

Redwood

National Park

National Park Service
US Department of the Interior

2009 REDWOOD CREEK SUMMER STEELHEAD SURVEY



Fish and Wildlife Branch
September 2015

Cover Photos: Taken During the 2009 Summer Steelhead Survey
Top Left: Snorkeler and Old Growth Redwoods
Top Right: Summer Steelhead Displaying Hiding Behavior
Middle Left: Swimming Through the Redwood Creek 'Gorge'
Middle Right: Redwood National Park Snorkelers
Bottom Left: Redwood National Park Snorkelers
Bottom Right: Western Pearlshell Freshwater Mussels

2009 RNP REDWOOD CREEK SUMMER STEELHEAD SURVEY

DATES: July 27, 28, 29, and 30 (Monday - Thursday) and August 3, 4, and 5, 2009

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]
Start of Survey: 33 cfs End of Survey: 25 cfs

DIVERS: David Anderson¹, Terry Hines¹, Kyle Max¹, Kelley Breen¹. (¹Person with prior summer steelhead diving experience on Redwood Creek or ² other rivers). Recorder: Heather Brown.

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 via Big Lagoon; hike/snorkel and camp on river four days/three nights to reach footbridge downstream of Tall Trees Grove/Tom McDonald Creek and walk 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:	Date	Survey Reaches	Distance	SSHD No.
	8/ 05	Lacks Creek to Panther Creek		
		<i>Anderson, Hines, Breen, Recorder – Brown</i>	6.02 km	3
	7/ 27	Panther Creek to Upstream of Devils Creek	35.25 km	
		<i>Anderson, Max, Hines, and Breen</i>	5.15 km	1
	7/28	Upstream of Devils Cr to Childs Creek		
		<i>Anderson, Hines, Max, and Breen</i>	5.60 km	2
	7/29	Childs Creek to Downstream of Bridge Cr	23.65 km	
		<i>Anderson, Hines, Max, and Breen</i>	6.10 km	1
	7/30	Downstream of Bridge Cr to Tall Trees Summer Bridge	19.30 km	
		<i>Anderson, Hines, Max, and Breen</i>	4.35 km	1
	8/03	Tall Trees Summer Bridge to Cloquet Cr		
		<i>Anderson, Max, and Breen, Recorder – Brown</i>	4.73 km	1
	8/04	Cloquet Cr to downstream of Hayes Cr	7.65	
		<i>Anderson, Max, and Breen, Recorder – Brown</i>	6.92 km	0

TOTAL NUMBER OF ADULT SUMMER STEELHEAD TROUT OBSERVED IN 2009: 9

(Number of Adult Summer Steelhead Trout Observed within the Index Section (Lacks Creek to Tom McDonald Creek – 16.1 miles): 7

SUMMER STEELHEAD TROUT

Summer steelhead (*Oncorhynchus mykiss*) 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 and relisted in 2006.

Summer 2009 was the 29th consecutive summer steelhead trout survey of Redwood Creek, the first being 1981. The survey reach began at Lacks Creek at Stover Ranch and proceeded 38.9 kilometers downstream through Green Diamond Resource Company timber lands into Redwood National Park to downstream of Hayes Creek. Originally the survey was from Lacks Creek to Tom McDonald Creek, but it was expanded downstream to downstream of Hayes Creek in 1992.

Nine adult summer steelhead (steelhead ≥ 16 inches), three ‘half-pounder’ steelhead (smaller immature sea-run steelhead returning after less than one year in the ocean), and 126 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). Seven of the nine summer steelhead were observed within the index reach, Lacks to Tom McDonald Creeks.

All summer steelhead were observed as solitary fish and in pools (Table 2). Three of the pools were associated with tributary or seep flowing into the mainstem pool. 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). Estimated summer steelhead length ranged from 16 to 24 inches.

Six of the nine fish were observed in the upper reaches of Redwood Creek reach, above Copper Creek, above the ‘Gorge’ area. The other three were observed between Dolson Creek and just downstream of Bond Creek (Figure 1).

Summer steelhead numbers over time are presented in Figure 2 and Appendix I.

Beaver and otter were each observed in two separate locations. Two Western Pearlshell (*Margaritifera falcata*) freshwater mussels approximately 3” long were observed at Queen’s Hole (31.20 km) and four were found in a pool upstream of Childs Creek at 29.75km.

Table 1. Numbers of adult summer steelhead ($\geq 16''$), 'half-pounder' steelhead, and coastal cutthroat trout, and aquatic wildlife observed during the 2009 summer steelhead survey of mainstem Redwood Creek, Humboldt County, California. Survey conducted on seven days, July 27 through August 5, 2009 from Lacks Creek to downstream of Hayes Creek and covered 38.9 km (24.1 miles) of Redwood Creek. (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 ($\geq 16''$)	No. of Steelhead Half Pounders	No. of Cutthroat Trout ($\geq 10''$)	Aquatic/ Wildlife Observed
O R I G I N A L I N D E X R E A C H	Lacks to Panther Creek 8/05/2009	3	2	5	Threespine Stickleback, Aquatic Snails (<i>Juga</i>), Lamprey Redds (3 at 45.10km & 2 at 41.75 km), Filamentous algae, River Otter, Bear and Bobcat tracks, American Dipper
	Panther to Coyote Creek 7/27/2009	0	0	7	Steelhead Juveniles, Garter Snake, Pacific Giant Salamander (1 Dead), Aquatic Snails (<i>Juga</i>)
	Coyote to Copper Creek 7/27 & 28/2009	3	1	6	Resident Steelhead, Rough-skinned newt, American Dipper, Spotted Sandpiper, Belted Kingfisher, Marbled Murrelets (at 06:05 on 7/28), and Turkey Vulture
	Copper to Pig Pen Prairie (Slide Cr) 7/28 & 29/2009	0	0	7	Resident Steelhead, Sacramento Sucker, Western Toad, Freshwater Mussels (2 locations), Beaver sign (feces, stripped willow sticks, band lodge)
	Pig Pen Prairie (Slide Cr) to Bridge Creek 7/29/2009	1	0	17	Aquatic Snails (<i>Juga</i>), Mergansers
	Bridge to Tom McDonald Creek 7/29 & 30/2009	0	0	7	Threespine Stickleback, Garter and Gopher Snakes, Otters (2), Campers (2)
	Tom McDonald to Bond Creek 7/30 & 8/3/2009	1	0	28	Sacramento Suckers, Aquatic Snails (<i>Juga</i>), Tadpoles, Pacific Giant Salamanders, Western Toad, Rough-skinned Newt, Otters (2), Vauxs Swift, and Campers (3)
	Bond Creek to downstream of Hayes Creek 8/3 & 4/2009	1	0	49	Aquatic Snails (<i>Juga</i>), Western Toad, Crawdad pincher, Beaver, and Campsite (1)
Total		9	3	126	One Dead Steelhead – skin and bones not included

Table 2. Date, location (river kilometer and UTM coordinates), number and estimated fork length (inches) and habitat description of adult summer steelhead trout observed in the 2009 snorkel survey of mainstem Redwood Creek. (Numbers in parentheses in the river km refer to locations on map of Figure 1).

Date	River KM	No. of SSHD	Est. Length (inches)	Habitat Description
SUMMER STEELHEAD				
8/05/2009	46.35 (a)	1	19"	Fish in one foot of water under vegetated cut bank in pool downstream of Lacks Creek confluence. Pool dimensions: 50m L x 15m W x 2.5ft D. (UTM: 426595E 4545930N)
8/05/2009	45.55 (b)	1	17"	Fish first seen swimming in pool then hiding amongst rocks along pool edge. Pool Dimensions: 125m L x 20m W x 6ft D. Pool was temperature stratified. A seep, UN 45.60 flowing into pool. Redwood Creek water temperature, 18.0°C at 10:25am. (UTM 426173E 4546420N)
8/05/2009	43.40 (c)	1	24"	Pool at Garrett Creek. Fish first seen in open near large woody debris. Pool Dimensions: 90m L x 30m W x 10ft D. Redwood Creek water temperature 20.0°C at 12:53pm. (UTM 426058E 4548092N)
7/27/2009	35.50 (d)	1	21"	Fish seen swimming in pool with large woody debris and boulders. Pool Dimensions: 100m L x 20m W x 8ft D. (UTM 422330E 4553050N)
7/28/2009	33.10 (e)	1	22'	Fish seen swimming in open in pool. Pool Dimensions: 200m L x 30m W x 9ft D. Redwood Creek water temperature 20.0°C at 12:00. (UTM 421740E 4554890N)
7/28/2009	32.75 (f)	1	16"	Swimming in open in pool. Pool Dimensions: 150m L x 20m W x 8ft D. Redwood Creek water temperature 20.5°C at 12:30pm. (UTM 421580E 4555225N)
7/29/2009	25.70 (g)	1	20"	In pool in 8ft of water. Pool Dimensions: 50m L x 15m W x 15ft D. Redwood Creek water temperature 22.5°C at 3:45pm (UTM 418555E 4560430N)
7/30/2009	20.30 (h)	1	24"	Opposite Tall Trees Grove. Fish in pool with fresh fallen redwood trees and large woody debris. Pool Dimensions: 30m L x 10m W x 7ft D. Redwood Creek water temperature 20.0°C at 11:45am. (UTM 415030E 456335N)
8/03/2009	15.80 (i)	1	21"	Fish was swimming back and forth in pool with lots of woody debris. Pool Dimensions: 150m L x 10m W x 3ft D. Redwood Creek water temperature 19.0°C at 13:28. (UTM 414562E 4565477N)
Summer Steelhead Total		9		
Not included in total fish: 7/28/2009 - One dead steelhead, ~28" long found, but just skin and bones with some white tissue at tail bones. Could not ascertain if a dead summer steelhead or an old decaying run back steelhead.				

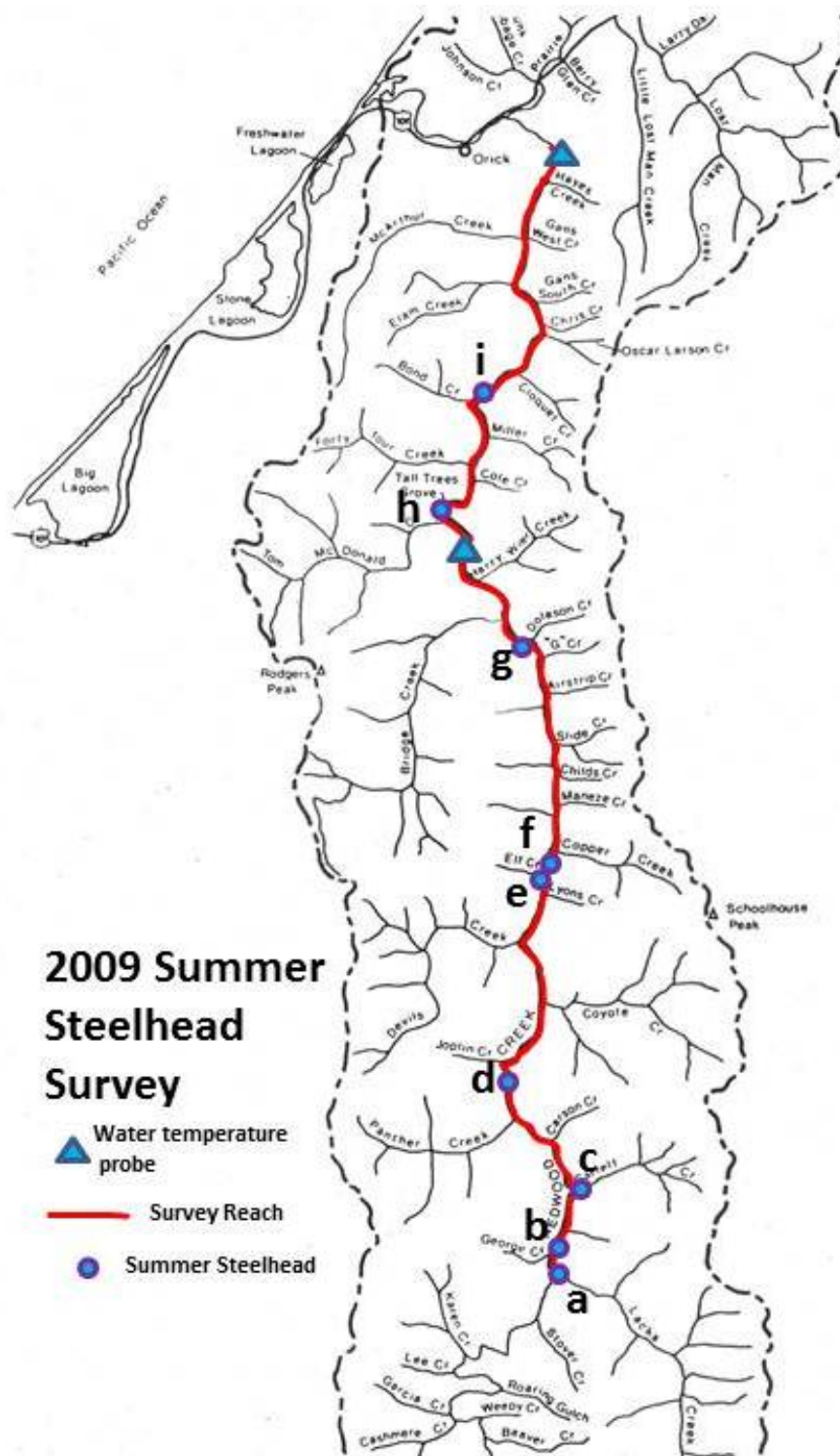


Figure 1. Location of the nine adult summer steelhead observed during the 2009 snorkel survey of Redwood Creek, Humboldt County, California. Survey was between Lacks Creek to downstream of Hayes Creek from July 27 to 30 and August 3 to 5, 2009.

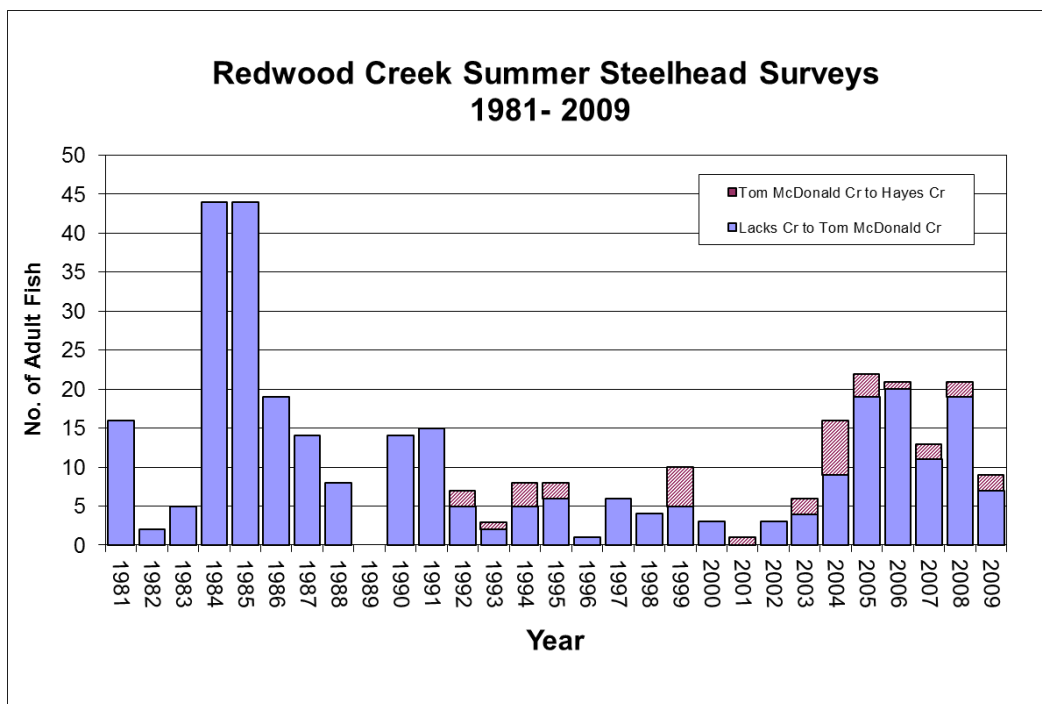


Figure 2. Numbers of summer steelhead observed each summer since 1981 on the 25.9 km index reach of Redwood Creek (Lacks Creek to Tom McDonald Creek), and expanded 13.0 km downstream reach (Tom McDonald Creek to downstream of Hayes Creek), Humboldt County, California. The survey was expanded in 1992.

WATER DISCHARGE

Water flow measured at the Orick gaging station located downstream of the confluence of Prairie Creek at Redwood Creek between July 27 and August 5 ranged between 33 and 24 cfs. (This USGS flow data is provisional and subject to revision.).

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, mainstem Redwood Creek temperature was measured upstream of the tributary confluence. Temperature loggers also recorded Redwood Creek mainstem water temperature at two sites.

Mainstem Redwood Creek - Redwood Creek water temperatures measured during the 2009 survey ranged from 17.5°C to 22.5°C (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 two locations. They recorded temperature at one-hour intervals from June to October 2009.

A temperature logger (Temp Pro S/N 1150626) was located upstream of Tom McDonald Creek/Tall Trees Grove (UTM 415940E 4561649N [NAD83]) between June 3 and October 5, 2009. Maximum and minimum water temperatures were 22.7°C and 12.1°C, respectively (Figure 3). The average water temperature was 18.2°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 19.5°C, the maximum 22.7°C, and the minimum 16.3°C. During the July 1 - August 31 period, the water temperature was at or greater than 18°C 81.2 percent of the time. Average water temperature for June 3 to 30 was 16.6°C; for July, 19.4°C; for August, 19.5°C; for September, 17.6°C; and for October 1 to 5, 14.0°C.

The second temperature logger (Temp Pro S/N 1150635) was located in lower Redwood Creek upstream of the Redwood Creek trailhead (UTM 413634E 4572156N [NAD83]) between June 16 and October 5, 2009. Maximum and minimum water temperatures recorded were 22.1°C and 13.8°C, respectively (Figure 4). The average water temperature was 17.4°C (Std. dev. 1.8°C). For the period July 1 through August 31, the warmer period of the summer, the average water temperature was 17.6°C, the maximum 22.1°C, and the minimum 15.1°C. During the July 1 - August 31 period, the water temperature was at or greater than 18°C 33.1 percent of the time. Average water temperature for June 16 to 30 was 16.6°C; for July, 17.4°C; for August, 17.9°C; for September, 17.6°C; and for October 1 to 5, 16.2.0°C.

Tributaries - Water temperatures of 58 east and westside tributaries entering Redwood Creek measured during the survey ranged from 11.5°C to 19.0°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 13.4°C (n = 34, std. dev. = 1.3°C) and temperatures ranged from 11.5°C (two unnamed tributaries UNWS 45.60 and UNWS 17.40) to 17.0°C (one unnamed tributary, UNWS13.85). The mean water temperature of eastside tributaries was 14.3°C (n = 24, std. dev. = 1.8°C) and temperatures ranged from 12.5°C (Chris Creek and Gans South Creek) to 19.0°C (Copper Creek).

The 2009 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.

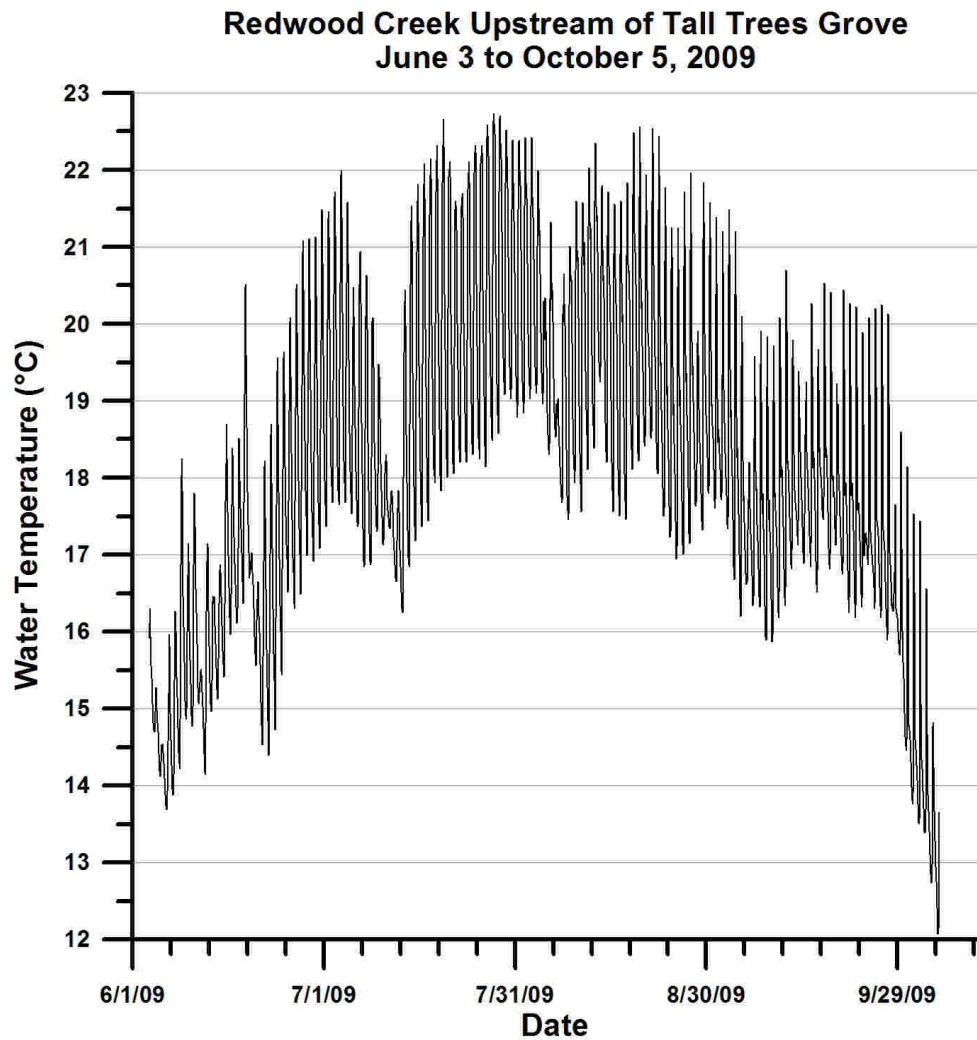


Figure 3. Mainstem Redwood Creek water temperatures (°C) from Onset TempPro temperature logger located upstream of Tom McDonald Creek/Tall Trees Grove at 22.05 river km. The logger recorded water temperature every 1-hour in the current below the surface of the water from June 3 through October 5, 2009.

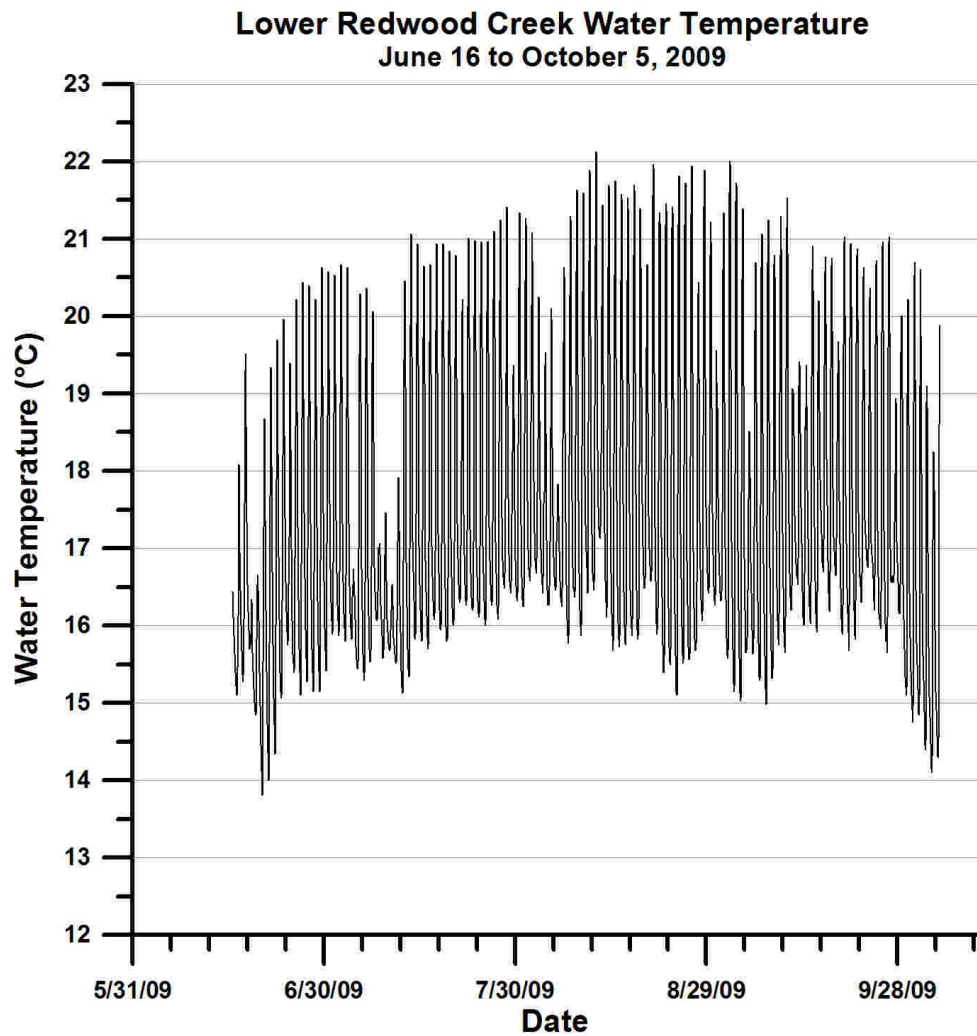


Figure 4. Mainstem Redwood Creek water temperatures (°C) from Onset TempPro temperature logger located upstream of the lower Redwood Creek trailhead parking lot at 7.65 river km. The logger recorded water temperature every 1-hour in the current below the surface of the water from June 16 through October 5, 2009.

REFERENCES

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- Reiser, D.W., and T.C. Bjornn. 1979. Influence of forest and rangeland management on anadromous fish habitat in western North America: Habitat requirements of anadromous

salmonids. USDA, Forest Service General Technical Report. PNW-96. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. 54 pp.

Roelofs, T.D. 1983. Current status of California summer steelhead (Salmo gairdneri) stocks and habitat, and recommendations for their management. Report to U.S. Department of Agriculture, Forest Service Region. 119 pp.

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Appendix I. Numbers of summer steelhead trout observed 1981 through 2009 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	Original 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 chinook)	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 (cont.)	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 Downstream of Hayes Cr (38.8)	7/29-31, 8/4-6/2003
2004	8 (+ 1 dead)	15 (+ 1 dead)	Lacks Cr to Downstream of Hayes Cr (39.0)	7/27-29, 8/3-5/2004
2005	19	22 (1 sockeye salmon)	Lacks Cr to Downstream of Hayes Cr (38.9)	7/26-28, 8/2-4/2005

2006	19 (+ 1 dead)	20 (+ 1 dead)	Lacks Cr to Downstream of Hayes Cr (38.9)	7/25-27 & 31, 8/1-2/2006
2007	11	13 (1 sockeye salmon)	Lacks Cr to Downstream of Hayes Cr (38.9)	7/24-26, 30, 31, 8/1/2007
2008	19	21	Lacks to Downstream of Hayes (38.9)	7/28-31, 8/4-6/2008
		9 ^f	Chezem Rd Bridge to Bair Rd Bridge (7.65)	7/28/2008
		6 ^f	Bair Rd Bridge to Beaver Cr (7.4)	7/29/2008
		23 ^f	Beaver Cr to Stover Cr (8.8)	7/30/2008
		59 Total	62.75 km	
2009	7	9	Lacks Cr to Downstream of Hayes Cr (38.9)	7/27-30, 8/3-5/2009
^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 ^f Tom Weseloh,- California Trout and Tom Shaw – USFWS-Arcata Office				

Appendix II. Water temperatures (°C) measured during the 2009 Redwood Creek summer steelhead trout survey from July 27 to August 5. 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. **SSHD**= Temperatures at summer steelhead locations.

Location	Alignment	Date	Time	Water Temperature (°C)
Redwood Creek (upstream)	REDW	8/05/2009	08:59	18.0
Lacks Creek	East	8/05/2009	08:59	15.5
Redwood Creek (upstream)	REDW	8/05/2009	10:00	18.0
George Creek	West	8/05/2009	10:00	13.0
Redwood Creek (upstream)	REDW	8/05/2009	10:17	17.5
UN WS 45.60	West	8/05/2009	10:17	11.5
Redwood Creek SSHD 45.55	REDW	8/05/2009	~10:25	18.0
Redwood Creek (upstream)	REDW	8/05/2009	11:49	19.0
UN ES 44.381	East	8/05/2009	11:49	13.0
Redwood Creek (upstream) SSHD 44.30	REDW	8/05/2009	12:53	20.0
Garrett Creek	East	8/05/2009	12:53	17.0
Redwood Creek (upstream)	REDW	8/05/2009	15:56	21.0
Carson Creek	East	8/05/2009	15:56	14.0
Redwood Creek (upstream)	REDW	8/05/2009	16:23	21.0
UN WS 41.372	West	8/05/2009	16:23	14.0
Redwood Creek (upstream)	REDW	8/05/2009	16:28	21.0
UN ES 41.244	East	8/05/2009	16:28	13.5
Redwood Creek (upstream)	REDW	8/05/2009	17:10	21.0
Panther Creek	West	8/05/2009	17:10	14.0
Redwood Creek (upstream)	REDW	7/27/2009	11:34	21.0
Panther Creek	West	7/27/2009	11:34	14.0
Redwood Creek (upstream)	REDW	7/27/2009	12:23	21.0
UN WS 39.90	West	7/27/2009	12:23	13.0
Redwood Creek (upstream)	REDW	7/27/2009	13:05	21.0
UN WS 39.05	West	7/27/2009	13:05	15.0
Redwood Creek (upstream)	REDW	7/27/2009	13:21	21.0
Joplin Creek	West	7/27/2009	13:21	15.0
Redwood Creek (upstream)	REDW	7/27/2009	16:51	21.5
Coyote Creek	East	7/27/2009	16:51	17.5
Redwood Creek (upstream)	REDW	7/27/2009	17:40	22.0
UN ES 37.7302	East	7/27/2009	17:40	16.0
Redwood Creek 35.35 km	REDW	7/28/2009	08:50	19.0
Redwood Creek (upstream)	REDW	7/28/2009	09:29	19.0
Devils Creek	West	7/28/2009	09:29	14.0
Redwood Creek (upstream)	REDW	7/28/2009	10:24	19.0

Location	Alignment	Date	Time	Water Temperature (°C)
ES UN XX.XX	East	7/28/2009	10:24	14.0
Redwood Creek (upstream)	REDW	7/28/2009	10:54	19.0
Lyons Creek	East	7/28/2009	10:54	14.0
Redwood Creek 33.10 SSHD	REDW	7/28/2009	12:00	20.0
Redwood Creek (upstream)	REDW	7/28/2009	12:30	20.5
Elf Creek	West	7/28/2009	12:30	14.5
Redwood Creek (upstream)	REDW	7/28/2009	14:28	22.0
Copper Creek	East	7/28/2009	14:28	19.0
Redwood Creek (upstream)	REDW	7/28/2009	17:01	22.0
UN WS 36.0	West	7/28/2009	17:01	16.0
Redwood Creek 29.75 km	REDW	7/29/2009	08:48	19.0
UN WS 29.80	West	7/29/2009	---	13.5
Redwood Creek (upstream)	REDW	7/29/2009	09:19	19.0
UN WS 29.40	West	7/29/2009	09:19	13.0
Redwood Creek (upstream)	REDW	7/29/2009	09:37	19.5
UN WS 29.066	West	7/29/2009	09:37	14.0
Redwood Creek (upstream)	REDW	7/29/2009	09:46	19.5
Slide Creek	East	7/29/2009	09:46	15.0
Redwood Creek (upstream)	REDW	7/29/2009	10:45	20.0
UN WS 28.15	West	7/29/2009	10:45	14.0
Redwood Creek (upstream)	REDW	7/29/2009	11:53	20.0
UN ES 27.75	East	7/29/2009	11:53	13.0
Redwood Creek (upstream)	REDW	7/29/2009	13:05	21.0
UN WS 26.912	West	7/29/2009	13:05	15.0
Redwood Creek (upstream)	REDW	7/29/2009	15:01	21.5
UN WS 26.70	West	7/29/2009	15:01	14.0
Redwood Creek (upstream)	REDW	7/29/2009	15:45	22.5
Dolason Creek	East	7/29/2009	15:45	17.0
Redwood Creek (upstream)	REDW	7/29/2009	16:22	22.5
UN WS 25.112	West	7/29/2009	16:22	14.0
Redwood Creek (upstream)	REDW	7/29/2009	16:56	22.5
Bridge Creek	West	7/29/2009	16:56	15.5
Redwood Creek 23.65 km	REDW	7/30/2009	08:55	18.0
Redwood Creek (upstream)	REDW	7/30/2009	09:15	18.0
Emerald Creek	East	7/30/2009	09:15	14.0
Redwood Creek (upstream)	REDW	7/30/2009	09:31	18.5
UN WS 22.861 22.8	West	7/30/2009	09:31	13.0
Redwood Creek (upstream)	REDW	7/30/2009	11:20	19.5
Tom McDonald Creek	West	7/30/2009	11:20	13.0
Redwood Creek 20.30 SSHD	REDW	7/30/2009	11:45	20.0
Redwood Creek 19.30 km	REDW	8/03/2009	09:26	18.0
Redwood Creek (upstream)	REDW	8/03/2009	09:36	18.0
UN ES XX.XX	East	8/03/2009	09:36	13.5
Redwood Creek (upstream)	REDW	8/03/2009	10:06	18.0
Cole Creek	East	8/03/2009	10:06	13.0

Location	Alignment	Date	Time	Water Temperature (°C)
Redwood Creek (upstream)	REDW	8/03/2009	10:33	18.0
Fortyfour Creek	West	8/03/2009	10:33	12.5
Redwood Creek (upstream)	REDW	8/03/2009	10:53	18.0
UN ES 17.60	East	8/03/2009	10:53	14.0
Redwood Creek (upstream)	REDW	8/03/2009	11:01	18.0
UN WS 17.40	West	8/03/2009	11:01	11.5
Redwood Creek (upstream)	REDW	8/03/2009	11:07	18.0
Miller Creek	East	8/03/2009	11:07	13.0
Redwood Creek (upstream)	REDW	8/03/2009	11:38	18.0
UN ES 16.95	East	8/03/2009	11:38	13.0
Redwood Creek (upstream)	REDW	8/03/2009	11:46	18.0
UN WS 16.85	West	8/03/2009	11:46	12.5
Redwood Creek (upstream)	REDW	8/03/2009	11:57	18.5
UN WS 16.45	West	8/03/2009	11:57	13.0
Redwood Creek (upstream)	REDW	8/03/2009	12:15	18.5
Bond Creek	West	8/03/2009	12:15	12.0
Redwood Cr 15.80 km SSHD	REDW	8/03/2009	13:28	19.0
Redwood Creek (upstream)	REDW	8/03/2009	13:52	19.0
UN WS 15.75	West	8/09/2009	13:52	12.5
Redwood Creek (upstream)	REDW	8/03/2009	14:01	19.0
UN WS 15.6936	West	8/03/2009	14:01	12.5
Redwood Creek (upstream)	REDW	8/03/2009	14:28	19.0
UN WS 15.00	West	8/03/2009	14:28	13.0
Redwood Creek (upstream)	REDW	8/03/2009	14:36	19.0
UN WS 14.80	West	8/03/2009	14:36	13.0
Redwood Creek (upstream)	REDW	8/03/2009	14:47	19.0
Cloquet Creek	East	8/03/2009	14:47	13.0
Redwood Creek (upstream)	REDW	8/04/2009	10:16	17.5
UN WS 13.85	West	8/04/2009	10:16	17.0
Redwood Creek (upstream)	REDW	8/04/2009	10:19	17.5
UN WS 13.806	West	8/04/2009	10:19	12.0
Redwood Creek (upstream)	REDW	8/04/2009	10:46	17.5
Oscar Larson Creek	East	8/04/2009	10:46	13.0
Redwood Creek (upstream)	REDW	8/04/2009	11:02	17.5
Chris Creek	East	8/04/2009	11:02	12.5
Redwood Creek (upstream)	REDW	8/04/2009	11:27	17.5
Gans South Creek	East	8/04/2009	11:27	12.5
Redwood Creek (upstream)	REDW	8/04/2009	11:51	17.5
UN ES 12.1692	East	8/04/2009	11:51	13.5
Redwood Creek (upstream)	REDW	8/04/2009	12:01	18.0
UN WS 11.717	West	8/04/2009	12:01	12.0
Redwood Creek (upstream)	REDW	8/04/2009	12:11	18.0
Elam Creek	West	8/04/2009	12:11	12.0
Redwood Creek (upstream)	REDW	8/04/2009	13:53	17.5
McArthur Creek	West	8/04/2009	13:53	12.0

Location	Alignment	Date	Time	Water Temperature (°C)
Gans West Creek	East	8/04/2009	---	Dry > 50m



Snorkelers diving a pool on Redwood Creek (RNP 2009)