Indian Creek Aquatic Restoration

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10-12-2005

Project Completion Date:
10-09-2006

Narrative Summary:

PROJECT GOALS AND OBJECTIVES

The purpose of the project was to restore anadromous fish habitat in 11 miles of streams in the Indian Creek drainage. Streams included in the project were Rogers, Gibson, Maria, WF Indian, NF Indian, and Taylor Creek. The Indian Creek drainage is on the central Oregon coast. Moreover, the Rogers, Maria, and West Fork Indian Creek subwatersheds are part of the Indian Creek Tier-1 Key Watershed, which denominates higher prioritization in terms of restoration. Like many streams in this area, these creeks have experienced considerable habitat degradation due to past land management practices that removed large wood from the channels. Without the large wood, spawning gravels have washed away leaving a mostly bedrock substrate. The down-cut stream is no longer connected to its former floodplain and fish have little refuge during high flows. Additionally, aquatic insect life, the basic food source for young salmonids, is limited without the diverse habitats formed by complexes of wood and gravel.

Goals associated with this restoration proposal include:

- Address limitation to anadromous fish production in Indian Creek tributaries
    - Enhance spawning, rearing, and overwintering habitat for anadromous and resident fish species
    - Restore storage capacity (water, substrates, and detritus) of the selected streams to levels more closely expected with unaltered systems in the Coast Range.
- Establish a connection between past small scale restoration efforts
- Maintain a network of organizations, stakeholders, and individuals who will participate in watershed restoration efforts.
    - After witnessing the successful implementation of the Karnowsky Creek Restoration project, this project will provide the avenue for maintaining the momentum that the partners have developed.
    - The Indian Creek Restoration provides another opportunity to continue to expand our network of restoration proponents.

METHODS TO ACHIEVE OBJECTIVES

Due to limited road and heavy equipment access, this project used a large helicopter to add large wood to 11 miles of streams in the Indian Creek Drainage. Preparation for the project was completed throughout the summer and included locating instream structure sites, identifying individual trees on ridgetops for use in the streams, and felling these trees prior to transport by the helicopter. US Forest Service gathered the necessary permits for the project and, with some help in facilitation from the Siuslaw Watershed Council, hosted public workshops, site tours, and other events involving the landowners and general public. Due to potential bank erosion and concerns from some of the local landowners, we eliminated the lower portion of NF Indian Creek from large wood placement and made plans to plant willows in this section of the stream in 2007. The helicopter work was next and was accomplished in 6 days during October, 2005 and October, 2006. A total of 174 trees were placed on the first year in Rogers Creek and Gibson Creek by a Boeing Chinook helicopter operated by Columbia Helicopters and placed as to form complex structures. The following year in 2006, a total of 248 trees were placed in Maria Creek, WF Indian Creek, NF Indian Creek, and Taylor Creek to complete the project with a grand total of 422 trees over the two year period. Trees were flown to the instream sites by a Boeing Chinook helicopter operated by Columbia Helicopters. The downed trees were lifted by the helicopter using a set of grapples attached to a longline and moved downslope to the structure site where ground crews guided the pilot as the trees were lowered into place.

MAINTENANCE AND MONITORING PERFORMED [(1) and (2)]

There has been no maintenance work performed on the structure sites after the project implementation. Monitoring/reporting costs incurred through dedication of staff time (US Forest Service and Siuslaw Watershed Council) amount to:
Forest Service Personnel: 15 hours fish biologist @ $35/hour = $525
Total cost: $525.

EXPECTED RESULTS

After placement of the large wood, the stream will undergo an adjustment period during which time habitat characteristics will undoubtedly change. Some change will be quick and some trees will have little impact on the habitat for years (dependent on flood sizes). Over time we expect to see more deep complex pools that provide excellent summer rearing for anadromous salmonids like the threatened coho salmon. We also expect a better sorting of substrate materials that will provide improved spawning sites for salmonids. We expect to see increased amounts of leaf litter, branches, small and large wood being captured at these large wood structure sites. This captured material provides the food source for the prey items of the salmonids in the stream. We may eventually see higher summer flows during drought conditions and lower water temperatures due to increased water storage in the now interactive floodplains. Over time as these changes take place we should see a noted increase in the amount of summer rearing of salmonids in these streams. This increase will be seen in the summer snorkel surveys that the Siuslaw Watershed Council will be repeating in the future.

The structures that were created will influence over 11 miles of fish habitat in Indian Creek drainage. Future flood events are considered important factors for improved fish habitat conditions. These flood events bring in large quantities of small rock and wood and, now that large wood is present in the stream, it will be trapped and detained instead of washing through. From a social perspective this project provides an opportunity to widen our base of stockholders that are interested in conducting restoration beyond what we have developed with our Deadwood and Karnowsky Creek projects.

ACTUAL RESULTS

Widened channel floodplain from newly derived gravel, side channel formation / channel alteration (with more sinuosity), and additional scour pools were observed throughout the structure sites we monitored since the project implementation from high water events. Especially, the amount of gravel that was delivered to the project reaches and the degree to which they were sorted in large concentration directly adjacent to the helicopter structures was far more prominent than what we have observed in previous years from other helicopter projects. Forest Service fisheries personnel observed Coho carcasses retained by the helicopter structures in many of the sites in 2006 even though we monitored these sites towards the tail end of the Coho spawning season. Similar to the NF Siuslaw Restoration Project, ODF&W Coho and Steelhead spawning surveyors have repeatedly reported to FS fisheries personnel that they had been seeing many spawning samonids actively using the helicopter trees while migrating upstream. According to them, the salmonids were frequently observed resting and spawning either directly underneath the helicopter trees or in areas directly adjacent to the helicopter trees, especially in WF Indian Creek and Rogers Creek. The site visit for 2007 was done in early November, so we did not get to see many spawning fish this year (unfortunately, the spawning fish numbers were low across the entire coast), but we did see some early spawners' redds in the project area, some of them using the fresh gravel that was collected by the structures. In 2006, many of the structures were altered considerably from the November flood with more sediment and other woody debris that were brought down as well as from the sheer strength of the stream flow. We did not see as much changes from the 2007 flooding, but as time progresses, we should see more of these changes. The stream complexity should be greatly enhanced, encouraging the natural processes to return the stream back to its healthy equilibrium.

Winter floods that occurred in 2006-2007 (5~10 year event) kick-started that process by transporting substantial amount of gravel and woody debris to the project sites to be collected by the large wood structures we placed. Important lessons include planning in plenty of days to complete the project because many of our flight days were canceled due to bad weather conditions and as a result our project got postponed for another year. Part of that was innevitable and unrelated to our responsibility, but if there are ways to plan in more days for the project, the better shape you will be in as far as completing the project in time. Also, because it was postponed, we realized that some of the project sites we had scheduled to treat the following year have changed enough to require new plans for the structure placement designs. Therefore, planning ahead of time to recognize those changes before the project seemed very crucial for the successful project implementation.

OUTREACH

Many of the sites treated with large wood are in great locations to have training sessions on restoration techniques for Fisheries Biologists and other natural resource specialists inside and outside the Forest Service. For instance, a regional US FS training titled NR20 (Stream and Watershed Restoration Design and Implementation Workshop) was held in Florence, OR, for the year 2006, and was organized mostly by Central Coast Ranger District employees. Large wood structures from this project would be an ideal candidate site for field trips to showcase the ins and outs of helicopter large wood placement projects. Aside from this, our district is visited by a substantial number of people each year, and the sites from this project, especially the ones that have easy access, such as Rogers Creek, NF Indian Creek, and Gibson Creek, would be excellent locations for field show-me trips

Siuslaw National Forest has a website in which all the restoration projects that have been proposed or completed annually would be listed and described for interested audience. There is also an intranet website created by WFRP (Wildlife, Fish, Rare Plants) that illustrates all the restoration projects that were sponsored by Forest Service each year, and this website has recently become available to the general public through the internet. As a result, details of this Indian Creek Aquatic Restoration Project, including funding, can be located there by anyone who is interested.

This project is following suit to the group of projects within the Siuslaw River Basin which were recognized nationally and internationally in 2004 through winning the Theiss International River*prize* awarded in Brisbane, Australia. The award was presented to the Siuslaw National Forest, the Siuslaw Watershed Council, The Siuslaw Institute, and The Siuslaw Soil and Water Conservation District. The attention garnered from this recognition continues to honor the Siuslaw Watershed. We will continue to reach out to the general public to inform and address what has been accomplished through the Indian Creek Aquatic Restoration project.

MONITORING AND EVALUATION

US Forest Service personnel and other agency partners will be in charge of project monitoring and evaluation. The data collected will be shared with all interested parties.

Photographs:

These photos below showcase the representative before and after photos with descriptions of what has been observed since the project implementation at these treatment sites in the project area. These photos characterize many of the on-the-ground changes we have seen as a result of the tree placement. For other types of monitoring results, please see the end of the document.

 = Reference Points (for easy comparison)

North Fork Indian Creek (Part 1)

Site #1 (furthest upstream structure), looking downstream – 2005 pre-project

Site #1 (furthest upstream structure), looking downstream - 2007

New Comments: The structure has helped collect small woody debris and sediment, scour pools, and encourage the high water to inundate the low-level floodplain on the left side.

North Fork Indian Creek (Part 2)

Site #2, looking downstream – 2005 pre-project

Site #2, looking downstream - 2007

New Comments: Recent fine sediment accumulation appears to have occurred extensively around the structure.

North Fork Indian Creek (Part 3)

Site # 5, looking downstream – 2005 pre-project

Site # 5, looking downstream - 2007

North Fork Indian Creek (Part 4)

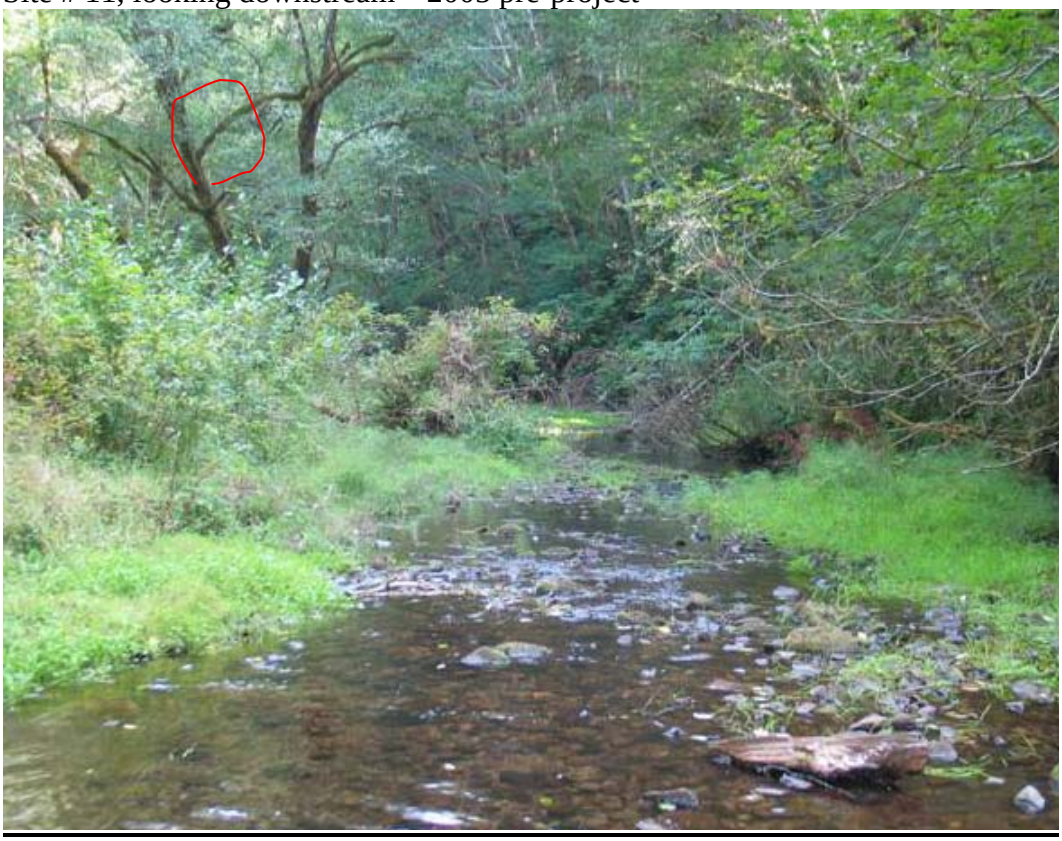
Site # 8, looking downstream – 2005 pre-project

Site # 8, looking downstream - 2007

New Comments: Recently formed side channel habitat and channel braiding around the structure was observed.

North Fork Indian Creek (Part 5)

Site # 11, looking downstream – 2005 pre-project



Site # 11, looking downstream – 2007

North Fork Indian Creek (Part 6)

Site # 11, looking upstream – 2005 pre-project

North Fork Indian Creek (Part 7)

Site # 12, looking downstream – 2005 pre-project

Site # 12, looking downstream – 2007

North Fork Indian Creek (Part 8)

Site # 14 looking downstream, 2005 pre-project

Site # 14 looking downstream, 2007

New Comments: Good collections of small woody debris around the structure was observed along with a new gravel bar which formed above the structure.

North Fork Indian Creek (Part 9)

Site # 17, looking downstream – 2005 pre-project

Site # 17, looking downstream – 2007

North Fork Indian Creek (Part 10)

Site #18, looking upstream - 2005 pre-project

Site #18, looking upstream - 2007

New Comments: Some recent scour was observed from newly placed logs.

North Fork Indian Creek (Part 10)

Site #18, looking upstream – 2007 (2)

New Comments:

New beaver dam found between Site #18 and #19 – 2007 (2)

North Fork Indian Creek (Part 11)

Site #19, looking upstream - 2005 pre-project

Site #19, looking upstream – 2007 (2)

New Comments: A couple of existing logs from a previous habitat project located on the right bank have swung downstream since the reference photos were taken.

North Fork Indian Creek (Part 11)

Site #19, looking upstream up close – 2007 (1)

Site #19, looking upstream up close – 2007 (2)

NF Indian Creek (Part 12)

Site #20, looking upstream – 2005 pre-project

Site #20, looking upstream – 2007

2006 Comments: The placed trees have already altered the stream enough to build up gravel in the center of the channel and create side channels going around the gravel pile.

NF Indian Creek (Part 12)

Site #20 looking upstream – 2007 (2)

New Comments: Now the majority of the flow is coming from the left side of the photo as a result of the gravel/sediment island that started developing since 2006 (see previous photo). The root wad that was upstream got caught partially by the tree in the photo here. On the upstream end of the structure, the placed tree is helping scour a deep pool in the middle of the channel.

Site #20 looking from side – 2007 (2)

New Comments: Good carcass retention was observed at Site # 21.

Maria Creek (Part 1)

Site #4, looking downstream – 2005 pre-project

Site #4, looking downstream – 2007

New Comments: A high number of juvenile fishes (particularly coho and cutthroats) were observed throughout the entire Maria Creek, and a large portion of them seemed to be taking advantage of the pools associated with the these new structures.

Maria Creek (Part 2)

Site #4, looking upstream – 2005 pre-project

Site #4, looking upstream – 2007

New Comments: The structure has affected the channel enough to develop a point bar at the downstream end of this structure, causing the stream to become more sinuous.

Maria Creek (Part 2)

Site #4, looking upstream from the center – 2007

New Comments: The trees configuration with a tree holding on top of the lowest tree helped collect the small woody debris that would have otherwise flushed out of the system. The bottom picture shows how the downstream end tree helped form the gravel bar and caused the stream to meander.

Site #4, looking downstream from the center – 2007

Maria Creek (Part 3)

Site #5, looking downstream – 2005 pre-project

Site #5, looking downstream – 2007

New Comments: The trees have changed the stream dynamics significantly by collecting sediment and creating a side channel. The photo on the right shows the area right where the channel splits.

Maria Creek (Part 4)

Site #5, looking upstream – 2005 pre-project

Site #5, looking upstream – 2007

The photo above shows the 6 inch DBH alder that the eager beaver munched down right below this structure site.

New Comments: The structure is helping the water seep out into the low-level floodplain zone (covered with small alders) during high water events. It's also adding various scour depths in the channel unit.

Maria Creek (Part 5)

Site #6, looking downstream – 2005 pre-project

Site #6, looking downstream – 2007

New Comments: Collected small woody debris and sediment, and helped create more scour holes in the channel unit.

Maria Creek (Part 6)

Site #7, looking downstream – 2005 pre-project

Site #7, looking downstream – 2007

New Comments: This structure hasn't brought about major changes yet on the upstream end, but we should see more changes over time, considering how low the trees are placed in the stream.

Maria Creek (Part 7)

Site #8, looking upstream – 2005 pre-project

Site #8, looking upstream – 2007

New Comments: This site has changed tremendously. The structure has caused the channel to meander around the trees, leaving a prominent point bar at the downstream end of the structure (center of the picture). This has increased the channel flow to slow down quite a bit, and created a nice pool.

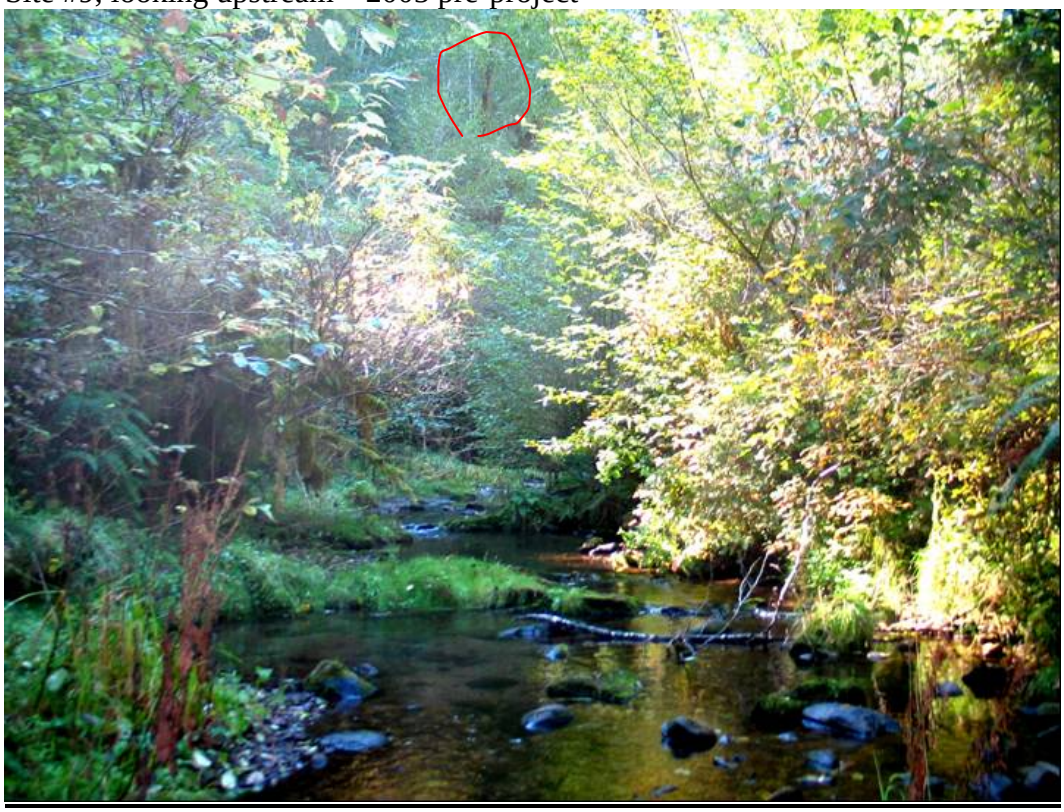
Maria Creek (Part 7)

Site #8, looking from side – 2007

New Comments: This photo shows the configuration of the trees that helped create the point bar creation and the meander in the stream.

Maria Creek (Part 8)

Site #9, looking upstream – 2005 pre-project



Site #9, looking upstream – 2007

New Comments: There was small woody debris collected around the new trees in addition to some beaver cuttings that were scattered in here. There is tributary that comes in on the left side, so we look forward to see future debris collection at this site.

Rogers Creek (Part 1)

Site #24, looking downstream – 2005 pre-project

Site #24, looking downstream – 2007

New Comments: The jam has collected some new sediment over the winter and the mid-channel island seems to be enlarging towards the structure as a result of that. The structure trees are nicely staggered, yet laying very low on the ground, so we expect to see more changes in the future.

Rogers Creek (Part 2)

Site #24, looking upstream – 2005 pre-project

Site #24, looking upstream – 2007

New Comments: Very nice configuration of the structure: a low lying tree in the center of the channel and more trees staggered on top of each other, which added elevation to collect small woody debris / sediment.

Rogers Creek (Part 3)

Site #25, looking downstream – 2005 pre-project

Site #25, looking downstream – 2005 pre-project

New Comments: The jam seemed to have caused the stream to become more sinuous. Because Rogers Creek has a wide floodplain, it was easier to work the trees in right to the bottom of the stream.

Rogers Creek (Part 3)

Site #25, looking upstream from center – 2007

New Comments: The photo above showcases the small woody debris collection that was observed at the site, which is hard to grasp from the photo on the previous page. The tree also helped scour a pool underneath. The photo below shows the salmon redd (probably a Coho) created this winter right by the structure tree.

Site #25, looking at the redd on the upstream end – 2007

Rogers Creek (Part 4)

Site #25, looking upstream – 2005 pre-project

Site #25, looking upstream – 2007

New Comments: The structure is helping regain the floodplain interaction by causing the high flow water to move into the low-level floodplains on both side of the bank.

Rogers Creek (Part 5)

Site #27, looking downstream – 2005 pre-project

Site #27, looking downstream – 2007

New Comments: Collecting more small woody debris and sediment, helping maintain and increase the channel meander.

Rogers Creek (Part 6)

Site #27, looking upstream – 2005 pre-project

Site #27, looking upstream – 2007

New Comments: The tree in the center here has helped scour deep pools in this channel unit. The amount of gravel decreased from this site downstream; in future years, we'll monitor how much gravel will be added to these downstream sites. The angle of the photo is slightly different, but it shows the same general area.

Rogers Creek (Part 6)

Site #27, looking downstream from the bottom end of the structure – 2007

New Comments: The photo above shows the deep scour pool created in this channel unit. The photo below shows how the upstream end tree is encouraging the formation of a pronounced point bar.

Site #27, looking downstream from the upper end of the structure – 2007

Rogers Creek (Part 7)

Site #28, looking downstream – 2005 pre-project

Site #28, looking downstream – 2007

This photo above shows the wood that are helping scour the deep pool.

New Comments: There is a mid-channel island that is forming under the right hand tree and the deep pool under the left hand tree is maintaining and increasing its depth as a result of the wood scouring.

Rogers Creek (Part 8)

Site #29, looking downstream – 2005 pre-project

Site #29, looking downstream – 2007

Rogers Creek (Part 9)

Site #30, looking downstream – 2005 pre-project

Site #30, looking downstream – 2007

New Comments: the channel seems to be encouraging the formation of the mid-channel island and side-channels upstream as a result of slowing down the water.

Gibson Creek (Part 1)

Site #11 looking upstream – 2005 pre-project

Site #11 looking upstream – 2005

Gibson Creek (Part 1)

Site #11 looking upstream – 2007

New Comments: The structure is starting to collect sediment and detritus all around these trees and changing the way this site looked drastically. I almost did not recognize it was the same site.

Gibson Creek (Part 2)

Site #12 looking upstream – 2005 pre-project

Site #12 looking upstream – 2007

New Comments: Although a majority of the site was covered with bedrock, gravel and fine sediment accumulation is starting to take place in the upstream and downstream end of this structure.

Gibson Creek (Part 3)

Site #12A looking downstream – 2005 pre-project

Site #12A looking downstream – 2007

New Comments: Looking at the amount of fine sediment that was collected above the gravel layer, there might have been a small debris slide that deposited all the sand and clay into the structure sites.

Gibson Creek (Part 4)

Site #13 looking downstream – 2005 pre-project

Site #13 looking downstream – 2007

New Comments: The large standing alder on the left fell down into the stream, so that is why you don't see it in the more recent photo. The trees are right on the bottom of the stream, so we look forward to see future changes.

Gibson Creek (Part 5)

Site #13 looking upstream – 2005 pre-project

Site #13 looking upstream – 2005

Gibson Creek (Part 5)

Site #13 looking upstream – 2007

New Comments: Gibson Creek seems to collect a lot of leaf litter and other coarse organic material, and as a result the structure is collecting that and sediment actively around the placed trees.

Gibson Creek (Part 6)

Site #11, looking from side – 2007

Site #14, looking from side – 2007

New Comments: The two photos above show how much gravel has accumulated by the large wood projects, making the trees blend in with the habitat very well.

Taylor Creek (Part 1)

Site #1 (Furthest Downstream Structure), looking upstream – 2005 pre-project

Site #1 (Furthest Downstream Structure), looking upstream – 2007

New Comments: Considering the size of the watershed (~1,000 acre watershed = smaller), I was surprised to see the amount of changes as I observed on Taylor Creek from the 2006-2007 winter storms. Newly collected gravel, fine sediment, and small woody debris were observed around virtually all of the 15 structures.

Taylor Creek (Part 2)

Site #1, looking downstream – 2005 pre-project

Site #1, looking downstream – 2007

New Comments: Lots of small woody debris collected at upstream end made a new side channel on right side (looking upstream) of the channel going through alders. Scour pools created by logs. Sediment deposited on upstream side. Overall floodplain width increased from new gravel collection dispersing onto the banks. Coho carcasses were found at Site #1 and immediately downstream by some of the cabled tie-down structures.

Taylor Creek (Part 3)

Site #2, looking upstream – 2005 pre-project

Site #2, looking upstream - 2007

New Comments: Design made on the spot. More gravel found along the structure. Site has increased complexity in terms of the channel formation from the placement trees (stream forced to move through the multiple trees).

Taylor Creek Site #2 Looking Upstream

Site #2, looking upstream - 2005 pre-project

Site #2, looking upstream - 2007

New Comments: Biggest changes (in terms of channel complexity) were observed in the lower 5 structures. Widened channel floodplain from newly derived gravel, side channel formation / channel alteration (with more sinuosity), and additional scour pools were observed throughout the structure sites in these lower reach.

The following list details the other elements that will be monitored over time:

Water temperature – continuous summer water temperature monitoring sites have been established by the Siuslaw National Forest and those sites will continue to be monitored to provide a long term database to monitor changes over time. Some of those sites are located within this project area. **Results:** Any significant changes will most likely occur over a long span of time (5~10 years), so we will continue to monitor those sites to detect those long-term changes. No sites on Indian Creek basin were monitored in 2007, but we will visit these sites in future years. There are other large wood placement projects on Siuslaw National Forest lands that have been used to monitor the temperature changes over time and will lender some insights into these effects.

- **Fish populations –** summer snorkel surveys were conducted by the Siuslaw Watershed council in 2000 and 2002-2006 to assess anadromous fish rearing densities. This monitoring will be repeated at a future date to document changes. Oregon Department of Fish and Wildlife has a random spawning survey that usually covers some of the streams that are included in this project. **Results** – Data from the snorkel surveys are available on GIS maps produced by Charley Dewberry and most of them are posted on a website titled "Inforain GIS" created by Ecotrust. Similarly, spawning data from ODFW 2001-2006 is available on its agency website. All the Indian Creek tributary sites monitored by ODFW for Coho Spawning Surveys are Random surveys, so it is difficult to track the changes from year to year. Also, the fact that there are many other factors that affect the fish population level from year to year (such as ocean conditions, natural events and climate), there are limited conclusions we can make about the effects of large wood placement from their data. However, talking with Charley Dewberry, his crew, and ODFW personnel, they have all commented on the fact that salmonids have been observed repeatedly using the large wood during their surveys. During my site visits, I have also sited Chinook and Coho on many occasions hanging out in pools created and shaded by the large wood that were placed by this project.
- **Fish Habitat –** The US Forest Service has been conducting summer habitat surveys for anadromous fish rearing in this project area. These surveys are on a 10 year revolving survey schedule and the streams in this project will be surveyed when the regular schedule approaches unless extenuating circumstances warrant an earlier survey (i.e. large localized flood/landslides, etc.) **Results** – The US Forest Service is making an effort to schedule in habitat surveys on the helicopter restoration reaches in the coming years. It is critical that we wait a few years so that the tree structures will have the chance to experience some large scale winter floods, which will in turn put the tree structures to the real test in whether they can yield positive habitat changes for fish habitat. 2006-2007 flood was a higher level flood (5~10 year event), which brought more changes to the channel morphology on the treated stream reaches, yet the scale of the flood was not big enough to warrant a earlier stream survey.

In addition, two other approaches were taken for monitoring to assess the outcome of the project: photos and GPS coordinates of each structure. Photos were taken before and after the placement of the helicopter trees from two angles, upstream and downstream, at each structure sites. GPS coordinates of the structure sites were recorded to assess any movement of individual or groups of trees especially after severe winter floods.