A Ten Minute History of
15 Years of Columbia River ESA Litigation

Rob Lothrop, CRITFC 729 NE Oregon, Suite 200, Portland Oregon 97232

Phone: 503-238-0667

Email: lotr@critfc.org

ABSTRACT:

The following is excerpted from Judge Redden's May 26, 2005 Opinion and Order overturning the 2004 FCRPS BiOp.

Summary of 1993, 1995, and 2000 Biological Opinions

1. 1993 Biological Opinion.

In 1992 NOAA issued its first biological opinion on the impact of hydropower operations on the listed species. This biological opinion, which concluded that the DAMS would not jeopardize the listed species, was challenged not by environmental interests but by power, industry and irrigation groups. Their claims ultimately were denied for lack of standing. *Pacific Northwest Generating Coop. v. Brown*, 822 F.Supp. 1479 (D. Or. 1993).

NOAA then issued another biological opinion in 1993 for operations covering the period April 1993 to January 1994. The 1993 biological opinion contained a two-step jeopardy analysis: (1) a "base period analysis" in which NOAA considered whether the proposed action would significantly reduce the level of human-induced mortality compared with the 1986-1990 base period, and (2) a "combined effects analysis," in which NOAA considered "the potential of the combined effects of all actions, using . . . life cycle models and other available information . . . ." 1993BiOp at 15.

NOAA concluded that the DAMS in the covered period were "not likely to jeopardize the continued existence" of the listed species. *Id*. at 64-66. In particular, the biological opinion predicted that the population of two of the listed species would stabilize over the next four life cycles. In addition, relative to the base period, NOAA predicted the proposed actions would decrease mortality by amounts ranging from between 2.5 and 11.4 percent for Snake River Spring/Summer Chinook and between 5.1 and 8.9 percent for Snake River Fall Chinook.

The State of Idaho challenged the 1993 biological opinion. In 1994, Judge Marsh of this court held the 1993 biological opinion to be invalid. *Idaho Dept. of Fish and Game v. NMFS*, 850 F.Supp. 886, 893 (D. Or. 1994), *vacated as moot*, 56 F.3d 1071 (9th Cir. 1995). Judge Marsh found specifically that the choice of the 1986-1990 baseline was arbitrary and capricious "because the agency failed to consider relevant facts such as the drought condition and low run numbers of the species during the base period," and

because in its combined effects analysis "NOAA arbitrarily and capriciously discounted low range assumptions without well-reasoned analysis and without considering the full range of risk assumptions." *Id*. at 898. While Judge Marsh did not reject the two-step jeopardy framework, he found that NOAA had consistently erred in applying the framework in favor of the status quo when "the situation literally cries out for a major overhaul." *Id*. at 900. Thus, Judge Marsh noted that "NOAA focused on the system capabilities . . . rather than stabilization of the species." *Id*. at 893. Judge Marsh also found "NMFS should have fully considered the enhanced risks associated with small populations prior to discounting low range assumptions." *Id*. at 899.

On similar grounds, Judge Marsh also rejected the argument that any agency proposal found to result in improved survival as a matter of *law* could *not* be said to have "reduced both the likelihood of survival and recovery" so as to constitute jeopardy. *Id.* at 899. Among other reasons, Judge Marsh cited a potentially incongruous result in that, for example, if 100 fish are expected to survive downstream juvenile migration in 1993, and 99 survived in 1990, a no-jeopardy finding would be mandated – even though a 100 survival level may still be considered so low as to constitute a continued threat to the species' existence. *Id*.

2. <u>1995 Biological Opinion</u>.

NOAA's 1995 biological opinion covered dam operations in the 1994-1998 period. In it, NOAA unveiled a new jeopardy process that stressed "whether the species [could] be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the environmental baseline and any cumulative effects, and considering measures for survival and recovery specific to other life stages." 1995BiOp at 13.

The process involved (a) defining the biological requirements of the listed species;

(b) evaluating the relevance of the environmental baseline to the species' current status;

(c) determining the effects of the proposed or continuing action on the species; (d) determining whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages; and

(e) identifying reasonable and prudent alternatives to a proposed or continuing action that is likely to jeopardize the continued existence of listed species. 1995BiOp at 10-15.

Under this jeopardy framework, NOAA concluded that the action agencies' proposal to operate the DAMS during 1994-1998 would be likely to jeopardize the continued existence of the listed salmon and adversely modify their critical habitat. *Id*. at 83-91. NOAA then offered a reasonable and prudent alternative to the proposed action involving "an adaptive approach to increasing survival and the probability of recovery of

the listed salmon that involved immediate survival improvements, structural modifications and evaluations, and intermediate flow-improvements, spill initiatives, continued transportation, lowered Snake River pools, preparation for drawdowns of Snake River reservoirs, and comprehensive evaluations and ongoing studies. *Id.* at 91-127. NOAA concluded that with adoption of its reasonable and prudent alternatives, the dam operations were not likely to jeopardize the listed species. *Id*. at 128-136.

The 1995 biological opinion was challenged by a coalition of environmental groups. In 1997, Judge Marsh upheld the 1995 biological opinion, although he acknowledged that even under NOAA's reasonable and prudent alternative, the "picture is not that rosy. A lot is left to chance and it is the acceptance of that risk as part of the BiOp which forms the heart of the current controversy." *American Rivers v. NMFS*, CV 96-384-MA, 1997 WL 33797790 *10 (D. Or. 1997). In the process, the court again rejected the argument "that any improved survival rates necessarily satisfied the ESA." *Id*. at *10 n.4 (noting that the biological opinion expressed concern that low populations of listed species pose a risk of compromising genetic variability even if the species or subspecies were later able to recover in numbers).

3. <u>2000 Biological Opinion</u>.

The 2000BiOp covered continuing dam operations. It utilized a jeopardy standard similar to the 1995 biological opinion, stating that mortality attributable to the proposed action, "when combined with mortality occurring in other life stages," must leave listed species with "a high likelihood of population survival and a moderate to high likelihood of population recovery." 2000BiOp, Appendix A, A-1. In other words, the proposed action would be deemed to cause jeopardy to a listed species if "the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages" would leave the listed species with too low a likelihood of survival and recovery potential. *Id*. at 1-8.

To aid its analysis, NOAA identified "survival and recovery indicator criteria," including interim recovery abundance levels. *Id*. at 1-13 to 15. The proposed action was evaluated in relation to the population growth rate that was needed to insure that each listed species have at least a 95 percent likelihood of persistence over 100 years; and at least a 50 percent chance of meeting specified interim abundance levels within 48 years.[16] *Id*. at Table A-1.

Jeopardy analysis in the 2000BiOp: (a) defines the recent population trend as the median annual population growth rate, and mostly calculated from data on adult returns from 1980 through 1999 (*Id*. at A-2); (b) estimated the proportional change in that rate necessary to achieve the survival and recovery criteria (*Id*. at A-5); (c) adjusted the population growth rate based on its assessment of the impact of the proposed action and

potentially different survival rates in other life stages (*Id*. at A-7); (d) constructed ratios to indicate the degree to which the proposed action would be expected to achieve the survival and recovery criteria (*Id*. at A-8); and (e) qualitatively evaluated the degree to which other factors – those that did not lend themselves to the quantitative analysis summarized above, including hatchery management and habitat improvements – would "reduce the additional necessary survival change" required to meet the criteria noted above. *Id.*

The 2000BiOp found that eight listed species would be jeopardized by the proposed operation of the DAMS. *Id.* at Chapters 6 and 8. NOAA therefore proposed reasonable and prudent alternatives to the proposed action, and analyzed whether, in conjunction with the environmental baseline and cumulative effects, these would increase survival rates enough to enable the listed species to achieve the survival and recovery criteria. *Id*., Chapter 9. Finding these insufficient, NOAA also appraised the impact of off-site mitigations, including hatchery and habitat initiatives outlined in the Basinwide Salmon Recovery Strategy. *Id.* NOAA found these sufficient to improve survival rates so as to enable the listede species to avoid jeopardy. *Id*.

In conducting its analysis, NOAA also considered the probability of extinction in 24 years and, because recovery within 48 years "may be unrealistic to expect," the likelihood of recovery in 100-years. 2000BiOp at 1-14. However, the BiOp reported only the 100-year survival and 48-year indicator criteria because these are "always harder to meet." *Id*. at A-1.

The following text is taken from CRITFC's comments on the 2004 draft FCRPS BiOp and describes the jeopardy analysis framework used by NMFS in that document.

DRAFT Biological Opinion Reinitiation of Consultation on Operation of the Federal Columbia River Power System Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin September 8, 2004

Step 1: Evaluate Current Status with Respect to Range-wide Biological Requirements and Essential Features of Critical Habitat

> For this Opinion, NOAA Fisheries reviewed the current status of the populations affected by the proposed action in the context of viable salmonid population (VSP) criteria and then reviewed the status of each major population group before reaching a conclusion for an ESU. NOAA Fisheries based this analysis on information published in its June 14, 2004 Status Review (69 FR 33102), which states the reason for listing each ESU and any other relevant information about its status….

2004 draft BiOp pages 1-6 & 1-7

NOAA did not quantify species' population trends in this BiOp, such as the likelihoods of achieving threshold population sizes or population growth rates that were set forth in the 1995 and 2000 BiOps, respectively. The 2004 draft BiOp generally indicates whether recent (5-year) population trends are above or below replacement. For example, the 2004 draft BiOp notes that:

> All populations in the UCR spring chinook ESU exhibited strong returns of adults during the past four years suggests [sic] that the next few brood cycles will also be strong. These increases are encouraging, following the last decade of steep declines to record, critically low escapements. However, despite the strong returns in 2001, both recent 5-year and long-term productivity trends remain below replacement.

2004 draft BiOp pages 4-6 & 4-7

For Snake River Spring/summer Chinook the picture according to NOAA is slightly better:

> Due to the severe declines in the populations since the 1960s, the long-term productivity trends remain below replacement for all natural production areas, despite the recent increases. However, the short-term productivity trends for the majority of the natural production areas in the ESU are at or above replacement, which are positive signs for this ESU.

2004 draft BiOp pages 4-4

For Snake River steelhead the picture according to NOAA is somewhat worse:

> Numbers of spawners surveyed in sections of the Grande Ronde, Imnaha, and Tucannon rivers were generally improved in 2001. However, recent 5-year abundance and productivity trends are mixed. Five of the nine available data series exhibit positive long- and short-term trends in abundance. Most of the remaining long-term population growth rate estimates were below replacement, and most of the short-term population growth rates were either marginally above replacement or well below replacement, depending upon the assumed effectiveness of hatchery fish in contributing to natural productivity.

2004 draft BiOp pages 4-10

Unlike the 2000 biological opinion NOAA does not quantitatively assess the likelihood of extinction for these stocks. Neither here nor in following steps does NOAA assess the degree of survival improvement that is needed to assure meeting biological survival and recovery indicators. The reader is left to wonder, among other things, how the "strong" Chinook returns can be below replacement or how far below replacement the recent "well below replacement" rates are for Snake River steelhead. This is one of the most serious "gaps" in NOAA's jeopardy framework.

Step 2: Evaluate Relevance of the Environmental Baseline in the Action Area to Biological Requirements and the Current Status of the Species and Any Designated Critical Habitat

> In this step, NOAA Fisheries analyzes the effects of past, present, and certain future human factors within the action area to which the effects of the proposed action would be added. The environmental baseline, together with cumulative effects (Step 4), provides the starting point for evaluating whether the action would cause, directly or indirectly, a reduction in the productivity, abundance, or distribution of the listed species or diminish any essential physical or biological feature of critical habitat.

1.2.2.1 Define the Action Area

> The action area defines the geographic scope of the environmental baseline and cumulative effects that are relevant to a particular consultation. It includes all areas affected directly or indirectly by the Federal action, not merely the immediate area involved in the action (50 CFR § 402.02).
>
> 2004 draft BiOp pages 1-8

NOAA defines the action area in this draft BiOp to include the mainstem Columbia and Snake rivers, high priority subbasins (Methow, Wenatchee, Entiat, Upper Salmon, Little Salmon, Lemhi, and John Day), areas affected by 19 BuRec water projects, and the estuary and near shore environment. Figure 5.1 on page 5-3 of the draft depicts these areas.

Once again, the identification of the action area in NOAA's BiOp is problematic. For instance, the action area defined in the draft BiOp does not appear to include any significant portion of the Yakima River Basin, yet this basin is pervasively influenced by the Bureau of Reclamation's water resources projects located therein, including five major water storage projects that largely dictate the flow of the Yakima and Naches rivers during certain months of the year.[1] Similarly, the operations of the Upper Snake projects should be considered in this BiOp because of their effects on Snake River water supplies.

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[1] The Yakima Project provides irrigation water for land that extends for 175 miles on both sides of the Yakima River in south-central Washington. The irrigable lands presently being served total approximately 464,000 acres. Storage dams and reservoirs on the project are Bumping Lake, Clear Creek, Tieton, Cle Elum, Kachess, and Keechelus. Other project features are 5 diversion dams, canals, laterals, pumping plants, drains, 2 powerplants, and transmission lines. More information can be found at: http://www.usbr.gov/dataweb/html/yakima.html#general

The action area inappropriately does not include subbasins where the Bonneville Power Administration is currently funding salmon restoration projects in fulfillment of its statutory duties under the Northwest Power Act. Attachment _____, the Columbia Basin Fish and Wildlife Program Rolling Provincial Review Implementation, prepared by the Columbia Basin Fish and Wildlife Authority, June 2004 (hereinafter "CBFWA Program Review"), describes BPA funded projects in numerous other basins such as the Walla Walla, Clearwater, Grande Ronde, Imanaha, Tucannon. These projects are directly and indirectly carried out by the action agencies in exercising responsibilities that are part and parcel of their operations of the FCRPS. These projects also directly affect salmonid species listed under the ESA. Also the draft does not incorporate the impacts of land disturbing activities that are the subject of programmatic consultations, due evidently to time limitations. The action area must be defined to include a much broader geographic range incorporating the full extent of areas affected by the action agencies' salmon mitigation projects and the full extent of Reclamation's project effects associated with the 19 projects under consultation in this BiOp.

1.2.2.2 Determine Biological Requirements and Essential Habitat Features within the Action Area

1.2.2.3 Evaluate the Environmental Baseline Relative to the Biological Requirements and Species Status

Unlike prior BiOps, NOAA's treatment of the environmental baseline in this BiOp has warped the jeopardy framework so severely that more than 90% of the salmon mortality associated with the operation and configuration of the FCRPS is excluded from treatment under section 7(a)(2) of the ESA. Moreover, the NOAA framework also effectively jettisons any notion of achieving salmon recovery from the agency's analytical framework. NOAA sets the stage for this wholesale turnabout in regulatory approach with the following narrative:

> Where the proposed action is a continuation of a past action, as is the case for the operation of the FCRPS, the analysis for this step is complicated, because the environmental baseline will necessarily include the effects of past actions taken to construct and operate the ongoing project. NOAA Fisheries must therefore distinguish the effects of the proposed future operation of the project from its past construction and operation. As described in more detail in Section 5.0, NOAA Fisheries made this distinction by following the fundamental principle of an ESA ' 7(a)(2) consultation. Section 402.03 provides: "Section 7 and the requirements of this part apply to all actions in which there is discretionary involvement or control." Accordingly, the ESA requires a Federal agency to consult on actions that it proposes to authorize, fund, or carry out that are within its discretionary authority. See also 50 CFR ' 402.02 "*action*" and ESA ' 7(a)(2). Thus, conversely, the effects of the existing project that are beyond the current discretion of the action agency are properly part of the effects of the environmental baseline. Those

> effects are part of the "no action" environment to which will be added the effects of the proposed action.
>
> 2004 draft BiOp pages 1-8 & 1-9

This new approach narrows the view of the effects of the operation of the FCRPS to the difference between a proposed operation of the FCRPS and a hypothetical reference case that purports to embrace the full "discretion" of the action agencies to operate the FCRPS for the benefit of salmon. As noted elsewhere in CRITFC's comments, the physical difference between the reference case and proposed operation is slight to non-existent. The measurement of survival differences between these two cases, using SIMPAS, compounds the omission of FCRPS induced mortalities from this BiOp, mortalities which were previously accounted for in the jeopardy frameworks of each FCRPS BiOp since 1993.

The 1995 and 2000 FCRPS BiOps recognized that the action agencies exercised control over both the operation and configuration of the FCRPS dams. Even the 2004 draft Biop recognizes that the action agencies will make configuration changes at the dams. Unlike the 2004 draft BiOp, however, these BiOps did not forgive FCRPS mortalities associated with past configuration decisions.

Step 3: Describe the Effects of the Proposed Action

As mentioned, the "net effects" approach taken by NOAA, which is essentially a comparison of two SIMPAS model runs and a qualitative assessment of the potential to fill any net survival "gap" identified stands in marked contrast to the analyses previously undertaken by NOAA.

> Effects of the action, to be evaluated in Step 3, are defined as "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR § 402.02).
>
> 2004 draft BiOp page 1-10

While NOAA purports to assess the full effect of the FCRPS on species survival and recovery, what NOAA does instead is to focus on "net effects". E.g. table 6.7 and 6.9. The relatively small "net effect" starkly contrasts with the approach taken in section 6 of the 2000 BiOp, where NMFS concluded that for all ESUs, stocks will need additional survival improvements up to several orders of magnitude to achieve a stable population growth rate. E.g. Table 6.3-12. This "net effects" analysis, which occupies most of chapter 6 of the 2004 BiOp, has virtually nothing to say about the likelihood of species survival and recovery. Rather the focus has shifted from survival and recovery, which NOAA admits is profoundly impacted by the operation and configuration of the FCRPS, to net effects which have little or anything to say about survival or recovery, except to say that the proposed operation, including changes to system configuration, "would likely

result in no **net** reduction in the numbers, reproduction, or distribution of this ESU." The "net" effects analysis performed in chapter 6 of the BiOp does not reveal whether the reproductive capacities of the target stock are such that it is in decline. Nor does the "net" effect analysis reveal whether the stock will achieve the indicators of survival and recovery identified by the BRWG or NMFS' 1995 BiOp or PATH or NMFS' 2000 BiOp.

Step 4: Describe Cumulative Effects

> The cumulative effects analysis in Step 4 requires NOAA Fisheries to evaluate the future effect of those state or private activities (not including Federal activities) that are reasonably certain to occur in the action area.
>
> 2004 draft BiOp pages 1-10 & 1-11

NOAA appropriately recognizes that the overall cumulative effects on the listed species are likely to be negative.

Step 5: Conclusion (section 8)

The evidence of a shift in NOAA's thinking about survival and recovery as regards the mortalities imposed by the FCRPS is clearly expressed in the conclusions section of the draft BiOp. The following excerpt concerning Upper Columbia River spring Chinook is illustrative:

> The main consideration in determining if the reduced numbers, productivity, and distribution of this ESU constitute an appreciable reduction in the likelihood of survival and recovery is the degree to which the proposed action poses an additional risk to the ESU.
>
> 2004 draft BiOp page 8-12

Even though NOAA recognizes that UCR spring Chinook are at "high risk," and that the mortality of the FCRPS in the baseline is the primary cause of this risk, the "main focus" is not this risk. It is instead the "additional risk" imposed by the hypothetical difference between a reference operation and the proposed operation. Because this "net effect" only rises to a "medium" indicator level, NOAA isn't too concerned about the "net effect". Gone from the analysis is any suggestion that the FCRPS must account for the overwhelming levels of mortality now included in the baseline.

Condit Decommissioning Project

Todd Olson

(Primary contact) Title, Affiliation, Address: Todd Olson, Program Manager, PacifiCorp Energy, 825 NE Multnomah, suite 1500, Portland, OR 97232

Phone: (503) 813-6657

Email: todd.olson@pacificorp.com

ABSTRACT: In 1999 parties to the Federal Energy Regulatory Commission relicensing of the Condit Hydroelectric Project reached a settlement by which PacifiCorp would remove the project in lieu of relicensing. The project, owned and operated by PacifiCorp, was built in 1913, is approximately 125 feet tall, and has a generation capacity of 13.7 Megawatts. Per relicensing conditions as stipulated by the agencies with mandatory authority, acceptance of a new license would render the project uneconomic. Although not an outcome typically desired, PacifiCorp accepted the responsibility to decommission given a cost cap was established to protect the financial exposure of the company and its customers.

PacifiCorp continues to pursue the permits needed to remove the project. At the same time, planning and design work is ongoing. This presentation briefly summarizes the project history, the settlement agreement, how the project will be decommissioned, and the social, cultural, and resource values that will be enhanced with project removal.

Salmon Habitat Recovery and Watershed Planning Processes In the White Salmon and Klickitat Basins

David McClure

Phone: (509) 773-2481
Email: davem@co.klickitat.wa.us

Title: Director, Klickitat County Natural Resources Department

Address: 228 West Main Street, MS-CH-37; Goldendale, WA 98620

ABSTRACT: In 1999 the Klickitat Lead Entity Organization was established pursuant to chapter 77.85 of the Revised Code of Washington (RCW) for a geographic area that includes the Klickitat River and White Salmon River basins. The Organization's primary function is to provide a citizen-based evaluation and prioritization of salmon habitat

restoration and protection projects that are proposed for grant funding through Washington State's Salmon Recovery Funding Board (SRFB) program. To date, the SRFB has awarded a total of $5,017,386 in grants to fund 30 projects in the Klickitat Lead Entity area. The Lead Entity Organization's other important functions include developing and maintaining an adaptive management strategy and maintaining a habitat work schedule. The adaptive management strategy, which is updated annually, includes a prioritization of salmonid stocks, geographic areas, limiting habitat factors and habitat forming processes, and habitat restoration and protection actions. Historically, the habitat work schedule consisted of the adaptive management strategy and a list of habitat projects that have been completed in the Klickitat Lead Entity area. A significant effort is now underway across the state to enhance the lead entities' habitat work schedules and upload them to a public portal that is internet-accessible by project sponsors and the general public.

In 1999 watershed planning was initiated pursuant to chapter 90.82 RCW for Water Resource Inventory Area 30 (WRIA 30), which includes the Klickitat Basin. The *Klickitat River Watershed Management Plan* was approved in August 2006. It was developed by a committee representing a broad range of water resource interests and addresses the priority water quantity, water quality, and habitat issues identified by the committee for the portion of WRIA 30 that is outside of the Yakama Reservation. We are now in the implementation phase of the watershed planning process. A detailed implementation plan is scheduled for completion in early April. It will identify the entities which have accepted responsibility for implementing the watershed management strategies and actions, as well as provide schedules and identify potential funding sources. On-going plan implementation activities include stream flow and temperature monitoring, groundwater assessments, and implementation of the Little Klickitat River Temperature TMDL. Work scheduled for 2008 includes installing a SnoTel (snowpack telemitry) monitoring station in the Simcoe Mountains, additional flow gauges in the Little Klickitat River and flow gauges and a ground water monitoring well in Swale Creek basin, and conducting stream shade assessments and riparian area mapping and assessments in the Little Klickitat River and Swale Creek basins.

A watershed management plan for WRIA 29 was approved in 2006, but it addresses the area of WRIA 29 east of the White Salmon Basin only. In 2007 the legislature split WRIA 29 into WRIAs 29a and 29b for purposes of watershed planning under chapter 90.82 RCW. We are in the process of securing the concurrence of local governments needed too initiate watershed planning in WRIA 29b, the White Salmon River basin.

Information from the Cle Elum Supplementation and Research Facility

David Fast[1*], Bill Bosch[1], Charles Strom[1], Mark Johnston[1], David Lind[1], Curt Knudsen[2], Doug Neeley[3]

Organization: [1]*Yakama Nation, YKFP Nelson Springs Research Office, 771 Pence Road, Yakima, WA, 98902, [2] Oncorh Consulting, [3] IntSTATS Consulting

David Fast, Yakama Nation
Phone: 509-945-1206
Fax: 509-966-4972
Email: Fast@Yakama.com.

ABSTRACT: The concept of the Cle Elum Supplementation and Research Facility (CESRF) was developed in the early 1990's in an attempt to improve the performance of hatchery produced salmon. This design is similar to the current integrated hatchery concept of the Hatchery Science Reform Group, with the hatchery fish intended to be similar to and a part of the overall natural population. The intent is to have the natural origin fish driving the adaptation and fitness of the overall population by using only naturally produced adults for hatchery brood stock. Other genetic guidelines include collecting broodstock over the entire adult return timing, and allowing at least half the returning adults to spawn in the wild. All juveniles were reared at low densities and cool temperatures (<55F). Research included comparing the survival of semi-naturally (SNT) fish reared with overhead and instream cover, underwater feeders, and camouflaged raceways to optimum conventionally reared juveniles (OCT) in standard concrete raceways. No difference in survival of outmigrating smolts or returning adults was detected between the two groups. Further research compared the effect of moderation of growth on survival vs. rate of precocialism. Reproductive success of hatchery and naturally produced spawners was also evaluated. An evaluation of domestication is currently occurring by using the returning hatchery adults as broodstock to determine if, when, and how domestication could occur in a traditional hatchery population compared to the supplementated population and a control population in an unsupplemented stream. Numerous juvenile and adult traits are being monitored for all three populations to evaluate the effects of domestication on the supplemented and traditional hatchery populations. The operation of the CERSF produced enough fish to benefit harvest by allowing the first sport fishery for Spring Chinook salmon in the Yakima in fifty years. Sportsmen are allowed to keep only hatchery fish while tribal fishers can keep both hatchery and naturally produced fish. Results of the research efforts and how we plan to utilize this information in the reform of the Klickitat Hatchery will be discussed.

THE ALL-H-ANALYZER MODEL: AN OVERVIEW AND APPLICATION IN ANADROMOUS FISHERIES MANAGEMENT

Chris Frederiksen

Title, Affiliation, Address: Research Scientist, Yakama Nation Fisheries Program, P.O. Box 151, Toppenish, WA. 98948

Phone: 509-966-5156

Email: chrisf@yakama.com

ABSTRACT: The All-H-Analyzer (AHA) model is a decision support tool being used by Fishery Co-managers at regional and local scales to help make informed decisions about actions targeting the 4-H's (habitat, hydro, hatcheries, harvest) and their effects on the performance of anadromous fish stocks. The model has been developed in response to the need for critical thinking about the integrated effects of the 4-H's as regional planners move toward development of comprehensive plans for fish recovery and restoration (Mobrand Jones & Stokes 2005). This presentation provides model background and user information as well as an example of its application for Klickitat spring chinook.

MONITORING AND EVALUATION OF ANADROMOUS SALMONIDS IN THE KLICKITAT SUBBASIN

Joe Zendt

Title, Affiliation, Address: Fisheries Biologist, Yakama Nation Fisheries Program, P.O. Box 215, 1575 Horseshoe Bend Rd., Klickitat, Washington 98628

Phone: 509-369-3184

Email: jzendt@ykfp.org

ABSTRACT: The Klickitat Monitoring and Evaluation Project, as a part of the larger BPA-funded Yakima/Klickitat Fisheries Project (YKFP), continues existing efforts to monitor status and trends and gather baseline information on the abundance, distribution, demographics, life history, and habitat of Klickitat spring Chinook, fall Chinook, and coho salmon, and steelhead. Methods of evaluating and monitoring effectiveness of

hatchery and habitat actions are also being developed. Focal anadromous species in the Klickitat subbasin include native populations of spring Chinook and ESA-listed Middle Columbia River steelhead.

Primary monitoring activities include: spawning ground surveys (redd counts); adult salmonid monitoring at the Lyle Falls fishway; juvenile outmigration monitoring; juvenile and resident salmonid population surveys; scale analysis; sediment monitoring; temperature and water quality monitoring; habitat surveys; pathogen sampling; genetic data collection and analysis; and PIT tagging of spring Chinook juveniles.

Adult salmonid population monitoring comes from redd counts (conducted since 1989), hatchery returns, harvest monitoring (from Yakama Nation [YN] and Washington Department of Fish and Wildlife [WDFW] databases), and more recently, monitoring at Lyle Falls fishway (adult trap operation and mark-recapture population estimates were initiated by WDFW in 2004-5 and are being continued by YN staff). Spring Chinook population levels appear to be fluctuating substantially. Since reaching a very low level in 2005, the wild fish returns appear to be rebounding slightly, while hatchery returns have remained relatively low for the last several years. Adult steelhead trends are more difficult to discern due to yearly variations in redd survey conditions, but populations appear to be a little more stable and at a slightly higher abundance level. Additional years of mark-recapture estimates should assist in population assessments. One useful product of redd surveys has been better documentation of steelhead spawning distribution and identification of important tributary spawning habitat (e.g., White Creek watershed), where habitat restoration efforts are now improving conditions. Notable results also include a recent increase of spring Chinook spawner escapement and passage above Castile Falls at RM 64 on the upper Klickitat River (following improvements in 2005 to non-functioning fish ladders that inhibited natural passage), and identification of a probable steelhead redd in the upper Little Klickitat River in 2007 upstream of a partial barrier falls at RM 6 (steelhead adults and redds were also observed in this area following high flow events in 1996 and 1997).

Juvenile monitoring is conducted via floating rotary screw traps, fished year round in the lower Klickitat River (above Lyle Falls) and at Klickitat Hatchery, and seasonally in the upper Klickitat River (above Castile Falls). Stream temperatures are monitored via continuously-recording thermographs at approximately 36 locations throughout the subbasin (data collection began at most sites in 1996). Sediment monitoring is conducted with McNeil core sampling at 12 locations on the Klickitat River and several important tributaries. Habitat surveys are conducted using Timber, Fish, and Wildlife (TFW) methodology; to date over 80 sites on more than 40 streams have been surveyed.

Influence of landscape on resident and anadromous life history types of *Oncorhynchus mykiss*

Shawn R. Narum[1*], Joseph S. Zendt[2], David Graves[3], William R. Sharp[4]

[1] Columbia River Inter-Tribal Fish Commission
Hagerman Fish Culture Experiment Station
3059-F National Fish Hatchery Road
Hagerman, ID 83332, USA
Phone: 208-837-9096
Fax: 208-837-6047
Email: nars@critfc.org

[2] Yakama Nation,Yakima Klickitat Fisheries Program
[3] Columbia River Inter-Tribal Fish Commission
[4] Yakama Nation,Yakima Klickitat Fisheries Program

Abstract: Landscape features can significantly influence genetic and life history diversity of rainbow/steelhead trout, *O. mykiss*. In this study, heterozygosity of 21 populations of *O. mykiss* from the Pacific Northwest, USA was significantly negatively correlated with features such as elevation ($P = 0.0023$), upstream distance ($P = 0.0129$), and precipitation ($P = 0.0331$), and positively correlated with temperature ($P = 0.0123$). Mantel tests of isolation by distance were significant for anadromous populations ($P = 0.007$) but not for resident collections ($P = 0.061$), and suggested that fluvial distance was not the only significant physical parameter that influenced genetic structure of life history types. Principal components interpolated to the drainage indicated that high elevation sites were primarily occupied by the resident life history and high gradients and barriers act to limit anadromous distribution to lower elevation sites. These patterns of *O. mykiss* life history diversity provide insight regarding the interaction, distribution, and limitations of resident and anadromous forms of the species within this region.

WHITE SALMON RIVER BASIN LAMPREY SURVEY

Christina W. Luzier*, Greg Silver and Timothy A. Whitesel

(Primary contact) Title, Affiliation, Address: Supervisory Fish Biologist, USFWS, Columbia River Fisheries Program Office, 1211 SE Cardinal Ct., Suite 100, Vancouver, WA 98683

Phone: 360-604-2529

Email: christina_luzier@fws.gov

ABSTRACT: Pacific lampreys have declined throughout their range, including the Columbia River basin, and the status of western brook lampreys is unknown. Additionally, little is known about native lamprey habitat use, population structure or the effects of various threats. Condit Dam, a complete barrier to anadromous fish, is scheduled to be removed in the fall of 2009. Pre- and post-removal surveys are needed to assess fish status and habitat conditions in the White Salmon River basin. Lamprey surveys were conducted in the summer of 2007. A random, spatially balanced sampling approach was used to conduct presence/absence and habitat surveys for lampreys. Larval western brook lampreys were found in Trout Lake Creek, Rattlesnake Creek and in the mainstem White Salmon River downstream of Condit Dam. Unidentified larval lampreys were found in the mainstem White Salmon River downstream of Condit Dam. The habitat upstream and downstream of Condit Dam was suitable for the spawning and rearing of lamprey species. Lamprey surveys will continue until Condit Dam is removed and will resume after removal is complete to assess changes in lamprey status and habitat.

Juvenile Salmon Production and Stock Composition in the Lower White Salmon River Prior to Removal of Condit Dam

Rod Engle, Brady Allen and Christian Smith

Rod Engle, Fish Biologist
U.S. Fish and Wildlife Service
Columbia River Fisheries Program Office
1211 SE Cardinal Court, Suite 100
Vancouver, WA 98683-9658
(360) 604-2500 x 2513
rod_engle@fws.gov

Brady Allen, Fishery Biologist
USGS-Columbia River Research Laboratory
5501A Cook-Underwood Rd.
Cook, WA 98605
(509) 538-2299 x 356
brady_allen@usgs.gov

Christian Smith, Conservation Geneticist
U.S. Fish & Wildlife Service
Abernathy Fish Technology Center
1440 Abernathy Creek Rd.
Longview, WA, 98632
(360) 425-6072 x 337
christian_smith@fws.gov

ABSTRACT: In Spring 2006 and 2007, the U.S. Geological Survey operated a rotary screw trap in the lower White Salmon River to estimate juvenile salmonid production. A complementary genetic study was instituted by the U.S. Fish and Wildlife Service to analyze the stock composition of juvenile Chinook salmon captured by the rotary trap during those years. Rotary trap captures of Chinook salmon in 2006 and 2007 were 2,777 and 1,083, respectively with small numbers of coho salmon and steelhead trout being captured as well. Genetic analysis of the Chinook salmon fry revealed two stocks of fall Chinook salmon, upriver bright and tule fall Chinook salmon, within the White Salmon River and two distinct periods of capture for these stocks in 2007. The combined results of these two studies have provided co-managers and agencies with an observation of fish assemblage in the lower White Salmon River pre-removal of Condit Dam. This information will also be used to make informed decisions on future fisheries restoration in the White Salmon River post-dam removal. This collaborative project has one more year data collection and analysis in 2008.

Fish assemblage, abundance, growth, and habitat in Rattlesnake Creek prior to the reintroduction of anadromous fish above Condit Dam

Patrick J. Connolly* and Brady Allen
U.S. Geological Survey, Western Fisheries Research Center
Columbia River Research Laboratory
5501-a Cook-Underwood Rd., Cook, WA 98605
509-538-2299 x 269, pconnolly@usgs.gov

Rattlesnake Creek is one of two major tributary systems to the White Salmon River that were accessible to anadromous fish prior to the blockage by Condit Dam. Historically, Rattlesnake Creek was likely a major contributor to anadromous fish production from the White Salmon watershed. To assess how ready the Rattlesnake Creek watershed was for reintroduction of anadromous fish, especially steelhead, we surveyed habitat conditions and fish populations during 2001-2005. Our habitat surveys revealed a system with low pool quality and frequency, low habitat complexity, long cobble and boulder dominated riffles, and reduced floodplain connectivity. Stream temperatures regularly reached over 20^{o}C during summer days while stream flows would drop to less than 0.5 cfs. High flows during winter could exceed 1000 cfs. Up to a 3-m falls at rkm 2.4, the fish assemblage consisted of rainbow trout, coastal cutthroat trout, longnose dace, shorthead sculpin, and brook lamprey. Two brook trout were collected in lower Rattlesnake Creek, one in October 2002 and another in October 2004. Above the falls, the assemblage was limited to rainbow trout, longnose dace, and shorthead sculpin. Longnose dace were the most abundant fish, followed by rainbow trout, in both of these segments of stream. Age-0 rainbow trout had higher abundance below the falls than above the falls, likely because the lower segment was used for spawning by rainbow trout residing most of their lives in the mainstem White Salmon River, in addition to those residing year-round in Rattlesnake Creek. Annual growth of age-1 rainbow trout was good at 30 to 40 mm, but almost no growth occurred during the harsh conditions of low flows and high stream temperatures during summer months. Even with the degraded state of Rattlesnake Creek, it appears to be a productive system for rainbow trout, cutthroat trout, and other resident fish species. However, without restoration actions, the Rattlesnake Creek watershed has limited habitat for anadromous fish production because of limited spawning gravels, limited rearing area for juvenile fish, high summer stream temperatures, low summer flows, and high peak flows.

Documenting *Oncorhynchus mykiss* life histories in Rattlesnake Creek and White Salmon River prior to the reintroduction of anadromous fish above Condit Dam

Brady Allen* and Patrick J. Connolly
U.S. Geological Survey, Western Fisheries Research Center
Columbia River Research Laboratory
5501-a Cook-Underwood Rd., Cook, WA 98605
509-538-2299 x 356, ballen@usgs.gov

From 2001 through 2005, we documented the life history characteristics of rainbow trout *Oncorhynchus mykiss* populations prior to anadromous fish reintroduction in the White Salmon River with the pending removal of Condit Dam in 2008. The dam has blocked upstream migration of anadromous fish at river kilometer 5.1 since 1913. To document the existing *O. mykiss* life history diversity, we combined radio and passive integrated transponder (PIT) tagging technologies. Radio tagging (n = 64) was performed in the mainstem White Salmon River from the reservoir above Condit Dam through the likely zone of anadromous fish recolonization (rkm 5.1 – 19.7). To document movement and growth patterns in Rattlesnake Creek and the White Salmon River, an instream PIT-tag interrogation system was installed in Rattlesnake Creek at rkm 0.2, and PIT tagging (n = 4,856) was conducted in several reaches. The *O. mykiss* in Rattlesnake Creek and White Salmon River exhibited a wide spectrum of migratory tendencies including resident, fluvial, adfluvial, and anadromous life histories. Our radio-tagging and PIT-tagging efforts in Rattlesnake Creek and the White Salmon River showed that important linkages exist between the mainstem White Salmon River and tributary populations of *O. mykiss.* Some evidence showed that the connection to the Columbia River and the Pacific Ocean has not been severed, which indicates that rainbow trout above Condit Dam have potential to be an important source for reestablishing the steelhead life history to the upper White Salmon River with the removal of Condit Dam. The knowledge gained by using a fusion of technologies was substantially greater than the use of a single technology.

KLICKITAT FISHWAY PASSAGE IMPROVEMENT PROJECT

Bill Sharp

Title, Affiliation, Address: Research Scientist, Yakama Nation Fisheries Program - YKFP, P.O. Box 151, Toppenish, Washington 98948

Phone: 509-865-5121

Email: sharp@yakama.com

ABSTRACT: Under the 1938 Mitchell Act, the U. S. Bureau of Commercial Fisheries funded construction of two fishways by the Washington Department of Fisheries in the Klickitat Subbasin: Lyle Falls Fishway (RM 2.2) in 1955, and Castile Falls Fishway (RM 64) between 1960 and 1963. In 2006 an Agreement was signed to transfer management and operation of both Klickitat Subbasin Fishways from the Washington Department of Fish & Wildlife to the Yakama Nation (YN).

The Castile Falls Fishway (CFF), intended to facilitate passage through a series of eleven falls in the upper Klickitat River, was only minimally successful. With time and the effects of high water, debris and bedload movement, the project was likely inhibiting passage instead of improving it. Funding secured by NOAA Fisheries to repair flood-damaged Columbia Basin Mitchell Act facilities was used to repair and modernize the CFF during the period from 2002 to 2004 to reestablish effective passage to over 50

miles of high quality spawning and rearing habitat for spring Chinook salmon (*Oncorhynchus tshawytscha)* and ESA-listed steelhead (*O. mykiss)*. Conversion of the CFF from a pool-weir to vertical-slot fishway now provides effective passage over a wide range of river flows and also significantly reduces maintenance. Immediately following construction both spring Chinook and steelhead were once again documented spawning in the upper watershed. Bonneville Power Administration (BPA) is completing a Biological Assessment for installing an adult counting and monitoring station at the exit of the Falls 10 fishway to allow fisheries managers to remotely and directly monitor escapement into the upper Klickitat Basin. The monitoring station would incorporate Passive Integrated Transponder (PIT) detection, digital video monitoring, and the ability to conduct biological research.

BPA is also completing an Environment Impact Statement for modernizing the Lyle Falls Fishway to meet federal passage criteria and allow for effective operation over a wider range of river flows. Reconstruction entails an auxiliary water supply, extending the fishway exit, installing three additional interior chambers, and building monitoring facilities. The proposed monitoring facilities would include PIT tag detection and digital video capabilities, as well as a station for marking and collecting biological information from returning adults, allowing managers to better estimate escapement of each anadromous stock back to the subbasin.

ITEROPARITY IN COLUMBIA RIVER SUMMER-RUN STEELHEAD

(*ONCORHYNCHUS MYKISS*): SUMMARY OF 2001-2004 KELT STUDIES

Robert Wertheimer[1], Allen Evans[2], Matthew Keefer[3], Charles Boggs[3], Christopher Peery[3]

[1]U.S. Army Corps of Engineers
PO Box 2946
Portland, Oregon, 97208, USA
503-808-4777
*robert.h.wertheimer@usace.army.mil

[2]Real Time Research, Inc.
52 SW Roosevelt Ave
Bend, Oregon, 97702, USA

[3]Idaho Cooperative Fish and Wildlife Research Unit, U.S. Geological Survey
University of Idaho, Moscow, ID, 83844-1141

Abstract: Repeat spawning from steelhead kelts provides genetic and population stabilizing benefits, and as such management actions that promote iteroparity may aid recovery efforts. Between 2001 and 2004, 13,193 adult steelhead were collected in juvenile bypass systems at John Day, McNary, and Lower Granite dams and ultrasound exams indicated 89% (11,769) were post-spawn kelts. We PIT and/or radio tagged the

majority of the sampled kelts to examine downstream migration behaviors and to estimate percentages returning on repeat spawning migrations. Studies continue through hydro-acoustic evaluation of seasonal project operations (i.e., from 1 March to 10 April) to evaluate surface flow outlet operations at the Bonneville Dam PH II Corner Collector (B2CC) as a means to bolster steelhead repeat spawning rates.

Results for the aggregate Columbia and Snake River kelt runs suggest that iteroparity rates vary along several gradients. First, there was a clear negative relationship between kelt outmigration distance and repeat spawner return rates, with much lower return rates for kelts tagged at Lower Granite Dam. Second, there was clear evidence for condition-dependent mortality, as kelts in good external condition returned at rates more than an order of magnitude higher than poor-condition fish from all collection sites. Third, females were both far more abundant than males and were at least two to four times more likely to return as repeat spawners. Fourth, proportionately more wild than hatchery fish and more small than large fish returned, particularly from upstream release groups. Repeat spawner return rates for the aggregated in-river samples were 5.45% (John Day), 5.37% (McNary), and 0.69% (Lower Granite). Returns for good condition kelts were 9.22%, 7.16%, and 1.19%, respectively.

Of relevance to adaptive hydro-actions were results indicating that out migration timing influenced returns, with higher returns from earlier outmigrants. Results have led to studies of the seasonal operations of the B2CC prior to passage operations for ESA-listed juvenile salmonids. Such operations could be particularly beneficial to both ocean and stream maturing steelhead spawning in tributaries to the Bonneville Pool. A discussion of synopsized information as well as data collected spring 2007 from the B2CC will be presented at the symposium.

AN OVERVIEW OF THE KLICKITAT WATERSHED ENHANCEMENT PROJECT

Will Conley

Watershed Restoration Specialist, Yakama Nation Fisheries Program, Klickitat Field Office, PO Box 215, Klickitat, WA 98628, 509-369-3183, will@ykfp.org

ABSTRACT: The Klickitat Watershed Enhancement Project (KWEP) enhances and restores watershed health in the Klickitat River subbasin. Project actions target stream reaches and watersheds that support steelhead (*Oncorhynchus mykiss*; ESA- listed as "Threatened") and/or spring Chinook (*O. tshawytscha*). Implemented by the Yakama Nation Fisheries Program (YNFP) and funded by Bonneville Power Administration, KWEP addresses Yakima-Klickitat Fisheries Project (YKFP) as well as Columbia Basin Fish & Wildlife Program habitat goals of the Northwest Power and Conservation Council.

Since 2000, KWEP has implemented over 18 projects resulting in:

- correction of fish barriers at 3 sites restoring access to over 11.5 miles of habitat
- enhancement of over 7400' of stream including construction of 57 LWD jams
- installation of at least 15,000 plantings along 8,000' of stream
- fencing of over 10000' of stream
- creation of more than 3500 square-feet of wetland
- restoration of high-flow access to over 800 lineal feet of side channels
- monitoring streamflow at 13 sites
- assessment of over 74 miles of stream
- assessment of over 110 miles of road and railroad
- treatment of 10.5 miles of road for drainage improvements

KWEP works interactively with other BPA-funded projects including YKFP Data Management and YKFP Monitoring and Evaluation. KWEP has cooperated with numerous private and public entities, including:

- Washington Department of Fish & Wildlife
- Mid-Columbia Regional Fisheries Enhancement Group
- Columbia Land Trust
- Washington Department of Natural Resources
- Yakama Nation Water Program
- Washington State Parks & Recreation
- Underwood Conservation District
- Central & Eastern Klickitat County Conservation District
- Yakama Forest Products
- BIA Forestry and BIA Range
- Klickitat County
- private individuals

These partnerships have involved over 10 projects resulting in:

- conservation of over 1050 acres and 4 miles of fish-bearing streams and side channels
- correction of 4 fish passage barriers restoring access to 3.3 miles of habitat
- enhancement of over 3400' of stream
- installation of at least 9,000 plantings along 3,000' of stream
- design and development of relational databases to manage habitat, temperature, and sediment data
- implementation of no-till agricultural practices on several hundred acres of farmland

Current projects involve:

- replacement of 3 passage barriers that will restore access to over 5 miles of habitat
- treatment of over 2000 feet of road to restore access to 0.5 miles of side channels
- install over 7000 plantings along 5 riparian acres

- enhance over 3500 feet of active channel and restore access to over 4500 feet of side channels

Additionally, KWEP staff have provided technical support to private landowner and assisted various planning processes including:

- Subbasin Planning (Northwest Power Council)
- Recovery Planning (NOAA Fisheries)
- Strategic Planning (Washington Salmon Recovery Funding Board)
- Watershed Planning (Washington Department of Ecology)

Presentation on Mid-Columbia Fisheries Enhancement Group and work in the White Salmon & Klickitat Basins

Margaret Neuman, Executive Director
Mid-Columbia Fisheries Enhancement Group
P.O. Box 1271
White Salmon, WA 98672

Phone: 509-281-1322
Email: fish@midcolumbiarfeg.com

ABSTRACT: Mid-Columbia Fisheries Enhancement Group is a non-profit (501c3) organization dedicated to restoring and protecting salmonid habitat. Mid-Columbia Fisheries is one of 14 Regional Fisheries Enhancement Groups in Washington State. The RFEG program was created by the legislature in 1990 and receives base funding through a surcharge on sport and commercial fishing license fees. The group is run by a volunteer board of directors and is not a political or advocacy organization.

The Mid-Columbia region includes several important steelhead and salmon rivers, notably the Wind River, the White Salmon River, the Klickitat River, the Yakima River, and numerous tributaries to the Columbia River. Our region includes all of the waterways in seven of Washington's Water Resource Inventory Areas, fully encompassing all of Klickitat, Benton, Yakima, and Kittitas Counties, as well as portions of Skamania and Franklin counties. The watersheds in this region provide habitat for seven salmonid species listed as threatened or endangered under the Endangered Species Act, as well as a number of sensitive and culturally significant stocks.

Mid-Columbia Fisheries takes a three-pronged approach to protecting and restoring fish habitat.

- We sponsor and implement high-quality habitat restoration and protection projects throughout our region.
- We help support the work of our partners by providing financial support for restoration and protection projects.
- We help support educational and community outreach programs that will promote the long-term commitment our society needs to protect fisheries resources.

Mid-Columbia Fisheries works with many partners including the Washington Department of Fish and Wildlife, the Yakama Nation, federal agencies, conservation districts, private landowners, local governments, schools and community groups.

We are currently developing projects in the White Salmon basin and have a number of on-going projects in the Klickitat basin. Projects in the Klickitat watershed include the following.

In 2007:

- We re-constructed and maintained nine miles of livestock exclosure fencing on tributaries to the Klickitat River.
- We planted 600 feet of the Little Klickitat River with native trees and shrubs.
- Community volunteers planted native trees along Spring Creek, a tributary to the Little Klickitat River.
- Mid-Columbia Fisheries continued our commitment to riparian restoration at the two properties along the lower mainstem Klickitat River, where crew members added additional plants and maintained plants installed in 2006.

In 2006:

- Six sites along the Klickitat River were planted with a hydraulic stinger in 2006 in a cooperative project with the Yakama Nation. First year survival data indicated good survival rates despite difficult site conditions.
- Volunteers and AmeriCorps members removed debris from the Klickitat River in October, 2006. A five foot diameter culvert was removed from the river by hand. The culvert had blown out of an upstream tributary a number of years before and was temporarily lodged in branches that were overhanging the active river channel.

New projects planned in 2008 include riparian planting along the Klickitat River and an instream project on Swale Creek in cooperation with the Yakama Nation.

Sticks, Livestakes, and Snails - Underwood Conservation District's Watershed Activities from the Headwaters to the Columbia

Presenters: Tova Cochrane and Jamie Gomez

Tova Cochrane, Manager, Underwood Conservation District
tovacochrane@gorge.net
Jamie Gomez, Watershed Resource Technician, UCD
jamiegomez@gorge.net
PO Box 96, White Salmon, WA 98672
(509)493-1936

ABSTRACT: Underwood Conservation District (UCD) has a long history of conducting watershed enhancement projects in both the Klickitat and White Salmon watersheds. Because we are a unique form of local government, there will be a brief overview of what UCD's role is in watershed management, how we operate, and where our district boundaries reach. Then a summary of a planned project on Simmons Creek will follow. This project, located on a tributary to Snyder Creek in the Klickitat basin, will work to repair 6,600 linear feet of the incised channel by building 40-50 "channel roughness/sediment capture structures" and providing two off-stream watering facilities to grazing cattle. The objectives of this project include: add channel roughness, capture sediment, reduce erosion, increase groundwater recharge and storage, increase summer instream flow, reduce sedimentation of stream, and provide off-stream watering sites to reduce cattle impacts to stream. Target species that will benefit from this work include: summer and winter steelhead and resident rainbow trout in Snyder Creek, and Chinook, bull trout, Coho, and resident aquatic organisms in the Klickitat River. Key habitat factors addressed will be: water quantity, channel, floodplain, riparian, and streambed sediment conditions, and water quality. The presentation will end with a quick synopsis of some outreach and education work we are conducting regarding the potential arrival of an aquatic invasive species called the New Zealand Mudsnail. These snails are present in the Deschutes River, the Lower Columbia River, and the Snake River and can overproduce to crowd out native aquatic organisms and degrade salmonid habitat. Identifying features and prevention methods will be described.

COLUMBIA LAND TRUST
PRIVATE, VOLUNTARY HABITAT CONSERVATION AND RESTORATION ON THE KLICKITAT RIVER

Lindsay Cornelius

Lindsay Cornelius
Gorge and East Cascades Conservation Lead
Columbia Land Trust

1351 Officers Row	8 Fourth Street
Vancouver, WA 98661	Hood River, OR
360-921-1073	360-921-1073

lindsayc@columbialandtrust.org

ABSTRACT: Columbia Land Trust, a non-profit organization based in Vancouver, WA, has successfully worked with private landowners in the Klickitat River watershed to conserve nearly 2,000 acres of oak and pine woodland, mixed conifer forest, and riparian habitats along the Klickitat River. We are currently engaged in a 150-acre oak woodland restoration project at Dillacort Creek and Logging Camp Canyon to reduce stand density, enhance wildlife nesting and forage resources, reduce fire fuel levels, and establish native vegetation in the understory. We are also, in partnership with Yakama Nation Fisheries,

planning an effort to restore hydrologic function and floodplain re-connection along the Klickitat River between river mile 18 and 32, where these functions have long been impaired by the haul road. This presentation will provide a broad overview of conservation and management strategies employed by the Land Trust, as well as an overview of our current and future restoration plans in the Klickitat River watershed.