Upper Middle Fork John Day River

Intensively Monitored Watershed:

Final Report (October 1, 2009 – September 30, 2010)

November 8th, 2010

Prepared by:

Cyrus Curry
Data Steward
and IMW Coordinator

Kyle Abraham
Effectiveness Monitoring Coordinator
Oregon Watershed Enhancement Board

Contents

Acknowledgements

We would like to thank the following individuals and agencies, who have provided their dedication and support to the success of this project and also provided the results summarized in this final report. Amy Charette, North Fork John Day Watershed Council. Jim Ruzycki and Chris James, Oregon Department of Fish and Wildlife. Patricia McDowell and Michael Hibbard, University of Oregon. John Selker and Sue Lurie, Oregon State University. Eric Archer, Tom Friedrichsen, Steve Namitz, Jim Soupir and Holly Bentz, United States Forest Service. Brian Cochran, Scott Turo and Steph Charette, Confederated Tribes of Warm Spring in Oregon. Mark McCollister and Scott Peerman, The Freshwater Trust. Jerry Ebeltoft, The Nature Conservancy. Bruce Crawford, National Oceanographic and Atmospheric Administration.

Introduction

This final report, for the time period October 1st 2009 through September 30th, 2010 for the Upper Middle Fork John Day River Intensively Monitored Watershed (IMW), is intended to describe the implemented restoration actions, collaborative monitoring, and new partnerships that have developed over the past year. This report also marks the successful completion of the third year of monitoring for the IMW.

Coordination

In early February, an opportunity was identified to submit and present a poster at the River Restoration Northwest Symposium. The poster, titled, "Multiple Agency Cooperation: Long Term Monitoring of the Effects of Watershed Scale Restoration", was developed by the IMW coordinator and presented in this forum. The IMW coordinator held a two day Science Forum on February 17th and 18th 2010 in John Day. Project partners presented their respective projects and shared preliminary results. The science forum was an important tool for engaging in active and constructive dialog on a myriad of IMW topics. There were also presentations by organizations performing restoration, research or monitoring in the area that were not directly involved in the IMW but are undertaking similar work. This was an opportunity to network with other restoration actions in the vicinity and will provide an avenue to more accurately describe the suite of restoration actions in the basin. There were 18 presentations and 12 posters presented at the forum and at least 50 people in attendance, including members of the local community. The next science forum is slated to be held in the early part of 2012.

Monthly conference calls with associated agendas have been in place to apprise the project partners of continuing developments regarding their efforts in support of the IMW. All have achieved a high level of attendance despite the increased workloads for most all representatives involved. The monthly conference calls are important for addressing immediate coordination issues and help to keep the project focused and on track over the long term. A well received face-to-face meeting was held in mid-September, following a yearly schedule. The face-to-face meeting provided a good opportunity to network among project partners and a venue for discussing lessons learned during the past field season.

The IMW coordinator attended three Pacific Northwest Aquatic Monitoring Partnership (PNAMP) meetings with the goal of multiagency cooperation and coordination of effectiveness monitoring, during the past year. The IMW coordinator also participated in a conference call with the Middle Columbia Basin Federal Caucus to discuss methods for re-establishment of steelhead populations. The IMW coordinator worked closely with OWEB staff on the development of a request for proposal with the goal of acquiring a contractor with the ability to create an action implementation plan for the IMW. The contract for the development of an action implementation plan was awarded in late July and a final product is expected before the end of calendar year 2010. In addition, the IMW coordinator was able to successfully post a large proportion of the IMW monitoring data to the Integrated Status and Effectiveness Monitoring Program (ISEMP) collaboration portal. The IMW coordinator also made significant progress in editing the water quality database template to ensure more consistent data entry and to minimize time spent by constituents on this task. The IMW coordinator also made substantial improvements to the IMW geodatabase with the intent of improving usability for all potential users. The goal for the geodatabase is a consistent field convention and consistent presence of metadata for files uploaded into the geodatabase. The IMW coordinator also performed quality assurance/quality control of existing geodatabase elements to eliminate redundancy and increase uniformity among feature classes.

In August, the IMW collaborators conducted a tour of the project area for our National Oceanic and Atmospheric Administration (NOAA) representative, Bruce Crawford. The tour highlighted most of the main stem Middle Fork John Day River with an emphasis on the watershed upstream of the confluence with Big Creek. Most of the project partners involved with the IMW attempted to be present so they could explain their expertise in individual projects and techniques in support of the IMW effort. Projects included restoration actions that are underway in the Middle Fork John Day River, as well as a few sites where restoration actions are planned for the near future. A focus was placed on illustrating the idea of monitoring at multiple scales so that it will be possible to attribute differences in salmonid populations due to restoration actions. The ease of working with various agencies and organizations and the ability and willingness to cooperate with one another, within and outside of the IMW, is illustrative of a set of relationships that benefit from a lens that looks at a much larger scale than that of the individual project. Without these relationships the project would not have been nearly as successful.

The IMW coordinator created, with help from OWEB staff, an historical expense tracking sheet for IMW funds and also created a budget and scope of work document for predicted expenditures of 2011 funds from Pacific States Marine Fisheries Council (PSMFC).

Restoration Project Updates

Channel Realignment

The Middle Fork John Day River had a significant channel reconfiguration occur this year. The large investment in channel realignment impetus and funding were of wholly separate entities, namely The Freshwater Trust and the USFS. Both funding entities have been forthcoming with realignment plans and were open to IMW compatible monitoring strategies. In return, the Upper Middle Fork Working Group (UMFWG) provided advice and assisted with monitoring as well as data sharing that has been collected as a result of the IMW. This is a prime example of cooperation and partnership between agencies that the IMW network is fostering and benefiting from.

The Middle Fork John Day River historically had a *pool-riffle* channel morphology. Due to river corridor modifications upstream from and through, the project area, the pre-project channel was characterized as having *plane bed* morphology. *Pools* were relatively uncommon, likely due to the modified channel planform, channel profile, and increased stream energy. Loss of large wood and a suspected coarsening of the river bed, related to the shorter and steeper channel profile, reduced channel complexity, floodplain connectivity, and riparian vegetation.

The Middle Fork John Day River generally flows north at the project site which is roughly divided in two halves by land ownership. The upstream half (Reach 1) is on public land managed by the Malheur National Forest (MNF) and the downstream half (Reach 2) is privately owned. An assessment of the river and floodplain shows local modifications including river straightening, riparian vegetation removal, and floodplain berm construction to improve agricultural production. These practices are believed to be the precursor to the disconnection of three channel segments (Abandoned Meander 1, 2, and 3).

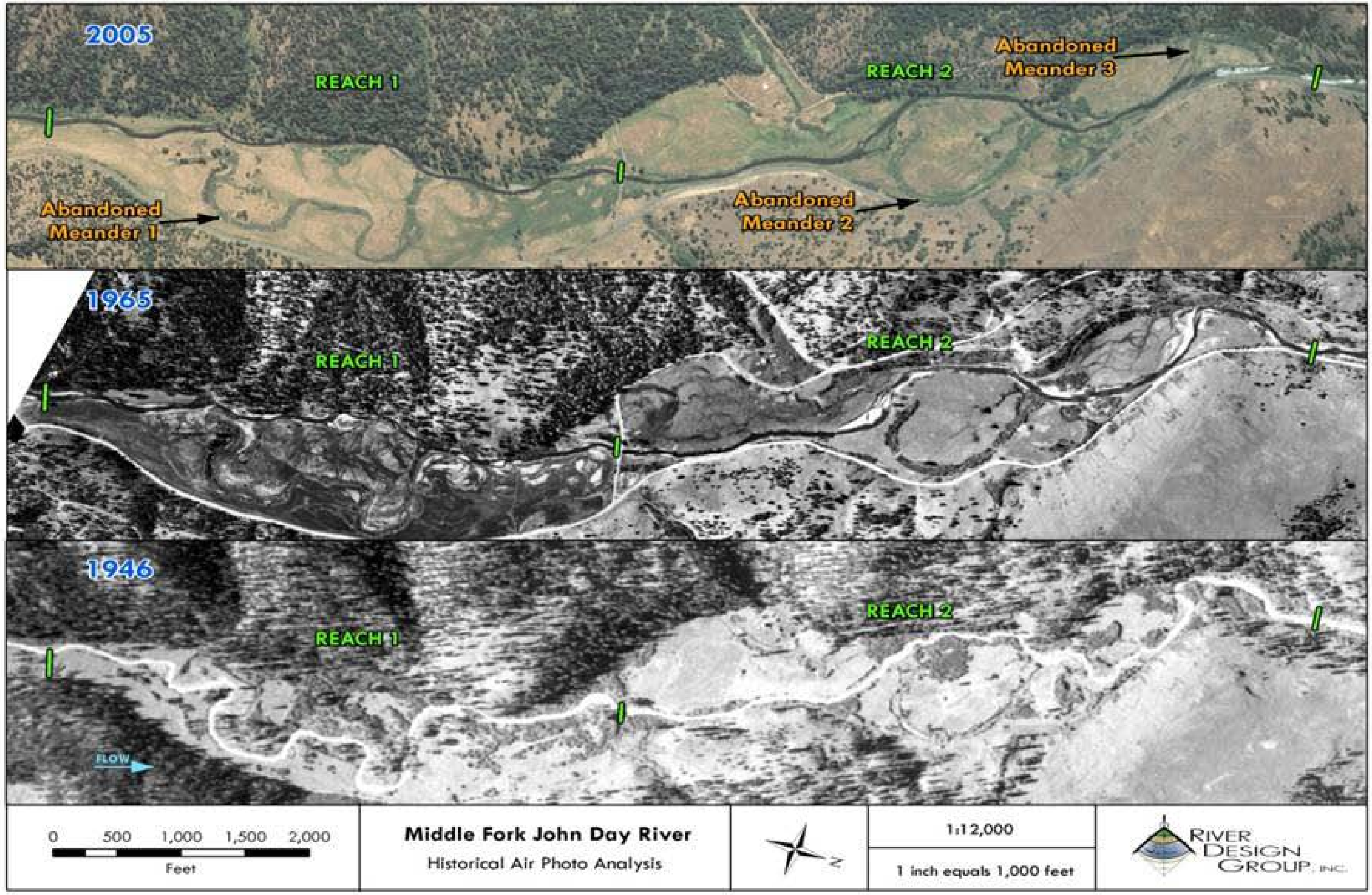

Figure 1. Aerial Photos of Reach 1 and 2 in Middle Fork John Day River in 1946, 1965 and 2005.

Primary project activities were designed based on site conditions within the context of basin scale limiting factors for spring Chinook salmon and summer steelhead. Project objectives were: to increase stream length and channel complexity, restore riparian and floodplain vegetation, improve channel-floodplain connectivity, and improve altered thermal regime. Restoration techniques included both active and passive restoration.

Key accomplishments and outcomes include: restoring flow to two abandoned channel segments (reach 2, abandoned meander 3, was restored in 2009), restoring aquatic and floodplain habitat complexity, and restoring riparian habitat. Completed project work is designed to address primary limiting factors for spring Chinook salmon and summer steelhead and incorporates both active and passive restoration occurring at the basin scale. Pre-project monitoring data, compatible with the IMW study design, has been collected at the site level. Geomorphologic monitoring was initiated by The Freshwater Trust through River Design Group. This monitoring will continue through the University of Oregon as part of the longer term geomorphology monitoring associated with the IMW. To facilitate this change in agencies' which monitor this restoration project site, data collection protocols have been reviewed and will provide necessary information to both parties. These data and subsequent analyses will provide an opportunity to assess project effectiveness in meeting goals and objectives in a manner that will inform adaptive management opportunities.

Measurable objectives include:

- Restored flow to Abandoned Meander 3 in 2009. This increased channel length from 810' to 1,300'.
- Restored flow to Abandoned Meander 1 in 2010. This increased channel length from 1,911' to 4,126'.
- Total channel length at the project site increased from 8,795' to 11,500'.
- 600 pieces of large wood were placed in-stream in constructed engineered log jams.
- Channel sinuosity increased from 1.07 to 1.21
- Large wood density increased from 0.0003 pieces per foot to 0.05 pieces per foot.

Figure 2. Preparation for channel realignment

Figure 3. View of new channel and embedded log structures.

Figure 4. Heavy equipment preparing new channel.

Additional restoration actions in the basin include continued improvements to fish passage through culverts by the United States Forest Service (USFS) in the Lick Creek and Camp Creek sub-basins. In 2010 alone, fish passage improvement by the USFS will provide access to more than 5 miles of spawning and rearing habitat for juvenile steelhead and Chinook salmon. The Nature Conservancy (TNC) continued a successful weed abatement program on private property managed by TNC. Oregon Parks and Recreation Division (OPRD) also established a weed abatement program at Bates Pond which is located in the upper reaches of the Middle Fork John Day River watershed. Another significant restoration action was a water diversion and wildlife exclosure which were installed on private property along Big Boulder Creek. In particular, this restoration action helps illustrate the dedication and support of local landowners to activities which are improving conditions in the Upper Middle Fork John Day River.

Monitoring Project Updates

Stream and Air Temperature Monitoring

The North Fork John Day Watershed Council (NFJDWC) coordinated stream and air temperature monitoring efforts for the IMW since 2009. In 2010, a network of 77 stream temperature loggers were calibrated & deployed in the project area, most of the loggers were installed in the mainstem Middle Fork John Day River but some installations occurred on larger tributaries. Barring technical issues with individual loggers, or other unforeseen issues, temperature data is now available for each of these installation locations for the time period of 2008-2010.

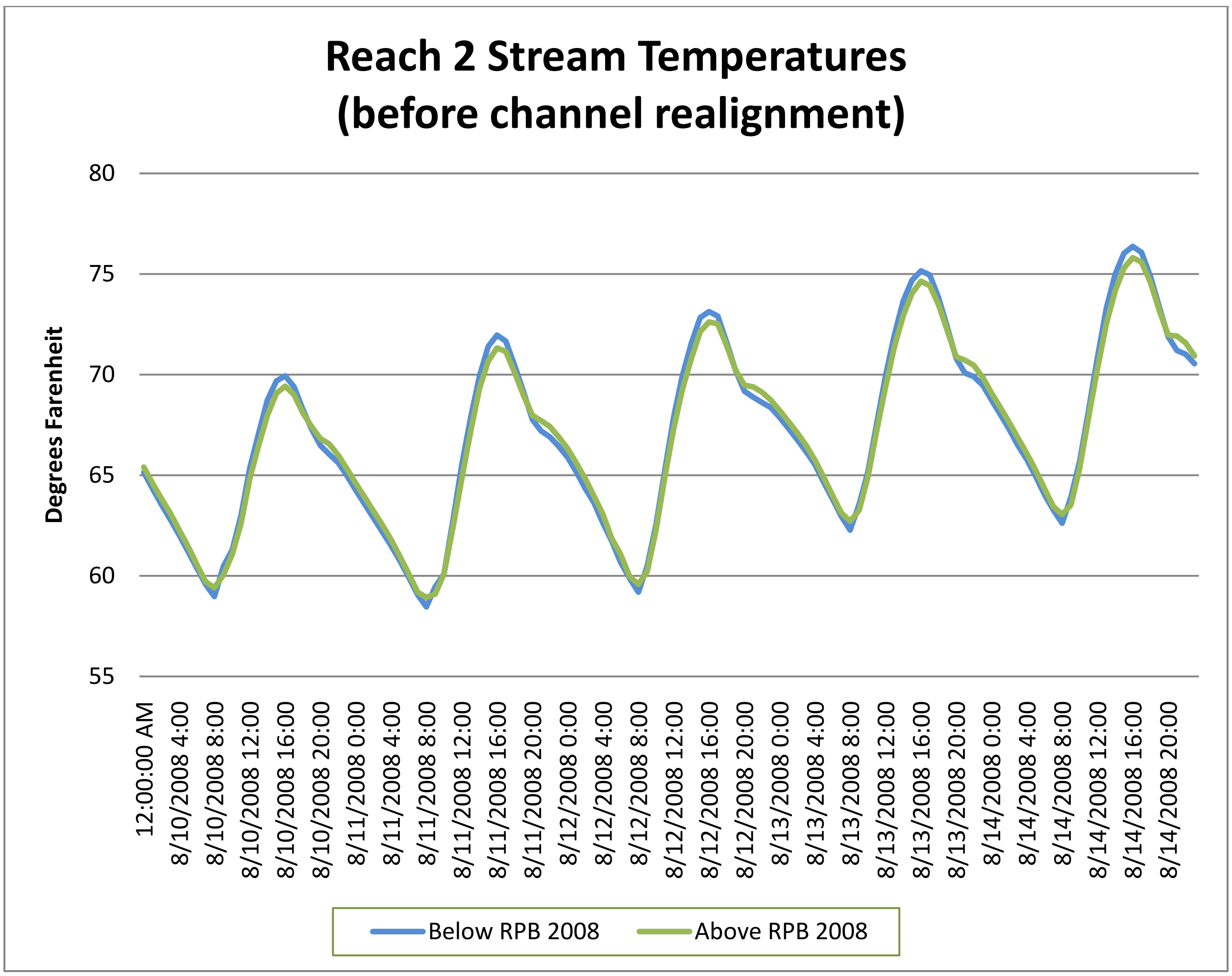

Figure 5. Stream temperature comparison upstream and downstream from reach 2 before channel realignment project.

The NFJDWC has successfully accomplished the compilation of all temperature monitoring data within the Middle Fork John Day River. The NFJDWC also works to ensure that data from stream temperature loggers, deployed for the IMW, is uploaded to the Oracle database with NOAA Fisheries' Northwest Fisheries Science Center. A geodatabase, which contains installation locations of all recorded temperature loggers for 2008-2010 for the NFJDWC, ODFW, TNC, and Confederated Tribes of the Warm Spring Reservation in Oregon (CTWSRO) was also uploaded to the Oracle database. The NFJDWC has additionally been working to ensure that overall goals outlined in the study design are being met by all participants for the temperature monitoring portion of the IMW. The current array of temperature data originates from a compilation of loggers, logger data, and logger installation locations:

- North Fork John Day Watershed Council 2009-2010
- Oregon Dept. of Fish and Wildlife 2008-2010
- The Nature Conservancy 2008-2010
- Confederated Tribes of the Warm Spring Reservation of Oregon 2008-2010
    - Oxbow Conservation Area
    - Forrest Conservation Area
    - John Day Basin Office
- Malheur National Forest 2008-2010
    - Prairie City Ranger District
    - Blue Mountain Ranger District

A consistent naming convention has been applied to the various temperature loggers and the upload of stream temperature data into the ISEMP database for normalized water quality was initiated.

Fiber Optic Stream Temperature Monitoring

Significant effort was devoted to understanding the groundwater and hyporheic processes controlling temperature dynamics in the major tributaries of the Middle Fork John Day River. Effort was focused on the Big Boulder Creek, where fiber optic temperature data was collected over the past two years (2009-2010). A large component of late-season groundwater inflow is apparent in stream temperature profiles in the lower section of the tributary, resulting in decreasing peak stream temperatures immediately prior to joining the Middle Fork John Day River. The project is mid-way into modeling processes that are utilizing a modified version of the HeatSource model, adapted to run on MATLAB (a mathematical computational, analysis, visualization, and algorithm developing program). Specific focus on analyzing the various datasets collected from the Middle Fork John Day River was a priority task over the past year.

The aforementioned fiber optic stream temperature data identified a new and persistent cool water pocket in the mainstem of the Middle Fork John Day River. The cool water pocket is thought to be the direct result of an engineered log jam construction and pool excavation that has enhanced groundwater input. Because of the denser, cool water settling in the pool there has been little mixing with the warmer flow above which has resulted in the creation of a thermal refuge for fish in times of high water temperature. A before and after restoration stream temperature profile is described by the following chart (Figure 6). The average stream temperature in the project reach has not dropped by 1.5° C; this apparent difference in stream temperature is due to measurements at different dates within each year. The comparison that can be drawn is in the stream temperature profiles, whose temperatures are accurate within each year.

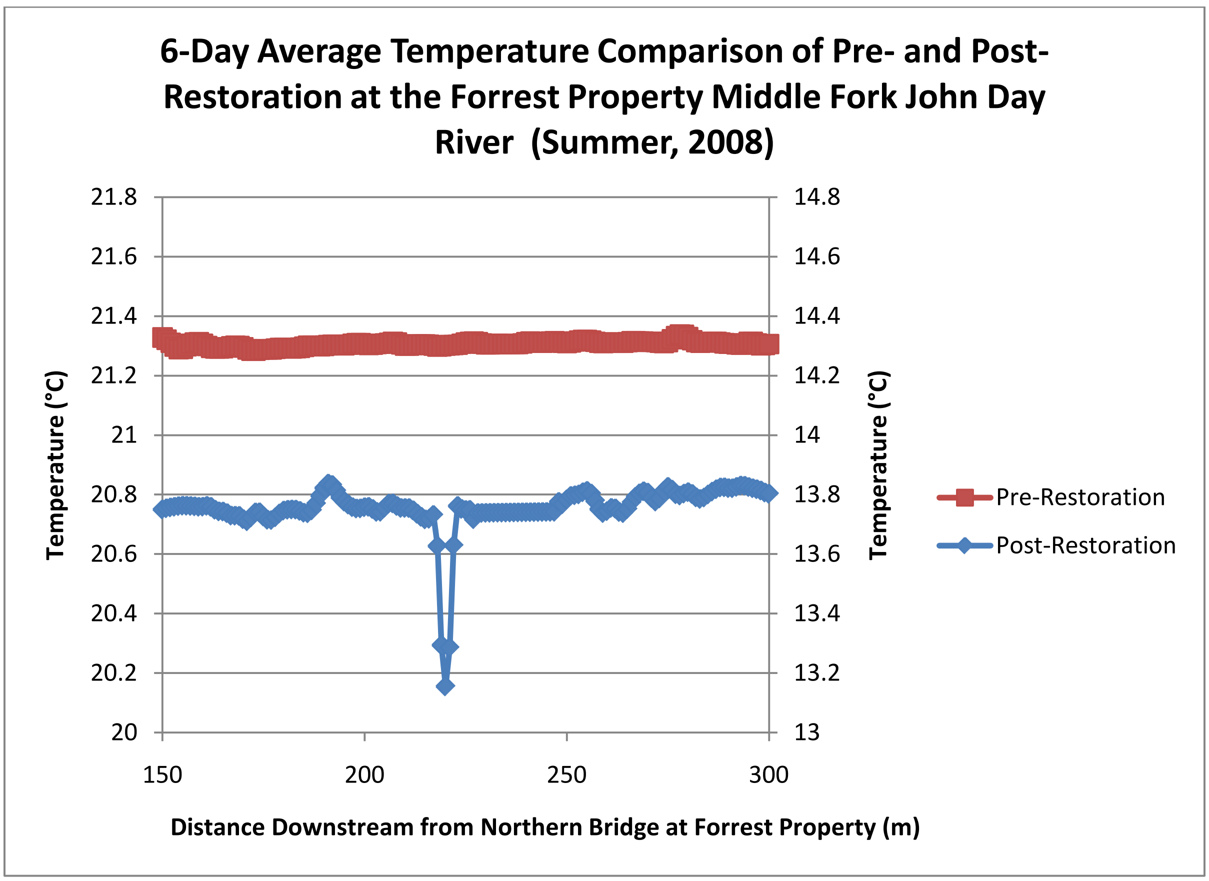

Figure 6. Stream temperature comparison before and after restoration actions.

We can be relatively certain that this persistent downward spike is a direct result of a groundwater inflow for a couple of reasons. First, cool water in the pocket must have been generated in some manner. In this scenario, barring the influence of cool water input, shading from the log jam itself would have been the only logical heat sink and it is unlikely that this would affect water temperature to the degree that has been demonstrated in the data. More likely this cooling can be attributed to either hyporheic exchange or groundwater inflow. A distinction can be made between these two hypotheses by analyzing the diurnal shift in the cool water pocket's temperature. A typical temperature profile of groundwater inflow and hyporheic exchange versus river temperature is presented in figure 7.

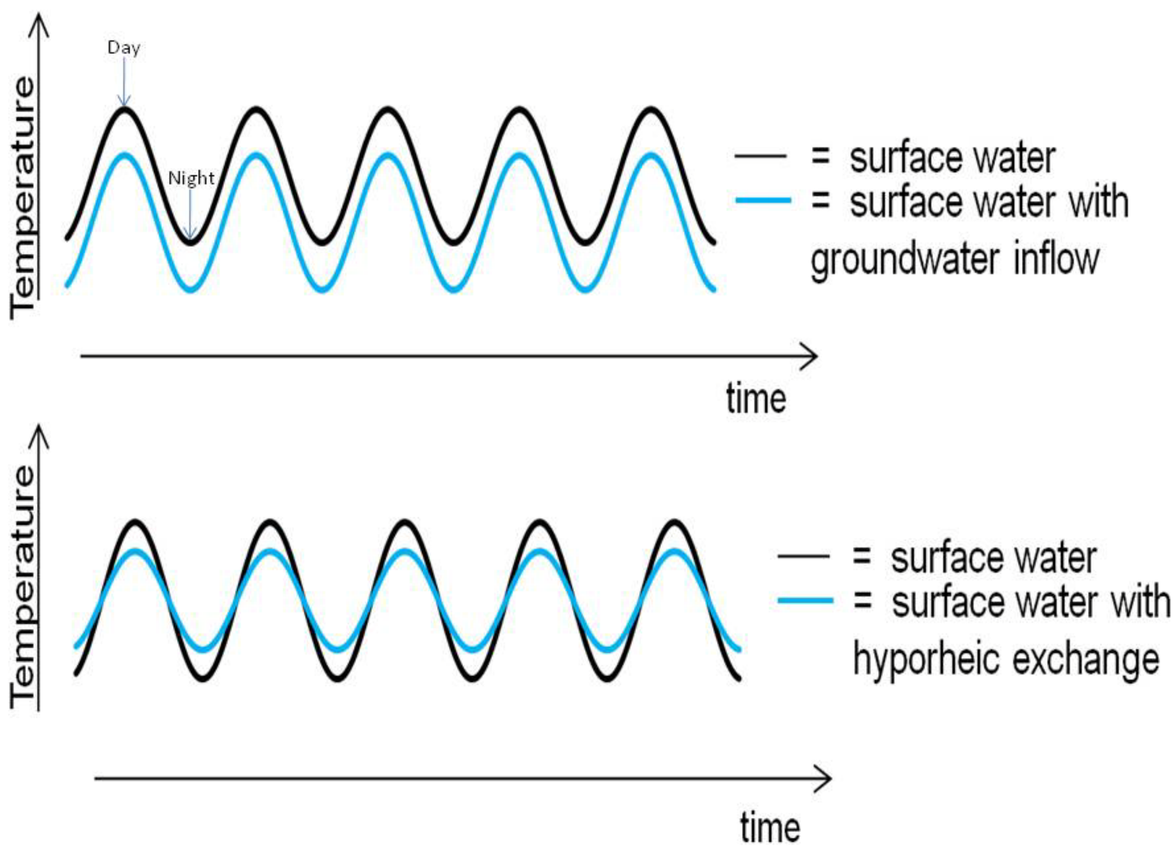

Figure 7. Profile of groundwater inflow and hyporheic exchange versus river temperature.

Note that the hyporheic flow is cooler than stream temperature during the day but at night is warmer, whereas groundwater inflow is always cooler than stream temperature. The latter condition is described in the following graphs (figure 8), where the data are the averages of the four hottest hours and four coolest hours of each day. Had the spike in the cooler water profile been upward it would have reflected hyporheic exchange. As it is a strong case can be made that groundwater inflow is the driving factor.

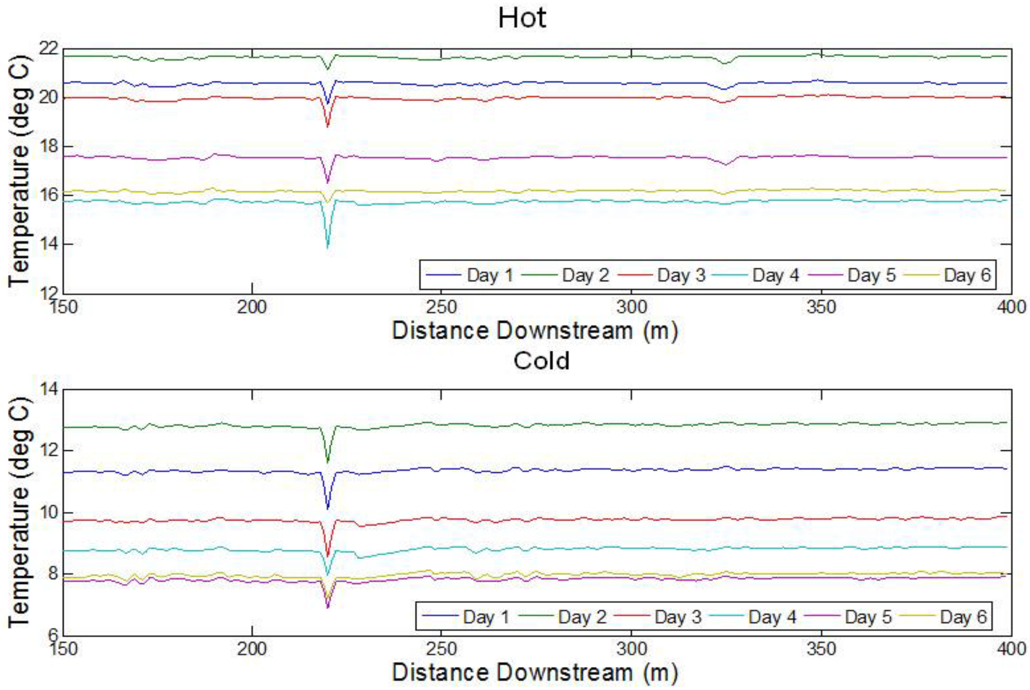

Figure 8. Profile of stream temperature and detectable decrease in stream temperature.

The IMW has been utilizing fiber optic temperature monitoring throughout the life of the project. The ultra-fine resolution of the fiber optic monitoring provides the ability to detect these small yet significant changes due to restoration.

Groundwater Monitoring

From May 2008 to the present, groundwater levels have been monitored, on an hourly basis, in up to 45 groundwater monitoring points in the Middle Fork John Day River (MFJDR) floodplain. Groundwater levels are measured via continuously-logging pressure sensors (Onset Corporation). Calibration of records is accomplished by use of barometric pressure records, field measurements, and reference elevations (relative to mean sea level). Calibrated results are expressed in terms of groundwater elevation. The groundwater level records provide information about groundwater dynamics, including typical annual groundwater level range, the dynamics of spring-to-summer groundwater level decreases, and, in some locations, dates of floodplain saturation. This information is relevant to river restoration work performed on the Middle Fork John Day River because groundwater dynamics, and their impact on stream flow regime, are intimately connected to the goals of many of the riparian restoration projects underway on the Middle Fork John Day River.

An example of a typical groundwater monitoring transect, consisting of four groundwater monitoring points, is displayed in Figure 9. For this particular transect, groundwater records were available between March and July of 2009 and 2010; these records are displayed in Figure 10.

Figure 9. Groundwater monitoring transect in the Middle Fork John Day IMW

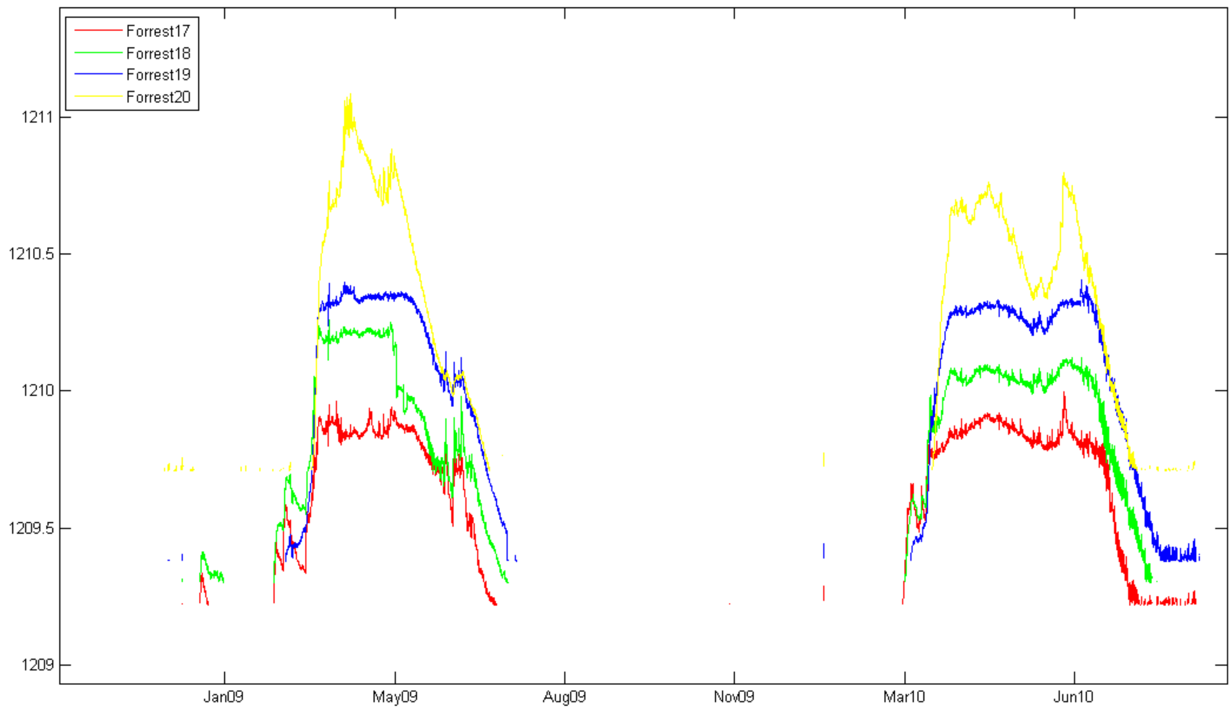

Figure 10. Profile of groundwater monitoring stations in the Middle Fork John Day River IMW.

Using Figure 10 as an example, several deductions can be made about the shallow floodplain groundwater aquifer. First, "flat-lining" that occurs between March and May of each year in the "Forrest17", "Forrest18", and "Forrest19" records indicates saturated floodplain conditions. During this period, the soil in the floodplain is "full," with the rate of water entering the floodplain (via snowmelt, precipitation, and groundwater inflows from upslope areas) being greater than the rate of water leaving the floodplain (via evaporation, plant transpiration, and draining to the river). Only in the latter half of May does this situation reverse, and floodplain groundwater levels begin to drop.

Second, the magnitude of groundwater drop between May and July can be evaluated in relation to evapotranspiration, allowing a better understanding of the quantity of groundwater available to augment stream flow. Between May and July, groundwater levels drop approximately 1 meter. Given the typical soil specific yield for this floodplain (0.2 meters per meter), a 1 meter drop in groundwater level corresponds to 0.2 meters depth of water being lost from the floodplain. In comparison to this water loss, evapotranspiration water loss for "pasture" in Grant County Oregon (published in the "Oregon Crop and Water Use Irrigation Requirements," OSU Extension Miscellaneous 8530, 1999) between May and July is expected to be approximately 0.45 meters. The comparison of actual water loss, 0.2 meters, to potential water loss due to evapotranspiration, 0.45 meters, reveals that evapotranspiration rates are fast enough to remove much of the water from the Middle Fork John Day floodplain between May and July.

Third, the groundwater records can be used to estimate the quantity of groundwater flowing into the Middle Fork John Day River. Specifically, the difference in groundwater elevations between the upslope and downslope ends of a floodplain can be used to estimate groundwater "gradient," and this value can be used in Darcy's equation for flow in soils to estimate total flow. For example, the groundwater elevation at the upslope "Forrest20" is approximately 1 meter higher than the downslope "Forrest17". This drop in groundwater surface elevation occurs over a linear distance of 240 meters, yielding a groundwater gradient of 0.4%. Using Darcy's Law (flow = area* hydraulic conductivity * gradient), we can estimate a magnitude of groundwater flow into the Middle Fork John Day River. Using the value of 0.4% for gradient, the value of 1 meter/day for hydraulic conductivity, and conducting the computation along a 1-kilometer long, 2-meter deep section of floodplain (area = 2000 square meters), we can estimate that each kilometer of floodplain (one side of the river only) adds 8 cubic meters of groundwater per day to the Middle Fork John Day River. This quantity is small compared to the total flow in the upper Middle Fork John Day River in late spring (97,860 cubic meters per day, at a flow rate of 40 cfs). Following input from the UMFWG through a conference call in June additional resources are planned to be devoted which are intended to provide more sampling resolution and understanding of groundwater in the Middle Fork John Day River.

Analysis of existing records performed by Oregon State University is underway, and a complete dataset will be made available on the IMW website in December 2010.

Macroinvertebrate Monitoring

Macroinvertebrate monitoring was performed in 2009 by the USFS and by the NFJDWC. USFS efforts included collecting benthic samples at 9 locations on the main stem of the Middle Fork John Day River, while the NFJDWC collected drift samples at 14 locations, including the 9 USFS locations (Figure 11). Drift sampling focused on assessing the total abundance of major taxonomic groups as a measure of food availability for salmonids, rather than as a direct measure of biological integrity of the watershed. However, The NFJDWC has partnered with ABR, Inc. to develop and implement a long-term (8-year) macroinvertebrate monitoring program that directly assesses biotic integrity of the Middle Fork John Day River and expands upon and continues the macroinvertebrate assessment work initiated in 2009. This macroinvertebrate monitoring plan for the IMW recommends using a Paired Before After Control Impact (P-BACI) design to evaluate the effectiveness of completed restoration project in the Middle Fork John Day River. For this study design, samples will be collected in both the Middle and South Fork John Day River while using the South Fork John Day River as a control. There has been few restoration actions in the South Fork John Day River and should provide the basis, along with the temporal repeatability of the P-BACI design, to provide the framework for a statistically sound study.

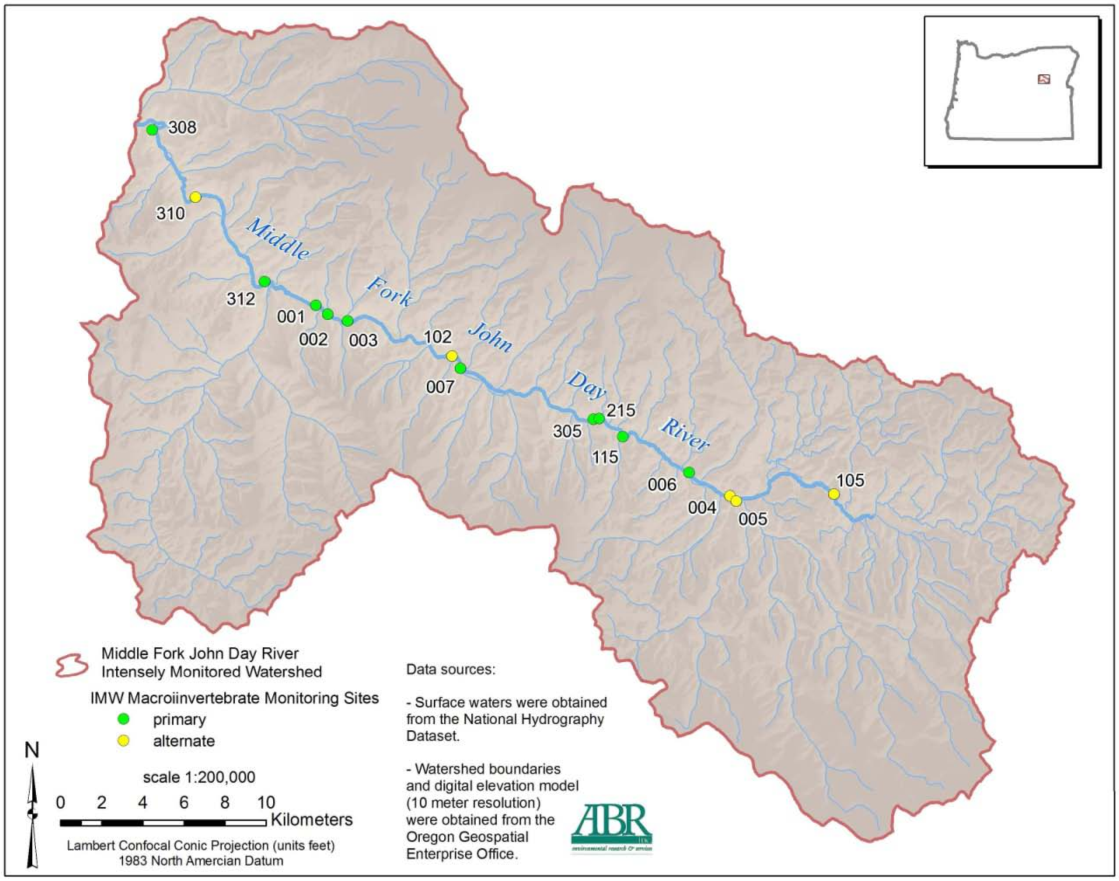

Figure 11. Locations of PIBO monitoring sites on the Middle Fork of the John Day River that will be used for monitoring macroinvertebrate community conditions in the IMW.

To date, macroinvertebrate sampling locations in both the Middle and South Fork John Day River have been identified and a preliminary budget has been developed for continuing this effectiveness monitoring.

Fish Monitoring

This report marks the fourth year for successfully completing fish population and abundance surveys in the Middle Fork John Day River in support of the IMW effort by the Oregon Department of Fish and Wildlife (ODFW). The main goal of this monitoring is to improve the understanding of relationships between fish and their habitat. To accomplish this goal, four broad project objectives have been defined:

1. Estimate spawner escapement of summer steelhead and spring Chinook.
2. Estimate freshwater productivity (smolts/redds) of summer steelhead and spring Chinook.
3. Estimate parr-to-smolt survival for summer steelhead and spring Chinook.
4. Delineate seasonal parr rearing habitat.

Redd surveys for spawning adult summer steelhead were conducted from March 30, 2010 to June 16, 2010. Thirty sites were randomly chosen using a probabilistic sampling design. Results from this effort show that an average of 2.7 redds/km were extrapolated for the entire IMW (Figure 12).

Figure 12. Summer steelhead redd densities for 2010

In July 2010, a total of 2,610 juvenile steelhead, juvenile Chinook salmon and Bull trout were collected and implanted with a Passive Integrated Transponder (PIT Tag). Also in 2010, using the PIT tag antenna array (for the first time in the IMW) twenty nine adult Chinook salmon and seven adult steelhead which originated in the Middle Fork John Day River and tagged as part of the IMW study were detected. In addition, seventeen adult fish from outside the Middle Fork John Day River were also detected with the PIT-tag antenna array. Summer distribution of juvenile Chinook salmon in 2010 was similar to observed conditions in 2008 and 2009. Recent fish passage improvements in Lick Creek have lead to increased upstream distribution of juvenile Chinook by 3.5 km upstream from what was observed in previous years.

Geomorphologic Monitoring

This effectiveness monitoring component of the study is intended to identify the stream channel morphology changes that may occur as a result of restoration actions. As discussed previously, many of the restoration efforts in the Middle Fork John Day River are designed to address limiting factors of salmonid abundance. As such, determining at a project or reach scale the changes to stream channel morphology as a result of individual restoration actions is paramount to inform the outcomes of the IMW. Geomorphologic data collection at past and present restoration locations has been ongoing since 2008 on a biennial rotation. It was identified early on in the IMW that a biennial interval is potentially the most efficient method to track changes in channel morphology. To date, detailed maps of control and treatment reaches have been developed by this monitoring. In addition, strategic investments have led to improvements in management and analysis of 2008 and 2009 data. A spatial data improvement for GIS analysis and upload of data onto the ISEMP web site has also occurred during this time period. Preliminary analysis of the aggradation/scour at log structures and gravel count data in 2008-2009 was completed. Effort has gone into developing analytical methods for comparing multiple year as-built survey data. These dense total station survey data sets of the channel bed and banks around individual log structures are designed to detect channel aggradation or scour associated with restoration actions such as engineered log jams. An example of the detected changes to stream geomorphology after the installation of an engineered log jam and scour pool is shown in figure 13.

Contractors also worked closely with the IMW coordinator to assign stream reaches in the Middle Fork John Day River so that partners within the UMFWG and IMW can achieve a consistent naming convention for stream reaches which will aid in consistency and reduce confusion in the long term. Stream reaches were differentiated, as closely as possible, by geomorphic class and bounded by named tributaries. This monitoring is also likely to benefit from the development of the action implementation plan which will identify the long term designation of control sites to enable the continued use of a BACI statistically valid study.

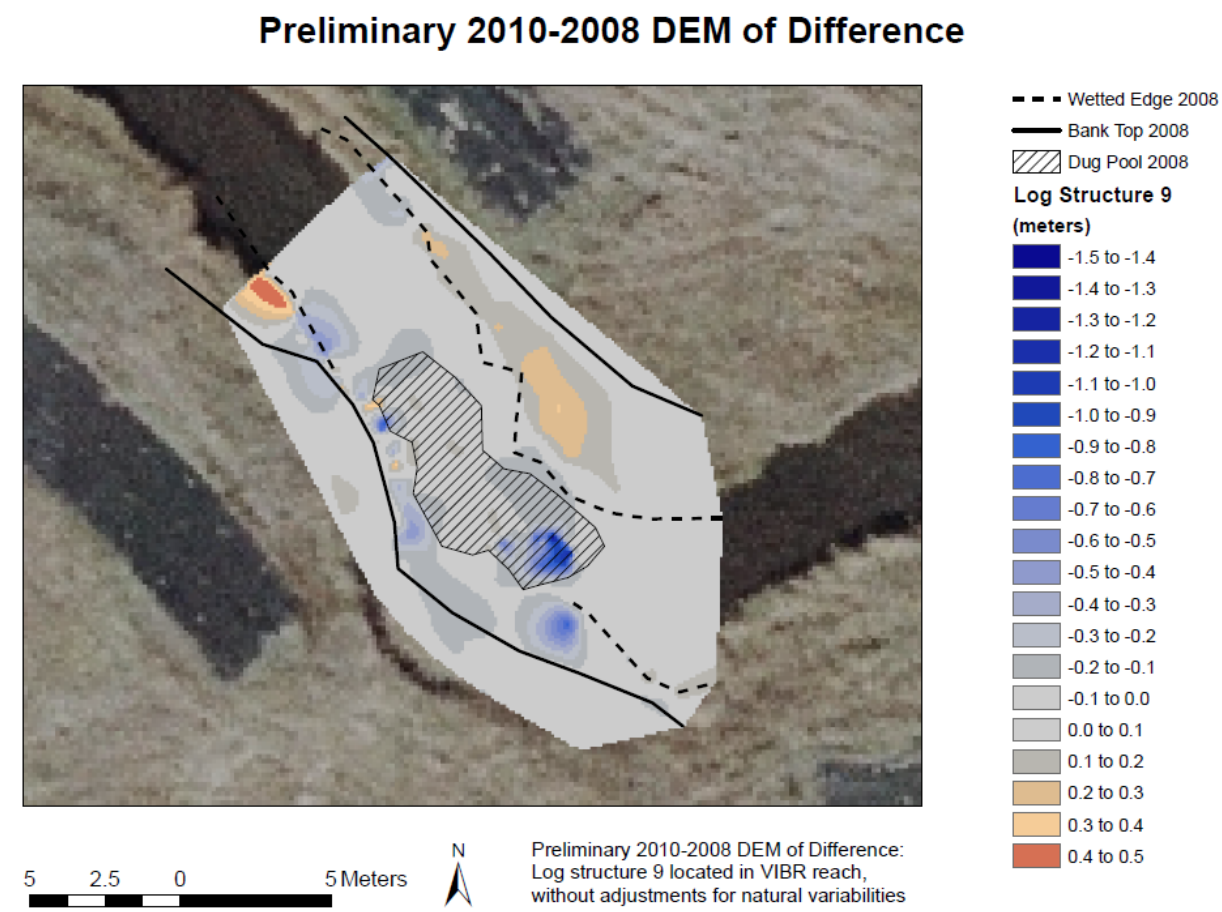

Figure 13. Change in stream channel morphology following restoration action

Socio-Economic Monitoring

One of the most significant developments in natural resource planning and management in the past fifteen years has been the emergence of the restoration economy – also referred to as conservation-based development, sustainable livelihood, and the conservation economy, among other terms. The central focus of the restoration economy is resource management. However, it explicitly considers the local economy and community as well. It holds that "ecological integrity, economic opportunity, and community are inextricably linked in the long run" (von Hagen & Fight, 1999, 3). It entails projects, programs, and policies that aim to "meld ecology with economics and the needs of community . . . (Weber, 2000, p. 238).

The IMW has initiated a socio-economic tracking method for the area, and this project has accomplished its initial purposes. It has engaged key members of the Grant County community in a significant discussion of the restoration economy in Grant County and eastern Oregon more broadly. It has identified a robust set of measures that can help explain the socio-economic effects of restoration projects in the upper Middle Fork on the local community. To continue this effort the IMW has enlisted the NFJDWC to accept ongoing responsibility for collecting, storing, and updating the socio-economic measures. But, that is just the beginning of what will be an ongoing process.

Socio-economic measures have no intrinsic meaning. They only take on meaning when they are used to inform public discussions and decisions – for policymaking, for management of the IMW, and for public education/citizen action. Having tangible measures that illustrate the potential of the restoration economy can help the local community realize its contribution; however, designing appropriate measures that can be reasonably monitored and interpreted is not a straight-forward task. This first iteration is based on expert guesswork about what measures are likely to be useful. As the community engages the measures for these purposes they will need to change and evolve. The community will learn which of the measures are helpful, which need to be revised, and which should be abandoned. As well, they will identify possible new measures that need to be tested. That is why the community needs to embrace the IMW socio-economic monitoring project. It is a work-in-process, under construction by the community, to be used by the community in the service of building a local restoration economy that makes sense to them.

The combination of the following direct effects and measured outcomes is a suite of indicators that have been selected to track the economic effects meaningful to the community by restoration efforts in the IMW and in Grant County.

Direct Effects

Measures of the socio-economic output from implementing restoration projects on the upper Middle Fork of the John Day River.

In order to collect data regarding the socio-economic output from restoration projects in the IMW, a representative from each organization involved in restoration work needs to be contacted. The necessary information for each project includes:

- The organization managing the funds
- Source of Funds
  - Type of restoration project
  - Beginning and ending date of project
  - Name and business location of contractor hired
  - Contract size in Dollars
  - Contract Dollars spent in Grant County

Outcome Measures

- Number of restoration contractors active in Grant County

The Grant County Soil and Water Conservation District keeps a record of the number of restoration contract bidders on an annual basis. This information can be requested from the Grant County Soil and Water Conservation District.

- Grant county landowners interested in adopting restoration practices

The Grant County Soil and Water Conservation District also keeps records of the number of landowners applying for restoration related projects. However, some restoration projects are undertaken in partnership with the North Fork John Day Watershed Council and are not included in the Grant County Soil and Water Conservation District's records in order to prevent a project from being counted twice.

- Restoration related jobs in Grant county

The 2000-09 comparison shows substantial change, but year-to-year comparisons are not useful, so these data do not need to be collected regularly.

- Annual travel spending in Grant County (in millions) 2000-2009
- Estimated number of jobs generated by travel spending in Grant County 2000-2009

The economic and market research firm, Dean Runyan Associates, produces an annual report detailing the economic stimulus generated by travel spending in Oregon. The report provides detailed information for Grant County. The report can be obtained through the Dean Runyan website (http://www.deanrunyan.com) by completing the following steps:

- Travel Impact Studies
  http://www.deanrunyan.com/index.php?fuseaction=Main.Travelstats&section=ImpactStudies
- Oregon
  http://www.deanrunyan.com/index.php?fuseaction=Main.TravelstatsDetail&page=Oregon
- Full report for Oregon State Estimates
  http://www.deanrunyan.com/doc_library/ORImp.pdf

Considering the condition, described by the following graph, that Grant County is depressed compared with Oregon and the U.S. as a whole, we can say that even though the restoration economy is rather small it is an additional stimulus which is helpful in keeping rural communities prospering. If we can prove that restoration is helpful to the economy it may aid in bolstering public sentiment, as well as land-owner sentiment, towards restoration which will give us the ability to affect more streams which will benefit both the environment and its' tenants.

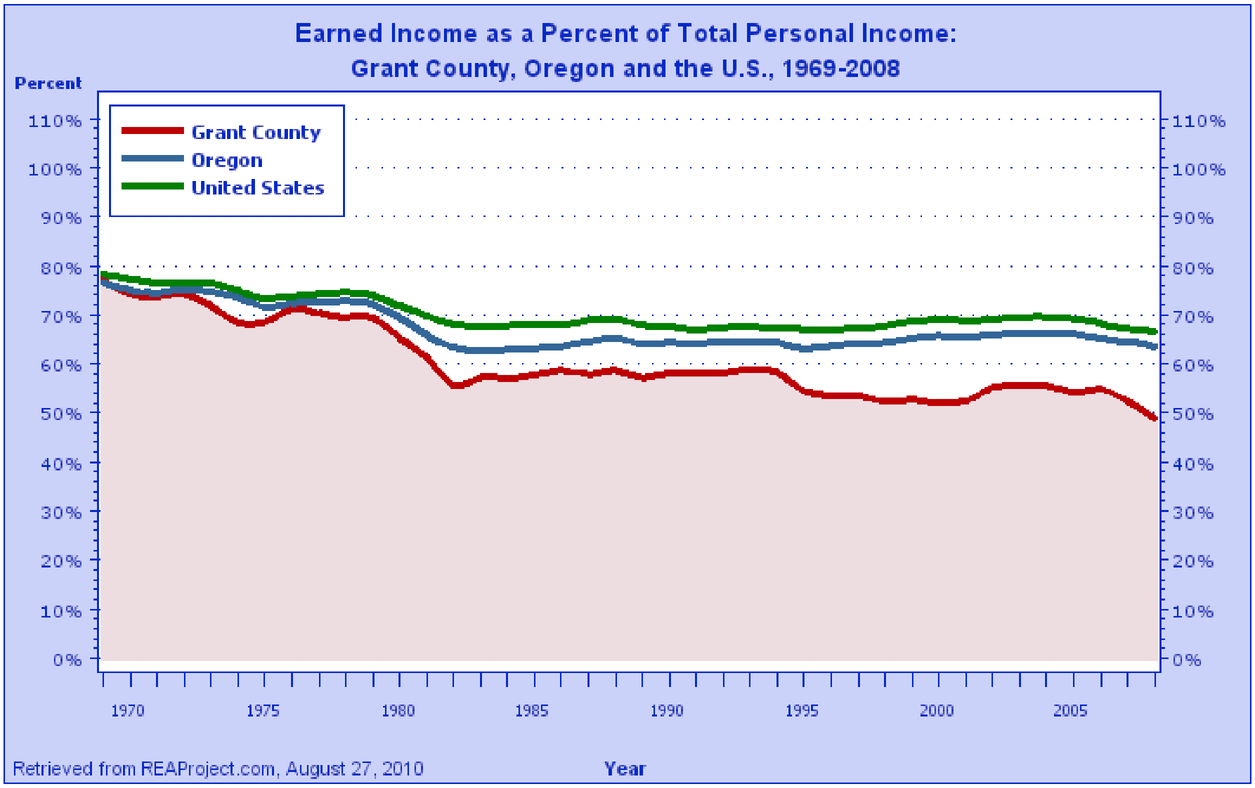

Figure 14. Chart of earned income as a percent of total personal income

Implementation Plan

With the initial development of the IMW, a draft study design was produced which would guide the actions of the partners involved in the IMW. Since 2007, the IMW has been working with the guidelines set forth in the draft IMW study design. Recently there was, among other things, the need for identification of semi-permanent control reaches identified at the reach and basin scale to effectively and efficiently answer effectiveness monitoring questions. It was also determined that more specific detail in restoration project planning, project locations and identification of previous restoration projects before the official start of the IMW was required. In the summer of 2010, the IMW coordinator and OWEB staff developed an RFP to begin the process for identifying a qualified contractor who could work with the UMFWG to gather information and refine that information into a final study design for the IMW. The final study design is anticipated for completion by the end of the calendar year 2010. The results of this work will further guide the restoration and monitoring efforts in the future and will provide the roadmap for participants involved with this IMW.