Project Success Stories

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Successful Collaboration and Agricultural BMPs Improve 80 Miles of Sun River Waterbody Improved
The mainstem of the Sun River is split into upper and lower segments for management purposes. The Upper Sun River was listed as impaired on Montana's 2000 and 2002 303(d) list of impaired waterbodies because of excess nutrients. Landowners; local watershed organizations; and many federal, state, and local government agencies collaborated to implement agricultural best management practices (BMPs) in the Upper Sun River and its tributaries. Water quality improved as a result, allowing the Montana Department of Environmental Quality to remove the Upper Sun River from the 303(d) list for nutrients in 2006. The Sun River watershed project is a classic example of using the watershed approach to address nonpoint source pollution.

Problem
The Upper Sun River is in central Montana on the Rocky Mountain Front. The previously impaired segment is approximately 80 miles long and runs from Gibson Dam to Muddy Creek. The Montana Department of Environmental Quality (MDEQ) added the Upper Sun River to the 2000 and 2002 303(d) impaired waters list because high levels of nutrients caused the river to not meet state water quality standards for aquatic life and cold water fishery uses. Montana's nutrient standard prohibits "conditions [that] produce undesirable aquatic life," which, in this case, refers to excess growth of benthic algae that interferes with aquatic life uses. Agricultural practices were largely to blame for the Upper Sun River's elevated nutrient levels. Irrigation and stormwater runoff carried excess nutrients from over-fertilized fields and poorly managed livestock production areas into the river.

Project Highlights
Early community-planning efforts produced initial watershed plans that identified key action items for restoration. This led to the development of the TMDL/Watershed Restoration Plan, coordinated by MDEQ in partnership with the Sun River Watershed Group. As part of this plan, Montana set nutrient targets (39 micrograms per liter [μg/L] total phosphorus and 350 μg/L total nitrogen) for the Upper Sun River. If nutrient concentrations could be reduced to below the stated targets, excess growth of benthic algae would not occur under typical conditions. The plan also included restoration strategies for the impaired segments in the watershed.

Responding to the plan, partners have helped implement numerous water quality improvement projects in the Upper Sun River watershed. Farmers implemented nutrient management BMPs in the Ford/Elk Creek and Adobe Creek watersheds to minimize fertilizer applications and thus reduce the amount of nutrients transported to streams via runoff. Farmers improved irrigation water management practices by (1) lining irrigation canals to minimize and stabilize irrigation return flows and (2) using AgriMet—a U.S. Bureau of Reclamation satellite-based network of...
automated agricultural weather stations that provides weather, crop-water use, and other information to help support irrigation and agriculture management (for more information, see the AgriMet Website (www.usbr.gov/pn/agrimet) Exit Disclaimer). In addition, landowners implemented riparian area grazing management BMPs such as fencing, stream bank stabilization techniques, and fishery improvement projects in the Ford/Elk Creek and Adobe Creek watersheds and along Willow Creek, Big Coulee, and the mainstem of the Sun River. Streambank stabilization included using non-riprap techniques such as sloping banks; planting vegetation; and installing erosion matting, root wads, and rock bars.

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Results

The cumulative effects of these on-the-ground efforts, combined with outreach and education activities that have led to better land-use practices by landowners, resulted in 20 miles of stabilized streambank, four miles of restored primary fishery and spawning habitat, 800 feet of lined irrigation canal, and the implementation of grazing management practices on 50,000 acres of rangeland. In 2005 and 2006, MDEQ collected water quality samples from the Upper Sun River. They indicated that phosphorus and nitrogen concentrations had dropped and were consistently below target levels of 39 µg/L and 350 µg/L, respectively, as identified in the TMDL/Watershed Restoration Plan. As a result, MDEQ removed the 80-mile long impaired segment of the Upper Sun River from the 303(d) list for nutrients in 2006.

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Partners and Funding

Many partners were involved with this project, including seven federal agencies, eight state agencies, ten local governments, four community groups, and many landowners. From 1994 to 2006, MDEQ administered $623,430 of Clean Water Act section 319 grant funding for implementing the variety of BMPs previously mentioned. In addition, $2,484,926 of nonfederal and another $1,988,793 in federal funds were used to restore the Sun River watershed through programs such as Montana's Future Fisheries program, and the Natural Resources Conservation Service's (NRCS's) EQIP program. The Fort Shaw Irrigation District, Greenfields Irrigation District, Nilan, and Sun River Ditch Company worked together to improve irrigation efficiencies in the watershed by 10 percent. The NRCS Conservation Reserve Program helped to reduce salinity by converting dry cropping lands to rangeland. The U.S. Fish and Wildlife Service; the Lewis & Clark Conservation District; and the Montana Department of Fish, Wildlife, and Parks are working on the Hogan irrigation diversion to improve fish passage.
Lower Red River Meadow Restoration Project, Idaho

Primary Project Type: Instream Restoration
Secondary Type: Riparian Restoration

Primary Problem: Bank Instability, Channel Alteration, Channel Incision, Over-Widened Channel, Sedimentation
Secondary Problem: Change in Land Use

Main Restoration Action(s): Channel reconstruction, Floodplain reconnection, Riparian revegetation

Native Fish Focus: Bull trout, Chinook salmon, Steelhead

Is this project part of a watershed scale restoration? No

Project Dates: 1994 to 2004
  Initial Monitoring: 1994 (pre-restoration, reconnaissance-level monitoring), 1997 (effectiveness monitoring began)
  Follow-up Monitoring: 1997-2004

Lead Agency:
  Idaho County Soil & Water Conservation District (project sponsor)
  Bonneville Power Administration (funding agency)

Project Partners:
  TerraGraphics Environmental Engineering, Inc.
  University of Idaho Center for Ecohydrology Research
  LRK Communications
  Wildlife Habitat Institute
  Technical Advisory Committee (TAC):
  Bonneville Power Administration, Idaho County Soil and Water Conservation District, Idaho Department of Fish and Game, Idaho Department of Environmental Quality,
  Idaho State Soil Conservation Commission, Natural Resources Conservation Service, Nez Perce National Forest, Nez Perce Tribe

Project Location: The Lower Red River Meadow Restoration Project is located in north-central Idaho. The initial restoration activities (Phases I-IV) were conducted on acquired private land deeded to the Idaho
Department of Fish and Game’s Red River Wildlife Management Area (RRWMA) near the town of Elk City. The other three parcels located in the meadow are still in private ownership and may be included in future restoration activities. The Lower Red River Meadow is surrounded by Nez Perce National Forest land and situated at an elevation of 4,200 feet. The lower meadow is comprised of four separate land parcels (> 1,300 acres or 526 hectares) and, prior to restoration work, approximately 4.4 miles (7.1 kilometers) of stream channel (LRK Communications et al. 1999),

Project Description: The text of this report is adapted from the Lower Red River Meadow Restoration Project, Final Project Report – Performance Period 1994-2004 (LRK Communications et al., 2004)

Since the early part of the 20th century, human activities on various geographic scales have had a cumulative impact on the ecology of the Lower Red River Meadow. Construction of reservoirs and hydroelectric dams in the Snake and Columbia River systems downstream has inhibited the migration of anadromous fish species. On a watershed scale, logging, mining, and road-building practices have altered the hydrology, sediment delivery, and water quality characteristics of the Red River. On a local scale, the river channel was straightened and native riparian vegetation eliminated due to dredge mining, or in an attempt to reduce flooding and maximize grazing area throughout the meadow. The river/wet meadow ecosystem responded with decreased channel length and sinuosity, channel downcutting, disconnection from the meadow floodplain and lowered groundwater table, elevated water temperatures, and reduced quantity and diversity of instream fish habitat.

Historically, the Red River supported relatively abundant numbers and diverse populations of anadromous and resident fish species, including chinook salmon (Oncorhynchus tshawytscha), steelhead/rainbow trout (Oncorhynchus mykiss), bull trout (Salvelinus confluentus), and westslope cutthroat trout (Oncorhynchus clarki lewisi). Many of the historical fish species are still present in the Red River but are generally found in low numbers. The depressed population levels are due in part to the habitat and water quality degradation in the watershed.

Project Goals: The project team has established the following Mission Statement:

“This demonstration project is designed as a model to restore the Lower Red River Meadow, using a holistic watershed approach, to a naturally functioning wet meadow ecosystem. The project goals are to increase the quality and quantity of fish and wildlife habitat, improve water quality, and promote watershed restoration education.”

To accomplish this mission, the following general objectives have been defined: (1) Restore natural river channel shape, meander pattern, and substrate conditions to enhance the quantity and quality of spawning and rearing habitat for chinook salmon, steelhead trout, bull trout, and other species of fish and aquatic organisms. (2) Restore meadow and riparian plant communities to enhance fish and wildlife habitat, stabilize streambanks, and improve water quality. (3) Promote public and agency awareness and scientific knowledge of watershed restoration principles and techniques. (4) Measure and document progress in satisfying short- and long-term project goals, objectives, and outcomes. (5) Manage and communicate project activities. For more info see chapter 3.3 in Biennial Report 1996-1997 [38 KB PDF] (LRK Communications et al. 1999).

Project Methods: The text of this report is adapted from the Lower Red River Meadow Restoration Project, Final Project Report – Performance Period 1994-2004 (LRK Communications et al., 2004)
The Lower Red River Meadow Restoration Project (LRRMRP), located in north central Idaho, is a multi-phase ecosystem enhancement endeavor and part of the Northwest Power Planning Council's Columbia Basin Fish and Wildlife Program. Initiated in 1994, the LRRMRP is one of Bonneville Power Administration's (BPA) many efforts at off-site mitigation for damage to salmon and steelhead runs and fish and wildlife habitat caused by the construction and operation of federal hydroelectric dams on the Columbia River and its tributaries.

The Lower Red River Meadow Restoration Project spans 10 years and is a multi-phase ecosystem enhancement effort that restores natural physical and biological processes and functions to stabilize the stream channel and establish high-quality habitats for fish and wildlife. After the initial two years of pre-restoration data collecting, designing, and planning, the implementation phases began in 1996 on the RRWMA. Restoration of the 1.5 miles of stream on this property was divided into four phases with the intent of completing one phase per year, beginning on the upstream end of the property (Phase I) and finishing on the downstream end (Phase IV). The channel work in Phase IV was completed in 2000. Riparian plantings were completed the following year.

Restoration activities included reconnecting historic meanders, constructing new meanders, reshaping channel cross sections, installing a variety of bioengineered bank treatments, and planting native riparian vegetation. Six reinforced banks of buried log and rock crib walls were constructed in strategic locations perpendicular to the former channel sections to prevent future recapture. Eight rock control sills were installed to create pool/riffle habitat, raise low-flow surface water elevations, and check further channel downcutting.

Monitoring Data and Collection Methods: *The text of this report is taken directly from the Lower Red River Meadow Restoration Project, Final Project Report – Performance Period 1994-2004 (LRK Communications et al., 2004)*

The Lower Red River Meadow Restoration Project was a vast undertaking and looked at multiple parameters and conditions. These parameters were studied by a cooperative group of federal, state, tribal and private individuals, which made up the Red River Technical Advisory Committee or TAC committee. For a list of TAC members, see above (Project Partners).

The LRRMRP comprehensive monitoring program began in 1997 to assess both the short-term effectiveness of restoration designs and implementation techniques and the long-term success of restoration work in attaining the specific restoration objectives. Short-term monitoring was performed to facilitate an adaptive management program that resulted in improved designs, construction techniques, and monitoring procedures in the later phases of the project. The long-term monitoring program was designed to track the evolution of the degraded system toward dynamic equilibrium and document the recovery progress at routine intervals.

Was this project effective and how was this determined? Overall, the physical features of the channel are meeting or evolving toward the performance criteria and thus, in the direction of expected habitat improvements. The small sample size and annual and seasonal variability in discharge patterns hinder our ability to detect a decrease in groundwater depth in the shortterm. Also, the ecosystem is too early in the recovery process to expect sediment balance at this time.
Although aquatic habitat structure has improved, no significant positive trends over time in salmonid densities or chinook redd densities were detected in the project reach. Off-site conditions beyond the project's control and natural and human-induced fluctuations in both anadromous and resident fish populations affect the number of adult spawners in any given year and complicate analyses. Three years post-restoration is also early in the recovery process relative to expectations for positive changes in fish populations and chinook redd densities.

Bird numbers and species are increasing on the project site while overall terrestrial wildlife habitat has yet to exhibit improvements. Summer water temperatures are increasing. The native riparian shrubs, actively planted throughout the project site, continue to exhibit slow growth rates and reduced vigor, providing only a small percentage of cover in the riparian and greenline plant composition transects. Thus, a shading effect is currently unavailable to help reduce water temperatures, and in turn, to improve the thermal conditions of aquatic habitat. Until a woody riparian corridor, capable of intercepting solar radiation, is sufficiently established on both the restoration site and upstream, overall water temperature decreases, additional significant improvements to aquatic habitat, and significant increases in terrestrial wildlife habitat value appear unlikely.

Confounding Effects/Additional Information: There is much more information on the Lower Red River Meadow Restoration Project. All of the current information pertaining to this project can be found at http://www.redriver.uidaho.edu/.

Project Specs (all specs are estimates):

- Overall Estimated Cost: