

Scott River Water Trust

2007 Summer Flow Leases -- Habitat Assessment

by

Erich Yokel – Siskiyou RCD

Background

During the summer months, juvenile coho salmon and rainbow trout must survive in the tributary and main stem habitats of the Scott River that offer suitable water quality and quantity parameters. These streams have limited habitat volume due to natural low base flows that are lessened by adjudicated surface water diversions. Additionally, a series of cumulative effects (low flows, reduced riparian canopy, altered stream structure, etc.) creates reaches in the Scott River (e.g., East Fork and main stem Scott River) with water temperature regimes that are unsuitable for cold water fish during some periods of the summer season.

The Scott River Water Trust began its summer leasing operations to improve instream flows and habitat conditions in August 2007 in two major tributaries to the Scott River: French Creek (and its Miner's Creek tributary) and Shackleford Creek (and its Mill Creek tributary). The following five sites and flow amounts were successfully leased from water diverters for the remaining portion of the summer irrigation season:

Location / Site	Lease Date	Lease - cfs	Stream Flow Above – cfs ¹
French Creek – Miner's Ck			
Diversions #33	8-13-07	0.40	0.65
Diversions #36	8-21-07	0.25	1.0
French Creek			
Diversions #20	8-30-07	2.4	3.5
Diversions #48	8-13-07	0.18-0.4	0.4
Shackleford Creek – Mill Ck.			
Diversions #14	8-21-07	0.7	2.5

¹ Estimated by the DWR Watermaster at time of lease.

Methods

Fish habitat monitoring was performed for the 2007 summer flow component of the Water Trust. Two methods were performed: 1) measurements of pool volume before and after the leasing of instream water rights, and 2) direct observation dives to document the presence of juvenile salmon (Chinook and coho) and steelhead in the reaches downstream of the leased waters.

Previous direct observation efforts performed by the Siskiyou RCD and the scientific literature have shown that rearing juvenile coho salmon and larger rainbow trout utilize pools and runs at a much higher density than riffle habitats during the low flow period of late summer. An objective of the Water Trust during summer is to increase the volume of these preferred habitat types and potentially increase the amount of inundated marginal

fish cover elements (e.g. undercut banks, terrestrial vegetation and/ or woody debris). An increase in habitat volume and available cover should allow for increased survival and condition of salmonids, if other water quality parameters (temperature) are suitable. A pool volume measurement was performed before and after the water was leased in order to document the increase in available habitat volume for rearing salmonids.



Picture 1 – suitable fish cover from riparian vegetation over a pool – Mill Creek

Two sites were monitored immediately before and after the leasing of water: 1) Miner’s Creek below the Lewis Ditch (and above leased Diversion #33) and 2) French Creek below leased Company Ditch (Diversion #20). Two additional sites were established and pre-monitored but post monitoring was not performed – 1) in French Creek below Brown’s Ditch (Diversion #48), where the monitored pools were altered due to weir replacement, and 2) in Shackelford’s Mill Creek, where the post monitoring was not able to be performed in a timely enough manner to capture just the effect of the water leasing.

Pool volume was measured by establishing five cross sections equally spaced along the length of the pool’s longitudinal profile. Ten measurements were made at an equal interval along each cross section and total pool volume was calculated by summing the cell volume for the fifty measured cells. The same cross section positions were used in the pre- and post- treatment measurements to increase the comparability of the effort.



Picture 2 – measuring water depth at one point along a transect in a pool – French Creek

Periodic water temperature measurements were performed during pool volume measurements above and below the diversion on the French Creek site using a YSI 550A hand held temperature and dissolved oxygen meter. Stream temperature was continuously recorded downstream of the water trust location on French Creek by Timber Products Company using a HOBO electronic instrument (Farber, 2007).

Results:

The following tables and figure show the change in volume in the monitored pools in two reaches of French Creek and its tributary of Miner’s Creek.

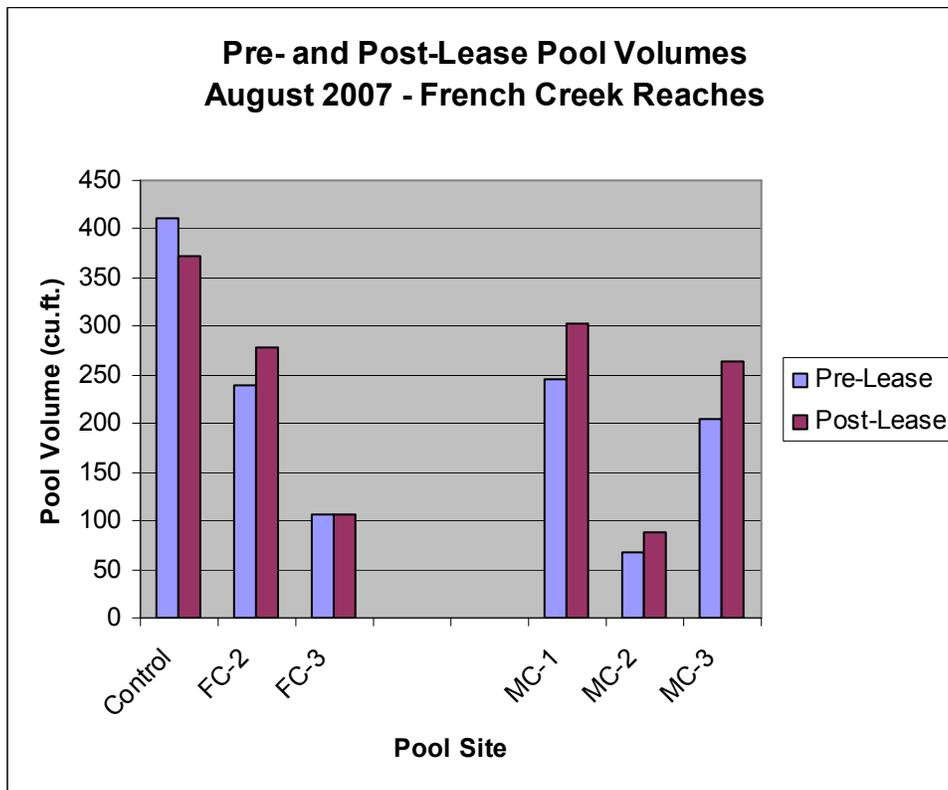
Habitat Volume measurements for Water Trust			
French Creek Below Ditch #20.			
Pool #	Pre Volume (cu. Ft.)	Post Volume (cu. Ft.)	% (Post/Pre)
1	412	373	91%
2	239	278	116%
3	106	106	100%

Note: Pool #1 was between location of diversion and fish screen by pass in which the diverted water was returned to French Creek.

Miners Creek - Below Lewis Ditch

Pool #	Pre Volume (cu. Ft.)	Post Volume (cu. Ft.)	% (Post/Pre)
1	246	303	123%
2	68	87	128%
3	204	264	129%

Figure 1. Pre- and post- lease volumes for pools in French /Miner’s Creeks.



Pool volume consistently increased (by approximately 25%) in the three monitored pools in Miner's Creek, while the pool volume change was not so conclusive in the French Creek reach. At the French Creek site, Pool #1 was a control due to its location above the point in which the diverted water was returning to French Creek at the fish screen bypass. The decrease in pool volume of this control unit could indicate a decrease in base flow and therefore a more significant increase in the volumes of pools #2 and #3.

This monitoring technique was developed to directly measure a parameter (pool volume) that affects the carrying capacity of rearing juvenile fish. It should be noted that increasing stream discharge has no effect on the pool's residual volume and the increase in pool volume would be less significant in pools with a larger residual pool volume. Another indicator of increased fish habitat would be a greater volume of fish cover elements (woody debris, overhanging riparian vegetation, undercut banks, etc) being inundated by the increase flow regime. The establishment and monitoring of photo points at pools could be utilized to document the inundated fish cover before and after the water is leased.

Temperature measurements:

No significant alteration in temperature regime was observed in French Creek by the continuous stream temperature monitoring effort of Timber Products Co. due to the diverting of water and subsequent return of leased water- see Attachment #1 (Farber, 2007). Periodic stream temperature measurements directly below the input site for the leased water recorded a water temperature of 14.8° C at 10:30 a.m. on 8/31/07 (pre-treatment) and 13.7° C at 11:00 a.m. on 9/3/07 (post-treatment). It is difficult to determine if this decrease in stream temperature is a result of the water trust activities and/or is a product of a cooler air temperature regime. This result is to be expected in this site with full riparian canopy over the stream and the ditch inlet.

Stream temperature would be more likely affected in ditches that were diverting a significant volume of water in an area with no riparian cover and a channel with a high width to depth ratio (e.g. an alluvial channel). Additionally, elimination of any warm tailwater would positively benefit stream water temperatures. For next year, electronic temperature dataloggers (e.g. Optic StowAways) could be purchased and placed downstream of the leased diversion to produce a continuous and local record of stream temperatures before and after water is leased.

Fish observations:

- No fish observations were performed on Miner's Creek per landowner request.
- No fish observations were performed in the vicinity of Company Ditch on French Creek because the landowner (Timber Products) has stated in the past to the Siskiyou RCD that they will perform their own biologic surveys on their land.
- Juvenile coho salmon and rainbow trout were observed rearing in French Creek below the confluence with Miner's Creek.
- Juvenile coho and Chinook salmon and rainbow trout were observed rearing directly below the diversion structure of Browns Ditch (Div. #48) in lower French Creek.

- Juvenile coho salmon and rainbow trout were observed rearing below the ditch on Mill Creek (Div. #14) that was leased.

Flow Measurements: No discharge (flow) measurements were performed by the Siskiyou RCD. All flows were estimated by the DWR Watermaster who also regulates these diversion sites.

Recommendations:

The Trust needs to perform Adaptive Management by doing the following:

1. Determine if pool volume measurements are an effective protocol to monitor positive response from leased water.
2. Consider that some diversion structures and/or stream reaches affected by the Water Trust's leases are owned by different landowners than the water user. Permission must be received from these landowners in order to perform monitoring activities on their land.
3. Consider if temperature measurements via dataloggers and actual instream discharge measurements would increase the array of important physical parameters that are being monitored before and after the execution of the leases by the Water Trust.
4. Effectively coordinate monitoring activities with the arrangement of leased waters to insure all pre- and post- monitoring efforts are performed.
5. Provide more lead time for the RCD biologist to anticipate the monitoring requirements for each lease site. The 2007 summer leases were necessarily done quickly due to the late availability of funding.

References:

Farber, Stuart. 2007. Research Note – Stream water temperature French Creek – Middle Reach (TFC3_07). Prepared for Timber Products Company on 11/26/2007.

Figure 1 Middle Reach (TFC3_07) stream water temperature from 5/30/07 to 9/17/07

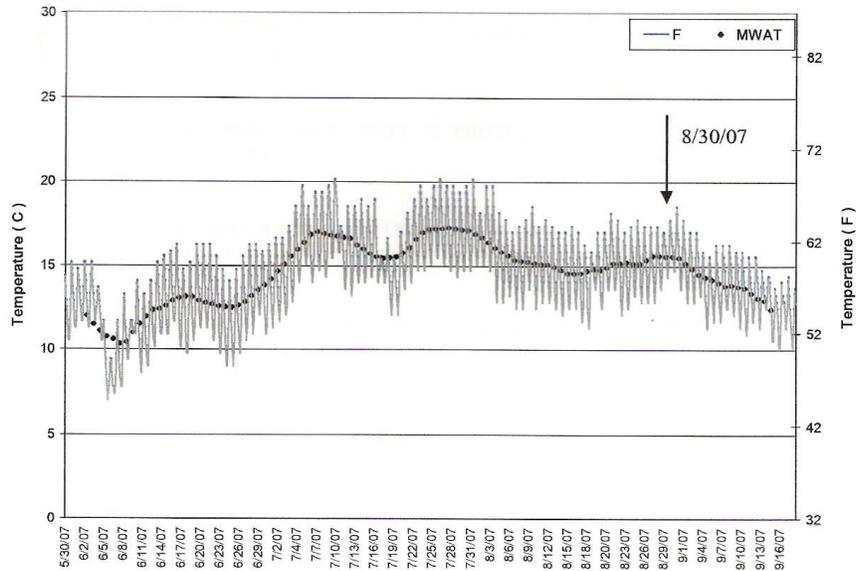


Table 1 7 days before and after lease of water on August 30, 2007

Date	Daily Min	Daily Max	Daily Average
8/23/07	12.1	17.1	14.4
8/24/07	12.5	17.4	14.7
8/25/07	13.3	17.8	15.4
8/26/07	12.9	17.4	15.1
8/27/07	12.9	17.4	14.9
8/28/07	12.9	17.4	15.0
8/29/07	13.7	17.1	15.4
8/30/07	14.4	17.8	16.0
8/31/07	14.8	18.6	16.3
9/1/07	13.7	17.8	15.4
9/2/07	12.9	17.1	14.9
9/3/07	12.9	17.1	14.8
9/4/07	13.3	15.9	14.4
9/5/07	11.3	15.6	13.3



Attachment #1 - Stream temperature data collected by Timber Products Co. in French Creek below water trust site – from Farber, 2007.