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The Influence of Lewiston Dam Releases on Water Temperatures of the Trinity and Klamath Rivers, CA., April to October, 2006

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Key words: Trinity River, Lewiston Dam, flow, water temperature

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Abstract —Water temperatures were monitored on the Trinity and Lower Klamath rivers from April to October 2006 to evaluate the influence of prescribed flow releases from Lewistown Dam on downstream water temperature objectives specified in the Trinity River Record of Decision. A modified "Extremely Wet" water year schedule was successful at cooling the mainstem Trinity River but was insufficient to prevent exceeding the desired "Optimal" smolt temperature objective of 13.0 ˚C at Weitchpec on May 16 to 18, and the temperature objective of 17.0 ˚C at Weithpec on July 3, 4 and 9. The exceedence of the objective in May and July occurred despite Lewiston Dam releases ranging from 4810 to 5800 cfs and 1870+ cfs, respectively. In all cases when temperature objectives were exceeded, the thermal regime remained within the "Marginal" thermal regime. Although the temperature objectives were not always met, the release of 1870+ cfs from Lewistown Dam from June thru early July resulted in the greatest difference in average daily water temperatures between the Lower Klamath (22.2 ˚C) and Trinity (16.6 ˚C) rivers. This difference and the approximate 21 % contribution of flow from Lewiston Dam to the total flow of the lower Klamath River had the effect of reducing the average daily temperature of the Klamath River from 22.2 to 20.5 ˚C or 1.7 ˚C.

Basin Plan objectives of the North Coast Regional Water Quality Control Board were not always met during summer 2006 even though flow magnitude from Lewiston Dam followed prescribed guidelines of 450 cfs from July through mid October. The objective of not exceeding 15.6° C (average daily temperature) was exceeded by up to 0.6 ˚C at the Douglas City compliance point for 7 consecutive days from July 23 to 29. The main reasons for not meeting the objective included moderately warm releases (10.2 to 10.6 ˚C) from Lewiston Dam and very warm air temperatures. Raw air temperature data from the Lewiston gage (#11525500) indicated that the maximum daily air temperature of 37.8 ˚C (100 ˚F) was exceeded for 10 of 14 days from July 16 to July 29 with a peak temperature of 43.3 ˚C (110 ˚F). Average daily air temperatures were correspondingly quite warm often-exceeding 25 ˚C with a peak of 28 ˚C.

INTRODUCTION

The Trinity River Restoration Program (TRRP) was reauthorized with the signing of the Record of Decision (ROD) of the Final Trinity River Environmental Impact Statement in December of 2000. Since this time, the Program has moved in earnest towards the over-arching goal of restoring the natural production of salmon and steelhead below Lewiston Dam. An important component of the TRRP is the application of an Adaptive Environmental Assessment and Management (AEAM) program designed to improve assessment and management of the Trinity River. As part of this program, monitoring is used to evaluate progress towards achieving restoration objectives, and improved understanding of the river response to various management actions (e.g. dam releases or gravel augmentation). In support of the AEAM program, this report was developed to assess the influences that Lewiston Dam releases had on the downstream thermal environment, and in particular whether or not the water temperature objectives as identified in the ROD were achieved.

This report represents the fifth consecutive year for which a report of this type has been written and supplied to the Trinity River Restoration Program. Reports describing the thermal regimes for the years 2002 to 2005 (Zedonis 2003, Zedonis 2004, Zedonis 2005, and Zedonis and Turner 2006) are available in electronic format from the Trinity River Restoration Program or the Arcata Fish and Wildlife Office of the U.S. Fish and Wildlife Service (http://www.fws.gov/arcata/fisheries).

STUDY AREA

The Trinity River, located in northwest California, is the largest tributary to the Klamath River (Figure 1). Trinity and Lewiston Dams regulate the Trinity River. From Lewiston Dam, the Trinity River flows for approximately 180 kilometers before joining the Klamath River at Weitchpec. From Weitchpec, the Klamath River flows for 70 kilometers before entering the Pacific Ocean.

METHODS

The influence of Lewiston Dam releases on downstream water temperature was assessed using water temperature data collected by telemetered stations and from probes deployed by the Arcata Fish and Wildlife Office (AFWO), and the Yurok and Hoopa Valley Tribes. Data from telemetered stations were downloaded from the California Data Exchange Center (CDEC) website available at http://cdec.water.ca.gov. Data obtained from the CDEC site are labeled "preliminary and subject to revision", meaning the accuracy of the data is unknown. To correct for possible errors, we conducted graphic evaluations to identify erroneous data points that were later deleted.

AFWO used temperature probes manufactured by Onset Computer Corporation® to collect hourly water temperature data from April to October. Prior to and after deployment, each probe was subjected to a performance test to verify it was recording within the manufacturer's accuracy specification of ± 0.2 degrees Celsius (˚C). In all tests, the instruments proved to be accurate and reliable.

Assessing the influences of Lewiston Dam releases on water temperatures of the Trinity River and lower Klamath River was accomplished by comparing environmental factors known to affect water temperature, primarily air temperatures and hydrology. Air temperature data were collected by AFWO using Onset® probes that met similar standards established for water temperature. Estimates of river flow at several sites on the Trinity River (Lewiston –rkm 178.2; and Hoopa – rkm 20.0) and Klamath River (Iron Gate - rkm 305.5; Orleans - rkm 95.1; and Klamath - rkm 13.0) were obtained from the CDEC and U.S. Geological Survey (http://water.usgs.gov) websites. Unfortunately, the flow data obtained from websites is also preliminary and subject to change.

RESULTS

Hydrology

Approximately 1.218 million acre-feet (MAF) of water was released from Lewiston Dam to the Trinity River in water year 2006. This total was comprised of 815.6 thousand acre-feet (TAF) to support a flow prescription for an Extremely Wet water year, and approximately 402.7 TAF for safety-of-dam releases that occurred from late December to mid-February and mid April to early May (Figure 2).

Contributions of flow from Lewiston Dam to the Klamath River varied through the year (Figure 2; also see Appendix A for detailed information). During the winter and early spring, contributions were smallest due to the larger contributions of flow from Trinity and Klamath River tributaries. The largest contributions of flow from Lewiston Dam occurred at the end of May and the start of June when flow from Lewiston Dam was great while tributary contributions were decreasing. During this time, the flow from Lewiston Dam provided up to one third of the flow of the Klamath River at the Klamath gage.

Spring flow from Lewiston Dam followed a modified Extremely Wet water year schedule as identified in the ROD (Figure 3). This marked the first year in which an Extremely Wet year was designated for the Trinity River since signing of the ROD. Differences to the ROD-prescribed flow included: 1) a substantial increase in flow from Lewiston Dam during April and May that helped maintain a safe elevation in Trinity Reservoir; 2) a peak flow of 10,000 cfs in late May and early June; and 3)a modified down ramp from June to July.

Water Temperatures of the Mainstem Trinity River

Lewiston Gage (rkm 178.2)

From April to October, water temperatures of Lewiston Dam releases remained between 8 and 10.6 ˚C (Figure 4). The warmest release temperatures coincided with typical warming trends and times of decreased flows out of Trinity and Lewiston reservoirs, resulting in increased hydraulic residence time of water in Lewiston Reservoir that is ultimately released to the Trinity River. This relationship is displayed in Figure 4 many times from April to October. Most notable times included: May thru July when decreased releases from Trinity Reservoir coincided with increasing release temperatures; and early October when flow from Trinity Reservoir was reduced to a minimum and release temperatures increased by about 1 ˚C.

Although residence time is a factor that influences the release temperature at Lewiston Dam, the depth at which the water is released from Trinity Dam was also influential in particular during May 19 to May 29. During this time, warmer surface water was spilled through the glory hole, rather than at outlets much lower on the dam that typically affords colder water. This spill resulted in a 1.0-˚C increase (8 to 9 ˚C) in temperature of water released from Lewiston Dam.

Douglas City Gage (rkm 148.5)

Water temperatures ranged between 8 and 10 ˚C from April to late June then steadily increased to a maximum of 16.6 ˚C in late July (Figure 5). Peak water temperatures occurred in response to extremely warm air temperatures , warmer than typical releases from Lewiston Dam, and reduced flow from Lewiston Dam. Raw air temperature data from the Lewiston gage (#11525500) indicated that the maximum daily air temperature of 37.8 ˚C (100 ˚F) was exceeded for 10 of 14 days from July 16 to July 29 with a peak temperature of 43.3 ˚C (110 ˚F). Average daily air temperatures were correspondingly quite warm often-exceeding 25 ˚C with a peak of 28 ˚C. From July 23 to July 29 dam releases decreased to 450 cfs and average daily water temperatures increased to levels that exceeded the 15.6 ˚C average daily temperature objective of the NCRWQCB.

Trinity above the North Fork Trinity (rkm 117.6)

Average daily water temperatures above the North Fork Trinity were slightly warmer in comparison to the upstream Douglas City site but followed a similar trend (Figure 6). Similar to the Douglas City site, water temperatures increased as flows decreased and peaked in late July, during an extremely warm period. Average daily temperatures peaked at 20 ˚C on July 26. Following the peak in July, average daily water temperatures continued to decrease thereafter. In all cases, including the start of October, the NCRWQCB objective of 13.3 ˚C was met.

Above Big French Creek to Weitchpec (rkm 94.2 to 0.1)

Water temperatures in this region of the river were also influenced by Lewiston Dam releases, but to a lesser degree than the upstream reaches. Within this reach, the temperature influence of Lewiston Dam releases are somewhat obscured during the spring by the large contributions of flow from tributaries (e.g. South Fork Trinity River, New River, etc) that acted to dilute the influences of less dominating dam releases.

From April to mid-May, water temperatures of this reach generally remained below 13.0 ˚C (Figure 7). By late May, water temperatures decreased slightly in response to increased flow from Lewiston Dam. From mid-June to late July water temperatures steadily increased and peaked at 25.5 ˚C. Following the unseasonably warm period in late July,

water temperatures decreased sharply in response to cooler air temperatures possibly afforded by cloud cover in the form of smoke from several local fires. In fact water temperatures remained below 22 ˚C until early September and continually decreased thereafter due to continued cooler air temperatures, as well as shortened day length.

The springtime temperature criteria for the Extremely Wet water year were for all practical purposes met. Time periods where the water temperatures exceeded the optimal temperature criteria were few (Figure 8). The specific dates when the criteria were exceeded by less than 0.4 ˚C included May 16, 17 and 18, and July 3 and 4. The greatest exceedence occurred on July 9 when the water temperature was 0.8 ˚C above the criterion of 17 ˚C. Examination of air temperature data revealed a positive association between the warmest time periods and times of water temperature exceedence (Figure 9).

Water Temperatures of the Klamath River at and below the Trinity River Confluence

From mid-April to mid October, the average daily water temperatures of the Klamath River were almost always warmer than the Trinity River (Figure 10, See Appendix A for more detail). The period of greatest difference occurred from early June through the third week of July with the peak difference occurring on June 30. On this day, the Klamath River was 22.2 ˚C and the Trinity River was 16.6 ˚C, representing a 5.6 ˚C difference. During this time, the flow from Lewiston comprised 21% of the total flow at the Klamath Gage.

In late July, water temperatures of the Klamath River and Trinity River were very similar and very warm. During this extreme warm spell both streams reach average daily temperatures that exceeded 25 ˚C for four consecutive days. Beginning in August, water temperatures decreased rapidly and remained below 23˚C through October. As mentioned earlier in the report, this reduction in temperature after July was likely due to cooler air temperatures caused by increased cloud cover in the form of smoke from local fires. From late July through October, water of the Trinity River was between 1 and 1.5 ˚C colder than the Klamath River.

Areas downstream of the confluence were also influenced by Trinity River water (Figure 10). Not surprising, the greatest influence occurred during late June and early July when

the Trinity River was coldest relative to the Klamath River. During this time, the Trinity River reduced the temperature of the Klamath River at RKm 68.7, 26.5, and 13.0 by ~1.7 ˚C.

DISCUSSION

Water temperatures of the Trinity River immediately below Lewiston Dam are influenced by the temperature of water released from Trinity Reservoir, hydraulic residence time in Lewiston Reservoir, the magnitude of the release to the river, ambient meteorological conditions throughout the basin. Typically, the coldest dam releases are associated with short hydraulic residence time of water stored in Lewiston Reservoir. Short hydraulic residence times generally result from high volume releases into the Trinity River alone or in combination with large diversions to the Sacramento River basin through the Carr Tunnel (Zedonis 1997). However, the magnitude of the influence can vary substantially with distance from the dam; river temperatures closest to the dam are primarily influenced by release temperature. Magnitude of dam releases, tributary inflows, and ambient meteorological conditions become increasingly important to river temperatures with increasing distance downriver.

The spill event that occurred through the glory hole of Trinity Dam from May 19 to May 29 resulted in an increase in water temperatures at Lewiston Dam. Fortunately, the surface water that was entrained into the glory hole was also fairly cold so that the effect was only an increase in temperature of 1 ˚C. Had the spill occurred when the surface water was warmer, the releases could have resulted in substantially warmer water being released to the river.

The temperature criterion for springtime objectives was met for all practical purposes. Minor exceedences (less than 0.4˚C) of the criteria occurred on May 16, 17, 18, and July 3 and 4. Perhaps the most significant exceedence occurred on July 9 when temperatures were 0.8 ˚C warmer than the criterion. Reasons for not meeting the criteria included: the flow contributions from tributaries were high and warm from a warm spell, and dam releases were reduced and warming. In order to meet this criterion, either an increase in flow (greater than 1870 cfs) or a reduction in release temperature would have been

required. In either case, perhaps the only method of determining the change in flow or a reduction in temperature is best addressed through modeling.

The NCRWQCB temperature objectives were not always met in 2006. The temperature objective of 15.6 ˚C at Douglas City was exceeded for 7 days (July 23 to July 29). During this time, water temperatures were up to 0.6 ˚C greater than the objective. The main reasons for not meeting the objective included moderately warm releases (10.2 to 10.6 ˚C) from Lewiston Dam and very warm air temperatures. Raw air temperature data from the Lewiston gage (#11525500) indicated that the maximum daily air temperature of 37.8 ˚C (100 ˚F) was exceeded for 10 of 14 days from July 16 to July 29, with a peak temperature of 43.3 ˚C (110 ˚F). Average daily air temperatures were correspondingly quite warm often-exceeding 25 ˚C with a peak of 28 ˚C. As mentioned above, a management action to decrease the release temperature to below 10 ˚C could have either reduced the number of days the 15.6 ˚C temperature objective at Douglas City was exceeded or resulted in near 100 % compliance.

ACKNOWLEDGEMENTS

We would like to thank Nicholas Hetrick and Joe Polos of the Arcata Fish and Wildlife Office of the U.S. Fish and Wildlife Service for providing comments on an earlier draft of this report.

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Table 1. Water temperature objectives for the Trinity River, California.

Source	Target Area	Dates	Temperature Objective[1]
Basin Plan for the North Coast Region (Regional Water Quality Control Board, 1994)	• Lewiston to Douglas City (rkm 178.2 to 148.5) • Lewiston to DouglasCity (rkm 178.2 to 148.5) • Lewiston to the Confluence of the North Fork Trinity River Confluence (rkm 178.2 to 117.6)	All Years • July 1 to September 15 • September 15 to September 30 • October 1 to December 31	≤ 15.5 ≤ 13.3 ≤ 13.3
Spring-Time Objectives of the Record of Decision for the Trinity River EIS/EIR (USFWS et.al., 2000)	• Lewiston to Weitchpec (rkm 178.2 to 0.1)	Normal and Wetter Water Years: • April 15 to May 22 • May 23 to June 4 • June 5 to July 9 Dry and Critically Dry Water Years: • April 15 to May 22 • May 23 to June 4 • June 5 to June 15	 ≤ 13.0 ≤ 15.0 ≤ 17.0 ≤ 15.0 ≤ 17.0 ≤ 20.0

[1] = Average daily water temperature in degrees Centigrade

Table 2. Water temperature monitoring sites of the Trinity River and the Klamath River below Weitchpec in 2006. Note: Not all data identified in this table are presented in the report but are available upon request.

Water Temperature Monitoring Sites			
Mainstem Trinity River			
Site Name (abbreviation)	**Location (rkm)**	**Data Source**	**Operator**
TR @ Lewiston Gauge (TRLW2)	178.2	California Data Exchange Center (CDEC)	California Department of Water resources
TR above Rush Ck (TRRC1)	173.0	FWS	Fish and Wildlife Service (FWS)
TR@ Limkiln Gulch Gage (TRLK1)	158.7	CDEC	U.S. Geological Survey (USGS)
TR @ Douglas City Gage (TRDC2)	148.5	CDEC	USGS
TR above Canyon Ck (TRCN1)	127.4	FWS	FWS
TR abv N.F. Trinity R. (TRNF1)	117.6	CDEC	US. Bureau of Reclamation (USBR)
TR abv Big French Creek (TRBF1)	94.2	FWS	FWS
TR @ Burnt Ran. Trans Sta (TRBR1)	76.4	FWS	FWS
TR abv S. Fork Trinity R. (TRSF1)	50.6	FWS	FWS
TR @ Weitchpec (TRWE1)	0.1	FWS	FWS/Yurok Tribe/Hoopa Valley Tribe
Mainstem Klamath River			
KR at Weitchpec (KRWE1) [b]	70.2	FWS	FWS/Yurok Tribe
KR below Weitchpec (KBW3)	68.7	FWS	FWS/Yurok Tribe
KR above Blue Ck (KRBC1)	26.5	FWS	Yurok/FWS
KR above Terwer (KRTG2)	13.0	FWS	FWS/Yurok Tribe
Trinity River Tributary Sites			
Rush Ck (RCTR2)	173.0 + 0.4	CDEC	USBR/ USGS
Canyon Ck (CNTR1)	127.3 + 0.1	FWS	FWS
N. F. Trinity R (NFTR1)	116.7 + 0.1	FWS	FWS
Big French Ck (BFC)	94.1 + 0.1	FWS	FWS
S. F. Trinity R (SFTR1)	50.5 + 0.1	FWS	FWS

'a = River kilometer of mainstem Trinity River + the distance up the tributary
'b = This site is located immediately above the confluence of the Trinity River and refers to the distance from the Klamath River mouth.
'c = Data is not available from USFWS but may be available from Yurok Tribe.

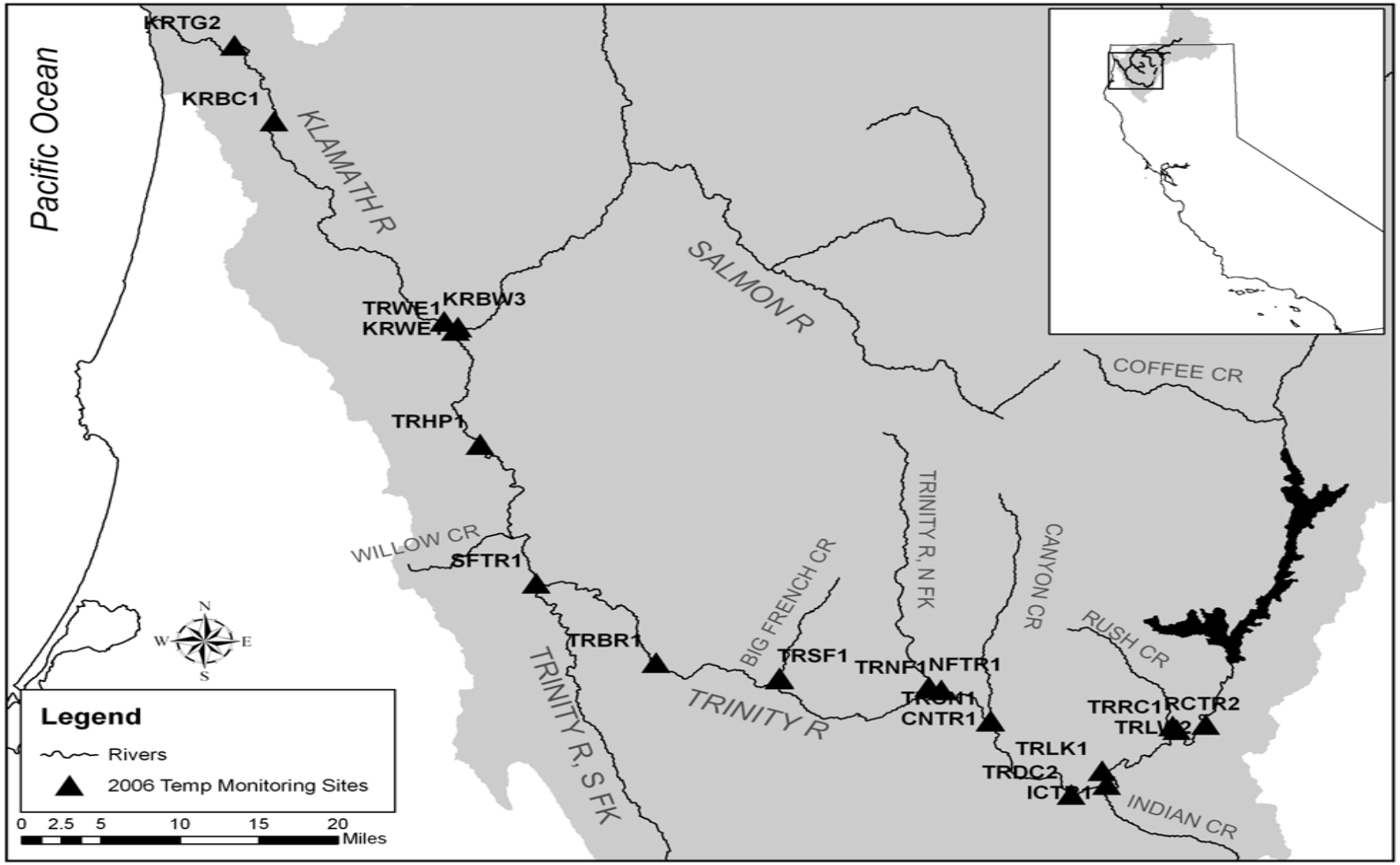

Figure 1. Location of water temperature monitoring sites of the Trinity River and lower Klamath River in 2006. See Table 2 for site descriptions.

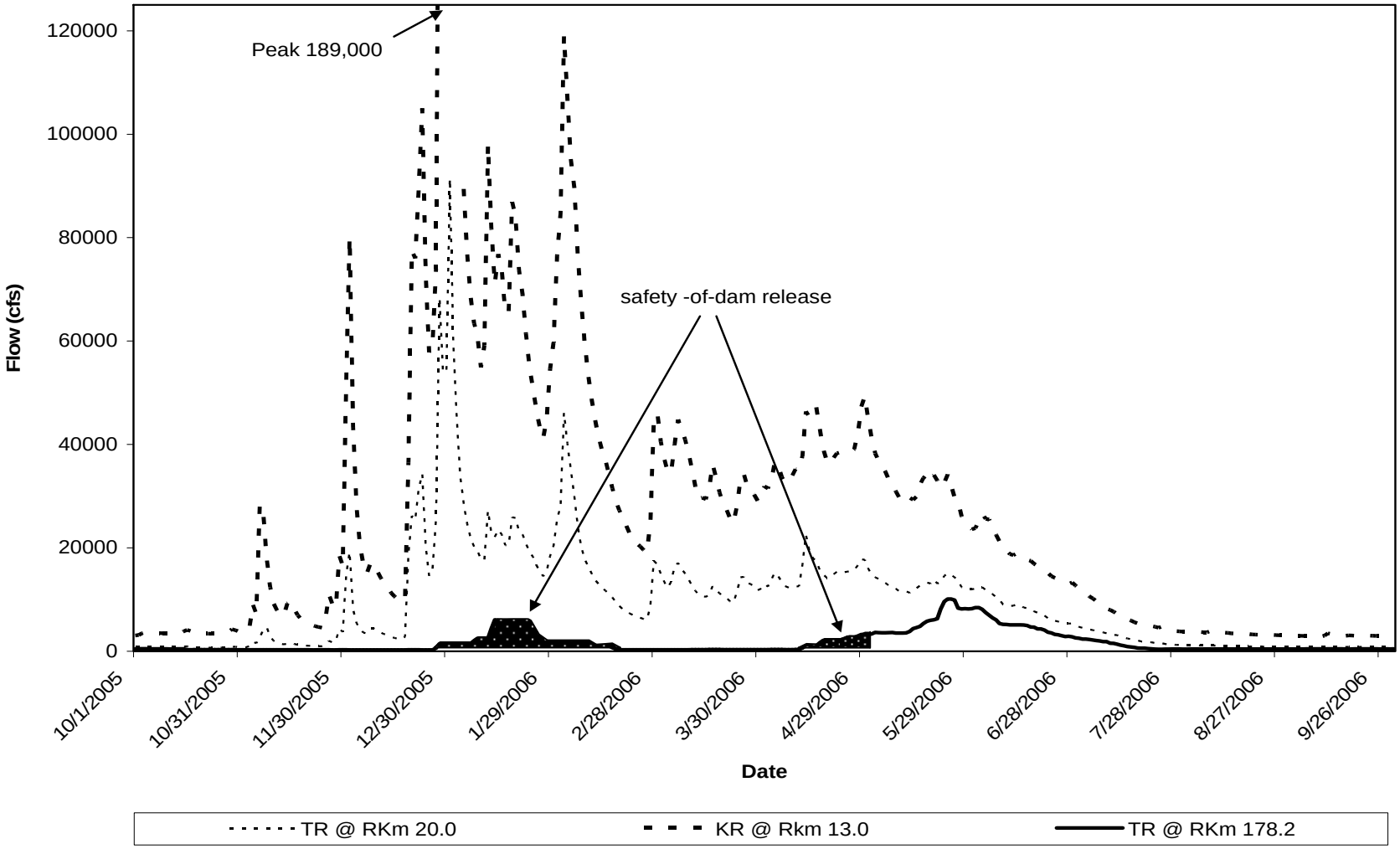

Figure 2. Average daily flow of the Trinity River (TR) at Lewiston gage (rkm 178.2) and Hoopa gage (rkm 20.0), and the Klamath River at the Klamath Gage (rkm 13.0) in 2006. US Geological Survey gage data, preliminary and subject to revision.

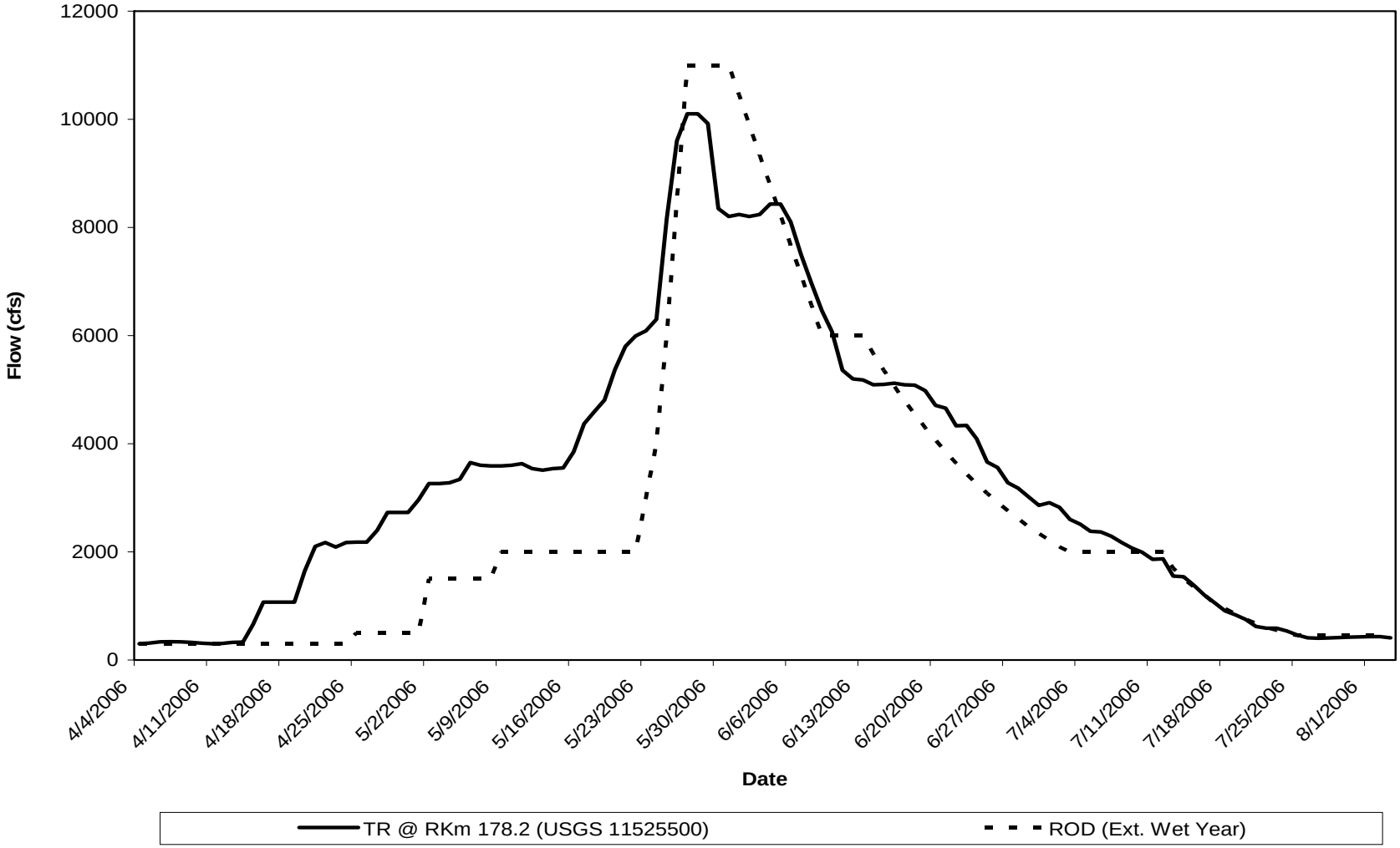

Figure 3. Spring and early summer flow releases from Lewiston Dam (rkm 178.2) on the Trinity River (TR) in 2006 compared to a flow schedules for an Extremely Wet hydrologic water year identified in the Record of Decision (ROD) (USFWS et.al., 2000).

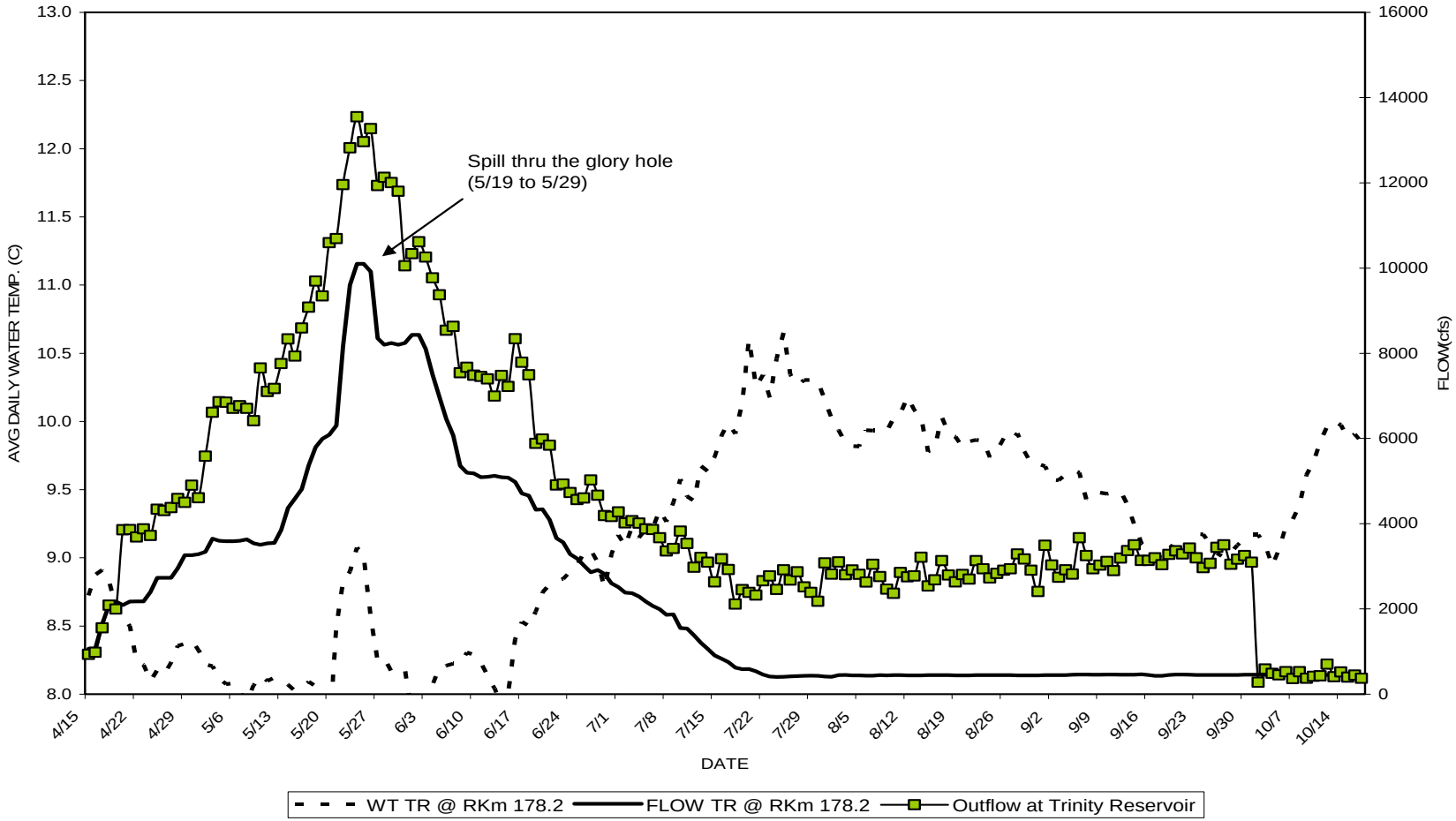

Figure 4. Water temperature (WT) and flow of the Trinity River at Lewiston (RKm 178.2) and Trinity Reservoir outflow in 2006. Trinity Reservoir outflow supplies water to the Trinity River and diversions to the Sacramento River basin. The area between lines representing Trinity Reservoir outflow and flow at Lewiston represent an estimate of flow diverted to the Sacramento River Basin.

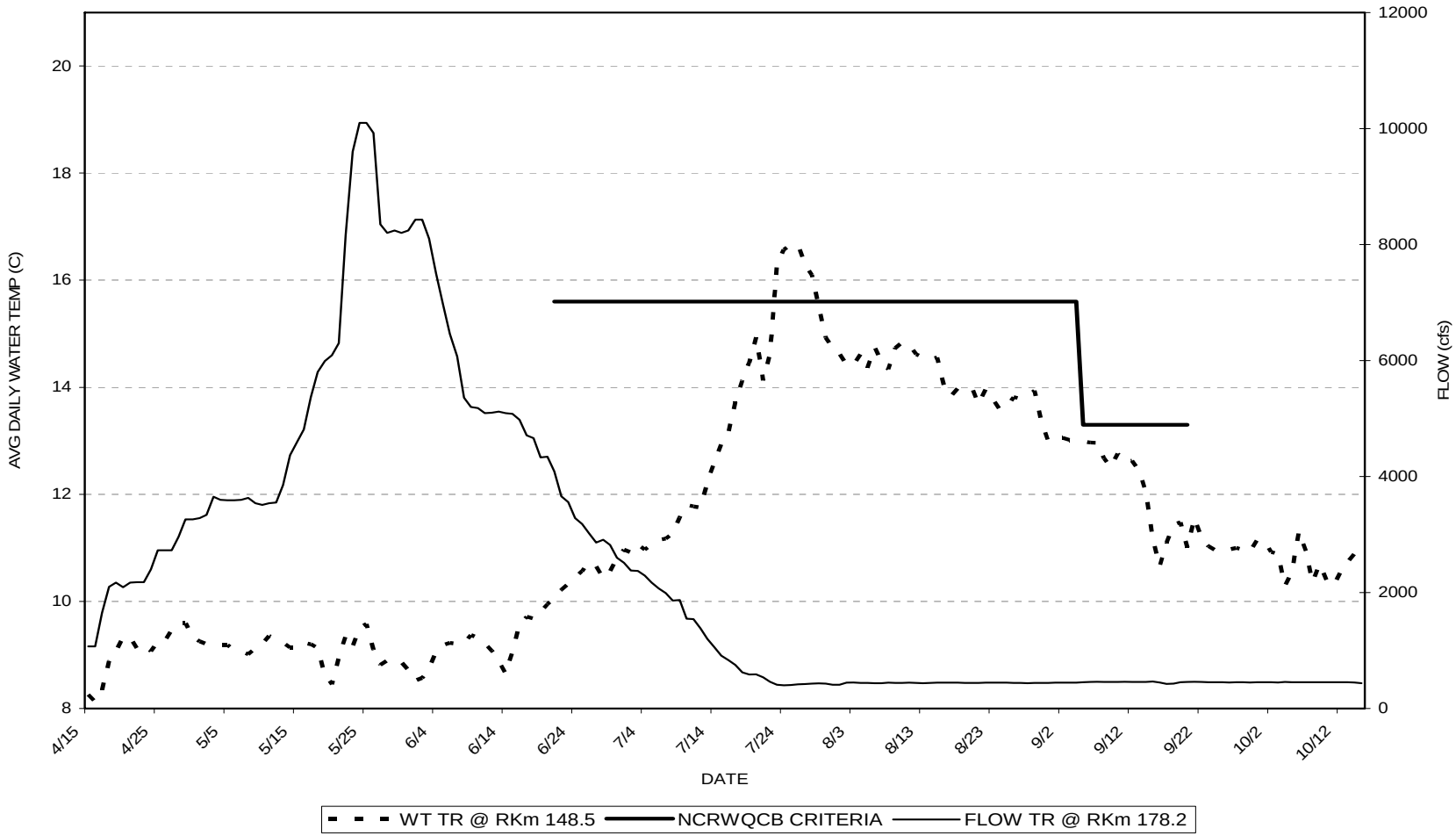

Figure 5. Comparisons of average daily water temperatures (WT) of the Trinity River at Douglas City gage (RKm 148.5) in 2006 and the water temperature objectives of the North Coast Regional Water Quality Control Board. The objectives are not to be exceeded.

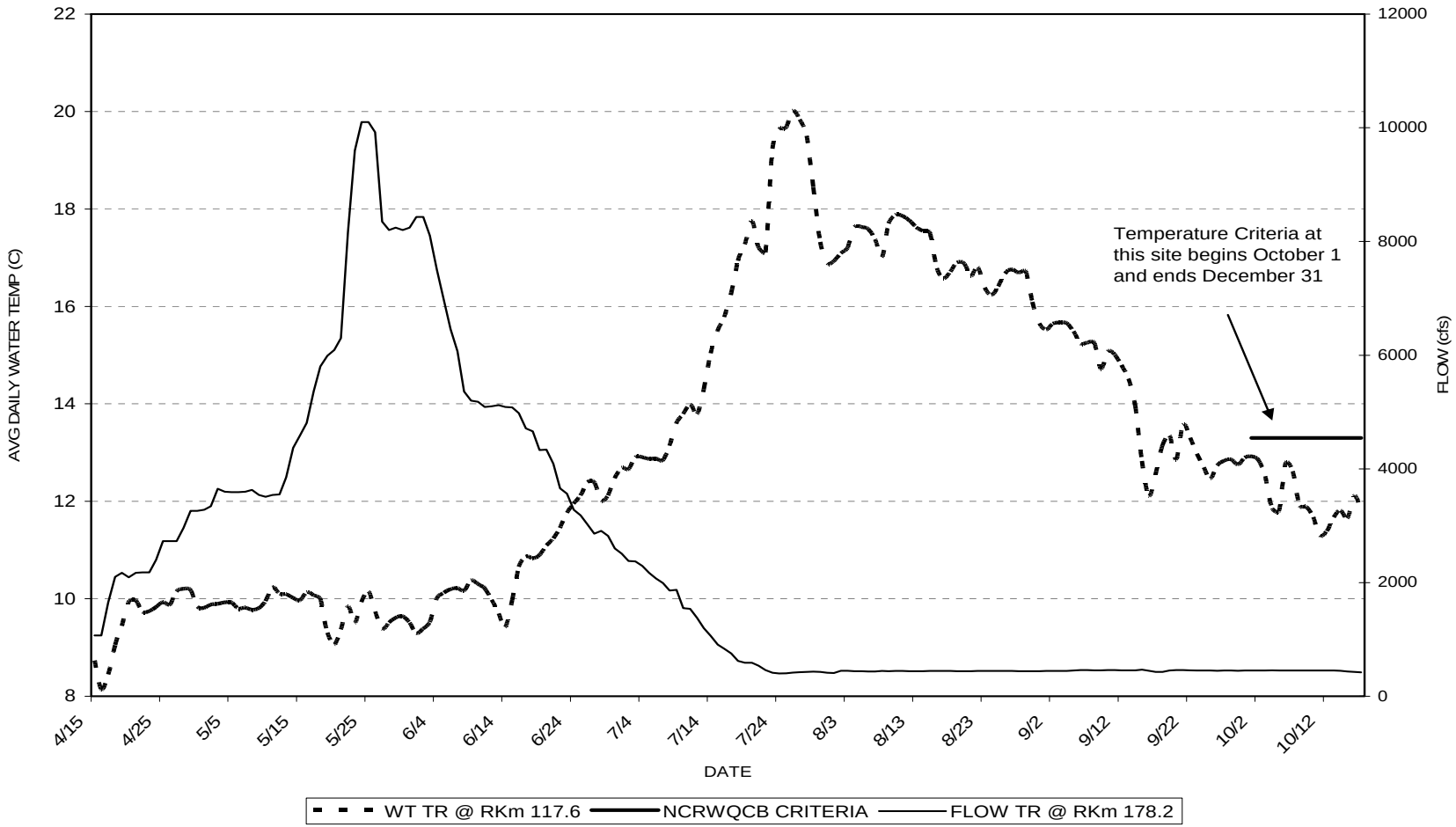

Figure 6. Comparisons of average daily water temperatures (WT) of the Trinity River above the confluence of the North Fork Trinity River (RKm 117.6) in 2006 and the water temperature objectives of the North Coast Regional Water Quality Control Board. The objectives are not to be exceeded.

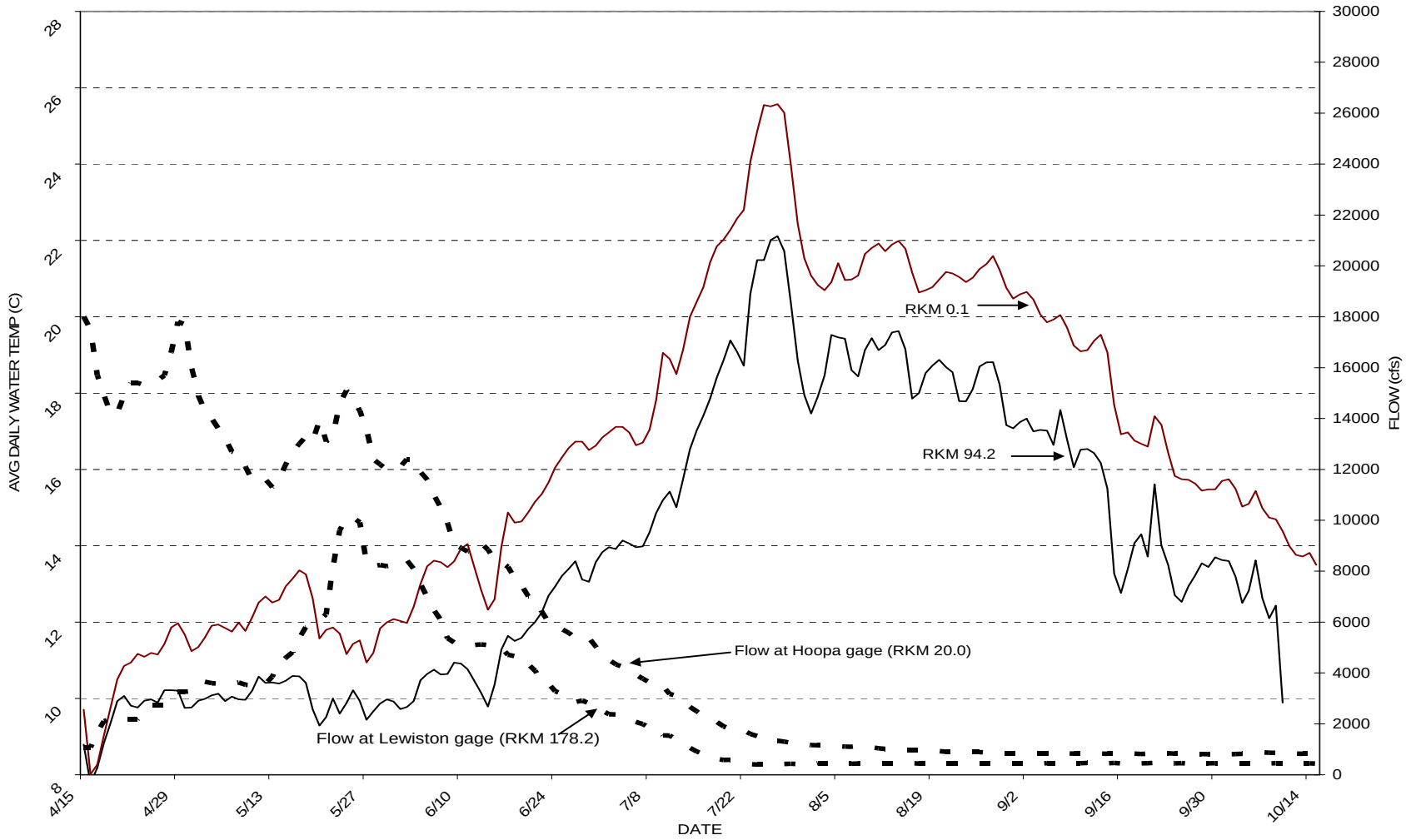

Figure 7. Average daily water temperatures of the Trinity River immediately above Big French Creek (rkm 94.2) and Weitchpec (rkm 0.1), and flow data from Lewiston (rkm 178.2) and Hoopa (rkm 20.0) in 2006.

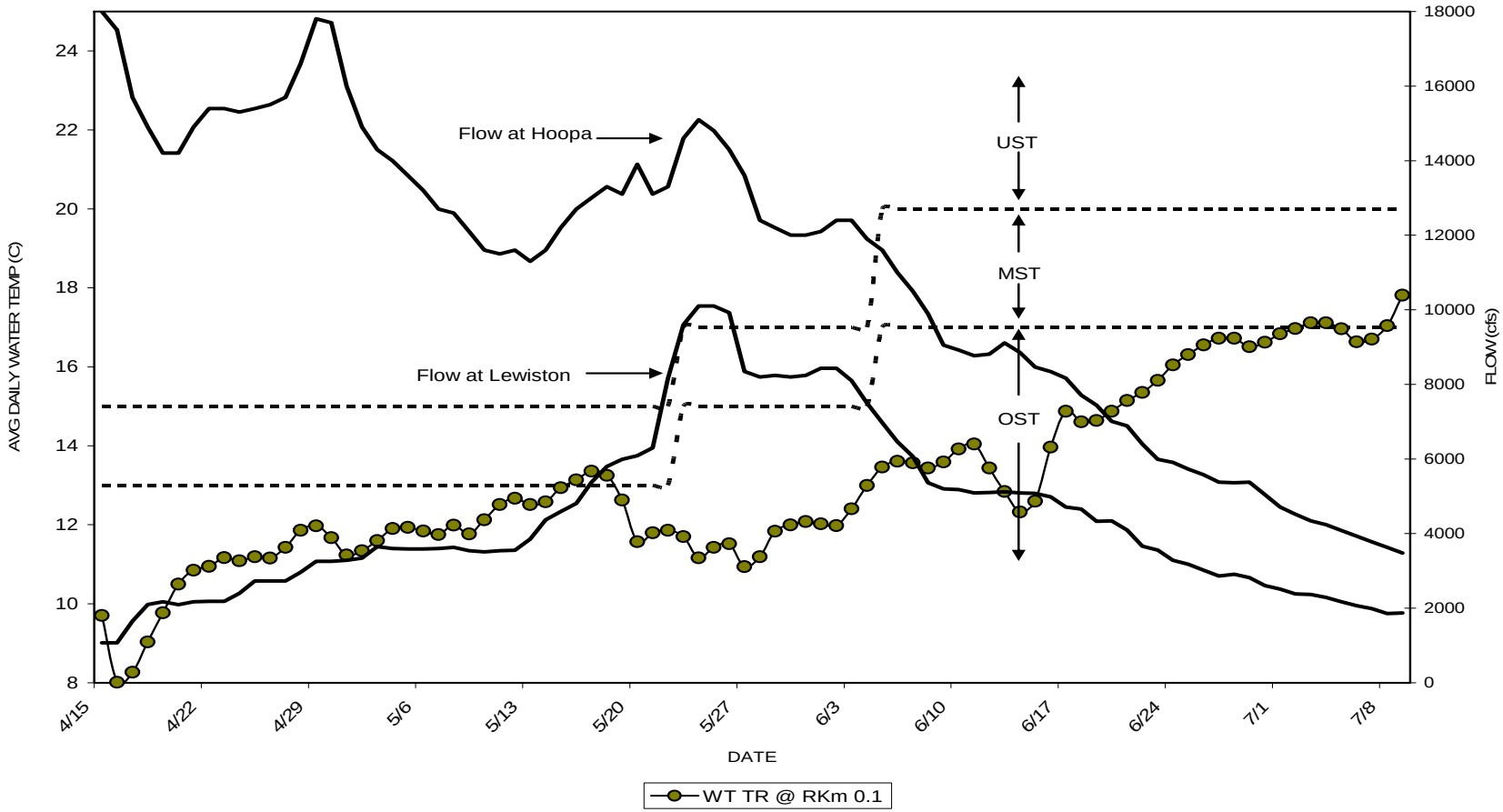

Figure 8. Average daily water temperatures (WT) of the Trinity River at Weitchpec in 2006 and how they compare to the spring-time temperature criteria established by the Record of Decision (USFWS et al., 2000). Smolt criteria: UST = unsuitable smolt temperatures; MST = marginal smolt temperatures, OST = optimal smolt temperatures. Optimal smolt temperatures were sought in 2006.

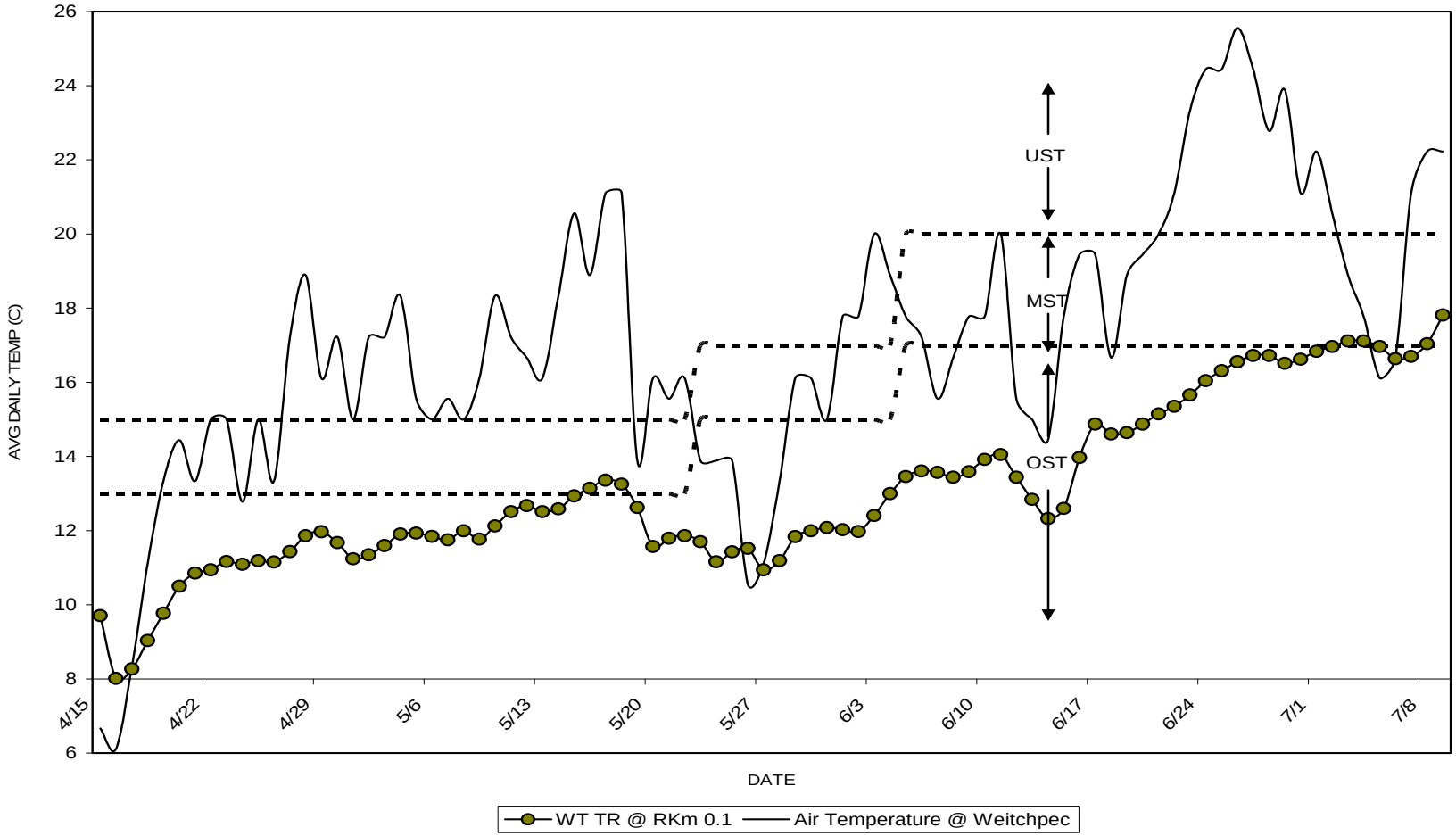

Figure 9. Air temperature (AT) and its influence on water temperature (WT) of the Trinity River at Weitchpec from April 15 to July 9, 2006. Smolt criteria: UST = Unsuitable temperatures; MST = Marginally suitable temperatures; OST = Optimally suitable temperatures.

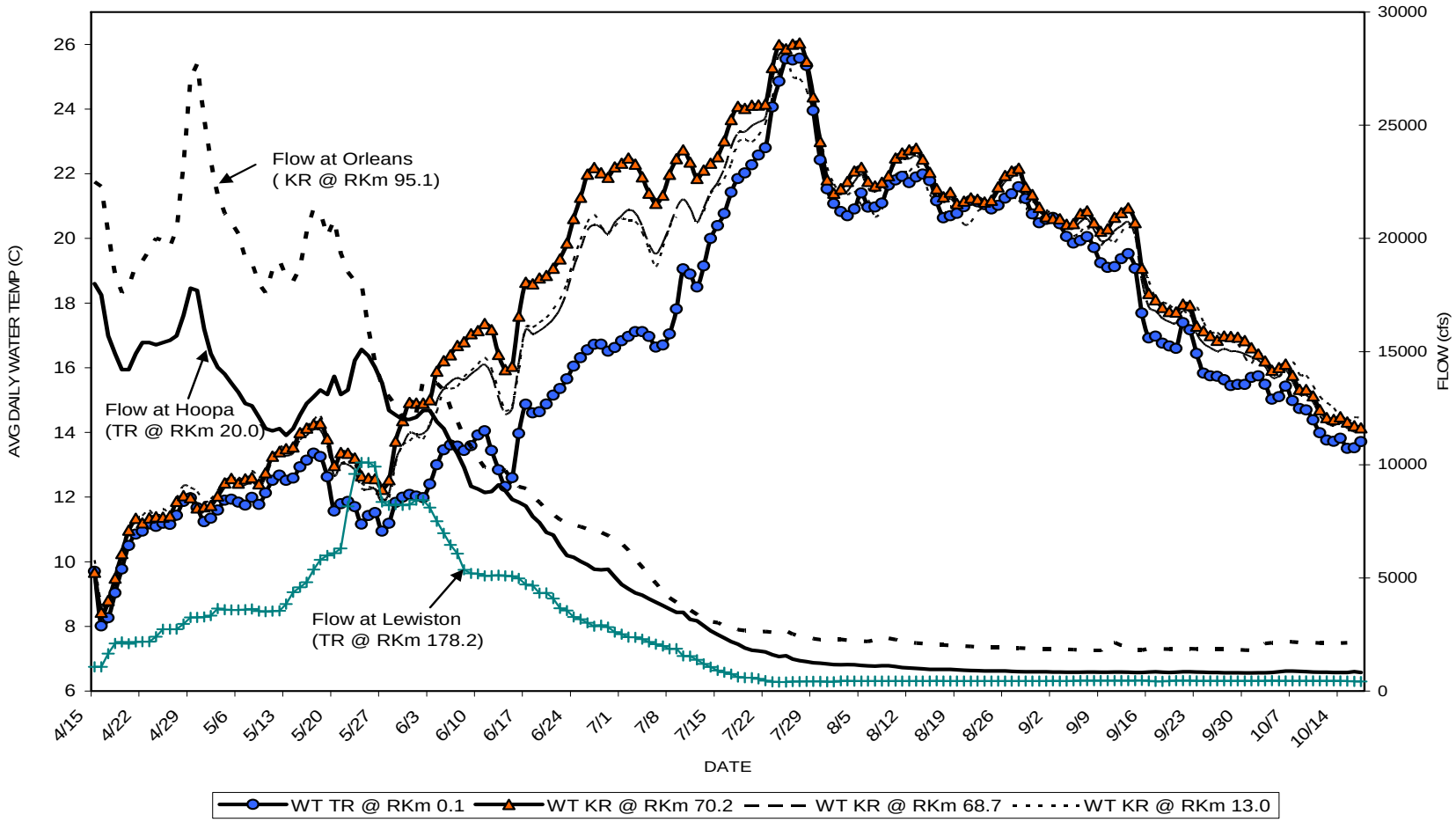

Figure 10. Comparison of water temperatures (WT) of the Trinity River (TR) at Weitchpec (RKm 0.1) and the Klamath River (KR) above (RKm 70.2) and below (rkm 68.7 and RKm 13.0)) the confluence of the Trinity River (RKm 20.0) in 2006. See Appendix A for more specific daily information.

Appendix A.. Table of water temperatures and flows of the Trinity River (RKm 0.1) and the mainstem Klamath River above and below the confluence of the Trinity River and the Klamath River, April 15 to October 15, 2006.

	Flow (CFS)							Average Daily Water Temperatures (°C)					Differences in Water Temps (°C) of the Klamath R. at RKm 70.2 and:			
	Trinity R.		Klamath R.			Contributions of Flow to the Klamath Gage (%)[b]		Trinity R.	Klamath R. Sites				Trinity R.	Klamath R. Sites		
Date	Lewiston rkm 178.6	Hoopa rkm 20.0	Iron Gate rkm 305.5	Orleans rkm 95.1	Klamath rkm 13.0	Lewiston Dam rkm 178.6	Iron Gate Dam rkm 305.5	TR rkm 0.1	WE rkm 70.2	KBW rkm 68.7	KBC rkm 26.5	KAT rkm 13.0	TR rkm 0.1	KBW rkm 68.7	KBC rkm 26.5	KAT rkm 13.0
4/15/06	1070	18000	9880	22500	44729	2	22	9.7	9.7	9.7	10.1	10.0	0.0	0.0	-0.4	-0.4
4/16/06	1070	17500	8710	22300	46558	2	19	8.0	8.4	8.3	8.7	8.7	0.4	0.1	-0.2	-0.3
4/17/06	1650	15700	7440	20200	42183	4	18	8.3	8.8	8.7	8.6	8.6	0.5	0.1	0.2	0.2
4/18/06	2100	14900	6950	18400	38479	5	18	9.0	9.5	9.4	9.4	9.4	0.5	0.1	0.1	0.0
4/19/06	2170	14200	6840	17600	36371	6	19	9.8	10.3	10.1	10.1	10.2	0.5	0.1	0.1	0.1
4/20/06	2090	14200	6530	17900	35621	6	18	10.5	11.0	10.9	10.9	10.9	0.5	0.1	0.1	0.1
4/21/06	2170	14900	5930	18800	36754	6	16	10.9	11.3	11.2	11.3	11.3	0.5	0.1	0.0	0.0
4/22/06	2180	15400	5730	19000	37638	6	15	10.9	11.2	11.1	11.4	11.4	0.3	0.1	-0.2	-0.2
4/23/06	2180	15400	5590	19500	37825	6	15	11.2	11.4	11.3	11.6	11.6	0.2	0.0	-0.2	-0.2
4/24/06	2400	15300	5090	20000	38142	6	13	11.1	11.4	11.3	11.4	11.4	0.3	0.1	0.0	0.0
4/25/06	2730	15400	4610	19900	38125	7	12	11.2	11.4	11.4	11.6	11.6	0.2	0.0	-0.2	-0.3
4/26/06	2730	15500	4100	19600	37904	7	11	11.2	11.4	11.4	11.5	11.5	0.3	0.0	-0.1	-0.1
4/27/06	2730	15700	4080	20400	38329	7	11	11.4	11.9	11.8	12.0	11.9	0.4	0.1	-0.1	-0.1
4/28/06	2960	16600	4550	23300	41146	7	11	11.9	12.0	12.0	12.3	12.4	0.2	0.0	-0.3	-0.3
4/29/06	3260	17800	5240	27100	46713	7	11	12.0	12.0	12.0	12.3	12.3	0.0	0.0	-0.3	-0.3
4/30/06	3260	17700	5690	27700	49250	7	12	11.7	11.7	11.7	12.1	12.2	0.0	0.0	-0.5	-0.5
5/1/06	3280	16000	5910	25300	44513	7	13	11.2	11.7	11.6	11.9	11.8	0.5	0.1	-0.1	-0.1
5/2/06	3340	14900	5790	23400	40663	8	14	11.3	11.7	11.7	11.9	11.9	0.4	0.1	-0.2	-0.2
5/3/06	3650	14300	5630	21900	37988	10	15	11.6	12.0	11.9	12.2	12.2	0.4	0.1	-0.1	-0.2
5/4/06	3600	14000	5340	21100	36671	10	15	11.9	12.4	12.3	12.5	12.5	0.5	0.2	-0.1	-0.1
5/5/06	3590	13600	4740	20700	35704	10	13	11.9	12.6	12.4	12.6	12.6	0.6	0.1	-0.1	0.0
5/6/06	3590	13200	4440	20200	34725	10	13	11.8	12.4	12.3	12.6	12.6	0.6	0.1	-0.2	-0.2
5/7/06	3600	12700	4090	19100	33196	11	12	11.8	12.6	12.4	12.5	12.5	0.8	0.2	0.1	0.0
5/8/06	3630	12600	3970	18900	32333	11	12	12.0	12.6	12.5	12.8	12.8	0.6	0.1	-0.2	-0.2
5/9/06	3540	12100	4260	18000	31196	11	14	11.8	12.4	12.3	12.6	12.6	0.6	0.1	-0.1	-0.2
5/10/06	3510	11600	4870	17600	30067	12	16	12.1	12.7	12.6	12.8	12.8	0.6	0.1	0.0	-0.1
5/11/06	3540	11500	4620	18600	30263	12	15	12.5	13.3	13.1	13.2	13.2	0.8	0.1	0.0	0.0
5/12/06	3550	11600	4410	19000	30817	12	14	12.7	13.4	13.3	13.5	13.6	0.7	0.1	-0.1	-0.1
5/13/06	3850	11300	4280	18300	30008	13	14	12.5	13.5	13.3	13.5	13.5	1.0	0.2	0.0	0.0
5/14/06	4370	11600	3880	18100	29721	15	13	12.6	13.6	13.4	13.5	13.6	1.0	0.2	0.0	0.0
5/15/06	4590	12200	3580	18700	30183	15	12	12.9	14.0	13.8	13.9	14.0	1.1	0.2	0.0	0.0
5/16/06	4810	12700	3370	20300	32267	15	10	13.1	14.1	13.9	14.2	14.2	1.0	0.2	0.0	-0.1
5/17/06	5370	13000	3140	21300	33579	16	9	13.4	14.3	14.1	14.3	14.4	0.9	0.2	-0.1	-0.1
5/18/06	5800	13300	3080	21100	34317	17	9	13.3	14.3	14.1	14.4	14.5	1.0	0.2	-0.1	-0.2
5/19/06	5990	13100	3260	20100	33342	18	10	12.6	13.8	13.6	13.9	13.9	1.2	0.2	-0.1	-0.1
5/20/06	6090	13900	3780	20800	34013	18	11	11.6	13.0	12.7	12.9	13.0	1.4	0.3	0.1	0.0
5/21/06	6300	13100	3730	19300	33188	19	11	11.8	13.4	13.0	13.0	13.0	1.6	0.4	0.3	0.3
5/22/06	8160	13300	3520	18500	31888	26	11	11.9	13.4	13.0	13.1	13.1	1.5	0.4	0.3	0.3
5/23/06	9600	14600	3220	18100	32804	29	10	11.7	13.2	12.8	12.9	13.0	1.5	0.4	0.3	0.2
5/24/06	10100	15100	3030	18000	34163	30	9	11.2	12.7	12.3	12.4	12.4	1.5	0.4	0.3	0.2
5/25/06	10100	14800	3080	16000	32375	31	10	11.4	12.6	12.2	12.3	12.3	1.2	0.3	0.3	0.3
5/26/06	9920	14300	3150	14500	30038	33	10	11.5	12.6	12.2	12.3	12.3	1.0	0.3	0.3	0.3
5/27/06	8350	13600	3670	13500	29192	29	13	10.9	12.2	11.8	11.9	11.9	1.3	0.4	0.3	0.3
5/28/06	8200	12400	4050	13000	26708	31	15	11.2	12.5	12.1	12.0	12.0	1.3	0.4	0.5	0.6
5/29/06	8240	12200	3950	12600	25704	32	15	11.8	13.7	13.1	13.1	13.1	1.9	0.6	0.7	0.7
5/30/06	8200	12000	3670	12100	24867	33	15	12.0	14.4	13.6	13.6	13.6	2.4	0.8	0.8	0.8
5/31/06	8240	12000	3420	11900	24333	34	14	12.1	14.9	14.0	13.8	13.7	2.8	0.9	1.2	1.2
6/1/06	8430	12100	3230	12300	24525	34	13	12.0	14.9	13.9	13.9	13.9	2.9	1.0	1.0	1.0
6/2/06	8430	12400	3120	13700	25833	33	12	12.0	14.9	14.0	13.8	13.8	2.9	0.9	1.1	1.1

Appendix A. (continued)

	Flow (CFS)							Average Daily Water Temperatures (°C)					Differences in Water Temps (°C) of the Klamath R. at RKm 70.2 and:			
	Trinity R.		Klamath R.			Contributions of Flow to the Klamath Gage (%)[b]		Trinity R.	Klamath R. Sites				Trinity R.	Klamath R. Sites		
Date	Lewiston rkm 178.6	Hoopa rkm 20.0	Iron Gate rkm 305.5	Orleans rkm 95.1	Klamath rkm 13.0	Lewiston Dam rkm 178.6	Iron Gate Dam rkm 305.5	TR rkm 0.1	WE rkm 70.2	KBW rkm 68.7	KBC rkm 26.5	KAT rkm 13.0	TR rkm 0.1	KBW rkm 68.7	KBC rkm 26.5	KAT rkm 13.0
6/3/06	8100	12400	3100	13600	27000	30	11	12.4	15.0	14.2	14.2	14.3	2.6	0.8	0.8	0.7
6/4/06	7500	11900	3100	13600	26146	29	12	13.0	15.9	15.0	14.7	14.6	2.9	0.9	1.2	1.2
6/5/06	6970	11600	3100	13300	26129	27	12	13.5	16.2	15.4	15.4	15.3	2.8	0.9	0.8	0.9
6/6/06	6460	11000	3110	12500	24567	26	13	13.6	16.4	15.6	15.4	15.4	2.8	0.8	1.0	1.0
6/7/06	6070	10500	3110	11900	23314	26	13	13.6	16.7	15.7	15.5	15.4	3.1	1.0	1.2	1.3
6/8/06	5360	9890	3190	11200	22096	24	14	13.4	16.8	15.6	15.7	15.7	3.4	1.2	1.1	1.1
6/9/06	5200	9050	3160	10800	20817	25	15	13.6	17.1	15.8	15.9	15.9	3.5	1.2	1.2	1.1
6/10/06	5180	8920	3110	10300	20029	26	16	13.9	17.2	16.0	16.1	16.1	3.2	1.2	1.0	1.0
6/11/06	5090	8770	3110	9880	19508	26	16	14.0	17.4	16.1	16.3	16.3	3.3	1.3	1.1	1.1
6/12/06	5100	8810	3130	9850	19209	27	16	13.4	17.2	15.8	16.0	16.0	3.7	1.4	1.2	1.2
6/13/06	5120	9110	3150	9870	19563	26	16	12.8	16.4	15.1	15.3	15.3	3.6	1.3	1.1	1.1
6/14/06	5090	8850	3140	9750	19467	26	16	12.3	15.9	14.6	14.7	14.7	3.6	1.4	1.3	1.3
6/15/06	5080	8460	3090	9340	18800	27	16	12.6	16.0	14.7	14.7	14.8	3.4	1.3	1.3	1.2
6/16/06	4980	8340	3090	9030	18229	27	17	14.0	17.6	16.2	16.0	15.9	3.6	1.4	1.6	1.6
6/17/06	4710	8170	3090	8940	18079	26	17	14.9	18.6	17.2	17.3	17.3	3.8	1.5	1.4	1.4
6/18/06	4660	7710	3080	8580	17458	27	18	14.6	18.6	17.0	17.2	17.2	4.0	1.6	1.4	1.3
6/19/06	4330	7440	3100	8340	16971	26	18	14.6	18.8	17.1	17.4	17.4	4.1	1.6	1.4	1.4
6/20/06	4340	7010	3100	8030	16338	27	19	14.9	18.9	17.3	17.5	17.6	4.0	1.6	1.4	1.3
6/21/06	4090	6890	3090	7790	15788	26	20	15.1	19.1	17.5	17.8	17.8	3.9	1.6	1.3	1.3
6/22/06	3660	6400	3090	7570	15183	24	20	15.4	19.4	17.8	18.1	18.1	4.0	1.6	1.3	1.3
6/23/06	3560	5990	3090	7420	14263	25	22	15.7	19.9	18.4	18.6	18.6	4.2	1.5	1.2	1.2
6/24/06	3280	5910	3090	7330	13900	24	22	16.0	20.6	19.1	19.4	19.3	4.6	1.5	1.2	1.3
6/25/06	3180	5730	3090	7260	13613	23	23	16.3	21.3	19.7	20.0	20.0	5.0	1.6	1.3	1.3
6/26/06	3020	5580	3100	7150	13270	23	23	16.6	22.0	20.3	20.5	20.5	5.4	1.7	1.5	1.5
6/27/06	2860	5380	3090	6990	12908	22	24	16.7	22.2	20.4	20.8	20.7	5.5	1.8	1.4	1.5
6/28/06	2910	5360	3100	7010	12529	23	25	16.7	22.0	20.3	20.5	20.4	5.3	1.7	1.5	1.7
6/29/06	2820	5380	3120	6870	12900	22	24	16.5	21.9	20.1	20.3	20.2	5.4	1.8	1.6	1.7
6/30/06	2600	5040	3150	6690	12195	21	26	16.6	22.2	20.5	20.5	20.4	5.6	1.7	1.7	1.8
7/1/06	2510	4710	3010	6520	11550	22	26	16.8	22.3	20.7	20.7	20.6	5.5	1.6	1.6	1.7
7/2/06	2380	4520	2780	6230	11048	22	25	17.0	22.5	20.9	20.8	20.6	5.5	1.6	1.7	1.9
7/3/06	2370	4340	2570	5830	10370	23	25	17.1	22.3	20.8	20.8	20.5	5.2	1.5	1.5	1.8
7/4/06	2290	4240	2330	5470	9757	23	24	17.1	21.9	20.4	20.4	20.2	4.8	1.5	1.5	1.7
7/5/06	2170	4080	2100	5100	9273	23	23	17.0	21.4	19.8	19.8	19.7	4.4	1.6	1.5	1.7
7/6/06	2070	3930	1830	4760	8673	24	21	16.6	21.1	19.5	19.4	19.1	4.4	1.6	1.7	2.0
7/7/06	1990	3780	1690	4380	8079	25	21	16.7	21.3	19.9	19.9	19.7	4.6	1.5	1.4	1.6
7/8/06	1860	3630	1580	4120	7487	25	21	17.0	22.0	20.4	20.4	20.3	4.9	1.6	1.6	1.6
7/9/06	1870	3480	1520	3920	7017	27	22	17.8	22.5	20.9	20.8	20.7	4.7	1.6	1.7	1.8
7/10/06	1550	3480	1400	3780	6737	23	21	19.1	22.7	21.2	21.2	--	3.7	1.5	1.5	--
7/11/06	1540	3170	1270	3590	6414	24	20	18.9	22.4	20.9	20.8	--	3.5	1.4	1.6	--
7/12/06	1380	3110	1140	3390	5997	23	19	18.5	21.9	20.5	20.7	--	3.4	1.4	1.1	--
7/13/06	1200	2880	1130	3180	5702	21	20	19.1	22.1	20.9	21.0	20.8	3.0	1.2	1.1	1.3
7/14/06	1060	2660	1100	3080	5293	20	21	20.0	22.3	21.4	21.5	21.4	2.3	0.9	0.8	0.9
7/15/06	909	2490	1000	3030	5017	18	20	20.4	22.5	21.7	21.8	21.6	2.1	0.8	0.8	0.9
7/16/06	833	2340	1000	2860	4793	17	21	20.8	23.0	22.2	22.0	21.8	2.2	0.9	1.0	1.2
7/17/06	752	2180	997	2780	4491	17	22	21.4	23.7	22.8	22.6	22.3	2.3	0.8	1.1	1.4
7/18/06	620	2070	999	2710	4248	15	24	21.8	24.1	23.3	23.2	23.0	2.2	0.8	0.9	1.1
7/19/06	587	1900	1010	2670	4078	14	25	22.0	24.0	23.3	23.3	23.0	2.0	0.7	0.7	1.0

Appendix A. (Continued)

	Flow (CFS)							Average Daily Water Temperatures (°C)					Differences in Water Temps (°C) of the Klamath R. at RKm 70.2 and:			
	Trinity R.		Klamath R.			Contributions of Flow to the Klamath Gage (%)[b]		Trinity R.	Klamath R. Sites				Trinity R.	Klamath R. Sites		
Date	Lewiston rkm 178.6	Hoopa rkm 20.0	Iron Gate rkm 305.5	Orleans rkm 95.1	Klamath rkm 13.0	Lewiston Dam rkm 178.6	Iron Gate Dam rkm 305.5	TR rkm 0.1	WE rkm 70.2	KBW rkm 68.7	KBC rkm 26.5	KAT rkm 13.0	TR rkm 0.1	KBW rkm 68.7	KBC rkm 26.5	KAT rkm 13.0
7/20/06	588	1800	1010	2630	3883	15	26	22.3	24.1	23.5	23.3	23.0	1.8	0.6	0.8	1.1
7/21/06	538	1770	1010	2610	3804	14	27	22.6	24.1	23.6	23.6	23.2	1.6	0.5	0.5	0.9
7/22/06	461	1730	1010	2630	3785	12	27	22.8	24.2	23.7	24.0	23.6	1.4	0.4	0.2	0.6
7/23/06	411	1600	1010	2590	3677	11	27	24.1	25.3	24.9	24.8	24.4	1.2	0.4	0.5	0.9
7/24/06	402	1520	1010	2680	3490	12	29	24.9	26.0	25.7	25.7	25.1	1.1	0.3	0.3	0.8
7/25/06	405	1560	1010	2660	3674	11	27	25.5	25.9	25.8	26.0	25.6	0.3	0.0	-0.2	0.3
7/26/06	416	1410	1010	2510	3433	12	29	25.5	26.0	25.9	25.6	25.0	0.5	0.1	0.4	1.0
7/27/06	423	1340	1010	2420	3210	13	31	25.6	26.0	26.0	25.6	24.9	0.5	0.1	0.4	1.1
7/28/06	429	1300	1010	2360	3080	14	33	25.3	25.5	25.5	25.1	24.6	0.1	0.0	0.4	0.9
7/29/06	432	1250	1010	2310	2970	15	34	24.0	24.4	24.3	24.3	23.9	0.4	0.1	0.1	0.5
7/30/06	430	1230	1000	2270	2900	15	34	22.4	23.0	22.8	23.3	23.1	0.6	0.2	-0.3	-0.1
7/31/06	411	1200	1010	2270	2882	14	35	21.5	21.8	21.8	22.3	22.2	0.3	0.0	-0.5	-0.4
8/1/06	409	1170	1020	2280	2867	14	36	21.1	21.4	21.4	21.8	21.7	0.3	0.0	-0.4	-0.3
8/2/06	447	1160	1000	2280	2865	16	35	20.8	21.5	21.4	21.6	21.4	0.7	0.2	0.0	0.1
8/3/06	449	1170	991	2250	2844	16	35	20.7	21.8	21.5	21.6	21.4	1.1	0.3	0.2	0.4
8/4/06	440	1160	992	2230	2834	16	35	20.9	22.1	21.8	21.8	21.5	1.2	0.3	0.3	0.6
8/5/06	440	1130	998	2210	2809	16	36	21.4	22.2	22.0	21.5	21.0	0.8	0.2	0.7	1.2
8/6/06	437	1110	1000	2190	2750	16	36	21.0	21.8	21.5	21.6	21.2	0.8	0.2	0.2	0.6
8/7/06	437	1100	1000	2260	2758	16	36	21.0	21.6	21.4	21.1	20.7	0.7	0.2	0.6	1.0
8/8/06	445	1120	1050	2400	2959	15	35	21.1	21.7	21.6	21.4	20.9	0.7	0.1	0.4	0.8
8/9/06	442	1120	1010	2330	3045	15	33	21.6	21.9	21.9	22.0	21.7	0.3	0.0	-0.1	0.2
8/10/06	443	1080	996	2270	2923	15	34	21.8	22.5	22.3	22.3	22.0	0.7	0.2	0.2	0.5
8/11/06	444	1040	995	2190	2776	16	36	21.9	22.6	22.5	22.3	22.0	0.7	0.2	0.3	0.6
8/12/06	442	1020	994	2160	2706	16	37	21.7	22.7	22.5	22.4	22.1	1.0	0.3	0.3	0.7
8/13/06	439	1000	991	2120	2658	17	37	21.9	22.8	22.6	22.6	22.3	0.9	0.2	0.2	0.5
8/14/06	442	978	993	2100	2610	17	38	22.0	22.5	22.3	22.3	21.9	0.5	0.1	0.2	0.5
8/15/06	445	966	993	2070	3420	13	29	21.8	22.0	22.0	21.8	21.4	0.3	0.0	0.2	0.7
8/16/06	446	962	997	2030	3370	13	30	21.2	21.5	21.5	21.3	21.2	0.4	0.1	0.2	0.4
8/17/06	444	962	1010	2030	3350	13	30	20.6	21.3	21.1	21.1	20.8	0.7	0.2	0.2	0.5
8/18/06	444	959	981	2010	3350	13	29	20.7	21.4	21.2	21.2	21.0	0.7	0.2	0.2	0.4
8/19/06	442	942	984	2010	3330	13	30	20.8	21.1	21.0	21.1	20.8	0.3	0.0	0.0	0.2
8/20/06	442	925	986	1980	3260	14	30	21.0	21.2	21.1	20.7	20.4	0.2	0.0	0.4	0.7
8/21/06	441	907	986	1970	3220	14	31	21.2	21.2	21.3	20.9	20.5	0.1	0.0	0.4	0.7
8/22/06	444	903	986	1950	3200	14	31	21.1	21.2	21.2	21.1	20.8	0.1	0.0	0.1	0.4
8/23/06	444	895	986	1930	3160	14	31	21.0	21.1	21.1	21.2	20.9	0.1	0.0	-0.1	0.2
8/24/06	445	889	986	1920	3140	14	31	20.9	21.2	21.1	21.2	21.1	0.3	0.1	0.0	0.1
8/25/06	444	889	986	1920	3130	14	32	21.0	21.6	21.4	21.3	21.1	0.6	0.2	0.3	0.5
8/26/06	443	887	983	1920	3150	14	31	21.2	21.9	21.7	21.5	21.1	0.7	0.2	0.4	0.8
8/27/06	443	876	978	1910	3130	14	31	21.4	22.1	21.9	21.7	21.3	0.7	0.2	0.4	0.8
8/28/06	439	865	980	1900	3100	14	32	21.6	22.2	22.0	21.6	21.2	0.6	0.2	0.6	1.0
8/29/06	442	856	978	1890	3090	14	32	21.2	21.6	21.5	21.3	20.9	0.4	0.1	0.3	0.7
8/30/06	441	849	977	1880	3030	15	32	20.8	21.4	21.2	21.3	21.1	0.6	0.1	0.0	0.2
8/31/06	440	852	977	1870	3000	15	33	20.5	21.0	20.8	21.2	20.9	0.5	0.1	-0.2	0.0

Appendix A. (Continued)

	Flow (CFS)							Average Daily Water Temperatures (°C)					Differences in Water Temps (°C) of the Klamath R. at RKm 70.2 and:			
	Trinity R.		Klamath R.			Contributions of Flow to the Klamath Gage (%)[b]		Trinity R.	Klamath R. Sites				Trinity R.	Klamath R. Sites		
Date	Lewiston rkm 178.6	Hoopa rkm 20.0	Iron Gate rkm 305.5	Orleans rkm 95.1	Klamath rkm 13.0	Lewiston Dam rkm 178.6	Iron Gate Dam rkm 305.5	TR rkm 0.1	WE rkm 70.2	KBW rkm 68.7	KBC rkm 26.5	KAT rkm 13.0	TR rkm 0.1	KBW rkm 68.7	KBC rkm 26.5	KAT rkm 13.0
9/1/06	444	850	980	1870	3000	15	33	20.6	20.7	20.7	21.0	20.9	0.1	0.0	-0.4	-0.2
9/2/06	446	839	980	1870	2990	15	33	20.7	20.6	20.7	20.8	20.6	0.0	0.0	-0.2	0.0
9/3/06	444	837	982	1860	2990	15	33	20.5	20.6	20.6	20.5	20.3	0.1	0.0	0.1	0.3
9/4/06	445	831	984	1840	2970	15	33	20.1	20.4	20.3	20.4	20.1	0.4	0.1	0.1	0.3
9/5/06	454	827	986	1830	2970	15	33	19.9	20.5	20.3	20.3	20.1	0.6	0.2	0.1	0.4
9/6/06	459	827	986	1800	2930	16	34	19.9	20.8	20.5	20.5	20.2	0.8	0.3	0.2	0.6
9/7/06	461	837	986	1790	2880	16	34	20.0	20.9	20.6	20.6	20.4	0.8	0.2	0.2	0.5
9/8/06	456	837	1130	1780	2870	16	39	19.7	20.5	20.2	20.0	19.7	0.8	0.2	0.4	0.7
9/9/06	456	828	1480	1780	2850	16	52	19.2	20.2	19.9	20.1	19.8	1.0	0.3	0.1	0.4
9/10/06	459	829	1300	2160	3010	15	43	19.1	20.3	20.0	20.1	20.0	1.2	0.3	0.2	0.3
9/11/06	461	841	1150	2140	3470	13	33	19.1	20.7	20.2	20.2	19.9	1.5	0.4	0.5	0.8
9/12/06	456	842	1020	2010	3300	14	31	19.4	20.8	20.4	20.5	20.2	1.4	0.4	0.3	0.6
9/13/06	458	833	1010	1880	3120	15	32	19.5	20.9	20.5	20.7	20.4	1.4	0.4	0.2	0.5
9/14/06	458	825	1010	1810	2950	16	34	19.1	20.5	20.1	20.2	20.2	1.4	0.4	0.3	0.3
9/15/06	467	821	1010	1810	2900	16	35	17.7	19.1	18.7	19.4	19.2	1.4	0.4	-0.3	-0.2
9/16/06	450	843	997	1870	3000	15	33	16.9	18.3	17.9	18.5	18.7	1.4	0.4	-0.2	-0.4
9/17/06	427	852	997	1870	3070	14	32	17.0	18.1	17.7	18.1	18.1	1.1	0.4	0.0	0.0
9/18/06	430	833	999	1860	3050	14	33	16.8	17.9	17.5	18.0	18.0	1.1	0.3	-0.2	-0.2
9/19/06	452	818	1010	1850	3010	15	34	16.7	17.7	17.4	17.9	17.9	1.1	0.3	-0.2	-0.2
9/20/06	459	832	1030	1840	2990	15	34	16.6	17.7	17.4	17.8	17.8	1.1	0.3	0.0	0.0
9/21/06	460	851	1030	1870	3040	15	34	17.4	18.0	17.8	17.7	17.8	0.6	0.2	0.3	0.2
9/22/06	458	856	1030	1870	3070	15	34	17.2	17.9	17.7	17.8	17.6	0.8	0.2	0.1	0.3
9/23/06	453	844	1030	1860	3040	15	34	16.4	17.3	17.1	17.8	17.9	0.8	0.2	-0.5	-0.6
9/24/06	452	830	1030	1850	3020	15	34	15.8	17.1	16.7	17.3	17.4	1.3	0.4	-0.1	-0.3
9/25/06	453	819	1030	1840	2960	15	35	15.7	17.0	16.6	17.1	17.1	1.2	0.4	-0.1	-0.1
9/26/06	450	819	1030	1840	2960	15	35	15.7	16.8	16.5	17.0	17.1	1.1	0.3	-0.2	-0.2
9/27/06	453	816	1020	1840	2960	15	34	15.6	17.0	16.6	16.9	16.9	1.4	0.4	0.1	0.1
9/28/06	453	814	1030	1840	2950	15	35	15.4	17.0	16.5	16.8	16.8	1.5	0.5	0.2	0.1
9/29/06	449	811	1040	1820	2930	15	35	15.5	16.9	16.5	16.7	16.7	1.5	0.4	0.2	0.2
9/30/06	454	804	1040	1810	2890	16	36	15.5	16.8	16.4	16.4	16.3	1.4	0.4	0.5	0.5
10/1/06	454	805	1310	1800	2880	16	45	15.7	16.6	16.3	16.5	16.1	0.9	0.3	0.1	0.5
10/2/06	454	808	1320	1930	2880	16	46	15.7	16.4	16.2	16.6	16.5	0.7	0.2	-0.2	-0.1
10/3/06	451	812	1280	2100	3180	14	40	15.5	16.2	16.0	16.2	16.2	0.7	0.2	0.0	0.0
10/4/06	456	822	1280	2130	3290	14	39	15.0	15.9	15.7	15.9	15.8	0.9	0.2	0.0	0.1
10/5/06	454	847	1280	2160	3350	14	38	15.1	16.0	15.7	15.8	15.7	0.9	0.3	0.2	0.3
10/6/06	452	877	1280	2190	3410	13	38	15.4	16.1	15.9	16.2	15.9	0.7	0.2	0.0	0.2
10/7/06	453	883	1280	2170	3450	13	37	15.0	15.8	15.5	16.1	16.2	0.8	0.2	-0.3	-0.4
10/8/06	452	869	1280	2150	3410	13	38	14.7	15.3	15.2	15.7	15.8	0.6	0.2	-0.3	-0.5
10/9/06	453	857	1280	2140	3380	13	38	14.7	15.3	15.1	15.6	15.8	0.6	0.2	-0.3	-0.4
10/10/06	453	846	1280	2130	3350	14	38	14.4	15.1	14.9	15.4	15.4	0.7	0.2	-0.2	-0.3
10/11/06	454	830	1290	2120	3320	14	39	14.0	14.7	14.5	15.0	15.1	0.7	0.2	-0.3	-0.4
10/12/06	453	830	1290	2120	3300	14	39	13.8	14.5	14.3	14.8	14.9	0.7	0.2	-0.3	-0.5
10/13/06	452	826	1290	2120	3300	14	39	13.7	14.4	14.2	14.6	14.8	0.7	0.2	-0.2	-0.4
10/14/06	450	826	1280	2120	3310	14	39	13.8	14.5	14.3	14.4	14.4	0.7	0.2	0.1	0.1
10/15/06	438	826	1290	2130	3330	13	39	13.5	14.3	14.1	14.4	14.3	0.8	0.2	-0.1	0.0