

Redwood

National and State Parks

National Park Service
US Department of the Interior

Department of Parks and Recreation
State of California

2005 REDWOOD CREEK SUMMER STEELHEAD SURVEY



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December 2005

Cover Photos:

Top Left: Mainstem Redwood Creek

Top Right: Summer Steelhead Survey Dive Crew

Bottom Left: Summer Steelhead Survey Diver

Bottom Right: 2005 Redwood Creek Summer Steelhead

2005 RNSP REDWOOD CREEK SUMMER STEELHEAD SURVEY

DATES: July 26, 27, 28 (Tuesday - Thursday) and August 2, 3, 4 (Tuesday - Thursday), 2005

LOCATION: Redwood Creek, Humboldt County, California
Mainstem reach from Lacks Creek - river km 46.514 to downstream of Hayes Creek (Redwood National and State Parks) - river km 7.65.

DISTANCE: 38.9 km (24.1 miles) [36 % of the 108-km (67.1-mile) long Redwood Creek mainstem]

FLOWS: Gaging Station: Orick [ORK] (<http://waterdata.usgs.gov/> [daily mean values])
Start of Survey: 118 cfs End of Survey: 83 cfs

DIVERS: David Anderson¹, Baker Holden¹, Terry Hines¹, Kyle Max¹, Kelly Breen², Alfonso Campa. (¹Person with prior summer steelhead diving experience on Redwood Creek or ² other rivers). Recorder: Beverly Shaw.

METHOD: Visual observation by diving with mask and snorkel, and surf wetsuit (Roelofs 1983). Survey proceeded in the downstream direction with the flow.

ACCESS: Lacks Creek via Stover Ranch on Redwood Valley Road; Panther Creek via Green Diamond Resource Company K&K road at Korbel; Coyote Creek via Green Diamond Resource Company K&K road and hike down Redwood Creek to Coyote Creek; hike/snorkel and camp on river three days/two nights to reach Tom McDonald Creek, Tom McDonald Creek in or out via Tall Trees loop trail to summer bridge and trail to 44 horse camp. Drive out C-12/A9-9/West Side Access; Bond Creek in or out via A-9 road and hike road extension to Redwood Creek trail; and downstream of Hayes Creek intercept Redwood Creek trail and hike to lower trailhead parking lot.

ITINERARY:	<i>Date</i>	<i>Survey Reach</i>	<i>Distance</i>	<i>SSHD No.</i>
	7/ 28	Lacks Creek to Panther Creek <i>Anderson, Hines, Breen, notes - Shaw</i>	6.02 km	4
	7/ 28	Panther Creek to Coyote Creek <i>Max, Campa, notes - Holden</i>	3.76 km	6
	8/02	Coyote Creek to downstream of Copper Creek <i>Anderson, Hines, Max, and Breen</i>	5.16 km	6
	8/03	Downstream of Copper Cr to upstrm of Dolason Cr <i>Anderson, Hines, Max, and Breen</i>	4.98 km	3
	8/04	Upstream of Dolason Cr to Tom McDonald Cr <i>Anderson, Hines, Max, and Breen</i>	6.00 km	0
	7/26	Tom McDonald Creek to Cloquet Creek <i>Anderson, Holden, Max, Breen, notes - Campa</i>	6.04 km	1
	7/27	Cloquet Creek to downstrm of Hayes Creek <i>Anderson, Holden, Hines, Max, Breen, notes - Campa</i>	6.92 km	2

TOTAL NUMBER OF ADULT SUMMER STEELHEAD TROUT OBSERVED IN 2005: 22
Total number of Sockeye salmon: 1

**(NUMBER OF ADULT SUMMER STEELHEAD TROUT OBSERVED WITHIN THE INDEX SECTION
(LACKS CREEK TO TOM McDONALD CREEK - 16.1 miles): 19**

SUMMER STEELHEAD TROUT (*Oncorhynchus mykiss*)

Summer steelhead are an anadromous race of rainbow trout. Their life cycle differs from that of the more numerous winter-run steelhead. Adult summer steelhead ascend the rivers in spring, hold over in deep pools in the summer, and then spawn in winter. Because adult summer steelhead hold in freshwater 8 - 10 months (Roelofs 1983), they are vulnerable to detrimental environmental and human-caused factors including higher water temperatures, low summer flows, decreasing pool depths, and poaching. Steelhead within the Northern California coastal steelhead ESU (evolutionary significant unit), which includes Redwood Creek, were federally listed by NOAA Fisheries as threatened in June 2000.

Summer 2005 was the 25th consecutive summer steelhead trout survey of Redwood Creek, the first being 1981. Twenty-two adult summer steelhead (steelhead ≥ 16 inches), seven ‘half-pounder’ steelhead (smaller immature sea-run steelhead returning after less than one year in the ocean), and 49 coastal cutthroat trout (*O. clarki*) (cutthroat ≥ 10 inches) were observed in a mainstem survey reach from Lacks Creek to just downstream of Hayes Creek (Table 1 and Figure 2). An adult sockeye salmon (*O. nerka*) with green head/red body was also observed, a first species occurrence for the 25 Redwood Creek summer steelhead surveys. The survey reach began at Stover Ranch and proceeded downstream through Green Diamond Resource Company timber lands into Redwood National and State Parks. Nineteen of the 22 summer steelhead were observed within the index reach, Lacks to Tom McDonald Creeks. The number of adult steelhead within the index reach has declined over time, but in 2005, though still low, the numbers doubled from the previous year (Figure 1 and Appendix I).

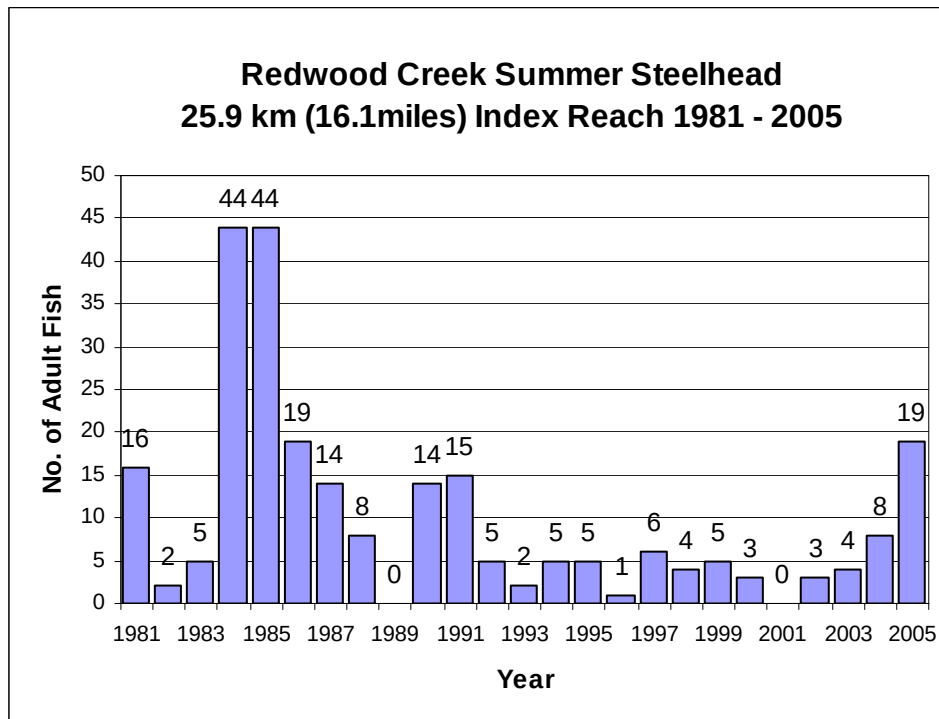


Figure 1. Numbers of summer steelhead observed each summer since 1981 on the 25.9 km (16.1 mile) **index reach** of Redwood Creek (Lacks Creek to Tom McDonald Creek), Humboldt County, California.

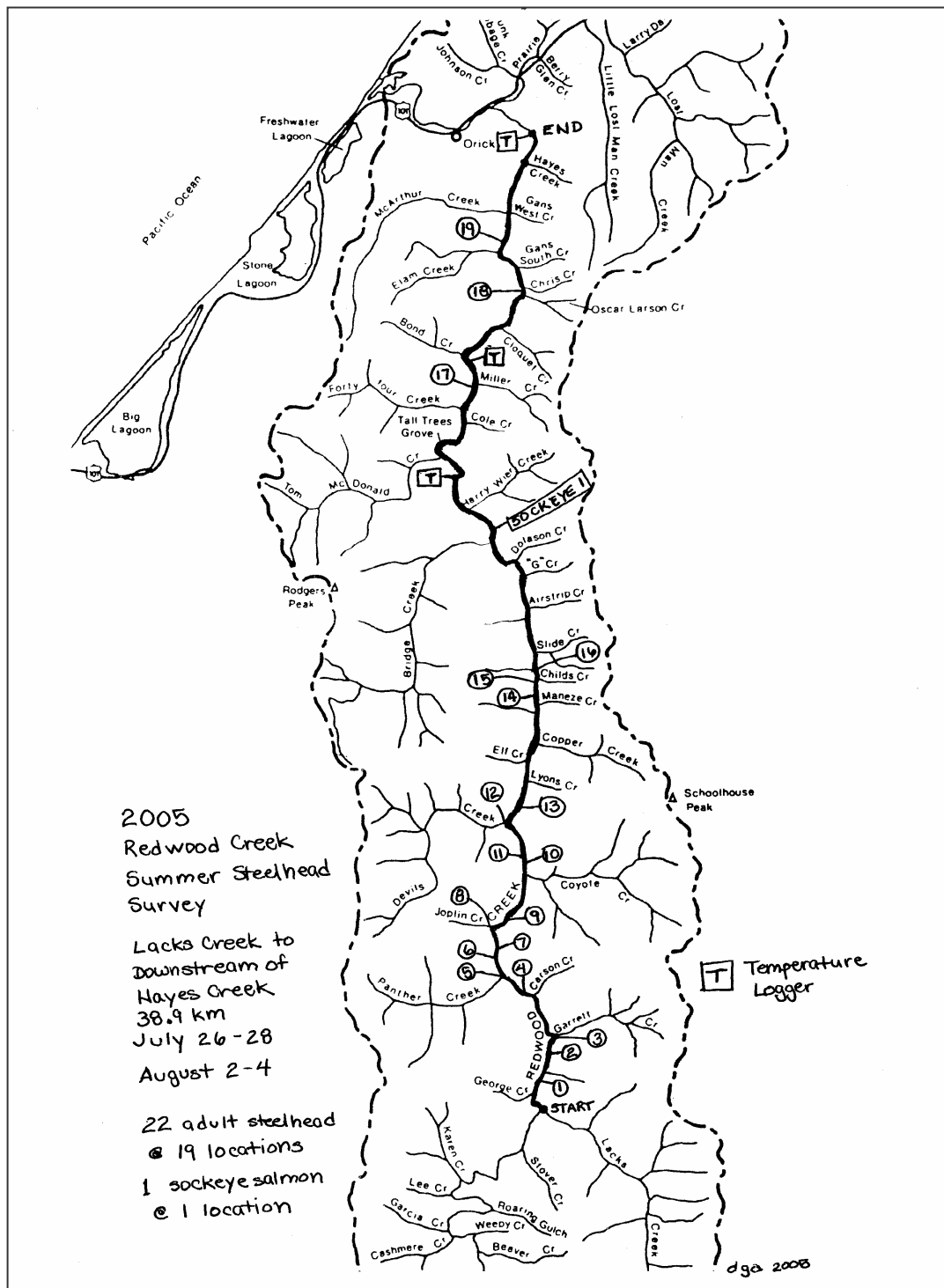


Figure 2. Location of the 22 adult summer steelhead and 1 sockeye salmon observed during the 2005 snorkel survey of Redwood Creek, Humboldt County, California. Survey was between Lacks Creek to downstream of Hayes Creek from July 26 to 28 and August 2 to 4, 2005.

Table 1. Numbers of adult summer steelhead ($\geq 16"$), 'half-pounder' steelhead, and coastal cutthroat trout, sockeye salmon, and aquatic wildlife noted during the 2005 summer steelhead survey of mainstem Redwood Creek, Humboldt County, California. Survey conducted on six days, July 26 through August 4, 2005 from Lacks Creek to downstream of Hayes Creek and covered 38.9 km (24.1 miles) of Redwood Creek mainstem. (Stream reaches are broken out to reflect past reported reaches. These original reaches were based on access points, the majority of which are no longer accessible by vehicle.)

Redwood Creek Mainstem Stream Reach		No. of Summer Steelhead Adults (≥16")	No. of Steelhead Half Pounders	No. of Cutthroat Trout (≥ 10")	No. of Sockeye Salmon	Aquatic Wildlife Observed
INDEX REACH	Lacks to Panther Creek 7/28/2005	4	2	5	0	Steelhead Trout Juveniles, Pacific Giant Salamander, Filamentous algae, <i>Juga</i> snail, Three Spined Stickleback, Sacramento Sucker, Yellowlegged Frog, Aquatic Garter Snake
	Panther to Coyote Creek 7/28/2005	6	2	8	0	Steelhead Trout (Resident and Juveniles), King Salmon Juveniles,
	Coyote to Copper Creek 8/02/2005	6	1	4	0	Steelhead Trout Juveniles, Limniphilid Caddisfly nymphs (rock case), <i>Juga</i> Snails, Glossosomatidae pupae, Damselfly adults, Three Spine Stickleback, River Otter, Sacramento Sucker, Aquatic Garter Snake
	Copper to Pig Pen Prairie (Slide Cr) 8/03/2005	3	0	5	0	Steelhead Trout Juveniles
	Pig Pen Prairie (Slide Cr) to Bridge Creek 8/03 & 04/2005	0	0	5	0	Steelhead Trout Juveniles, Yellow Legged Frogs, Limniphilid Caddisfly nymphs, <i>Juga</i> Snails, Glossosomatidae pupae, Sculpin sp., Sacramento Suckers
	Bridge to Tom McDonald Creek 8/04/2005	0	1	5	1	Three Spine Stickleback Juveniles
	Tom McDonald to Bond Creek 7/26/2005	1	0	7	0	Steelhead Trout Juvenile, Plecoptera nymphs (stonefly), Sacramento Sucker, Sculpin sp., Three Spine Stickleback, Western Toad Tadpoles, Yellow Legged Frogs, <i>Juga</i> Snails
	Bond Creek to downstream of Hayes Creek 7/26 & 27/2005	2	1	10	0	Sacramento Sucker, Sculpin sp., Three Spine Stickleback, Western Toad
Total		22	7	49	1	

Table 2. Date, location (river kilometer and UTM coordinates), number and estimated fork length (inches) and habitat description of adult summer steelhead trout and sockeye salmon observed in the 2005 snorkel survey of mainstem Redwood Creek. (Numbers in parentheses in the river km refer to locations on map of Figure 2).

Date	River KM	No. of SSHD	Est. Length (inches)	Habitat Description
SUMMER STEELHEAD				
7/28/2005	44.55 (1)	1	24	Fish under boulder in pool at 5 ft depth. Pool dimensions 10' D x 75m L x 15m W. Water temperature 20°C at 11:40 am. (UTM 4546910N 426205E)
7/28/2005	44.00 (2)	1	20	Fish in pool under boulder associated with woody debris at 4 ft depth. Pool dimensions 7' D x 350m L x 35m W. Water temperature 22°C at 1:31 pm. (UTM 4547400N 426160E)
7/28/2005	43.40 (3)	1	17	Fish under rock at 10 ft depth in large deep pool associated with the confluence of Garrett Creek. Pool dimensions 10' D x 75m L x 40m W. Water temperature of Redwood Creek 22°C and of Garrett Creek 17°C at 2:30 pm. (UTM 4547900N 426190E)
7/28/2005	41.60 (4)	1	25	Fish under very large boulder at the bottom of the pool at 15 ft depth. Summer steelhead was found at this boulder in 1999. Pool dimensions 15' D x 60m L x 25m W. Water temperature 23°C at ~ 4:30 pm. (UTM 4548720N 424810E)
7/28/2005	40.50 (5)	1	25	Fish in 8 ft of water in pool associated with the confluence of Panther Creek. Pool dimensions 8' D x 100m L x 15m W. Water temperature 18.5°C. (UTM 4548850N 423790E)
7/28/2005	40.15 (6)	2	22 23	Two fish in pool 6' D x 200m L x 15m W. Water temperature 18.5°C at 9:45 am. (UTM 4549050N 423540E)
7/28/2005	39.80 (7)	1	24	Fish in open water in a run. Depth of water 4 ft. Water temperature 18.0°C at 9:58 am. (UTM 4549330N 423330E)
7/28/2005	38.95 (8)	1	20	Fish in pool associated with the confluence of Joplin Creek. Pool dimensions 15' D x 30m L x 30m W. Water temperature 18.5°C at 10:35 am. (UTM 4550005N 422905E)
7/28/2005	38.50 (9)	1	20	Fish out in the open in the pool. Pool dimensions 5' D x 25m L x 15m W. Water temperature 20.0°C. (UTM 4550310N 423160E)
8/02/2005	36.15 (10)	1	17	Fish spooked from open water to hide under rock boulder. Pool dimensions 4.5' D x 200m L x 20m W. Water temperature 19.5°C at 1210 pm. (UTM 4552390N 422895E)
8/02/2005	35.90 (11)	1	26	Fish under boulder in shade. Pool dimensions 3.5' D x 100m L x 20m W. Water temperature 20.0°C at 12:32 pm. (UTM 4552560N 422720E)

Date	River KM	No. of SSHD	Est. Length (inches)	Habitat Description
8/02/2005	34.92 (12)	3	23 24 26	Three fish in pool associated with confluence of Devils Creek. Pool dimensions 7' D x 75m L x 20m W. Water temperature of Redwood Creek 21.0°C and of Devils Creek 14.5°C at 3:10 pm. (UTM 4552995N 421940E)
8/02/2005	34.40 (13)	1	24	Fish in a run between and underneath two boulders out of the current. Run dimensions 3' D x 50m L x 15m W. Water temperature 20.5°C at 3:44 pm. (UTM 4553480N 421990E)
8/03/2005	30.30 (14)	1	20	Fish at 9 ft depth under ledge of large boulder located in center of pool. Two other large boulders in pool. (Nine adult summer steelhead were found in this exact location in 1984). Small westside tributary flows into pool. Pool dimensions 12' D x 50m L x 30m W. Water temperature of tributary 14.0°C and of Redwood Creek 19.5°C at 11:03 am. (UTM 4556880N 421040E)
8/03/2005	30.00 (15)	1	24	Fish under boulder at 7 ft depth. Pool with many boulders and small westside tributary entering pool. Pool dimensions 7' D x 150m L x 30m W. Water temperature of tributary 14.0°C and of Redwood Creek, 19.5°C, at 11:50 am. (UTM 4557150N 420945E).
8/03/2005	29.40 (16)	1	22	Fish in pool between a log and boulder in current at 6 ft depth. Pool dimensions 6' D x 75m L x 15m W. Water temperature 20.0°C at 12:48 pm. (UTM 4557590N 420680E)
7/26/2005	17.25 (17)	1	24	Fish under rock edge of boulder. Fish swam downstream and was found 30m downstream in 1 ft of water. Pool dimensions 8' D x 40m L x 25m W. Water temperature 21.0°C at 1:15 pm. (UTM 4564395N 415315E)
7/27/2005	13.0 (18)	1	24	Fish was under rock ledge, 50 m upstream of Chris Creek confluence. Pool dimensions 5' D x 200m L x 35m W. Water temperature 18.5°C at 11:20 am. (UTM 4567700N 415400E)
7/27/2005	11.30 (19)	1	22	Fish in rootwad. Pool dimensions 7' D x 75m L x 15m W. Water temperature 20.0°C at ~ 12:20 pm. (UTM 4568540N 414210E)
Summer Steelhead Total		22		
SOCKEYE SALMON				
8/04/2005	24.10 (sockeye 1)	1	24	Sockeye salmon adult in a long pool. It had a red body, green head, silver gray tail, a hook jaw, and white edge on the mouth. Fish spooked back and forth in the pool. Pool dimensions 8' D x 150m L x 35m W. Water temperature 21.0°C at 12:30 pm. (UTM 4560790N 417550E)

The 22 adult summer steelhead were observed in 17 pools and 2 runs. Seven of the pools were associated with tributaries, five of them westside tributaries (Panther, Joplin, and Devils Creeks, and two unnamed westside tributaries) and two eastside tributaries (Garrett and Chris Creeks). Past data from Redwood Creek show the majority of summer steelhead are observed in pools, and pools associated with the inflow of cooler water from tributaries (Anderson 1993). Most fish were found in the mid to upper reaches of the survey. Downstream of Slide Creek, only three summer steelhead were seen, and that was in the Tom McDonald to Hayes Creek reach. Seventeen were solitary fish observations, and the other two observations were groups of two and three fish respectively. Two fish were observed under the exact boulders in the same locations as summer steelhead seen in 1999 and 1984. The sockeye salmon was also observed in a pool. Sockeye were also reported in summer 2005 in the Mad River at Blue Lake (Michael Sparkman - CDFG Arcata, personal communication).

WATER DISCHARGE

Water flow measured at the Orick gaging station located downstream of the confluence of Prairie Creek at Redwood Creek between July 26 and August 4 ranged between 118 and 83 cfs. (This USGS flow data is provisional and subject to revision.). These flows were larger than normally experienced during the annual sampling period (last week of July/first week of August). Late spring rain events increased and prolonged a higher summer baseflow for Redwood Creek. Previous years, 2004 - 2000 for example, Redwood Creek flow ranged from 77 to 12 cfs. It did not rain during the survey.

FISH ACCESS TO REDWOOD CREEK

Increased flow kept the mouth of Redwood Creek open to the ocean until the second week of September. The mouth of Redwood Creek is normally closed to the ocean by mid-June.

WATER TEMPERATURE

Water temperature (°C) was measured with a hand held thermometer below the water surface in the main current of Redwood Creek and tributaries. At each tributary, the mainstem Redwood Creek temperature was measured upstream of the tributary confluence. Temperature loggers also recorded Redwood Creek mainstem water temperature at three sites.

Mainstem Redwood Creek - Redwood Creek water temperatures measured during the 2005 survey ranged from 17°C (downstream of Cloquet Creek at 9:53am and upstream of Oscar Larson at 10:59am on July 27) to 23°C (six mainstem locations between Garrett and Panther Creek between 3pm and 6pm on July 28) (Appendix II).

Onset™ recording temperature loggers were placed mid-depth in the current of mainstem Redwood Creek within the park (and the snorkel survey reach) at three locations. They recorded temperature at one-hour intervals from June to October 2005.

A temperature logger (Tidbit S/N 552819) was located upstream of Tom McDonald Creek/Tall Trees Grove (UTM 4561485N 415988E) between June 1 and October 4. Maximum and minimum water temperatures were 23.1°C and 11.3°C, respectively (Figure 3). The average water temperature was 17.3°C (Std. dev. 2.7°C). For the period July 1 through August 31, the warmer period of the summer, the average water temperature was 19.4°C, the maximum 23.1°C,

and the minimum 15.5°C. During the July 1 - August 31 period, the water temperature was at or greater than 18°C 82.4 percent of the time.

A second temperature logger (Tidbit S/N 552817) was located upstream of Bond Creek (UTM 4564913N 414731E) between June 1 and October 5. This was the second season at this location. Maximum and minimum water temperatures were 24.6°C and 11.7°C, respectively (Figure 4). The mean water temperature was 17.8°C (Std. dev. 2.9°C). For the period July 1 through August 31, the warmer period of the summer, the average water temperature was 19.8°C, the maximum 24.6°C, and the minimum, 15.6°C. During the July 1 - August 31 period, the water temperature was at or greater than 18°C 82.6 percent of the time.

The third temperature logger (TempPro S/N 761043) was located in lower Redwood Creek upstream of the Redwood Creek trailhead (UTM 4571962N 413723E) between June 15 and October 4. The probe was placed in the water later in June. Higher flows prevented placement of the probe in a suitable location. Maximum and minimum water temperatures recorded between June 15 and October 4 were 22.6°C and 11.9°C, respectively (Figure 5). The average water temperature was 17.5°C (Std. dev. 2.1°C). For the period July 1 through August 31, the warmer period of the summer, the average water temperature was 18.5°C, the maximum 22.6°C, and the minimum 15.5°C. During the July 1 - August 31 period, the water temperature was at or greater than 18°C 51.9 percent of the time.

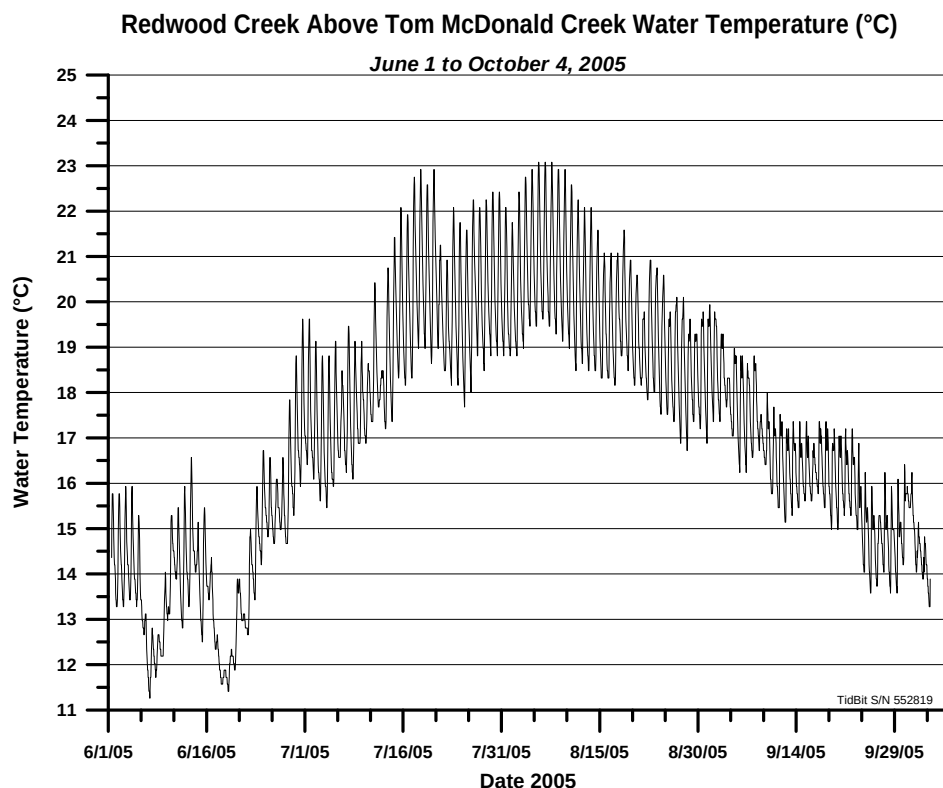


Figure 3. Mainstem Redwood Creek water temperatures (°C) from Onset TidBit temperature logger located upstream of Tom McDonald Creek/Tall Trees Grove. The logger recorded water temperature every 1-hour in the current below the surface of the water from June 1 through October 4, 2005.

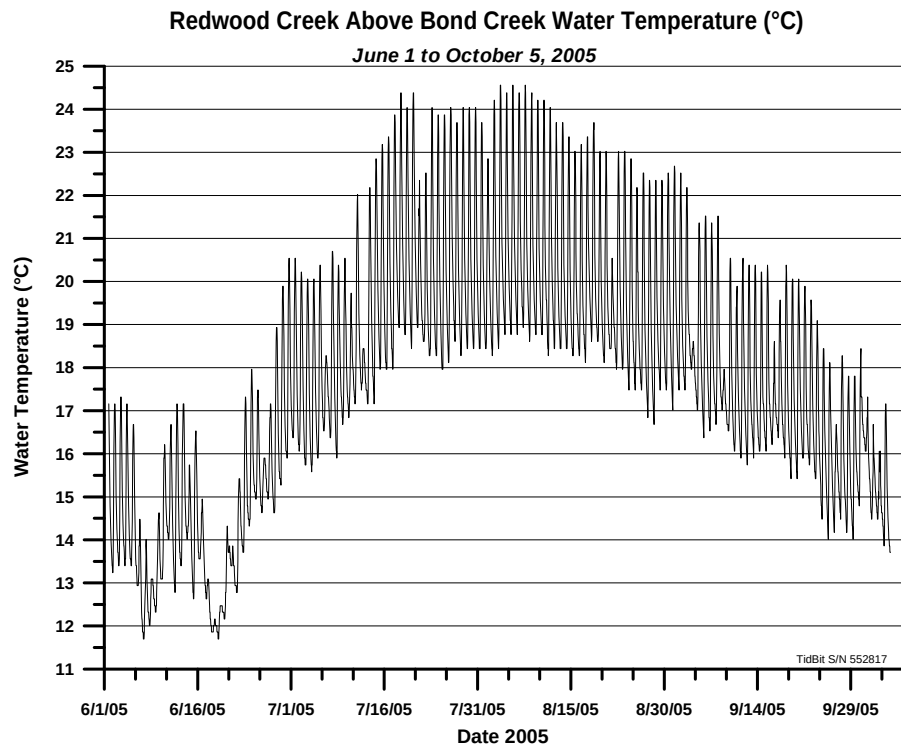


Figure 4. Mainstem Redwood Creek water temperatures (°C) from Onset TidBit temperature logger located upstream of Bond Creek. The logger recorded water temperature every 1-hour in the current below the surface of the water from June 1 through October 5, 2005.

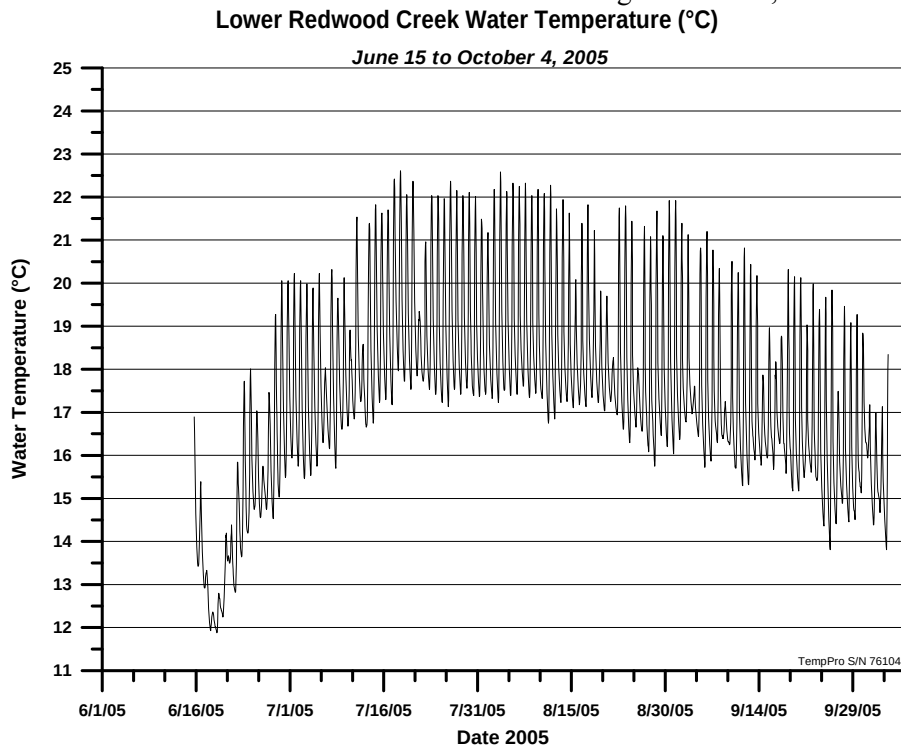


Figure 5. Mainstem Redwood Creek water temperatures (°C) from Onset TempPro temperature logger located upstream of the lower Redwood Creek trailhead parking lot. The logger recorded water temperature every 1-hour in the current below the surface of the water from June 15 through October 4, 2005.

Tributaries - Water temperatures of 63 east and westside tributaries entering Redwood Creek measured during the survey ranged from 12°C to 17°C (Appendix II). Water temperatures of all tributaries were cooler than the corresponding temperature of mainstem Redwood Creek measured at the same time.

Westside tributaries were generally cooler than eastside tributaries; a pattern repeated in all past summer steelhead surveys. The mean water temperature of westside tributaries was 14.3°C (n = 43, std. dev. = 1.0°C) and temperatures ranged from 12°C (two unnamed tributaries) to 16°C (Tom McDonald Creek and two unnamed tributaries). The mean water temperature of eastside tributaries was 15.3°C (n = 20, std. dev. = 1.0°C) and temperatures ranged from 13.5°C (Chris and Oscar Larson Creeks) to 17°C (Garrett and Slide Creeks).

The 2005 year summer water temperatures are similar to temperatures and patterns have been recorded in all past summer steelhead surveys. Water temperatures in mainstem Redwood Creek are high for salmonid fish, above the preferred temperature range reported by Reiser and Bjornn (1979) for steelhead of 7.3°C to 14.6°C.

Other wildlife noted is listed in Appendix III.

REFERENCES

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- Personal Communication - Michael D. Sparkman, Biologist (Marine/Fisheries), Anadromous Fisheries Resource Assessment and Monitoring Program, North Coast Region, California Department of Fish and Game, 50 Ericson Court, Arcata, Ca. 95521, (707) 825-4856

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[December 2005]

Appendix I. Numbers of summer steelhead trout observed 1981 through 2005 and annual survey dates in the 25.9-km (16.1-mile) index reach (Lacks Creek to Tom McDonald Creek) and expanded survey reaches of Redwood Creek, Humboldt County, California by Redwood National and State Parks personnel and others.

Year	Index Reach (Lacks Creek to Tom McDonald Creek) No. of Summer Steelhead	Total Reach Surveyed		Survey Dates
		Total No. of Summer Steelhead	Start to End Points and Distance (km)	
1981	16	16	Beaver Cr to Orick (51.5)	8/10 – 13/81
1982 ^a	2	2	Stover Cr to Emerald Cr (22.5)	10/12 & 14/82
1983	5	7	HWY 299 to Tom McDonald Cr (44.4)	8/22 – 25/83
1984	44+	44+	Index Reach (25.9)	8/08 – 10/84
1985	44+	44+	Index Reach (25.9)	8/20 - 22, 9/4/85
1986	19	19	Index Reach (25.9)	8/25 – 27/86
1987	14	15	1mile downstream of Snow Camp Cr to Tom McDonald Cr (72.7)	7/14 – 16/87
1988	8	8 & (6 Spring	Index Reach (25.9)	7/26 – 28/88
1989 ^b	0	0	Lacks Cr to Bridge Cr (17.9)	7/31, 8/01 – 02/89
1990	14	14	Index Reach (25.9)	7/31, 8/01-03/90
1991	15	15	Index Reach (25.9)	8/05 – 08/91
1992	5 (4 & 1 carcass)	7 (6 & 1 carcass)	Lacks Cr to Hayes Cr (37.8)	8/03 - 06, 10/92
1993	2	3	Lacks Cr to Hayes Cr (37.8)	8/02 - 05, 09/93
		2 ^c	Chezem Rd to Stover Cr (24.75)	8/18, 20, 27/93
		3 ^d	Ayres Cabin to Chezem Rd (14.3)	8/28 & 30/93
		8 Total	76.9 km	
1994	5	8	Lacks Cr to Hayes Cr (37.8)	8/01 – 04/94
		16 ^c	Chezem Rd to Stover Cr (24.8)	8/04-06/94
		3 ^e	HWY299 to Chezem Rd (2.0)	8/15/94
		9 ^d	Bradford Cr to HWY 299 (20.1)	8/13-14/94
		36 Total	84.7 km	

Year (con't.)	Index Reach (Lacks Creek to Tom McDonald Creek) No. of Summer Steelhead	Total Reach Surveyed		Survey Dates
		Total No. of Summer Steelhead in total reach	Begin to End Creeks and Distance (km)	
1995	6 (5 & 1 carcass)	8 (7 & 1 carcass) 8 ^c	Lacks Cr to Hayes Cr (37.8) Chezem Rd to Bair Rd (7.6)	7/24 – 27/95 8/28/95
		2 ^d	Bradford Cr to Ayres Cabin (7.85)	9/02/95
		18 Total	53.25 km	
1996	1	1 21 ^c 1 ^d	Lacks Cr to Hayes Cr (37.8) Chezem Rd to Stover Cr (24.8) Bradford Cr to Chezem Rd (22.1)	8/05 – 08/96 7/31, 8/1, 22/96 8/10-12/96
		23 Total	84.7 km	
1997	6	6 16 ^c 15 ^d	Lacks Cr to Hayes Cr (37.8) Chezem Rd to Stover Cr (24.8) Bradford Cr to Chezem Rd (22.1)	8/04 - 07/97 8/06 – 08/97 8/17, 24, 30/97
		37 Total	84.7 km	
1998	4	4 21 ^d	Lacks Cr to Hayes Cr (37.8) Bradford Cr to Stover Cr (46.9)	7/27 – 30/98 8/24-27, 31/98
		25 Total	84.7 km	
1999	5	10	Lacks Cr to Hayes Cr (38)	8/02-05, 09-10/99
2000	3	3	Lacks Cr to Hayes Cr (38)	8/01-03, 07-09/2000
2001	0	1	Lacks Cr to Hayes Cr (38.1)	7/31, 8/01-02, 07/2001
2002	3	3	Lacks Cr to Hayes Cr (38.1)	7/29-31, 8/ 1, 5, 7/2002
2003	4	6	Lacks Cr to Downstrm of Hayes Cr (38.8)	7/29-31, 8/4-6/2003
2004	8 (+ 1 dead)	15 (+ 1 dead)	Lacks Cr to Downstrm of Hayes Cr (39.0)	7/27-29, 8/3-5/2004
2005	19	22	Lacks Cr to Downstrm of Hayes Cr (38.9)	7/26-28, 8/2-4/2005

^a Survey from Stover Creek to Emerald Creek, 14 miles, covering most of index section and best pool habitat.

^b Survey from Lacks to Bridge Creek, minus Garret to Panther Creek, a total of 11.1 miles. Covered best pool habitat.

^c Tom Weseloh – California Trout ^d Matt Smith -North Coast Fisheries Restoration ^e Kirk Cohune

Appendix II. Water temperatures (°C) measured during the 2005 Redwood Creek summer steelhead trout survey from July 26 to August 4. Locations are listed south to north. Redwood Creek (upstream) refers to water temperature measurement taken immediately upstream of the tributary confluence listed below. UN ES or WS refers to unnamed eastside or westside tributary, and the number refers to river kilometer (measured from the mouth of Redwood Creek). Alignment refers to tributary watershed position: East = Eastside, West = Westside, and REDW = mainstem Redwood Creek.

Location	Alignment	Date	Time	Water Temperature (°C)
Redwood Creek (upstream)	REDW	7/28/2005	9:15 AM	19.5
Lacks Creek	East	7/28/2005	9:15 AM	15.0
Redwood Creek (upstream)	REDW	7/28/2005	10:07 AM	19.5
George Creek	West	7/28/2005	10:07 AM	14.0
Redwood Creek (upstream)	REDW	7/28/2005	10:24 AM	19.0
UN WS 45.60	West	7/28/2005	10:24 AM	12.0
Redwood Creek (upstream)	REDW	7/28/2005	10:50 AM	20.0
UN WS 45.2131	West	7/28/2005	10:50 AM	13.0
Redwood Creek (upstream)	REDW	7/28/2005	12:00 PM	19.5
UN ES 44.381	East	7/28/2005	12:00 PM	14.5
Redwood Creek (upstream)	REDW	7/28/2005	1:11 PM	21.5
UN WS 44.2514	West	7/28/2005	1:11 PM	14.0
Redwood Creek 44.00 km	REDW	7/28/2005	1:31 PM	22.0
Redwood Creek (upstream)	REDW	7/28/2005	1:51 PM	22.0
UN WS 43.7669	West	7/28/2005	1:51 PM	16.0
Redwood Creek (upstream)	REDW	7/28/2005	2:30 PM	22.0
Garrett Creek	East	7/28/2005	2:30 PM	17.0
Redwood Creek (upstream)	REDW	7/28/2005	3:06 PM	22.5
UN WS 42.92	West	7/28/2005	3:06 PM	15.0
Redwood Creek 42.35 km	REDW	7/28/2005	--	23.0
Redwood Creek (upstream)	REDW	7/28/2005	4:19 PM	23.0
UN ES 42.10	East	7/28/2005	4:19 PM	15.5
Redwood Creek 41.60 km	REDW	7/28/2005	--	23.0
Redwood Creek (upstream)	REDW	7/28/2005	4:35 PM	23.0
Carson Creek	East	7/28/2005	4:35 PM	16.0
Redwood Creek (upstream)	REDW	7/28/2005	5:11 PM	22.5
UN WS 41.372	West	7/28/2005	5:11 PM	15.0
Redwood Creek (upstream)	REDW	7/28/2005	5:19 PM	23.0
UN ES 41.244	East	7/28/2005	5:19 PM	15.0
Redwood Creek (upstream)	REDW	7/28/2005	5:56 PM	23.0
Panther Creek	West	7/28/2005	5:56 PM	15.0
Redwood Creek (upstream)	REDW	7/28/2005	9:04 AM	18.5 (Air 13.5)
Panther Creek	West	7/28/2005	9:04 AM	13.5
UN WS 40.10	West	7/28/2005	9:34 AM	12.0
Redwood Creek 40.15 km	REDW	7/28/2005	9:45 AM	18.5
Redwood Creek 39.80 km	REDW	7/28/2005	9:58 AM	18.0

Location	Alignment	Date	Time	Water Temperature (°C)
Redwood Creek (upstream)	REDW	7/28/2005	10:26 AM	18.0
UN WS 39.7728	West	7/28/2005	10:08 AM	14.0
UN WS 39.25	West	7/28/2005	10:26 AM	14.0
Redwood Creek (upstream)	REDW	7/28/2005	10:35 AM	18.5
Joplin Creek	West	7/28/2005	10:35 AM	14.5
Redwood Creek (upstream)	REDW	7/28/2005	--	18.5
UN ES 38.50 (38.5814)	East	7/28/2005	--	15.0
Redwood Creek (upstream)	REDW	7/28/2005	12:37 PM	19.0
UN WS 37.0	West	7/28/2005	12:37 PM	14.5
Redwood Creek (upstream)	REDW	7/28/2005	1:35 PM	20.0
Coyote Creek	East	7/28/2005	1:35 PM	16.0
Redwood Creek (upstream)	REDW	8/2/2005	11:20 AM	19.0
Coyote Creek	East	8/2/2005	11:20 AM	15.5
Redwood Creek (upstream)	REDW	8/2/2005	12:02 PM	19.0
UN WS 36.2757	West	8/2/2005	12:02 PM	12.0
Redwood Creek 36.15 km	REDW	8/2/2005	12:10 PM	19.5
Redwood Creek 35.90 km	REDW	8/2/2005	12:32 PM	20.0
Redwood Creek (upstream)	REDW	8/2/2005	12:53 PM	20.0
UN ES 35.714	East	8/2/2005	12:53 PM	15.5
Redwood Creek (upstream)	REDW	8/2/2005	3:10 PM	21.0
Devils Creek	West	8/2/2005	3:10 PM	14.5
Redwood Creek 34.40 km	REDW	8/2/2005	3:55 PM	20.5
Redwood Creek (upstream)	REDW	8/2/2005	4:38 PM	21.0
Lyons Creek	East	8/2/2005	4:38 PM	16.0
Redwood Creek (upstream)	REDW	8/2/2005	5:37 PM	20.5
Elf Creek	West	8/2/2005	5:37 PM	14.0
Redwood Creek (upstream)	REDW	8/2/2005	5:53 PM	20.5
UN WS 32.527	West	8/2/2005	5:53 PM	15.5
Redwood Creek (upstream)	REDW	8/2/2005	6:15 PM	21.0
Copper Creek	East	8/2/2005	6:15 PM	16.5
Redwood Creek 31.55	REDW	8/3/2005	9:25 AM	18.5
Redwood Creek (upstream)	REDW	8/3/2005	10:19 AM	19.0
UN WS 31.042	West	8/3/2005	10:19 AM	14.0
Redwood Creek (upstream)	REDW	8/3/2005	11:03 AM	19.5
UN WS 30.536	West	8/3/2005	11:03 AM	14.0
Redwood Creek (upstream)	REDW	8/3/2005	11:32 AM	19.5
UN WS 30.27	West	8/3/2005	11:32 AM	14.0
Redwood Creek (upstream)	REDW	8/3/2005	11:47 AM	19.5
UN WS 30.00	West	8/3/2005	11:51 AM	14.0
Redwood Creek (upstream)	REDW	8/3/2005	12:23 PM	20.0
UN WS 29.60	West	8/3/2005	12:23 PM	15.5
Redwood Creek 29.40 km	REDW	8/3/2005	12:48 PM	20.0
Redwood Creek (upstream)	REDW	8/3/2005	1:00 PM	20.5
UN WS 29.25	West	8/3/2005	1:00 PM	14.0
Redwood Creek (upstream)	REDW	8/3/2005	1:07 PM	22.0

Location	Alignment	Date	Time	Water Temperature (°C)
UN WS 29.20	West	8/3/2005	1:07 PM	15.5
Redwood Creek (upstream)	REDW	8/3/2005	1:20 PM	21.0
UN WS 29.066	West	8/3/2005	1:20 PM	16.0
Redwood Creek (upstream)	REDW	8/3/2005	2:40 PM	22.0
Slide Creek	East	8/3/2005	2:40 PM	17.0
Redwood Creek (upstream)	REDW	8/3/2005	3:35 PM	22.0
UN WS 28.243	West	8/3/2005	3:35 PM	15.0
Redwood Creek (upstream)	REDW	8/3/2005	4:46 PM	22.0
UN WS 27.70 (27.7527)	West	8/3/2005	4:46 PM	14.0
Redwood Creek (upstream)	REDW	8/3/2005	5:42 PM	22.0
UN WS 27.25	West	8/3/2005	5:42 PM	15.0
Redwood Creek (upstream)	REDW	8/3/2005	6:15 PM	21.5
UN WS 26.912	West	8/3/2005	6:15 PM	14.0
Redwood Creek 26.60 km	REDW	8/4/2005	9:52 AM	18.5
Redwood Creek (upstream)	REDW	8/4/2005	10:08 AM	19.0
UN ES 26.3744	East	8/4/2005	10:08 AM	15.5
Dolason Creek	East	8/4/2005	10:36 AM	15.0
Redwood Creek (upstream)	REDW	8/4/2005	10:55 AM	19.0
UN WS 25.45	West	8/4/2005	10:55 AM	14.0
Redwood Creek (upstream)	REDW	8/4/2005	11:05 AM	19.5
UN WS 25.30	West	8/4/2005	11:05 AM	15.0
Redwood Creek (upstream)	REDW	8/4/2005	11:35 AM	20.5
Bridge Creek	West	8/4/2005	11:35 AM	15.5
Redwood Creek 24.30 km	REDW	8/4/2005	12:30 PM	21.0
Redwood Creek (upstream)	REDW	8/4/2005	1:00 PM	21.5
Emerald Creek	East	8/4/2005	1:00 PM	16.0
Redwood Creek (upstream)	REDW	8/4/2005	2:26 PM	22.0
UN WS 22.861	West	8/4/2005	2:26 PM	14.5
Redwood Creek (upstream)	REDW	8/4/2005	2:40 PM	21.5
UN WS 22.30	West	8/4/2005	2:40 PM	15.5
Redwood Creek (upstream)	REDW	8/4/2005	4:05 PM	22.0
Tom McDonald Creek	West	8/4/2005	4:05 PM	16.0
Redwood Creek (upstream)	REDW	7/26/2005	9:53 AM	18.0 (Air 16.0 @ 9:30 am)
Tom McDonald Creek	West	7/26/2005	9:53 AM	13.5
Redwood Creek (upstream)	REDW	7/26/2005	10:26 AM	18.5
UN WS 20.1505	West	7/26/2005	10:26 AM	14.0
Redwood Creek (upstream)	REDW	7/26/2005	11:40 AM	20.0
Fortyfour Creek	West	7/26/2005	11:47 AM	13.5
Redwood Creek 17.25 km	REDW	7/26/2005	1:15 PM	21.0
Redwood Creek (upstream)	REDW	7/26/2005	1:26 PM	21.0
Miller Creek	East	7/26/2005	1:26 PM	14.5
Redwood Creek (upstream)	REDW	7/26/2005	2:02 PM	22.0
Bond Creek	West	7/26/2005	2:03 PM	14.0
Redwood Creek (upstream)	REDW	7/26/2005	2:52 PM	22.5
UN WS 14.75 (14.7086)	West	7/26/2005	2:53 PM	14.0

Location	Alignment	Date	Time	Water Temperature (°C)
Redwood Creek (upstream)	REDW	7/26/2005	3:09 PM	22.0
Cloquet Creek	East	7/26/2005	3:02 PM	15.0
Redwood Creek 14.5 km	REDW	7/27/2005	9:53 PM	17.0 (Air 17.5)
Redwood Creek (upstream)	REDW	7/27/2005	10:20 AM	18.0
UN ES 13.85	East	7/27/2005	10:19 AM	14.0
Redwood Creek (upstream)	REDW	7/27/2005	10:26 AM	18.0
UN WS 13.806	West	7/27/2005	10:29 AM	14.0
Redwood Creek (upstream)	REDW	7/27/2005	10:59 AM	17.0
Oscar Larson Creek	East	7/27/2005	10:58 AM	13.5
Redwood Creek (upstream)	REDW	7/27/2005	11:20 AM	18.5
Chris Creek	East	7/27/2005	11:18 AM	13.5
Redwood Creek 12.8 km	REDW	7/27/2005	11:47 AM	19.0
Redwood Creek (upstream)	REDW	7/27/2005	12:02 PM	19.5
UN WS 12.45	West	7/27/2005	12:02 PM	13.0
Redwood Creek (upstream)	REDW	7/27/2005	12:15 AM	20.0
Elam Creek	West	7/27/2005	12:14 PM	13.5
Redwood Creek (upstream)	REDW	7/27/2005	2:06 PM	20.5
McArthur Creek	West	7/27/2005	2:03 PM	13.5
Redwood Creek 7.65 km	REDW	7/27/2005	3:20 PM	21.5



NPS Summer Steelhead Divers Upstream of Dolason Creek on Mainstem Redwood Creek. August 4, 2005

Appendix III. Wildlife observed during the 2005 summer steelhead survey of Redwood Creek, Humboldt County, California, July 26 through August 4, 2005.

Redwood Creek Mainstem Stream Reach	Other Wildlife Observed
I N D E X R E A C H	Lacks to Panther Creek Stellars Jay, American Dipper, Belted Kingfisher, Wrentit, Chestnut Backed Chickadee, Pacific Slope Flycatcher, Turkey Vulture, Painted Lady Butterfly, Northern Flicker, California Quail, Spotted Sandpiper, Osprey
	Panther to Coyote Creek
	Coyote to Copper Creek American Dipper, Alligator Lizard
	Copper to Pig Pen Prairie (Slide Cr) - Spotted Sandpipers, Bandtailed Pigeons, Stellars Jay, Osprey, Marbled Murrelet, Great Blue Heron
	Pig Pen Prairie (Slide Cr) to Bridge Creek - Turkey Vulture, Begging Juvenile Owl (either Barred or Northern Spotted Owl) Spotted Sandpiper, Beaver (lodge and sign)
	Bridge to Tom McDonald Creek
	Tom McDonald to Bond Creek Spotted Sandpiper, Osprey, Tiger Swallowtail Butterfly, California Sister and Painted Lady Butterflies, American Dipper
	Bond Creek to downstream of Hayes Creek Belted Kingfisher, Beaver (sign [2 locations]), Spotted Sandpiper, American Dipper, Great Blue Heron, Osprey