



Upper Salmon Basin
Watershed Project

Upper Salmon Basin Watershed News

NEWS ABOUT RESTORING FISH HABITAT IN CENTRAL IDAHO Spring 2010

Research Proposed to Trace Irrigation Recharge

“The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased, and not impaired.”
Theodore Roosevelt

Innovations in irrigation systems such as the use of center pivots has resulted in increased efficiencies for farmers including lower labor costs and higher productivity. According to an article by Cindy Snyder in the January 8, 2010 *AG Weekly*, surface irrigation continues to decline by 22,000 acres yearly in Idaho as farmers change to pivots. Nationwide, the area irrigated by sprinkler systems increased 15 percent to 30.9 million acres while surface irrigation fell by 5 percent to 22 million acres. The conservation of water is another benefit from pivots, a factor that is of critical importance in restoring anadromous fish in the Upper Salmon Basin. But the switch to pivots and other more efficient water delivery systems may have other consequences for local irrigators not documented in this trend. There are concerns about the negative impacts that the proliferation of pivots may have on the water recharge cycle created by traditional flood irrigation. There is also concern about the potential for drying up springs that are dependent on natural and irrigation recharge.

Water from flood irrigation does not stop at the roots of the plants it sustain. It soaks into porous soils, replenishes springs and recharges the aquifer before emerging from the ground to flow into creeks and riv-

ers. Local ranchers compare this recharge phenomenon to a giant sponge. Imagine the earth below an agricultural field as a reservoir that soaks up the excess irrigation water not used by plants. When the subterranean reservoir is saturated like an over filled sponge, the often water flows back into streams and rivers. Ideally, when the cycle is completed, the water eventually becomes available for use by downstream users. If water is indeed the life blood of the land, recharge from flood irrigation may be the “vascular system” that keeps the precious liquid flowing through the soil for use on another day.

Depending on the depth and type of soils and the extent of the aquifer, water from recharge may return to nearby creeks and rivers in a few days or weeks. Or it could take years. Not all aquifers are created *(story continued on page 3)*

Inside this issue:

- Pahsimeroi Valley Groundwater Study** 2
- Dateline 1930 – Five Ponds for Lemhi** 3
- Coordinator’s Comments** 4

Watershed Calendar

Lemhi Soil and Water Conservation District
Annual Spring Tour
June 9th, 2010

View projects in the
Upper Lemhi

Bus boards as the
LSWCD office
at 9:30 a.m.



Tracer demonstration on Box Elder Creek, Black Hills of South Dakota, October 14, 1999. (Photo by Derric L. Iles, South Dakota Department of Environment and Natural Resources)

Geologic Controls on Groundwater/Surface Water Interaction in the Pahsimeroi Valley

By Robert B. Whittier, Hydrogeologist, University of Hawaii (Part four of four articles)

Estimated Water Budget for the Pahsimeroi Valley, Idaho

It is important for managers to know the quantity and nature of water that is available. Some components such as stream flow and precipitation can be directly measured. Others such as groundwater flow and evapotranspiration must be measured indirectly or inferred. This study estimated the Pahsimeroi Valley water budget for water years (WY) 2006 and 2007, and was the first study to estimate groundwater flow into the valley.

The major components of a water budget are;

- precipitation
- stream flow in
- groundwater underflow in
- groundwater underflow out
- Stream flow out, and evapotranspiration (ET)

Three components were measured; precipitation, stream flow in, and stream flow out. Precipitation and temperature were measured at the May, Idaho National Weather Station. Also, a full complement of climatic parameters was measured at an automated weather station maintained by Bureau of Land Management at the upper end of the valley.



Robert Whittier taking flow measurements in the Pahsimeroi

Stream flows were measured in Big Creek, Patterson Creek, and the upper Pahsimeroi River; and in two mountain front spring systems at the upper Goldberg Creek and Sulphur Creek by this project. The Idaho Power Corporation maintained automated stream gauges in Falls Creek and Little Morgan Creek. The flow in the ungaged mountain streams was estimated using data from the 1973 Young and Harenberg Report (A Reconnaissance of the Water Resources of the Pahsimeroi River Basin, Idaho – Idaho Department of Water Administration Water

Information Bulletin No. 31. June 1973). Stream flow out of the valley was measured at the USGS gaging station near Ellis, Idaho

Estimating ET is a complex procedure. There are many variables including vegetation type, climatic factors, soil characteristics, irrigation application rate, rate of snow melt, and whether or not groundwater can provide moisture for ET. The approach selected for this study was that used by the ET-Idaho Program (<http://www.kimberly.uidaho.edu/ETIdaho/>). Data from the two weather stations facilitated these calculations.

Groundwater flow into the valley was estimated using chloride mass balance and strontium isotope partitioning analysis. For this analysis it was assumed that the groundwater from the Lemhi Range was negligible. Chloride mass balance was used to test assumption. Chloride is a good environmental tracer because it does not precipitate out of solution, does not bond with other elements, and precipitation is usually the dominant source. Nearly all of the chloride that fell on the Lemhi Range with precipitation could be accounted for in stream flow out of this range, supporting the hypothesis of negligible groundwater flow from the east.

In strontium isotope partitioning analysis two isotopes were used, strontium-86 (^{86}Sr) and Strontium-87 (^{87}Sr). If water originates from different sources with contrasting $^{87}\text{Sr}:$ ^{86}Sr ratios the percentage of water contribution from each source can be calculated. The $^{87}\text{Sr}:$ ^{86}Sr ratio for the waters in the Lemhi Range was 0.745, for the Lost River Range was 0.710, and for the Pahsimeroi River at Ellis was 0.718. The strontium analysis indicated that 67 percent of the water leaving the valley originated in the Lost River Range. Since there is insufficient stream flow to support this amount of flow the surplus was assigned to groundwater flow into the valley.

This groundwater flow resulted in a water budget surplus. An amount equal to the surplus was assumed to be groundwater leaving the valley. The table below shows the estimated water budget results.

Component	WY 2006	WY2007	Average
Stream Flow In	143,000	149,000	146,000
Precipitation	181,000	177,000	179,000
Groundwater Flow In	108,000	115,000	111,500
Total In	432,000	441,000	436,000
Stream Flow Out	145,000	151,000	148,000
Evapotranspiration	212,000	214,000	213,000
Groundwater Flow Out	74,400	76,800	75,600
Total Out	431,400	441,800	436,600
units = acre-ft			

("Research Proposed to Trace Irrigation Recharge" continued from page 1)

equally. Some aquifers may trap and hold onto water for long periods of time. Recent research from Idaho's Pahsimeroi River Valley shows most of the surface water that soaks into the ground resurfaces in the river channel but some exits into the Salmon River as ground water.

To get answers to some of the mysteries surrounding recharge and the flow of water, researchers use colored dye to track the movement of water through the system. In 1976, dye was dumped in 3 locations in the Lemhi River near Leadore in a study lead by Frank Haws. Two sites were sampled daily to look for evidence of the dye: one site near Salmon and the other by the Lemhi Store about 30 miles south. Although traces of dye appeared just 2 days after it was used, the peak dye flow occurred six weeks later and slowly receded for another six weeks.

While studies like this one by Haws provided valuable information, there are still many lingering questions to be answered. For instance, can we predict changes in groundwater recharge when irrigation practices are converted from flood to sprinkler irrigation? What is the groundwater and surface water contribution of the upper Lemhi River to the lower Lemhi River below Hayden Creek?

The Upper Salmon Basin Watershed Program (USBWP) will be working this year with the Idaho Department of Water Resources and the USBWP Technical Team to initiate research which will hopefully provide new insight into these and other questions about recharge and irrigation practices.



Top: Gravel Springs, Black Hills of South Dakota, prior to dye arrival; Bottom: Gravel Springs at 69 minutes after dye tracer released in Box Elder Creek (Photos by Derric L. Iles)

Upper Salmon Basin Watershed News

955 Riverfront Drive, Suite B
Salmon, Idaho 83467
Phone 208-756-6322
FAX 208-756-6376

E-mail: hans.koenig@agri.idaho.gov
Web site: www.modelwatershed.org

Staff

Hans Koenig.....Project Coordinator
Allen BradburyProject Planner
Wendy Koons Project Planner
Jeff Maser
ISCC Water Quality Resource Conservationist

Coordinated by

Idaho Soil Conservation Commission
Sara Schmidt, Administrator

Lemhi Soil & Water Conservation District
Lynn Herbst, Chairman
Curtis Beyeler
Kevin Hoffman
Mike Kossler
Jane Sandstrom

Recorder Herald—Dateline June 11, 1930

FIVE PONDS FOR LEMHI COUNTY

Will Raise Trout Near Federal Fish Hatchery

Turner Sparkman, who looks after the interests of fish in Idaho for the state game department, was in Salmon the first of the week in company with Joe Paul, deputy state game warden from Arco. The visit was made in the interest of the rearing ponds for trout, which are now being constructed near the federal fish hatchery by the state game department.

Mr. Sparkman said the ponds would be constructed of wood, with sand bottom. There will be five of them each 8 feet wide, 20 feet long and 3 feet deep. Each pond is large enough to accommodate 50,000 baby trout until they are a year old, at which time they will be about six inches long.

Rainbow spawn taken from Williams lake by Game Warden Carl and his helper, Frank Gaver, is being cared for at the federal hatchery under the direction of Van A. Heffner. As soon as the ponds are ready there will be 250,000 little rainbows placed in them. Feed for the young trout will be furnished by the state department. When they are a year old the trout will be planted in streams and lakes of Lemhi county. It is found that much better results are obtained by planting the larger fish as they are better able to shift for themselves and but slight loss is noted.



NEWS ABOUT
RESTORING FISH
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955 Riverfront Drive,
Suite B
Salmon, Idaho 83467

Upper Salmon Basin
Watershed Program

To:

WE'RE ON THE WEB:

WWW.MODELWATERSHED.ORG

Coordinators Comments *By Hans Koenig*

In October, Bonneville Power Administration (BPA) Vice President Greg Delwiche, Policy and Planning Manager Jamae Hilliard Creecy and Karen Hunt, Manager of Regional Relations visited the Upper Salmon Basin, arriving just as old man winter was closing the doors on another glorious Idaho fall. Greg had heard the rumors but had never seen the Lemhi and Pahsimeroi River subbasins where BPA has fueled the efforts to recover imperiled fish for over a decade.

Mike Edmondson from the Idaho Governor's Office for Species Conservation (OSC) led the whirlwind tour along with Mark Davidson from The Nature Conservancy. In the Pahsimeroi Valley, we met Karma Bragg from the Custer Soil and Water Conservation District and several of her FFA volunteers in the field, where they were replanting willows at a project site on Patterson Big Springs Creek. By the end of the day, icy winds and the threat of snow greeted the travelers at our last stop at Agency Creek, where the BPA-sponsored L-32 siphon project was in progress.

Many thanks to the BPA management team for taking the time out of their busy schedules to see for themselves the good work that is being done by the Watershed Program and its partners in the Upper Salmon Basin.

Later in October, Bill Booth, Chairman of the Northwest Power and Conservation Council joined several local fisheries biologists and partner agency representatives on a tour of

the Lemhi River which focused on conservation easements. The highlight of the tour was a visit to Karl Tyler's Leadore Angus Ranch in the Upper Lemhi. Karl and his daughter, Kristine and Ranch Manager Carl Lufkin provided a guided tour of the ranch including the recently completed Big Timber Creek Flow Improvement Project that was featured in the Fall 2009 Watershed News.

After leaving the Upper Lemhi, Bill and a smaller group drove down river and visited project sites along the Lemhi, finishing the day with a drive up the Carmen Creek drainage to look at potential projects that we have proposed for funding. We appreciate Bill's interest in the Watershed Program and the continued support of the Northwest Power and Conservation Council. Our thanks to the Tylers for a wonderful tour of their Leadore Angus Ranch.

The relationship between the Idaho Soil Conservation Commission and the Upper Salmon Basin Watershed Program dates back to 1992 when the Commission was designated by former Governor Cecil Andrus as the lead agency to administer what was then known as the Idaho Model Watershed. This successful chapter in Idaho conservation history will close on June 30th when Idaho's two watershed programs - the Upper Salmon Basin and the Clearwater Focus Program are transferred from the Commission to OSC. In the coming months, the Watershed Program will be working toward a smooth transition into our new agency home.