-named pools and runs. Excellent (i.e., very likely that any fish present were actually seen) views were obtained of Bedrock Run, Log Pool, YMCA Pool, Park Pool, Mossy Rock Pool, Indian Spearing Pool, Big Landslide Pool, Yellow Rope Pool, Angle-Log Pool, and Lower Cable Run–and none of these sites held any adult steelhead. Likewise, no adult fish were seen in the Lady-Car Falls Pool or ATV Pool, but a 100% view of these sites was not achievable, mainly because of extensive shading and vegetation overhang. Shading and vegetation overhang was also a problem at the Snagging Pool where 20 adults were counted, thus the actual number present could easily have been higher.

The 2-day standard survey of the reach by boat on March 22-23 just before the aerial survey yielded 157 adult steelhead in 13 occurrences, with numbers ranging from 1 to 46 at the individual sites. Four named holding/resting sites held 66 (42 %) of these adults as follows: Concrete Slab Pool-46 (new single pool count record); YMCA Pool-2; Park Pool-6; and Snagging Pool-12. The 3 consecutive days of survey thus demonstrate that adults were clearly still moving upstream (and downstream). Therefore, the results obtained during the helicopter survey must be accepted as, at minimum, a reasonably accurate index to the actual number of adult steelhead migrating through the Index Reach during the aerial survey period.

Of seven steelhead redds found and marked during the two prior standard boating surveys, four were readily detected during the aerial survey, two could not be seen from the air due to shade and/or dense overhanging vegetation, and one was inadvertently missed. The redd missed may have been because someone had disturbed or removed the bank marking we were searching for from the air. Due to the various improvements made in survey technique (i.e., slower, lower, hovering, and hanging farther out of the aircraft), I estimate that the viewable percentage of the stream along the Index Reach from the air increased by 5-10 % to about 80-85 %.

South Fork.–Five occurrences of adult steelhead totaling 63 fish, in groups of from 1 to 25 fish, were recorded from the air (Figures 1 and 3). One redd was also recorded. Due to steep terrain, high stream sinuosity, relatively dense forest, and extensive stream-side shade only about 50-55

% of the stream was fully viewable from the air. Nevertheless, many large, deep potential holding/resting pools were fully viewable from the air. Also, there were no hazardous power lines affecting our survey, until just downstream of the Hauser Bridge where two sets cross the river, one relatively low and one relatively high above ground.

Conclusions and Recommendations

- Both aerial surveys lead to a conclusion that the main stem of the Wheatfield Fork is an excellent candidate for aerial survey by helicopter to detect and count adult steelhead and their redds. Both the 18.7-mile Index Reach and the next 5-10 miles of the Wheatfield Fork immediately upstream should be considered high priority for a long-term helicopter survey protocol beginning in 2008.

- The South Fork shows less feasibility for aerial survey than the Wheatfield Fork, but much more than Rockpile Creek (*see* Survey #1). A significant number of large, deep potential holding/resting sites of adult fish can potentially be surveyed from the air. This fact, and the complete lack of any other recent spawning survey data for the South Fork suggests that this reach should be included in a long-term helicopter survey protocol, if available funding allows.

- Video of the survey flights would no doubt be quite useful for enhancing the accuracy of the counts of redds and adult fish. Frame-by-frame analyses could be accomplished back at the office. Gyro-stabilized, TV-station-quality video should be incorporated into the long-term survey protocol, assuming the cost is reasonable.

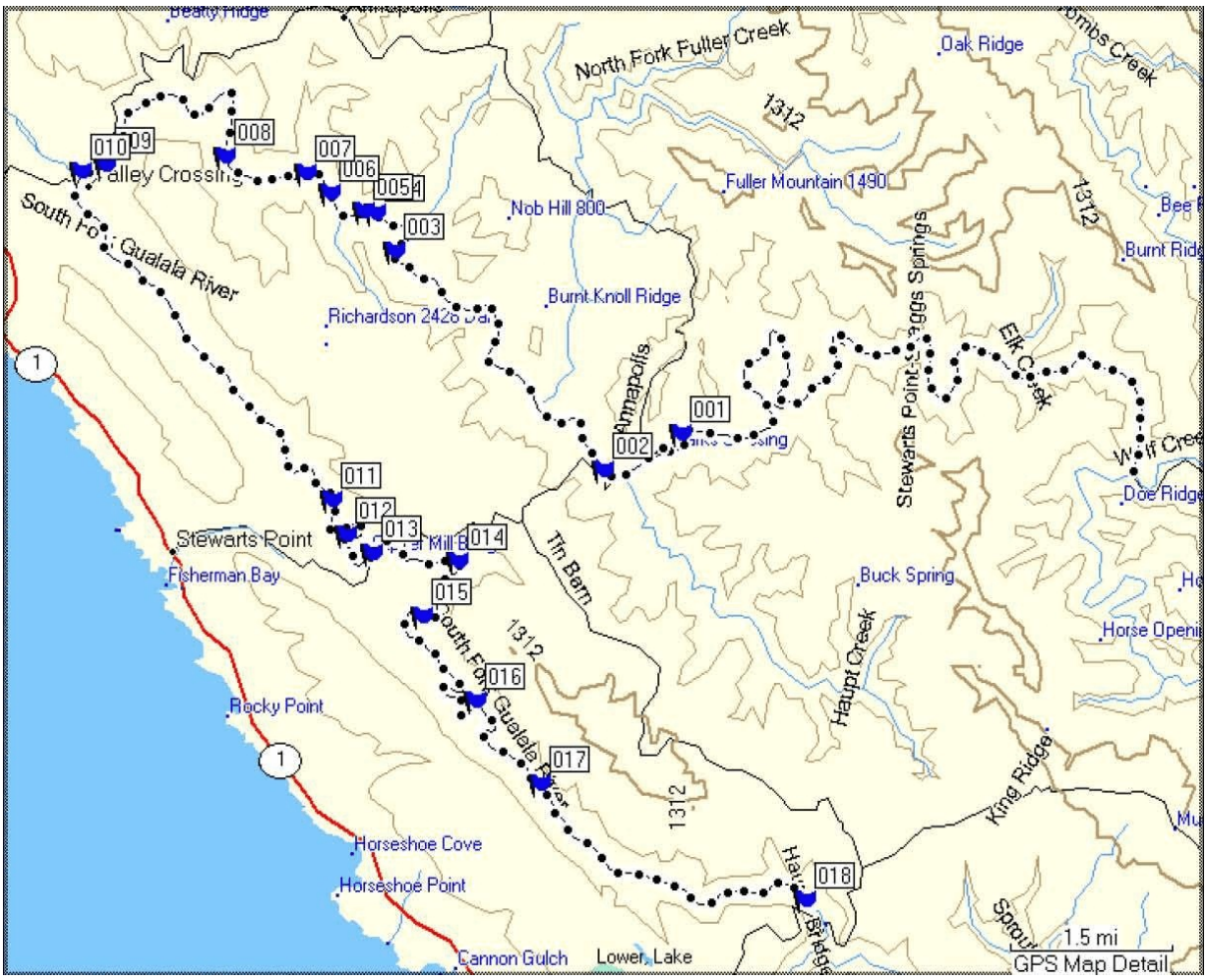

Figure 1. *March 24, 2007 helicopter survey "track" down the Wheatfield Fork's 18.7-mile Index Reach (upper track, from right to left) and up the South Fork for 13.7 miles (lower track, from upper left to lower middle of map). Waypoints are locations of some of the key aerial observations. See Figures 2 and 3 for expanded views of these locations. WP009 and 010 are the Wheatfield Fork bridge and South Fork-Wheatfield Fork confluence, respectively.*

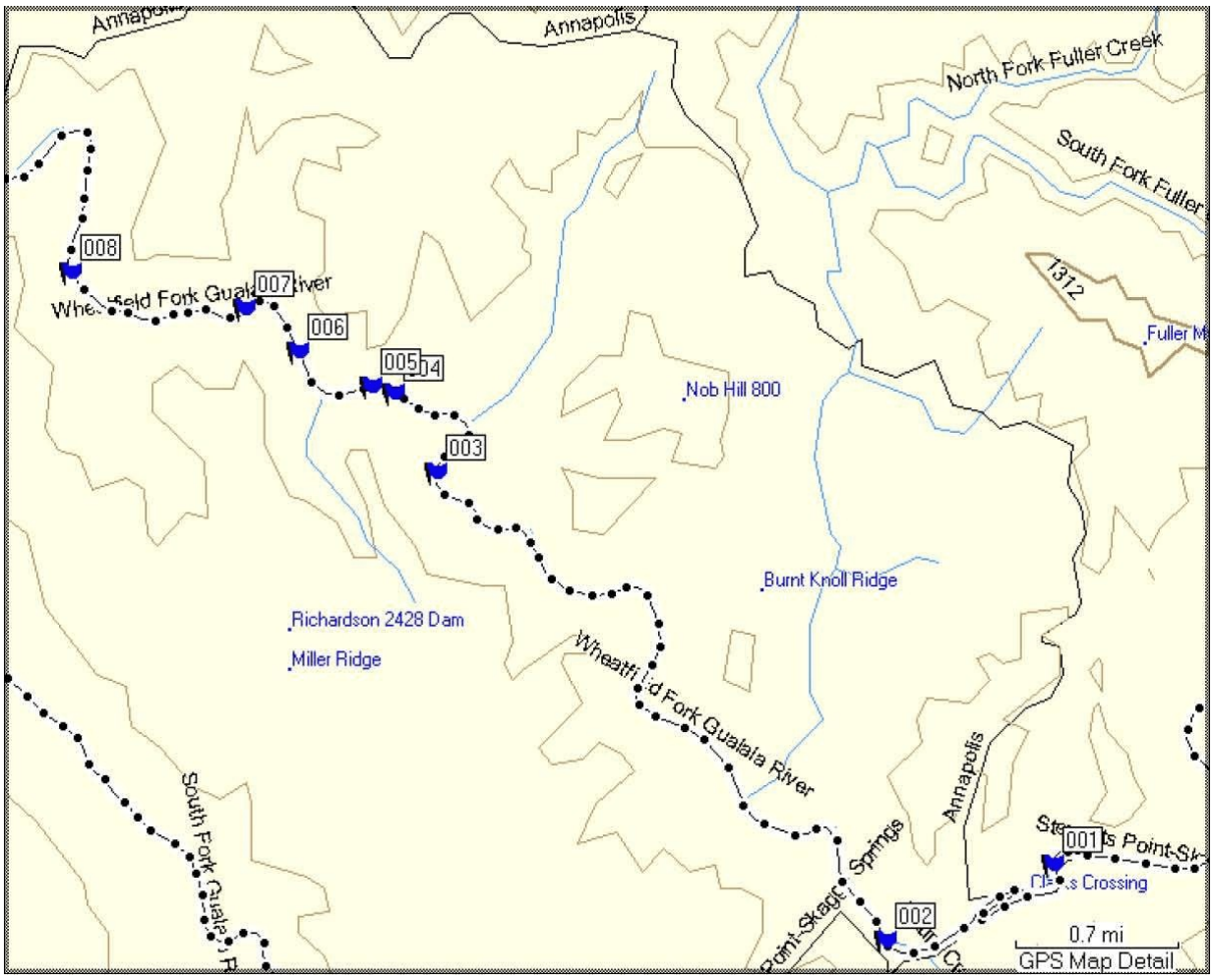

Figure 2. *Magnified view of Wheatfield Fork Index Reach key observation points. Adult steelhead were counted at the indicated waypoints (WPs) as follows: WP001-1 fish; 002-10; 003-10; 004-15; 005-10; 006-5; and 008-12. In addition, "favored" holding/resting site counts of adult steelhead included: Concrete Slab Pool-20 adults; and Snagging Pool-20 adults. The total adult steelhead counted for the aerial survey of the Wheatfield Fork Index Reach was thus 103 fish.*

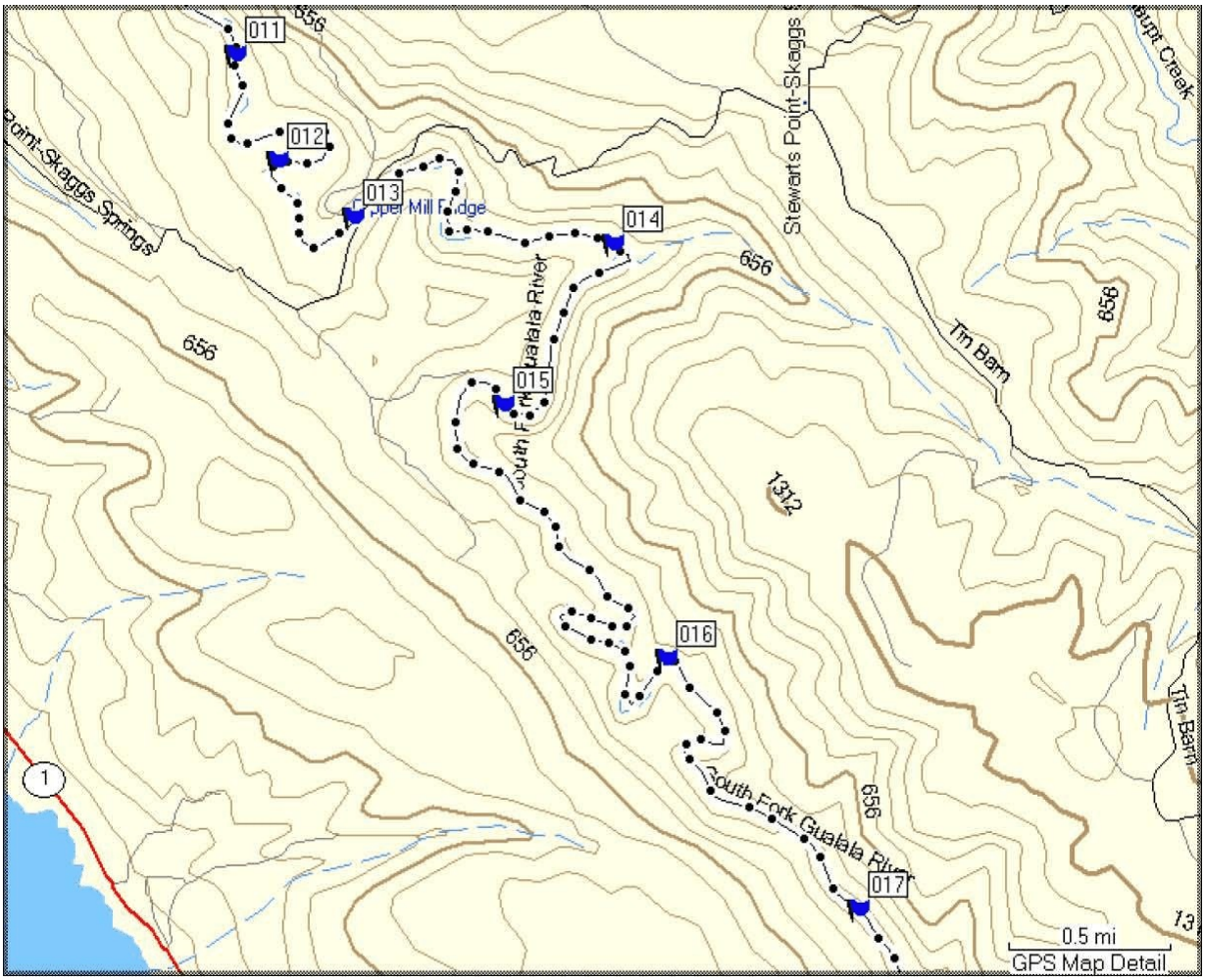

Figure 3. *Magnified view of South Fork survey reach key observation points. Adult steelhead were counted at the indicated waypoints (WPs) as follows: WP011-1 fish; 012-10; 014-25; 016-22; and 017-5. Thus, a total of 63 adult steelhead were counted along the 13.7 miles of the South Fork that were surveyed by air. In addition, one redd was observed at WP015. WP013 is the Clipper Mill bridge.*

Report Prepared March 27, 2007 RWD

MEMORANDUM TO THE FILE–#076

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

Subject: Spawning survey, Wheatfield Fork, from House Creek Confluence Downstream 18.7 Miles to Wheatfield Fork Bridge (just upstream of South Fork confluence), March 29-30, 2007, ***my ninth survey (a complete survey) of the index reach for the 2007 spawning season.***

Personnel and Survey Timing

I conducted this survey alone. I arrived at the mouth of House Creek at 0930 hrs, began the survey of the 9.3-mile upper index reach at 1007 hrs, and completed it at 1457 hrs, for an average survey rate of 1.93 mph. On day two, I surveyed the lower 9.4-mile index reach from 0855 to 1317 hrs, for an average rate of 2.18 mph.

Survey Methods and Purpose

Both upper and lower survey reaches were navigated using one of my 8-foot aluminum mini-drift-boats. All procedures were as I have previously documented.

Weather and Stream Conditions

Weather was sunny and mild (seasonal temperatures), with scattered, thin cirrus clouds both days. On day one, there was no wind or fog encountered. On day two, the typical upstream breeze began about 1100 hrs and became relatively strong about 1200 hrs.

Flow was continuing to slowly drop, but was still almost perfect for survey. The Wheatfield Fork gage declined from about 77 to 75 cfs from noon to noon over the 2-day period. Water clarity was excellent. I could see bottom virtually everywhere, except where wind created surface turbulence.

Rainfall and Hydrology Between Prior Survey and this Survey

One week had elapsed since the previous survey (by boat) was conducted on March 22-23, 2007. One rainfall event (March 26th) of 0.44 inches was recorded (VEN gage) during this 1-week period. This minor event caused about a 25 cfs rise in the river (Wheatfield Fork USGS gage).

Results and Discussion

A moderately high number of adult steelhead –119 (Table 1)–were recorded, including 15 along the upper survey reach and 104 along the lower reach. A total of 37 adults (31 percent) were recorded in just four named holding and resting sites: Concrete Slab Pool (7); Snagging Pool (25); Bedrock Run (1); and Mossy Rock Pool (4). Along the upper reach, I had excellent visibility into Lady-Car Falls Pool, Log Pool, Indian Spearing Pool, YMCA Pool, and Park Pool, and no adult steelhead were present in any of these holding/resting sites. Along the lower survey reach, no adult steelhead were present in the Big Landslide Pool, Angle-Log Run, Yellow Rope Pool, ATV Pool, Lower Cable Run, or Shady-Lane Run; I had excellent views into all of these,

except the Shady-Lane Run, where the upstream wind and related surface turbulence limited me to about 50 percent visibility.

Twenty (17 percent) of the adults appeared to be spent (a rough estimate). An estimated 37 percent of the adults were size 1, 49 percent were size 2, and 23 percent were size 3, but these too were rough estimates. However, there definitely appeared to be more smaller-sized fish than in previous years and earlier this season. I did not observe any "bite" marks on the adult steelhead, such as recorded during the previous survey one week earlier.

With this survey, the number of adult steelhead now counted this season during eight complete surveys and one partial survey of the Index Reach now stands at 733. This is by far the most adult steelhead I have recorded during my seven years of survey work on the river.

No adult steelhead carcasses were found. Also, no juvenile steelhead (JSH) were observed anywhere along the Index Reach. Lamprey spawning activity was similar to the last survey (but still well below numbers from previous years), with 35 total lamprey redds and 2 lampreys observed along the 18.7-mile survey reach. Rough-skinned newts were still present, but in low numbers and only along the upper 2/3s of the upper index reach. No pond turtles were recorded anywhere during the survey. One immature bald eagle was recorded at mile 4.10.

Dozens of "test" steelhead redds were observed and nine new steelhead redds were found (upper reach=7; lower reach=2), one each at stream mile (SM) 0.23, 1.94, 2.80, 5.28, 5.52, 5.96, 8.37, 10.93, and 16.76. The redd at SM 8.37 was the first one found in this area, which has extensive bedrock bottom covered by a shallow layer of cobble and gravel. The redd at SM 5.52 was in the *exact* same spot as the redd I found earlier this season on January 1, 2007. The redd at SM 10.93 was one of the largest I have found, measuring almost 25 feet in length and up to 7 feet in width; clearly more than one pair spawned at this site. Of the seven redds present during the previous survey, six were still discernable (SMs 6.11, 7.32, 7.66, 13.21, 13.81, and 16.58) and one (SM 9.65) was not.

I checked and photographed (attached) the river mouth at 1730 hrs on day one. Despite the relatively low river flow, the mouth was open with a wide, robust connection to the sea. The ocean was relatively calm, with low surf and little wind. A local construction worker indicated that the mouth had been closed early that morning, but had opened during mid-morning.

Conclusions

A relatively high number of adult steelhead, including kelts, were still migrating through the index reach. Overall, the season continues on track as a record high adult spawning run during the last 6 years of my surveys. On-site spawning (versus most spawning upstream) was beginning to accumulate, as the flow declined to well below the spawning threshold of about 100 cfs. Without further significant rainfall, more redds can be expected during the next survey in about 1 week. During the week that elapsed between successive surveys, conditions for adult steelhead migration through the Index Reach were good-to-excellent. JSH were not readily detectable from gross visual observation. Overall, survey conditions during the 2 days were:

flow=low; clarity=excellent; and weather=excellent, except for the lowermost 1.5 miles during day two.

Table 1. Observations of adult steelhead along the index reach on March 29-30, 2007.

Reach	Dist. (Mi)	Total # Adults	Number by Size Class C1	C2	C3	*	# Spent	Location
Upper	--	1	0	1	0	0	1	Bedrock Run
Upper	--	7	2	5	0	0	7	Concrete Slab Pool
Upper	5.52	1	0	1	0	0	1	un-named pool
Upper	5.59	1	1	0	0	0	1	un-named run
Upper	--	4	1	2	1	0	4	Mossy Rock Pool
Upper	9.17	1	1	0	0	0	1	un-named pool
Lower	9.52	1	1	0	0	0	1	un-named run
Lower	9.91	28	10	13	5	0	0	un-named run (@ Haupt Cr.)
Lower	10.46	1	1	0	0	0	1	un-named pool
Lower	10.58	1	0	1	0	0	1	un-named run
Lower	11.23	2	0	2	0	0	0	un-named run (@ Fuller Cr.)
Lower	11.47	2	1	1	0	0	0	un-named pool
Lower	13.37	1	0	1	0	0	1	un-named pool
Lower	13.75	7	1	3	3	0	0	un-named run
Lower	14.47	29	5	11	13	0	0	un-named run
Lower	15.28	1	1	0	0	0	1	un-named run
Lower	16.36	6	3	3	0	0	0	un-named run
Lower	--	25	5	15	5	0	0	Snagging Pool
TOTAL		119	33	59	27	0	20	

Prepared: April 6, 2007

MEMORANDUM TO THE FILE–#077

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

Subject: Spawning survey, Wheatfield Fork, from House Creek Confluence Downstream 18.7 Miles to Wheatfield Fork Bridge (just upstream of South Fork confluence), April 17-18, 2007, ***my tenth and last survey (a complete survey) of the index reach for the 2007 spawning season.***

Personnel and Survey Timing

I conducted this survey alone. The river was far too low to float, as usual, in one of my 8-ft aluminum boats, so the entire route had to be walked. I arrived at the mouth of House Creek at 0930 hrs, began the survey of the 9.3-mile upper index reach at 1015 hrs, and completed it at 1550 hrs, for an average survey rate of 1.69 mph. On day two, I surveyed the lower 9.4-mile index reach from 0835 to 1412 hrs, for an average rate of 1.71 mph.

Survey Methods

Both upper and lower survey reaches were walked. This greatly limited my ability to see into all the potential fish hiding places, although I likely found all or most of the steelhead redds that were present. Otherwise, all procedures were as I have previously documented in my reports..

Weather and Stream Conditions

NWS completely blew the weather forecast–which was for sunny skies and no precipitation. Both days were cool, partly cloudy, and day one also had scattered rain showers, which at times were briefly quite heavy. There was also considerable wind both days causing surface turbulence and limiting my views into holding pools and runs.

Flow was quite low and dropping slowly. The Wheatfield Fork gage declined from about 36 to 34 cfs from noon to noon over the 2-day period. Water clarity was excellent. I could see bottom virtually everywhere, except where wind was creating surface turbulence.

Rainfall and Hydrology Between Prior Survey and this Survey

Almost 3 weeks had elapsed since the previous survey by boat on March 29-30, 2007. Two relatively small, 1-day rainfall events (April 11th and 14th) of 0.24 inch and 0.28 inch, respectively, were recorded (VEN gage) during this 3-week period. These two minor events caused rises of less than 20 cfs each in river flow, based on the Wheatfield Fork gage data.

Results and Discussion

A total of 29 adult steelhead was recorded (Table 1), including 2 along the upper survey reach and 27 along the lower reach. Three adults (10 percent) were recorded in named holding sites–Big Landslide Pool (1) and ATV Pool (2). Along the upper reach, I had good views into all of the named holding sites, and I am certain that none held any adult fish. Along the lower reach, I had good views into all named holding sites, except Shady Lane Run, Snagging Pool, and Lower Powerline Pool all of which had windy conditions partially obscuring visibility.

Eight (28 percent) of the adults appeared to be spent. However, because I was walking and most spent fish appeared as singles, a significant, but unknown number, could have been missed. On group of 21 fresh-run adults was recorded. I believe it is unlikely I missed any other fresh-run groups of adults, unless they were in one of the three named sites where visibility was hampered. Of the 29 adult fish seen, about half were size #1 and half size #2.

With this survey, the number of adult steelhead now counted this season during nine complete surveys and one partial survey of the Index Reach now stands at 762. This is by far the most adult steelhead I have recorded during my 7 years of surveys along the river.

Twenty new steelhead redds were found, along with about 25-40 steelhead "test" redds. The locations of the 20 redds, plus the 18 redds found earlier this season, were recorded on the GPS for subsequent mapping in the 2007 Annual Report (Note: WP023 represents two redds; all other WPs represent one redd).

The river mouth was checked and photographed (attached) at 1800 hrs on day one and to my surprise (and despite the relatively low stream flow), it was open with a robust connection to the sea.

No adult steelhead carcasses were found. One adult lamprey was seen, along with a few dozen lamprey redds. There is no question, however, that lamprey presence and spawning this season has been far below what I have recorded during previous seasons. Only two pond turtles were recorded. Growth of periphyton has flourished since the last survey, likely due to the low flow and warm (early) tempertures.

Juvenile fish (mostly YOY) were relatively abundant in most shallow, near-shore areas along the survey route. Gualala roach were the most abundant, followed by juvenile steelhead (JSH)–both fry and other YOY. A few scattered, older JSH were also seen.

Conclusions

A relatively low number of adult steelhead, including kelts, were still migrating up and down the Index Reach. The total adult count for the season of 762 fish indicates that this is the largest spawning run to occur in the 7 seasons I have been conducting surveys on the river. With 20 new redds, on-site spawning (versus upstream spawning) was becoming significant. During the 3 weeks that elapsed between successive surveys, conditions for adult steelhead migration through the Index Reach were poor-to-fair, due to the low stream flow and lack of rainfall. Overall, survey conditions during the 2 days were: flow=low; clarity=excellent; and weather=fair, due to extensive wind and surface turbulence.

Table 1. Observations of adult steelhead along the index reach on April 17-18, 2007.

Reach	Dist. (Mi)	Total # Adults	Number by Size Class C1	C2	C3	*	# Spent	Location
Upper	--	1	0	1	0	0	1	un-named riffle
Upper	--	1	0	1	0	0	1	un-named riffle
Lower	--	1	1	0	0	0	1	un-named pool
Lower	--	1	1	0	0	0	1	un-named run
Lower	--	1	0	1	0	0	1	Big Landslide Pool
Lower	--	1	0	1	0	0	1	un-named riffle
Lower	--	2	2	0	0	0	2	ATV Pool
Lower	--	21	10	11	0	0	0	un-named run
		29	14	15	0	0	8	

MEMORANDUM TO THE FILE–#078

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

Subject: 2007 Juvenile Steelhead Snorkeling Surveys, *seasonal survey #1 on June 14-15, 2007.*

Personnel

I conducted this, the initial snorkeling survey of the 2007 summer season, alone. The survey extended over 2 days.

Survey Methods

Methods and snorkeling sites were the same as previously established and modified in 2006. Refer to File Memo #60 and my 2006 annual report for details. However, on this trip I did not measure and record water volumes at the sample (snorkeling) sites. Thus, JSH density cannot be quantified, except in general terms.

Rainfall and Hydrology Prior to the Survey

Based on the VEN gage, seasonal rainfall in 2007 (about 41 inches) for the watershed was about half the amount recorded in 2006 (over 80 inches). In addition, spring of 2006 was much wetter than average, while spring of 2007 was much drier than average. In particular, during March-May 2007, only seven relatively minor rainfall events totaling 3.52 inches were recorded. This contrasts with 29.60 inches recorded during March and April 2006.

The dry spring of 2007 severely depleted springtime stream flow compared to springtime 2006. During March-May 2007, no increase in flow due to rainfall events exceeded 500 cfs and most of the hydrograph increases were ≤25 cfs. As a result, I expected to already see some stream dewatering when I arrived at the study sites for this survey. However, I was pleasantly surprised that dewatering had not yet begun; instead, all sample sites still had continuous surface flow.

Weather and Stream Conditions

The lack of dewatering observed to date is no doubt partly related to the mild 2007 summer, with relatively mild ambient air temperatures, recorded to date.

Henceforth, I will assume that relative ambient air temperatures of inland areas along the stream can be roughly judged using air temperature data recorded by the National Weather Service for Ukiah, California (http://www.weather.gov/climate/index.php?wfo=eka). Ukiah is the nearest significant city with various monthly and daily climate data readily accessible via the internet.

In particular, I will be assuming that "hot" air temperatures (i.e., thermal stressors), which tend to be highly unfavorable to both surface stream flow maintenance and water temperatures suitable for JSH rearing, occur whenever average daily air temperature (i.e., average of maximum and minimum for a date) at Ukiah is $\geq 75^0$ F and $\geq +5^0$ F above average (for the date).

With this criterion, both June 14 and June 15 were the first major thermal stressors of summertime 2007.

The river mouth was blocked by a sandbar when viewed on the afternoon of June 15, 2007. Neither the river mouth nor any of the snorkeling sites was photographed, mainly because there was no dewatering to record.

Results and Discussion

Additional detail and analysis will be provided in my 2007 annual report to be issued in December 2007. My observations are only briefly summarized here:

#1-Wolf Creek*:* I arrived at 1140 hrs on day 1. Water and air temperatures, were 68 and 92^0F, respectively. Habitat of the site was the same as, or very similar to, 2006. Surface flow was continuous and about average for this time of year. JSH numbers were relatively low (all mentions of relative abundance at the sites are in relation to my previous surveys *at the same site*) with only 38 YOY and 2 age 1+ recorded; most of these were in the two pools, with only a few scattered JSH observed in the flatwater and riffle habitats. Fifty GR were also recorded.

#2-House Creek: I arrived at noon on day 1. Water and air temperatures were 73 (House Creek)–79 (Wheatfield Fork)–77^0 (downstream of confluence) and 92^0F, respectively. Habitat of the site was the same as, or very similar to, 2006. Surface flow was continuous, but less than average for this time of year. JSH numbers were moderate with 100 YOY and 50 age 1+ recorded; most of these were in the pools with most of the age 1+ in the pool at the confluence of the two branches. GR (25) and TSS (50) and two unidentified sculpins were also recorded.

#3-Wheatfield Fork (Lady-in-the Car): I arrived at 1300 hrs on day 1. Water and air temperatures were 77 and 98^0F, respectively. Habitat of the site was relatively unchanged from 2006. Surface flow was continuous and similar to average for this time of year. JSH numbers were high with 75 YOY and 5 age 1+ and 2 age 2+ recorded, mostly in high-velocity areas. No other species were recorded. Also, a school of about 100 JSH was seen moving downstream just upstream of the site. Two young men swimming at the site said they had seen other schools of fish, presumably JSH, moving downstream earlier in the day.

At nearby site #3a, a snorkel-only site, JSH numbers were also high, with 50 YOY, 10 age 1+, and 5 age 2+ recorded . The JSH were mostly in high-velocity areas, but a few were scattered along the slower-moving water too. Water temperature was 79 and air temperature was 98^0F. GR (15) were also recorded. Habitat at this site was relatively unchanged from 2006.

#4-Wheatfield Fork (Annapolis Road bridge)**:** I arrived at 1400 hrs on day 1. Water and air temperatures were 77 and 92^0F, respectively. A sea breeze was blowing upstream. Habitat of the site was relatively unchanged from 2006. Surface flow was continuous, but well below average for this time of year. JSH numbers were moderate-to-high, with 110 YOY, 10 age 1+, and 2 age 2+ recorded; most of these were among dense LWD in a deep thermal refuge pocket

of cold water along the south bank of the site. GR (100), TSS (20) and 3 unidentified sculpins were also recorded.

At snorkel-only site #4a, just under the bridge, JSH were low in abundance with only 2 YOY recorded. Water and air temperatures were 78 and 92^{0}F, respectively. This sub-site was pretty much unchanged from 2006 and still had a continuous surface flow, albeit below average for this time of year. GR (500) and TSS (50) were also recorded.

At snorkel-only site #4b 1/4-mile farther downstream, I recorded moderate abundance, with 50 YOY, 5 age 1+, and 2 age 2+ JSH, mostly in a high-velocity spot with abundant LWD, about half-way upsteam along the site. Water temperature at 1415 hrs was 75^{0}F with an air temperature of 96^{0}F. Habitat of this site was quite similar to 2006. It still had a continuous surface flow, albeit lower than average for this time of year. GR (100) were also recorded.

#5A-Near North Fork mouth (Upper Section)**:** I arrived at 0945 hrs on day 2. Water and air temperatures were 60 and 76^{0}F, respectively. Habitat of the site was modified from 2006, with the elimination of the deep flatwater trough that had been present along the easterly bank. Surface flow was continuous, but less than average for this time of year. JSH numbers were low, with 10 YOY and 40 age 1+ recorded, mostly in the woody cover along the easterly bank. GR (100) and 5 unidentified sculpins were also recorded. My low count of JSH may have been influenced by the relatively cold water, however.

#5B-Near North Fork mouth (Lower Section)**:** I arrived at this site at 1000 hrs on day 2, but could not snorkel it, due to a severe case of acid reflux. Temperatures were assumed to be the same as at site #5A, just downstream. Surface flow was continuous. Habitat appeared the same as in 2006.

#5C-North Fork Mouth Pool: I arrived at 0915 hrs on day 2. Water and air temperatures were 58 (North Fork) and 68^{0}F, respectively. The pool itself was 61^0, but just downstream the water was 64^{0}F. Habitat of the site was very similar to 2006. Surface flow of both the North Fork and main stem was continuous, but the main stem was clearly less than average for this time of year. JSH numbers were low, with 5 YOY and 20 age 1+ recorded, mostly in the woody cover along the north bank. GR (10) were also recorded. Cold water may have affected my counts, however.

#5D-100 Yards Upstream of North Fork Mouth in the Main Stem: I arrived at the site at 0900 hrs on day 2. Water and air temperatures were 64 and 68^{0}F, respectively. Surface flow was continuous, but lower than average for this time of year. I recorded 50 YOY JSH–a moderate-to-high number for this site. GR (100) were also recorded.

#6-Twin Bridges (Wheatfield Fork, beneath the Wheatfield Fork bridge)**:** I arrived at this site at 1545 hrs on day 1. Water and air temperatures were 70 and 86^{0}F, respectively. Surface flow was still continuous, but lower than average for this time of year. Habitat was very similar to 2006. I did not record any fish at the site.

#7-South Fork (beneath the Stewart's Point-Skaggs Springs Road bridge)**:** I arrived at 1500 hrs on day 1. Water and air temperatures were 69 and 82^{0}F, respectively. A sea breeze was flowing through the canyon. Habitat of the site was relatively unchanged from 2006. Surface flow was continuous, but well below average for this time of year. JSH numbers were moderate, with 150 YOY and 15 age 1+ recorded; mostly in the deepest area within dense woody cover. GR (200) were also recorded.

#8-Haupt Creek: I arrived at 1435 hrs on day 1. Water and air temperatures were 67 and 92^{0}F, respectively. Habitat of the site was relatively unchanged from 2006. Surface flow was still continuous, but well below the level at this time of year in 2006. JSH numbers were low, with 35 recorded in the two main pools. GR (50) were also recorded.

#9-Highway 1 Bridge Area: This site was briefly viewed on the morning of day 2. However, I did not snorkel it or record temperatures, because I was feeling ill with severe acid reflux.

Conclusions

Most sites had low, but continuous surface flows. The June 14-15 hot spell had elevated water temperatures to intolerable ranges for JSH rearing at several of the inland sites, while other sites nearer the coast were still well within temperature tolerances. JSH were in low-to-moderate abundances at the sites and were still widely distributed throughout the watershed. However, schools of JSH observed moving downstream, a lack of JSH at the Twin Bridges site, and relatively low numbers at the various estuary sites, suggest a widespread downstream migration (or other form of redistribution within the watershed) of JSH was underway.

Prepared: July 14, 2006; RWD
Edited: December 18, 2007; RWD

MEMORANDUM TO THE FILE–#079

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

Subject: 2007 Juvenile Steelhead Snorkeling Surveys, *seasonal survey #2 on July 15, 2007.*

Personnel

I conducted this, the second survey of the 2007 summer season, with a local resident and friend, who recorded data and observations for me. The survey was a 1-day event.

Survey Methods

Methods and snorkeling sites were the same as previously established and modified in 2006. Refer to File Memo #60 and my 2006 annual report for details. However, on this trip I did not measure and record water volumes at the sample (snorkeling) sites. Thus, JSH density cannot be quantified, except in general terms.

Rainfall and Hydrology Prior to the Survey

See the discussion of rainfall and hydrology in the previous survey report (#078).

Weather and Stream Conditions

Between the previous snorkel survey on June 14-15, 2007 and this survey 1 month later, only 5 days occurred with ambient air temperatures in the thermal stressor range (*see* File Memo #078 for "thermal stressor" criteria). The most significant "hot" spell was on July 4-6, when maximum inland air temperatures ranged from 103 to 108^0 F daily, average daily temperatures were 82-86^0 F, and departure of daily average from average was +10 to +14^0 F daily. Nevertheless, a significant marine influence for 6 days just before the survey kept average daily ambient air temperatures at $\leq 72^0$ F and -1 to -4^0 F below average.

I did not check the river mouth during this survey. However, the stage of the estuary was extremely low for summertime, indicating that the river's mouth had either opened very recently or was currently open.

Results and Discussion

Additional detail and analysis will be provided in my 2007 annual report to be issued in December 2007. Observations are only briefly summarized here:

#1-Wolf Creek*:* I arrived at 0925 hrs. Water and air temperatures, were 59 and 66^0F, respectively. Surface flow was still continuous but extremely low–the lowest I have observed at the site. JSH numbers were moderate-to-high (all mentions of relative abundance at the sites are in relation to my previous surveys *at the same site*) with 200 YOY recorded; these were in the larger, upper pool. Twenty-five GR were also recorded. A photo was taken of the site.

#2-House Creek: I arrived at 0945 hrs. Water and air temperatures were 65 (House Creek)–67 (Wheatfield Fork)–66^0 (downstream of confluence) and 66^0F, respectively. Surface flow was

continuous, but very low. JSH numbers were moderate, with 80 YOY and 1 age 1+ recorded; most of these were in the confluence pool and were relatively small (TL) and in poor condition. GR (25) and TSS (25) were also recorded. The site was photographed.

#3-Wheatfield Fork (Lady-in-the Car): I arrived at 1030 hrs. Water and air temperatures, were 66 and 69^{0}F, respectively. Surface flow was continuous and similar to my other observations at this time of year. JSH were absent. GR (50) and TSS (50) were recorded, however.

Also, at nearby site #3a, a snorkel-only site, JSH were absent. Water temperature was 66 and air temperature was 68^{0}F. GR (150) and TSS (350) were recorded, however. Photos were not taken at either of these two sites.

#4-Wheatfield Fork (Annapolis Road bridge)**:** I arrived at 1115 hrs. Water and air temperatures were 72 and 74^{0}F, respectively. Surface flow was continuous, but low and well below average for this time of year. JSH were not observed. GR (50) were recorded, however.

JSH were also absent from the snorkel-only site #4a, located just under the bridge. Here, the water and air temperatures were also 72 and 74^{0}F, respectively. GR (500) and TSS (50) were recorded, however.

At 1130 hrs, at snorkel-only site #4b, 1/4-mile farther downstream, I did record a moderate-to-high abundance of JSH, with 100 YOY and 12 age 1+–all in a fast-water (pool-riffle) spot with abundant LWD at the upstream end of the site. Water temperature was 68^{0}F with an air temperature of 80^{0}F. Surface flow was still continuous but low. GR (200) were also recorded. None of these three sites was photographed.

#5A-Near North Fork mouth (Upper Section)**:** I arrived at 1410 hrs. Water and air temperatures were 70 and 92^{0}F, respectively. JSH numbers were moderate, with 150 YOY and 25 age 1+ recorded, all in the cover along the easterly bank and in the riffle areas. GR (50) and TSS (50) were also recorded. Flow was still continuous, but low. A photo was taken.

#5B-Near North Fork mouth (Lower Section)**:** I arrived at this site at 1423 hrs. Temperatures were assumed to be the same as at site #5A, located just downstream. Surface flow was continuous, but low. JSH numbers were moderate-to-high, with 150 YOY, 100 age 1+, and 25 age 2+ recorded. GR (100) and unidentified sculpins (5) were also recorded. A photo was taken.

#5C-North Fork Mouth Pool: I arrived at 1345 hrs. Water and air temperatures were 64 (North Fork) and 90^{0}F, respectively. The pool itself was 67^0, but just downstream the water was 72^{0}F. Surface flow of both the North Fork and main stem was continuous, but the main stem was quite low for this time of year. JSH numbers were moderate-to-high, with 200 YOY recorded, mostly in the drop into the pool and in the brush along the north bank. GR (100) and TSS (50) were also recorded. A photo was taken of the site.

#5D-100 Yards Upstream of North Fork Mouth in the Main Stem: I arrived at the site at 1400 hrs. Water and air temperatures were 72 and 90^0F, respectively. Surface flow was still continuous, but low. A moderate number of JSH–50 YOY, 10 age 1+, and 5 age 2+–were recorded in the brush along the south bank. No other fish were recorded. The site was not photographed.

#6-Twin Bridges (Wheatfield Fork, beneath the Wheatfield Fork bridge)**:** I arrived at this site at 1514 hrs. Water and air temperatures were 72 and 83^0F, respectively. Surface flow was still continuous, but low. JSH were in low-to-moderate abundance, with 50 YOY recorded. GR (90) were also recorded. The site was photographed.

#7-South Fork (beneath the Stewart's Point-Skaggs Springs Road bridge)**:** I arrived at 1225 hrs. Water and air temperatures were 64 and 73^0F, respectively. A significant sea breeze was flowing up the canyon. Habitat of the site has (in contrast to what I stated in report #078) changed from 2006; the main pool is both deeper and larger than in 2006. Surface flow was still continuous, but very low and on the verge of becoming intermittent. JSH numbers were low-to-moderate, with 25 YOY, 50 age 1+, and 5 age 2+ recorded, mostly in the deepest pool area amongst dense LWD. GR (150) were also recorded. The site was not photographed.

#8-Haupt Creek: I arrived at 1145 hrs. Water and air temperatures were 65 and 83^0F, respectively. Surface flow was absent along the site; only two small, soon-to-be dried pools remained. And nearby, only a few feet of surface flow remained. JSH totaled 100 YOY in the two remaining pools of the site. No other fish were recorded. The site was not photographed, but the completely dry creek was photographed from the bridge.

#9-Highway 1 Bridge Area: I arrived at the site at 1330 hrs. The stage was very low, suggesting that the mouth was either open or had recently been open. Water and air temperatures were 74 and 78^0F, respectively. A relatively high number of JSH was recorded: 150 YOY and 50 age 1+, mostly in the brushy areas along the northwest bank. GR (150) and TSS (500) were also recorded. A photograph was taken of the site.

Conclusions

All sites had relatively low flows, but only the Haupt Creek site was dewatered and drying. The lack of dewatering to date in 2007, despite a very dry springtime, is partly related to the relatively mild summer air temperatures to date. Mild, marine-influenced air temperatures for 6 days prior to the survey resulted in relatively low water temperatures at the various sample sites.

There was clear evidence of JSH having moved downstream towards the estuary since the last survey in mid-June 2007. In particular, much of the Wheatfield Fork appears to now be devoid of JSH, although one site (#4b, just upstream of the mouth of Haupt Creek) nevertheless still had moderate-to-high JSH abundance. JSH abundance increased dramatically in the estuary since the June 2007 survey.

Prepared: July 21, 2007; RWD *PHOTOGRAPHS FROM THE SURVEY FOLLOW BELOW.*

Wolf Creek site, looking upstream. Very low, but continuous surface flow.

House Creek site (Wheatfield Fork-right). Very low, but continuous flow.

Annapolis Rd. Bridge site (#4). Surface flow continuous, but very low.

Haupt Creek, just downstream of site (#8) near bridge. No surface flow.

Highway 1 bridge site, at a low stage for summertime.

North Fork mouth site (#5c), with North Fork entering from left.

Recreational use at the lower (1/4-mile DS) North Fork site (5B).

South Fork at Twin Bridges. No surface flow.

Twin Bridges site (#6) on the Wheatfield Fork. Surface flow continuous.

MEMORANDUM TO THE FILE–#080

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

Subject: 2007 Juvenile Steelhead Snorkeling Surveys, *seasonal survey #3 on September 6, 2007.*

Personnel

I conducted this, the third and final survey of the 2007 summer season, alone. The survey was a long, 1-day event.

Survey Methods

Methods and snorkeling sites were the same as previously established and modified in 2006. Refer to File Memo #60 and my 2006 annual report for details. However, on this trip and the two earlier 2007 snorkeling surveys, I did not measure water volumes at the sample (snorkeling) sites. Thus, JSH density can only be quantified in general terms.

Rainfall and Hydrology Prior to the Survey

See the description of rainfall and hydrology for the 2006-2007 season in File Memo #078.

Weather and Stream Conditions

Between the previous snorkel survey on July 15, 2007 and this survey 7 weeks later, relatively mild summertime weather continued. During the period, only 11 total days occurred with ambient air temperatures in the "thermal stressor" range (*see* File Memo #078 for definition of "thermal stressor" criterion). The most significant "hot" spell was from August 28 to September 2, when maximum inland air temperatures ranged from about 96 to 103^0 F daily, average daily temperatures were 76-83^0 F, and departure of daily average from long-term average was +5 to +12^0 F daily.

The river mouth was checked and was closed on the survey date; however, the stage was very low. Two days earlier I was in the area fishing for tuna out of Point Arena and the mouth was slightly opened and the stage was the lowest I have ever observed, indicating that the mouth had breached quite recently (i.e., within previous 1-2 days).

Results and Discussion

Additional detail and analysis will be provided in my 2007 annual report to be issued in December 2007. My observations are briefly summarized below. Notes regarding abundance of JSH at the sites are qualitative only and are based on comparisons to my observations during previous surveys *at the same site*.

#1-Wolf Creek*:* I arrived at 0930 hrs. Water and air temperatures, were 60 and 70^0F, respectively. Surface flow was still continuous, but noticeably lower than during the July survey and definitely the lowest I have ever seen at the site. JSH numbers were still moderate-to-high, with 200 YOY recorded–the same number as in July; these fish were all in the larger,

upper pool. Two hundred GR were also recorded. The site was photographed. Impacts to the stream bed (i.e., trampling, heavy grazing and feces) due to cattle grazing were widespread.

#2-House Creek: I arrived at 1000 hrs. Water and air temperatures were 62 (House Creek)–63 (just downstream of confluence) and 73^{0}F, respectively. Surface flow was continuous in House Creek, but the Wheatfield Fork was dry. JSH numbers were low, with only 3 YOY and 2 age 1+ recorded; these fish were in the House Creek pool just upstream of the confluence area. GR (1,500) and TSS (200) were also recorded. The site was photographed.

#3-Wheatfield Fork (Lady-in-the Car): I arrived at 1045 hrs. Water and air temperatures were 65 and 69^{0}F, respectively. Surface flow was continuous, but very low–lower than my other observations at this time of year. JSH were absent. GR (50) and TSS (1,000) were recorded, however.

Also, at nearby site #3a, JSH were absent. Water temperature was 66 and air temperature was 72^{0}F. GR (500) were recorded, however. Photos were not taken at either of these two sites.

#4-Wheatfield Fork (Annapolis Road bridge)**:** I arrived at 1115 hrs. Water and air temperatures were 69 and 75^{0}F, respectively. Surface flow was very low and intermittent. The large pool at the site was the smallest I have seen it at this time of year. A low number (5-YOY) of JSH was observed, along with GR (2,500) and TSS (350). A photograph was taken.

JSH were not observed at nearby site #4a, located just under the bridge. Here, the water and air temperatures were 71 and 78^{0}F, respectively. GR (25,000) were recorded, however. The site had very low, intermittent surface flow. A photo was taken.

At 1130 hrs, at nearby site #4b, 1/4-mile farther downstream, I record 35 age 1+ JSH. Surface flow had become intermittent here and all JSH were in one small, remaining pool. I also recorded GR (300) TSS (200) at the site. Water temperature was 65^{0}F; air temperature was 83^{0}F. A photograph was taken.

#5A-Near North Fork mouth (Upper Section)**:** I arrived at 1345 hrs. Water and air temperatures were 70 and 93^{0}F, respectively. JSH were not recorded. GR (150) and TSS (1,500) were recorded, however. Flow was still continuous, but very low.

#5B-Near North Fork mouth (Lower Section)**:** I arrived at this site at 1400 hrs. Temperatures were assumed to be the same as at site #5A. Surface flow was continuous, but low. JSH numbers were low-to-moderate, with 200 YOY recorded. GR (250) and unidentified sculpins (5) were also recorded.

#5C-North Fork Mouth Pool: I arrived at 1300 hrs. Water and air temperatures were 62 (North Fork)-70^0 F (just downstream of confluence) and 89^{0}F, respectively. Surface flows of both the North Fork and main stem were continuous, but very low. One YOY JSH was recorded. GR (250) and TSS (50) were also recorded. A photo was taken.

#5D-100 Yards Upstream of North Fork Mouth in the Main Stem: I arrived at the site at 1330 hrs. Water and air temperatures were 72 and 88^{0}F, respectively. Surface flow was still continuous, but very low. Only 1 YOY JSH was observed. Fifty GR and 150 other unidentified juvenile fish were also recorded. The site was photographed.

#6-Twin Bridges (Wheatfield Fork, beneath the Wheatfield Fork bridge)**:** I arrived at this site at 1430 hrs. Water and air temperatures were 69 and 90^{0}F, respectively. Surface flow was intermittent. JSH were low in abundance, with only 5 YOY recorded. GR (250), TSS (750) and unidentified juvenile fish (300) were also recorded. The site was photographed from the bridge.

#7-South Fork (beneath the Stewart's Point-Skaggs Springs Road bridge)**:** I arrived at 1200 hrs. Water and air temperatures were 61 and 76^{0}F, respectively. Surface flow had become intermittent. Nevertheless, the main pool directly under the bridge was the largest and deepest (>7-ft-deep) I have observed at this time of year. JSH were in moderate abundance, with 100 YOY, 25 age 1+, and 5 age 2+ recorded, mostly in the deepest pool area amongst large woody debris. GR (500) and TSS (200) were also recorded. The site was photographed.

#8-Haupt Creek: I arrived at 1145 hrs. The entire site, and the stream reach downstream to the confluence with the Wheatfield Fork, were both completely dry. Air temperature was 83^{0}F. A photo was taken from the Haupt Creek bridge.

#9-Highway 1 Bridge Area: I arrived at the site at 1245 hrs. The stage was extremely low, reflecting a recently (last 2-4 days) breached mouth. Water and air temperatures were 72 and 89^{0}F, respectively. No JSH were recorded. I did observe GR (200) and TSS (10,000), however; other (5,000) small, unidentified (but *not* JSH) juvenile fish were also recorded.

Conclusions

Despite having the lowest stage I have observed, Wolf Creek continued its importance as a summertime JSH rearing area. Most other sites also had very low flows, with several developing intermittent (or no) flow. Overall JSH numbers and densities were relatively low, reflecting either high summertime mortality or a mass exodus seaward from the stream, or some combination of both. Relatively low numbers of JSH in the estuary lend credence to the mass exodus theory; exodus from the river likely occurred during two or more major summertime breaches of the river mouth. Although the Wheatfield Fork had low JSH abundance, isolated pockets of fish remained. GR and TSS were relatively high in abundance throughout the watershed.

Prepared: September 21, 2007; RWD
Edited: December 18, 2007; RWD

PHOTOGRAPHS FROM THE SURVEY FOLLOW BELOW.

Wolf Creek site, looking upstream. Upper pool with JSH just below alder.

Upstream pool with JSH at the Wolf Creek site. Surface flow very low, but still continuous.

Downstream end of the House Creek site, with a dry Wheatfield Fork entering from right.

Downstream end (pool right center) of site #4A, beneath the Annapolis Road bridge.

Upstream end (center-far right) of Annapolis Road bridge site #4.

Haupt Creek site #8--completely dry--and dry downstream to its mouth.

Wheatfield Fork site #4b, with JSH still present in pool (center).

Site #5c, North Fork mouth pool (right center), looking upstream on main stem of the river.

Site #5A-Near North Fork mouth (upper site).

A completely dry South Fork, just upstream of its confluence with the Wheatfield Fork (T.Ctr.)

A dry South Fork, looking upstream from the South Fork bridge at Twin Bridges.

Site #6-Twin Bridges (pool center foreground), looking downstream from the W. Fork bridge.

MEMORANDUM TO THE FILE–#081

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

Subject: Reconnaissance-level Helicopter Survey of Selected Reaches of the Gualala River, September 27, 2007 (Survey No 3).

Purpose and Personnel

This was the third of three reconnaissance-level helicopter flights over the river in 2007. The purpose of these flights was to evaluate the utility of helicopter surveys for: (a) enumerating adult steelhead and their redds; (b) evaluating summertime dewatering of the stream; and (c) identifying significant stream perturbations linked to the dewatering and/or other threats to steelhead. Based on results of these three surveys, a long-term protocol for annual helicopter surveys may be designed and implemented in 2008. Funding for the three initial surveys in 2007 was provided by Marc Felton and myself.

Procedures

For this survey, 2.35 hours of air-time was chartered from Wine Country Helicopters of Napa, California. The aircraft was Wine Country's Bell 206B-1 JetRanger III piloted by Wayne Lackey. Procedures were similar to those employed for the first survey conducted on March 15, 2007 (*see* File Memo #072):

- Marc Felton rode in the front seat where he operated the GPS and recorded data. I hung out of the right rear side of the aircraft and made most of the observations.

- The main purpose was to quantify the extent of stream dewatering in the lower, main-stem reaches of the river, along the South and Wheatfield forks.

- The South Fork was flown and surveyed from the mouth of the North Fork 7.25 miles upstream to its confluence with the Wheatfield Fork, then surveyed another 4.85 miles farther upstream to the Stewart's Point-Skaggs Springs bridge crossing (i.e., Clipper Mill bridge). Next, we flew directly back (i.e., no survey) to the South Fork-Wheatfield Fork confluence and then continued surveying upstream along the Wheatfield Fork for 16.6 miles to the mouth of House Creek. All distances are flight miles and not the slightly longer sinuous stream miles.

- We were airborne over the stream from about 1430 to 1515 hours;

- A mid-survey flight to Ukiah for fuel for the aircraft was unnecessary, since at 2.35 hours of total air time, we remained well within the aircraft's operational range on one tank of fuel;

- We landed briefly once near House Creek to properly secure the rear door of the aircraft before the flight back to Napa County Airport;

- We generally flew slightly faster (Ave.=25-35 mph) and higher (about 200 feet above the stream) than during the two earlier surveys, since we only needed to identify wet (flowing on the surface) and dry sections of the stream and we were not attempting to identify either adult steelhead or their redds;

- The aircraft was briefly "hovered" over the North Fork mouth, South-Wheatfield forks confluence, and House Creek mouth to record waypoints (WPs) and/or clear the GPS tracking feature; and

- I was able to lean farther out of the opened aircraft door, due to an improved safety harness (as well as my improved confidence–with experience–in such).

Results and Discussion

The survey was timed for late afternoon in an effort to avoid possible impedance due to coastal fog. However, just as we arrived over the North Fork mouth, fog was pouring back in (from the sea) over the coastal hills. We were able to begin the survey of the lower South Fork reach just before visibility became a critical issue. In the future, a starting time of around1300 hrs may be more appropriate. Fog was not an issue upstream of Twin Bridges (South-Wheatfield forks confluence), however.

Figure 1 is an overview of the entire survey and flight, including 12 recorded waypoints. Figure 2 is a "zoomed-in" view of the Twin Bridges area where dewatering was most severe. Figure 3 is a "zoomed-in" view of the South Fork survey reach downstream of Clipper Mill bridge. Results showed dewatering was less extensive than I expected, given the very dry springtime conditions in 2007 throughout the watershed. Nevertheless, any dewatering is a serious issue.

South Fork. The South Fork had very low, but nevertheless continuous surface flow from the North Fork mouth upstream to a point about 800 feet downstream of the South-Wheatfield forks confluence (i.e., WP-002 at Twin Briges). From there upstream for about 1 mile (i.e., WP-004) the stream was completely dry. Another completely dry reach, about 1,000 feet in length, was recorded just downstream from the Clipper Mill Bridge, between WP-005 and WP-006. In addition, there were 38 minor dry reaches (<100 feet in length) observed between WP-004 and the Clipper Mill bridge. From the helicopter, most of the dry reaches along the South Fork were readily seen from the air. However, dense riparian vegetation obstructed my view and prevented a determination of whether the stream was watered or dewatered along about 10-20 percent of the stream.

Wheatfield Fork. Two dry reaches were recorded along the Wheatfield Fork. The first was about 900 feet in length extending upstream of the South-Wheatfield forks confluence between WP-008 and WP-009. The second (not shown in the "zoomed-in" view) was about 260 feet in length and occurred just downstream of the Annapolis Road bridge between WP-010 and WP-011. I am relatively confident that these were the only dry sections along this fork of the stream.

Conclusions and Recommendations

- Aerial survey by helicopter is a relatively quick and efficient method of finding and recording the extent of stream dewatering along main stem reaches of the Gualala River.

- Dewatering was significant in the vicinity of Twin Bridges (i.e., the South Fork-Wheatfield Fork confluence) and along the entire South Fork, between Twin Bridges and Clipper Mill bridge.

- An annual survey protocol should be designed and implemented.

Figure 1. September 27, 2007 helicopter survey "track" upstream on the South Fork and Wheatfield Fork, to record stream dewatering.

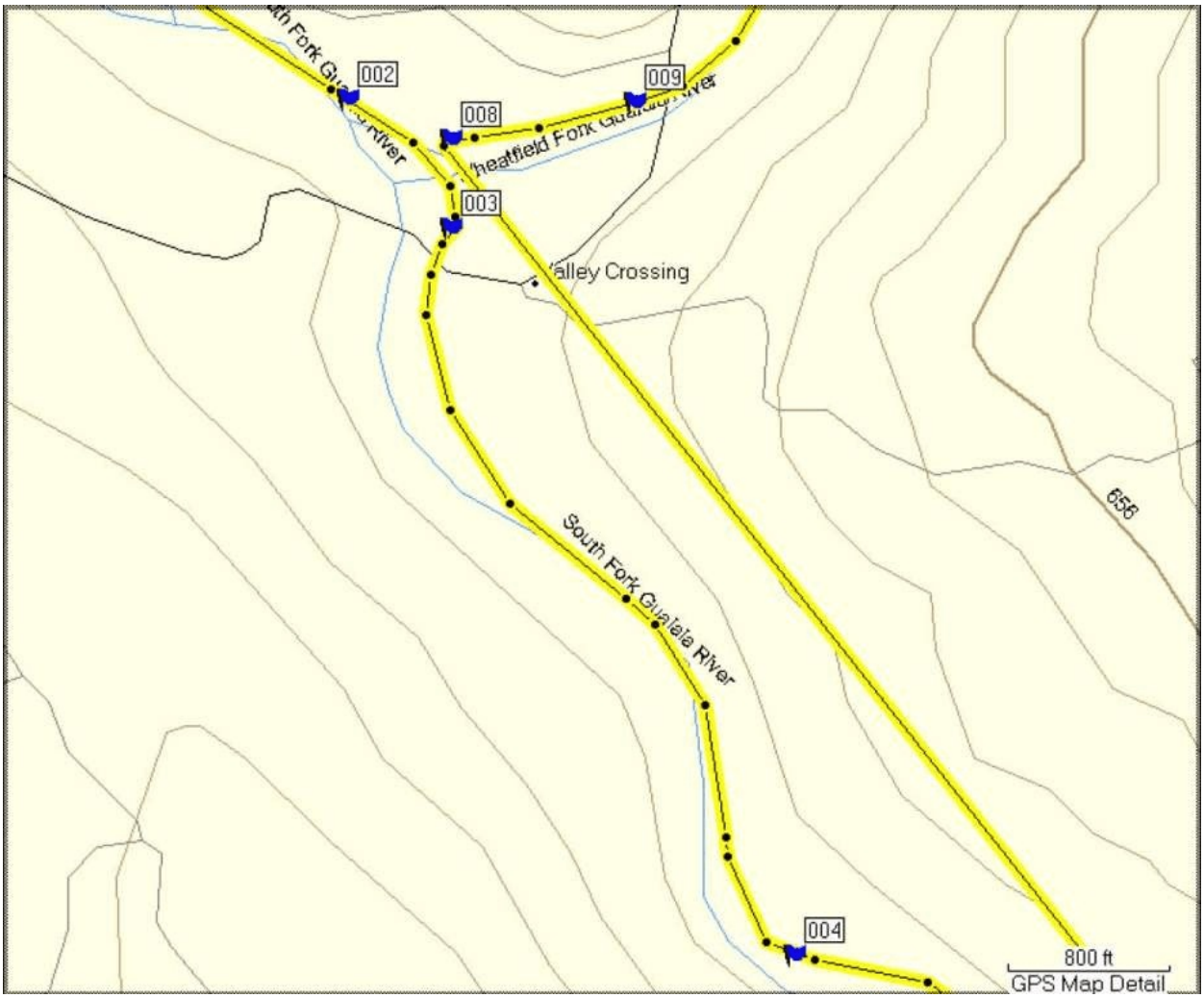

Figure 2. Magnified view of the Twin Bridges area, where lengthy dewatering occurred along the South Fork between WP-002 and WP-004 and along the Wheatfield Fork between WP-008 and WP-009.

Figure 3. Magnified view of the South Fork just downstream of Clipper Mill bridge, where dewatering occurred between WP-005 and WP-006. Thirty-eight other smaller occurrences (<100-ft-long) of dewatering were recorded along the South Fork downstream of Clipper Mill bridge to Twin Bridges.