Aquatic Inventory Project (AIP) Habitat Surveys:
Butte Creek – 2008 & 2012

Survey conducted by
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Introduction

In 2008 the South Coast Watershed Council (Council) undertook a channel relocation project on lower Butte Creek that replaced 0.5 miles of ditched stream channel with 0.5 miles of newly constructed channel. To evaluate the effectiveness of the project the District and Council conducted pre and post stream habitat surveys using the Oregon Department of Fish and Wildlife's (ODFW) Aquatic Inventory Project (AIP) protocol. This report is a comparison of the results of those surveys.

Background

Butte Creek is a tributary to New River, which is located in northern Curry and southern Coos counties, on the southern Oregon coast. The creek originates in the foothills and low mountains to the northeast of the town of Langlois. Multiple intermittent and perennial headwater streams drain a mix of hillslope pasture and non-industrial forestland in the upper watershed. Approximately 0.5 miles east of Highway 101 Butte Creek transitions from a hillslope confined, moderately steep channel into a terrace confined, relatively low gradient channel that runs due west in a narrow stream valley. Approximately 0.75 miles to the west of the highway the stream valley opens onto the New River coastal plain, and Butte Creek continues for another 0.5 miles before it flows into the southeast side of New Lake.

The New River coastal plain is a matrix of wetlands, small coastal lakes, stream channels, ditches, pastures, and estuarine habitat, which supports a highly productive coho fishery. In the late 19th century settlers began to manipulate the location and morphology of New River's tributary streams in order to create large, contiguous pastureland for sheep, dairy cows, and cattle. By the mid-20th century Butte Creek had been realigned in straightened ditch channels throughout its valley and where it crosses the New River coastal plain. These ditch channels were routinely "cleaned" of sediment, vegetation, and debris through the late 1990's, but when Oregon coastal coho were listed under the Endangered Species Act (ESA), maintenance ceased because the landowners were concerned that the ESA listing would make such maintenance illegal without a permit.

By the mid-2000's the lower end of Butte Creek was filling with fine sediment and beginning to flood the adjacent pastures on a regular basis, but unlike Morton Creek to the south, Butte Creek still had a fluvial connection to New Lake and so its Steelhead and coho populations were not in decline like they were in Morton Creek. Lower Morton and Butte were owned by the same landowner, who was troubled by the plight of the Morton Creek fishery and concerned that Butte Creek would end up in a similar condition. So in 2007 the landowner approached the Council and the Curry Soil and Water Conservation District (District) with a proposal to relocate both Morton Creek and Butte Creek along new channel alignments that traversed lower, wetter ground. The District vetted the proposal through local ODFW staff, which exposed concerns that they had regarding the performance of a similar project on Bethel Creek (a New River tributary to the north that was owned by the same landowner). After further discussion ODFW agreed to support the relocation projects, on the condition that the morphology and geometry of the channels would be designed and that the streams would be fenced and planted. Following this discussion the Council agreed to assist the landowner with Butte Creek, and the District agreed to assist with Morton Creek.

In 2008 the new Butte Creek channel was dug along an alignment that ran at the base of a slight terrace to the north, where ground water daylighted in multiple locations. The Council's Coordinator designed the new channel and oversaw the construction and riparian restoration. Wood structures were built predominately in the downstream half of the new channel, and approximately 75% of the length of the new channel was fenced and planted; the segment leading into New Lake was not fenced due to regular flooding. During the first winter post-implementation a headcut developed at approximately the mid-point of the new channel, presumably because the gradient was too steep within that reach. No measures were taken to arrest and stabilize the headcut.

Project Effectiveness Monitoring

District staff conducted stream habitat surveys in 2008 and 2012 using ODFW's AIP protocol, to evaluate pre and post conditions, respectively. The results of the 2008 survey were presented in a report prepared by the District, dated August 25, 2010. The results of the 2012 survey, and a comparison of pre and post conditions, are presented below.

Methods

Data characterizing instream habitat conditions were collected by District staff using ODFW's Aquatic Inventory Project (AIP) protocol (Moore, et al., 2008 & 2012). The newest version of the AIP protocol was used in each year, with the following modification: all unit widths and lengths were measured, rather than estimated, to decrease surveyor bias. In the 2008 survey Butte Creek was divided into 2 reaches, totaling 2,103 meters of primary stream channel. Reach 1 includes the segment of ditch channel that was abandoned and replaced with new channel, and approximately 90 meters of upstream channel that was not affected by the project. Reach 2 extends upstream to Highway 101; it was surveyed to function as a control on the project reach. In the 2012 survey Butte Creek was divided into 5 reaches, totaling 2,071 meters. Reaches 1 & 2 are the new channel, while Reaches 3, 4, and 5 are the upstream control. Since the 2008 reach break occurred approximately 90 meters upstream of the project, and the 2012 reach break occurred at the project, there is a slight discrepancy inherent to a comparison of the new and old channels, but that discrepancy is not significant enough to change the outcome of our assessment. So, for the purpose of this report, Reach 1 from the 2008 survey compares to Reaches 1 & 2 from the 2012 survey, and Reach 2 from the 2008 survey compare to Reaches 3, 4, and 5 from the 2012 survey.

The 2008 and 2012 data were entered into the AIP database and analyzed according to the AIP analysis protocol (versions MARCROPRO097 and MACROPRO-2012, respectively). The analysis generated reach summaries that provided means, ranges and an expression of variables on a *per primary channel length* basis. The reach summaries were compared to ODFW's benchmark indicators (after Flitcroft et al., 2002) to evaluate the overall quality of instream habitat, and to compare the new channel to the abandoned ditch channel. Data summaries and benchmark status are presented in Table 1. Reaches are grouped by comparison, such that Reach 1 from the 2008 survey is followed by

Reaches 1 & 2 from the 2012 survey, and Reach 2 from the 2008 survey is compared to Reaches 3, 4, and 5 from the 2012 survey.

Table 1 Butte Creek 2008 & 2012 AIP Reach Summaries and Benchmark Indicators

Butte Creek Benchmarks: 2008 and 2012 AIP Surveys

Stream/Reach	Year	Gradient	Primary Length (m)	Total Length (m)	Reach Area (m²)	% Primary	W:D Ratio	ACW (m)
Project Area								
Butte Reach 1	2008	0.5%	895	895	1798	100.0%	7.8	3.3
Butte Reach 1	2012	0.2%	215	215	521	100.0%	1.7	2.6
Butte Reach 2	2012	0.8%	612	628	952	98.1%	5.6	2.6
Control Area								
Butte Reach 2	2008	0.6%	1208	1208	2686	100.0%	10.7	4.5
Butte Reach 3	2012	0.9%	474	475	977	99.9%	9.4	3.0
Butte Reach 4	2012	1.1%	264	300	752	95.6%	15.4	4.2
Butte Reach 5	2012	1.5%	506	555	1252	97.0%	16.6	4.4

🟩 **Desirable**
🟨 **Between**
🟥 **Undesirable**

	Pools					**Riffles (.5-2.0%)**		**Shade**	**Large Wood**		
Stream/Reach	# of Pools	% Area	Pool Freq	Residual Depth	# of Complex Pools	% gr	% s/o & snd	Avg %	#/ 100m	vol/ 100m	key/ 100m
Project Area											
Butte Reach 1	39	42.5%	7	.53	0	83	16	25	.9	.1	0
Butte Reach 1	4	21.4%	20.6	0.63	1.0	53	46	52	14.0	7.0	0.0
Butte Reach 2	26	58.1%	9.4	0.41	5.0	59	25	27	10.8	5.1	0.0
Control Area											
Butte Reach 2	60	57.0%	4.5	.46	5	80.5	9	78	4.5	3.1	0
Butte Reach 3	24	59.0%	6.6	0.36	0.0	90	5	73	0.2	0.1	0.0
Butte Reach 4	18	57.7%	4.1	0.49	3.0	87	11	99	6.8	3.2	0.0
Butte Reach 5	37	67.3%	3.8	0.45	7.0	81	5	95	8.9	2.8	0.0

Findings

Construction of the new channel did not effectively change the length of Butte Creek, nor did it alter Butte Creek's connection to New Lake. The active channel width (ACW) of the new channel decreased by 0.7 meters across both 2012 reaches, and the width to depth ratio (W:D) also decreased, though the decrease varied significantly across reaches. Within the upstream control the ACW also decreased, and the W:D also changed, suggesting that, to some extent, the changes within both the new channel and the control were the result of surveyor bias. Pool metrics within the new channel were mixed --- pool frequency generally declined, but the number of complex pools increased. The percentage of gravel substrate declined in the new channel, but remained 'desirable', while the percentage of silt and sand increased. Shade remained 'undesirable' in the new channel, as did most of the wood metrics. In the control reach the pool, substrate, shade, and wood metrics remained essentially unchanged.

Discussion

Based on the benchmark indicators the abandoned segment of ditch channel was in better condition in 2008 than the new channel was four years post-implementation in 2012. And had the abandoned channel been fenced and planted, and wood structures installed, it would likely have attained ‘desirable’ benchmark conditions across most, if not all, of the indicators in a relatively short time frame. With that said, moving the channel to its current location was not necessarily a mistake, but the condition of the channel in 2012 highlights the fact that design criteria, such as channel slope, channel geometry, sinuosity, and wood distribution, are critically important and need to be designed by qualified professionals.

In particular, the upper half of Reach 2 is vertically unstable because the channel is too steep and lacks adequate structure (wood, coarse grained substrate), so the headcut that developed after the first winter post-implementation will likely continue to migrate upstream through the rest of the project area. If this occurs the channel will downcut and degrade before it stabilizes, and it will take years and perhaps decades before it rebuilds complex habitat within the incised channel. Fortunately the width of the riparian setback is sufficient to allow the channel to evolve, but without intervention it will be decades before riparian vegetation acts on the channel in a way that affects the morphology of the channel. The downstream half of Reach 2 was constructed with a better planform and more instream wood, so it partially offsets the structural deficiencies of the upstream half of Reach 2 with regard to the AIP indicators. However, sediment generated from the headcut has already begun to fill the downstream half of Reach 2, and unless the headcut stabilizes, the downcutting and subsequent widening of the channel will continue to load the stream with more sediment than it can process.

Setting aside the flawed morphology, the location of the new alignment does provide some inherent benefits that lend credence to the intent of the project. Specifically, the new channel was routed through slightly lower topography, so even if it fills with sediment and resumes regular flooding, the stream will return to the channel rather than spreading out across the adjacent pastureland. And the new alignment was routed through an existing, small willow swamp, where it intercepts groundwater and the willows provide immediate shade, cover, and complexity. The landowner also donated a relatively wide riparian setback that, as mentioned earlier, will allow the stream to evolve over time through channel migration, widening, and the development of inset terraces; and the width of the setback will facilitate the restoration of a diverse riparian plant community. The instability and undesirable aspects of the new channel, particularly in the upper half of Reach 2, could be partially mitigated by constructing additional instream log structures that function as grade control on the headcut and promote pool scour, channel widening, and lateral migration of the channel. If such measures are not taken, instream conditions in the new Butte Creek channel will likely to worsen before they improve.

Conclusion

The rationale for the Butte Creek Relocation Project was that it would result in a significantly more complex “fish friendly” segment of channel that flowed through more suitable and beneficial topography. Four years post implementation (2012) the new channel was not providing the level of complexity that was anticipated, and based on the

AIP benchmark indicators, habitat in the new channel appears to be comparable to, or slightly worse off, than it was in the ditch channel in 2008 when it was abandoned. Although there is nothing definitive to explain the discrepancy between the habitat that exists and the habitat that was anticipated, the AIP metrics and visual observations suggest that the constructed morphology of the new channel is flawed, and that portions of the channel severely lack instream wood. This is particularly disappointing given that the landowner set aside a sufficiently large riparian easement in which a more complex, sinuous, stable channel planform could have been constructed. And it begs the question why a project of this scale and complexity was not designed by qualified professionals.

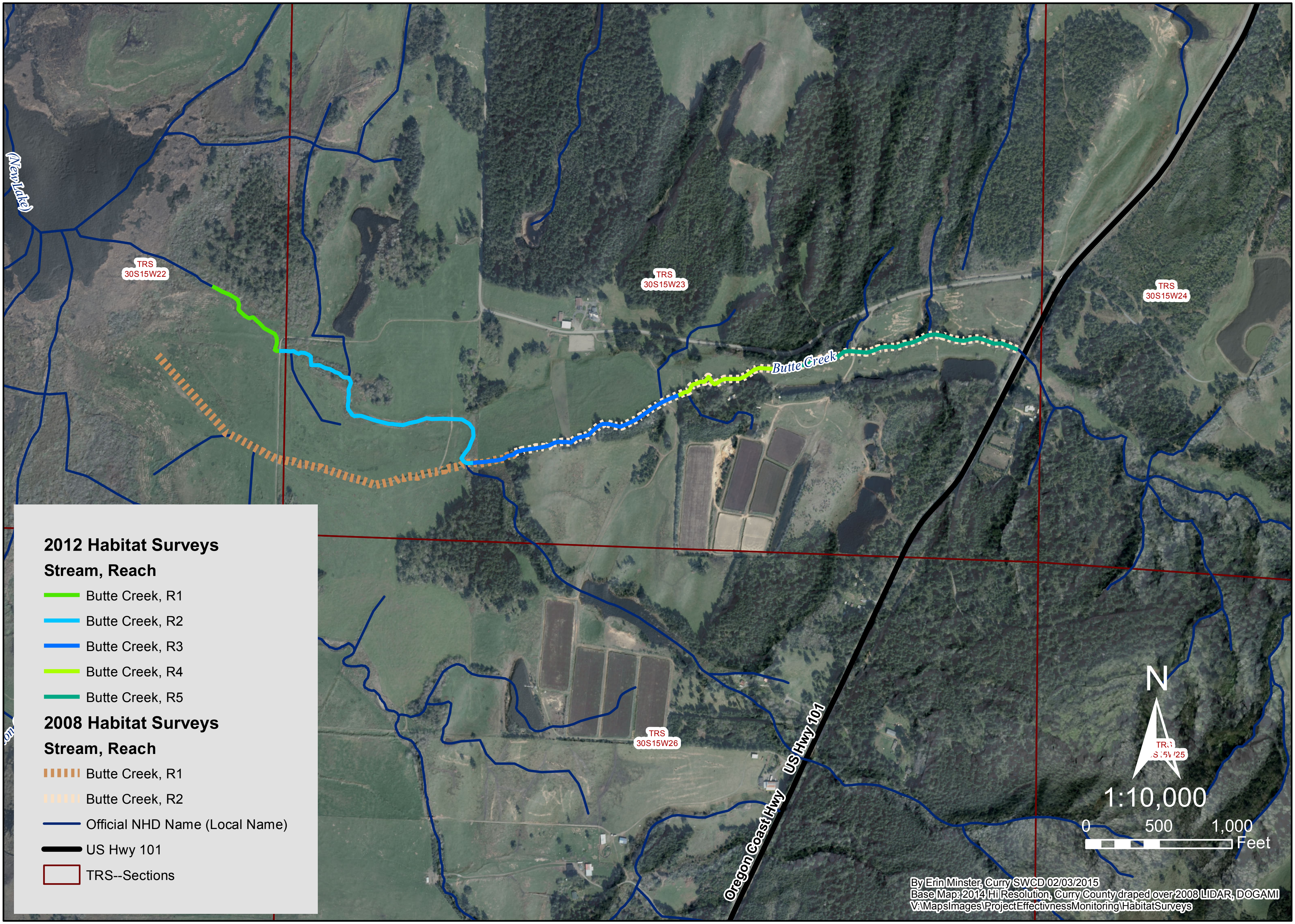
On a more upbeat note, the new alignment does flow through slightly lower topography where it intercepts groundwater and can overtop its banks without abandoning the channel; and the riparian setback, which was planted with a diverse assemblage of native trees and shrubs, is sufficiently wide to allow the channel to evolve overtime. The new channel also has a direct fluvial connection to New Lake, so even though the habitat within the project reach is less than desirable, the channel does provide a reliable ingress and egress for migrating adult and juvenile fish. Furthermore, although the morphology of the channel is flawed, strategically adding more log structures could mitigate some of the problems, such as the headcut and the lack of pools, and installing the structures would be relatively easy to do.

References

Moore, K.M.S, K.K. Jones, and J.M. Dambacher. 2008. Methods for Stream Habitat Surveys: Aquatic Inventories Project. Information Report 2007-01, Oregon Department of Fish & Wildlife, Corvallis. 67p

Flitcroft, R.L., K.K. Jones, K.E.M. Reis and B.A. Thom. 2002. Stream Habitat Conditions in Western Oregon, 2000. Monitoring Program Report Number OPSW-ODFW-2001-05, Oregon Department of Fish and Wildlife, Salem, Oregon

Butte Creek Habitat Surveys



By Erin Minster, Curry SWCD 02/03/2015
Base Map: 2014 Hi Resolution, Curry County draped over 2008 LIDAR, DOGAMI
V:\MapsImages\ProjectEffectivnessMonitoring\HabitatSurveys

Figure 1

2008 Reach 1, unit 1, looking downstream at ditch channel outlet to New Lake.

Figure 2

2012 Reach 1, unit 2, large wood placement looking downstream.

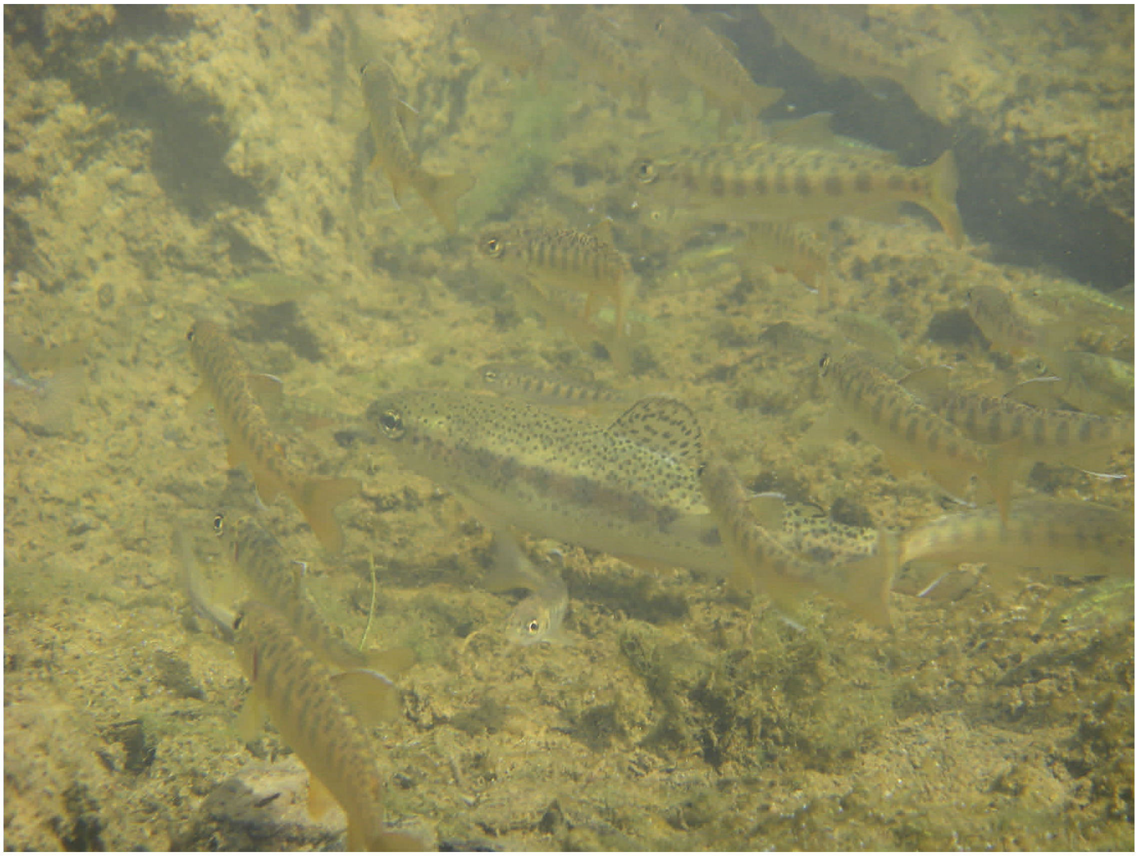
Figure 3

2012 Reach 2, unit 25 looking upstream at small beaver dam.

Figure 4

2012 Reach 2, unit 32, looking upstream at large wood placement within newly constructed channel reach.

Figure 5



2012 Reach 2, unit 43, coho and cutthroat trout utilizing new habitat.

Figure 6

2012 Reach 3, unit 108, looking downstream at 2 small debris jams create some channel complexity within the channel.

Figure 7

2008 Reach 2, unit 179, lateral scour pool with large wood placement looking downstream.

Figure 8

2012 Reach 2, unit 143, looking upstream at debris jam.

Figure 9

2008 Reach 2, unit 185, surveyor is standing at top of beaver dam, looking upstream.

Figure 10

2012 Reach , unit 166, same beaver dam as above photo is now just a debris jam, looking upstream.